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SUMMARY

As required by the National Environmental Policy Act at 40 CFR 1502.12, this section is a summary of the Dos Pobres/San Juan Project Environmental Impact Statement. It focuses on the purpose and need for the Dos Pobres/San Juan Project, alternatives considered, scoping issues analyzed, and impacts of the alternatives.

The Proposed Action analyzed in this Environmental Impact Statement (EIS) is a Mining Plan of Operations (MPO) submitted to the Safford Field Office of the Bureau of Land Management (BLM) by Phelps Dodge Safford, Inc. (PDSI) for the Dos Pobres/San Juan Project (Project). As proposed in the MPO, the Dos Pobres/San Juan Project, located near Safford, Arizona, would consist of two open pit copper mines with one leach pad, one shared solution extraction/electrowinning (SX/EW) processing facility[1], and shared infrastructure and support facilities. In addition to the MPO, the BLM is considering a land exchange alternative with Phelps Dodge (PD) that would enable the Dos Pobres/San Juan Project to proceed without BLM oversight, assuming that PDSI is able to obtain all necessary environmental permits. Authorizing the MPO or approving the land exchange constitute two separate but related federal actions, both of which are addressed in this single EIS per the National Environmental Policy Act (NEPA) of 1969. All the alternatives, with the exception of the No Action alternative under the Mining Plan Alternatives Set, would result in development of the Dos Pobres/San Juan Project within the constraints of federal and state environmental permitting requirements.

The BLM, as the primary decision-making agency for these actions, has determined that an EIS is required and is serving as the lead agency responsible for preparing the EIS. Cooperating agencies are the U.S. Army Corps of Engineers (COE), which has permitting responsibilities under Section 404 of the Clean Water Act for the proposed mining operations, and the U.S. Environmental Protection Agency (EPA), which formerly had permitting responsibility for Section 402 (National Pollutant Discharge Elimination System) of the Clean Water Act. Arizona Department of Environmental Quality (ADEQ) now administers the Section 402 permit program.

PURPOSE AND NEED

The purpose of the Proposed Action (the Dos Pobres/San Juan Project) is to enable PD to develop its mining claims and the mineral resources associated with the Dos Pobres and San Juan leachable copper ore deposits as an integrated project. The Project is necessary for PD, one of the largest manufacturers of copper and copper products, to continue meeting national and worldwide demand for copper.

As an alternative to developing the proposed Project on BLM-managed lands, the BLM and PD have agreed to consider a land exchange. Although the primary purpose and need for the land exchange alternative is to exchange public for private lands to achieve improved management of federal lands and federal acquisition of lands containing important resource values, the exchange alternative is also consistent with the purpose and need for the Proposed Action. Approval of the land exchange would still allow PDSI to develop the Dos Pobres and San Juan ore deposits should PDSI obtain the required federal and state permits to do so. In addition, PD would acquire lands that they anticipate using for possible future development of the nearby Lone Star deposit, which they own. Under either an MPO or a land exchange scenario, the Dos Pobres/San Juan

[1] The copper industry commonly uses the abbreviation “SX” for “solvent extraction” but Phelps Dodge has always called the process “solution extraction”.

Project must be permitted by the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act, by Arizona Department of Environmental Quality (ADEQ) under Section 402 (Arizona Pollutant Discharge Elimination System) of the Clean Water Act and Arizona Revised Statutes (ARS) 49-241 and 49-408 (Aquifer Protection Permit and Air Quality Permit), among others, prior to implementing the proposed mining operations. Both the Proposed Action alternative and the land exchange alternative are in conformance with the BLM's Safford District (now Field Office) Resource Management Plan, as adopted in the Partial Record of Decision I (BLM 1992a) and the Partial Record of Decision II (BLM 1994b).

The land exchange alternative is the BLM's preferred alternative and is consistent with the land exchange provisions of the Federal Land Policy and Management Act (FLPMA), as amended by the Federal Land Exchange Facilitation Act (FLEFA) and regulations governing federal land exchanges at 43 CFR 2200.

ALTERNATIVES

The five alternatives evaluated in this EIS are presented in two sets: the Mine Plan Alternatives Set and the Land Exchange Alternatives Set. Each set includes a "no action" alternative relative to the agency decisions available within that set (i.e., only BLM can decide to select the Land Exchange alternative). The BLM, as a public lands management agency, must decide whether to approve the land exchange or not; selection of the exchange would negate the need for BLM to select an alternative from the Mine Plan Alternatives Set, as BLM has no jurisdiction over mining on private lands. Regardless of the land ownership of the proposed project area, the COE has jurisdiction over the Project through its Clean Water Act permitting authority, and can only select an alternative from the Mine Plan Alternatives Set.

The BLM's preferred alternative is the Land Exchange alternative; the COE's preferred alternative is the least environmentally damaging, practicable alternative.

Mine Plan Alternatives Set

Proposed Action Alternative

The Dos Pobres/San Juan Project (the Project) is an integrated mining operation that includes the development of two open pit mines, a crushing and material handling system, a common Solution Extraction/Electrowinning (SX/EW) processing facility and shared infrastructure and support facilities. Based upon the current Mining Plan of Operations, the Project will produce approximately 2.9 billion pounds of salable copper over the Project's estimated 16-year mine production life. Project production will include the mining of 626 million tons of oxide and sulfide leach ore and 385 million tons of lower grade and unmineralized material referred to herein as development rock, also known in the copper industry as inert or overburden rock. Total minable material amounts to 1.01 billion tons resulting in a 0.6:1.0 non-ore to ore ratio. Construction of the SX/EW plant and associated support facilities will require approximately 15 months to complete and will start after completion of the Project's environmental permitting requirements. The Project would involve a total of 3,360 acres, currently comprised of 1,429 acres of PD private lands and 1,931 acres of BLM-administered lands.

Mining and Ore Processing Operations. Two open pit mines, Dos Pobres and San Juan, will be developed. The Dos Pobres open pit mine is located entirely on PDSI patented lands. Surrounding the planned Dos Pobres pit is an approximately 1,300-foot setback to allow for potential future mining of the deeper sulfide milling reserves that underlie the leachable ore at Dos Pobres. Leach ore and development rock (unmineralized and low-grade material) will be mined using conventional drilling and blasting techniques to

reduce ore to a manageable size (called run-of-mine or ROM) for loading and hauling. Depending on its copper content, ROM leach ore will be either hauled directly to the leach pad or hauled to a crushing system. Development rock will be hauled to two unlined development rock stockpiles, identified as East and West development rock stockpiles.

Three distinct periods of mining will occur during the 16-year life of the Project. The first period involves mining leach material exclusively from the Dos Pobres deposit during Years 1 through 4 . During the second period (Years 5 to 13), mining operations at the Dos Pobres and San Juan deposits will be combined. The third period, Years 14 - 16, will consist entirely of mining the remainder of the San Juan deposit. Mining rates and copper cathode production will decline during this period. The peak mining rate is approximately 94,000,000 tons per year and occurs during the first few years of the Project.

Crushing and Material Handling. The crushing and conveying system is designed to handle 100,000 tons per day (tpd). The crushing plant will be located along the northeastern corner of the leach pad. The crushing facility consists of a three-stage crushing system and an agglomeration system that reduces ROM material to a nominal 0.5-inch minus size. Crushed ore will be moved by conveyor from the crushing plant to the agglomeration facility. Agglomeration drums will tumble the crushed ore with sulfuric acid and water to agglomerate fines to the larger rock particles for a more homogeneous product with uniformly wetted particles. Agglomerated crushed ore will then be delivered to the leach pad by overland conveyor and placed onto the pad by a stacker system.

Leach Pad. A single, rectangular, approximately 922-acre leach pad will be located south of the Dos Pobres pit, between Cottonwood Wash on the east and Watson Wash on the west. The leach pad will be developed from south to north in 20 to 40-foot-high lifts. Based on current projected production rates, the leach pad is expected to reach a height of approximately 400 to 450 feet but will be designed to accommodate a potential ultimate height up to 600 feet. The leach pad will be constructed with setback benches to achieve a final overall slope of no greater than two horizontal to one vertical (2H:1V). The top surface of the pad will ultimately slope at approximately the same degree as the existing natural terrain. The site selected for the leach pad offers sufficient slope (generally steeper than four percent) to allow use of the natural contours of the terrain for collection of pregnant leach solution (PLS).

The key elements of the leach pad design include the pad foundation, a composite liner system consisting of a compacted clayey soil underliner, a synthetic geomembrane liner, and a “buffer” layer of overliner material. The leach pad design includes an internal stormwater collection ditch that will divert clean stormwater away from the pad during early years of operation, when the leach pad is confined to the southern portion of the site below the ditch. Later, this ditch will be incorporated into the leach pad system to provide for internal collection of PLS flows during leaching on the northern portion of the pad. The ditch will intercept PLS flows from the northern portion of the leach pad and direct them to the east edge of the pad where they will flow to the leach pad solution collection channel.

Raffinate, an acidic aqueous solution, will be applied to the leach pad using drip emitters. As the leach solution percolates through the copper-bearing ore, it will dissolve soluble copper minerals contained in the rock. The copper-laden water, called pregnant leach solution, or PLS, will then exit from the lined leach pad and be routed to the lined excess process solution impoundment located at the southeastern toe of the pad, from where it will be routed directly to the PLS collection tank and eventually processed at the SX/EW plant.

Leach Solution Collection/Distribution Facilities. The leach solution collection/distribution system includes the excess process solution impoundment and various piping and conveyance systems. PLS flows greater than that which can be processed by the SX/EW plant are retained in the lined excess process solution

impoundment, from which they can be routed to the SX plant as required. Excess flows can also be drawn from the excess process solution impoundment into the raffinate tank for return to the leach pad surface.

Solution Extraction and Electrowinning (SX/EW) Processing Facility. The solution extraction (SX) and electrowinning (EW) processing facility will consist of three primary components (SX plant, tank farm, and electrowinning tank house) and is located southwest of the leach pad.

Development Rock Stockpiles. Unmineralized and low grade material (referred to herein as development rock) will be hauled at ROM size to two unlined stockpiles that will not be leached. Development rock stockpiles will occupy approximately 834 acres total. One stockpile will be situated to the west of the Dos Pobres pit (the West development rock stockpile), and the other to the south of the San Juan pit (the East development rock stockpile). Stockpiles will be constructed in 50-foot lifts to approximately 400 feet above ground level. A liner is not proposed for these development rock stockpiles as the material is considered inert because the neutralization capacity of the non-ore material (i.e., development rock) present within the orebody exceeds the rock's acid-generating potential.

Soil and Growth Medium Stockpiles. Seven soil and growth medium stockpiles covering a total of roughly 123 acres will be created for use as growth media and capping material in reclamation.

Water Supply. The average amount of water required for the Project is forecast at 3,431 gallons per minute (gpm) (5,533 acre-feet per year [af/yr]); the total water demand over the life of the project is predicted to be 88,528 acre-feet (af). Groundwater near the Dos Pobres and San Juan mines will be developed for use by the Project. Currently, five 1,350 gpm vertical pumps are planned to be established at wells constructed in the project area. Water will be pumped from wells to water storage tanks that will gravity-feed to various project facilities.

Electric Power. The total average power requirements for the project are estimated to be 59.9 megavolts (mV). The power system for the Project will include construction of about seven miles of a primary 230 kilovolt (kV) transmission line from the existing 230 kV Hackberry line to a main substation that will be located on Phelps Dodge's property west of the Lone Star Road. At the main substation, power will be transformed and distributed via three separate 69 kV overhead transmission lines to the mine areas and facilities.

Compactible Soil Borrow Area. The Lone Star Compactible Soil Borrow Source is located on PD's private lands in Sec. 25, T6S, R26E, approximately 4.5 miles southeast of the leach pad. Material from this borrow source will be used to construct the composite liner system for the leach pad and will be transported by truck to the leach pad along an approximately 110-foot-wide aggregate roadway. The borrow area will ultimately be approximately 49 acres in size.

Shops, Office, Administration, and Communications. A service complex that includes a heavy duty truck shop, maintenance shop, fire truck and ambulance building, cable repair shop, recycling center, oil and lubricant storage, fuel station, and a truck wash facility will be built south of the San Juan mine. Communications for the Project will include hard wiring of a telephone cable in a loop configuration between the main security gate, Site No. 2, the truck shop complex, and the SX/EW plant. Radio communications require construction of a repeater transmitter tower on a hill located south of the San Juan Mine and three base stations for use at the administration building, mine office, and SX/EW facility.

Transportation/Access/Security. New infrastructure requirements for the Project include upgrading existing access roads, constructing employee parking facilities, and establishing additional security gates. Road crossings and access and haul roads will be constructed with culverts or at grade. A fence will be constructed

around the mine facility as needed to provide for security and safety and to keep cattle on adjacent lands off the mine property. Employee parking will be provided at Site No. 2 and the SX/EW plant site.

During the operational phase, average daily traffic is forecasted at 325 employee round trips and 80-90 truck round trips. Of the approximately 80 to 90 truck round trips to and from the Project, about 75 percent (60-68 round trips) are expected to come from the east and south and use the Solomon Bridge to cross the Gila River. The remaining 25 percent of trucks (20-22 round trips) are expected to arrive from the west and use the Thatcher Bridge (Reay Lane Bridge) to access the project site.

Aggregate Materials. Aggregate materials will be used for a variety of purposes, including road base fill material, riprap for stormwater diversion channels and road crossings, aggregate for concrete, and other uses. Two aggregate borrow sources totaling about 146 acres have been identified within the project area, from which approximately 19 million tons of material will be excavated over the life of the Project.

Environmental Protection Measures. A variety of environmental protection measures have been incorporated into the Mining Plan of Operations to meet applicable standards including those of regulatory agencies such as the ADEQ and COE that have review and approval authority over the proposed Project. These measures range from integrated stormwater management programs to concurrent and post-closure reclamation plans. Environmental protection measures that have been incorporated into the mine plan are summarized below.

< **Surface Water Management.** The Project will be constructed and operated as a “zero-discharge” facility, meaning that all process waters and stormwaters that come into contact with process facilities will be contained on-site rather than discharged off-site into waters of the United States. Development of the Project as a zero-discharge facility will necessitate diverting stormwater around the project area to reduce run-on into the pits and ponding against stockpiles, and to prevent release of flows potentially impacted by the leaching or mining operations into surface waters. The stormwater management facilities are designed to ensure that there are no potential points of stormwater discharge from the mines for the 100-year, 24-hour and 100-year, 10-day storm events. The stormwater impoundment will retain all incidental flows (stormwater and leach pad drain-down occurring during a power outage of up to 24-hours in duration) from the leach pad. A series of retention dams located upstream, downstream, and within the footprints of the development rock stockpiles will prevent off-site surface water discharge from storms during the early years of mine development.

Four diversion channels, South, Peterson Wash, West, and Site No. 1, will be constructed upgradient of the stockpiles and open pits to divert clean stormwater runoff around and through the site, preventing the water from being impacted by mining activities.

An integrated stormwater retention management system will be used to control stormwater run-on and runoff from the leach pad and the West and East development rock stockpiles. The system will use a lined stormwater impoundment south (downstream)of the leach pad, and a series of retention dams below, within, and above the footprints of the development rock stockpiles. These facilities were designed (sized) for the worst-case scenario of 100-year/24-hour and 100-year/10-day storm events.

Stormwater entering the leach pad perimeter will be conveyed to the stormwater impoundment designed to contain the 100-year/24-hour design storm event. The impoundment will be lined with a single, 60-mil, High-Density Polyethylene (HDPE) liner over six inches of 3/8-inch-minus, compacted native or natural material such as screened soil. The impoundment is currently designed

with a storage capacity of approximately 390 acre-feet plus two feet of freeboard. The final design of the stormwater impoundment may not change; however, if revised the design will still provide a minimum total containment volume for 317 af of storage plus freeboard, a volume of sufficient capacity to handle drain-down from the leach stockpile that would occur if there was a 24-hour power outage at the mine concurrent with a 100-year/24-hr storm event. The total surface area of the impoundment footprint is approximately 23 acres.

Diluent, reagents, fuel, and other petroleum products used in the operations will be stored in above-ground tanks within impervious secondary containment systems to avoid possible discharge to surface waters. All tanks will have leak detection systems. Secondary containment systems will have a capacity of at least 110 percent of the volume of the largest tank contained within the secondary containment facility. Sulfuric acid will be stored in tanks located within containment structures that can be drained to other containment facilities, such as the lined leach pad or the SX/EW tankfarm runoff tank. The SX/EW plant will be designed as a zero-discharge facility, incorporating drainage design features and containment tanks.

< **Groundwater Protection.** Project facilities are subject to the requirements of the State of Arizona's Aquifer Protection Program (APP) managed by the Arizona Department of Environmental Quality (ADEQ). Proposed groundwater protection measures include use of a liner system beneath the leach pad, stormwater controls, pumping systems, tank containment systems, and other features and operations designed to meet APP requirements.

PDSI has incorporated processes, structures, and operating methods that meet Best Available Demonstrated Control Technology (BADCT) into facility designs to protect groundwater and to ensure the greatest degree of discharge reduction achievable. The facility(s) will be developed in a manner that achieves the greatest degree of demonstrable discharge reduction. The leach pad liner system, lined stormwater impoundment, septic tank systems, truckwash, sulfuric acid storage, and other facilities and operations have been designed to meet BADCT criteria.

A conceptual closure and post-closure strategy for the Project has been developed and will be included in the APP application. ADEQ requires conceptual closure strategies in the APP permit application that minimize stormwater run-on and infiltration and/or seepage from mine facilities that would affect aquifer water quality. In general, all potentially discharging facilities will either be closed in place or will undergo clean closure. Closure in place consists of leaving solid materials in place and, if necessary, providing a containment system that meets Best Available Demonstrated Control Technology (BADCT) requirements. Clean closure consists of removing and properly disposing of all liquid and solid waste, unused or recyclable chemicals, and impacted materials from the facility (including removing underlying impacted soils to appropriate industrial health- or risk-based levels).

Waste Management. Solid waste generated at the Project will be disposed of in a manner consistent with ADEQ regulations. Solid waste will be transported off-site to an approved disposal or recycling facility. Office trash will be disposed of at the local landfill near Safford. Used petroleum products will be transported to a contracted recycling company in accordance with state and federal regulations. Nearly all scrap metal, most used HDPE pipe, and some construction debris will be recycled. Wastes determined to be hazardous under state and federal laws will be properly packaged and transported by a permitted transporter to an EPA-approved hazardous waste treatment, storage, or disposal facility. A pollution prevention plan, as required by the ADEQ, will be developed by PDSI prior to Project construction in order to minimize waste generation at the Project through source reduction, reuse, and recycling.

< **Hazardous Materials Storage, Handling, and Transport.** Sulfuric acid will be shipped to the Project in 3,500-gallon capacity tanker trucks and stored on-site in carbon steel tanks. The operations will include two 2,500-ton (312,500-gal) sulfuric acid storage tanks near the north end of the leach pad for acid addition in the agglomeration system and one 80-ton (10,000-gal) storage tank at the SX/EW facility to provide make-up acid to the SX plant. All three tanks will be situated in acid-resistant, concrete secondary containment facilities that can be drained to other containment areas, such as the lined leach pad and the 1.9-million-gallon stainless steel runoff collection tank located in the tankfarm.

Sulfuric acid consumption rates over the life of the Project are estimated to average about 1,600 tpd (about 200,300 gpd) during years of full production. These rates will require, on average, approximately 70 truck loads of acid per day. Probable sources of sulfuric acid include existing copper smelting operations northwest of the Project in Globe, Arizona, or to the east at Hurley, New Mexico, where sulfuric acid is a byproduct.

Reagents used and stored in the SX/EW area include diluent, extractant, and cobalt sulfate. These reagents will be stored in tanks located in the SX/EW tankfarm. The tankfarm is designed as a containment area. Process solution bypasses and stormwater runoff are collected in the tankfarm drainage system, which incorporates the 1.9-million gallon runoff tank located within the tankfarm.

Diesel fuel and gasoline will be supplied to the Project by tanker trucks. The trucks will travel directly to one of three fueling stations and offload into above ground storage tanks that will be provided with secondary containment systems. Storage tanks for this fueling station will be within a bermed area lined with polyvinyl chloride (PVC) or HDPE.

< **Air Quality Control Permit.** The Project will meet all applicable state and federal air quality standards. These standards prescribe emission limits, operational practices and administrative requirements. The purpose of these standards is to ensure that emissions are sufficiently reduced so as to prevent any exceedances of health-based, maximum allowable ambient concentrations.

Closure and Reclamation Measures. In addition to the conceptual closure plan submitted in its APP permit application, PDSI prepared and submitted a reclamation plan to the BLM. This plan was developed to meet both federal and state reclamation requirements. The reclamation measures presented in the plan were intended to achieve productive post-mining land uses (PMLU) as required by both federal and state regulations. Types of PMLUs envisioned for the project area include 1) wildlife habitat and limited grazing; 2) recreation, tourism, and education; 3) industrial development; 4) future mineral exploration and mine development; and 5) management of environmental resources including visual, air, water, and soil.

< **Leach Pad.** At closure, the leach pad will be allowed to drain to remove residual process solutions, consistent with APP requirements. To achieve the PMLU of wildlife habitat and limited grazing, revegetation with native species will occur in 100 percent of the surface area of the top of the leach pad. A test program will be undertaken concurrently with mine operation to determine the optimum method for reclamation of the leach pad side-slopes and will involve rinsing the surface of the flat area of the setback and outer slope with fresh water to remove residual salts. Following rinsing, the outer slopes and the flat area of the setback will be capped with approximately 12 inches of Basin Fill sediment or comparable growth medium and seeded with native species.

< **Development Rock Stockpiles.** To support the wildlife habitat and limited grazing PMLUs planned for the development rock stockpiles, 1) PDSI will construct stormwater diversions and management

systems; 2) the top surfaces of the development rock stockpiles will be graded during final placement of material to minimize random ponding and infiltration, to direct stormwater flows to compacted areas within the interior of the surface area for collection and evaporation, and to arrive at the final configuration, and the top portions of slopes will be crown chained or dozed to stabilize slope faces; and 3) revegetation with native species will occur on 100 percent of the surface area of the top of the development rock stockpiles.

< **Open Pits.** Revegetation of pit areas would interfere with potential future mining opportunities in the Mining District and therefore is not proposed. The open pit areas will be maintained for possible future access to mineral resources. Through time, a pit lake is expected to develop in each of the open pits but water quality within the pit lakes is expected to be satisfactory and specific remedies or reclamation activities are not anticipated to be necessary.

< **Roads and Traffic.** The post-reclamation configuration of roads has been designed to meet the access requirements for future industrial uses, education, and tourism uses, maintenance and security functions, and environmental monitoring. Approximately 160 acres of haul roads (excluding areas within the pits) and approximately 45 acres of new access roads will exist at the project site upon closure. Paved roads will be retained and maintained for long-term site access.

Reclamation Costs and Bonding. The estimated total cost to implement the proposed closure and reclamation measures is $10,992,000 (2003 dollars), which includes $1,066,000 in costs for closure requirements identified for PD's Aquifer Protection Permit and $9,926,000 in costs for reclamation measures. In consultation with BLM and the State Mine Inspector, PD will select an appropriate financial assurance mechanism(s) for reclamation costs. Potential financial assurance mechanisms include any one or a combination of the following: surety bond, cash, irrevocable letter of credit, certificates of deposit or savings accounts, securities or bonds, or insurance.

Projected Employment. The Project will provide both short-term construction employment and long-term employment in the form of direct employment by PDSI, local contractor employment in direct support of project operations, and local indirect employment (jobs created or maintained as a result of direct employee needs for goods and services). For the operational phase of the Project (16 years), approximately 250 full-time employees, with an average annual per-capita salary of $36,000 (1997 dollars) plus benefits, will be employed annually by PDSI. It is expected that roughly 80 percent or more of the positions would be filled by applicants residing in the local Graham and Greenlee counties area, including some PD employees currently working at PD's Morenci Mine. PDSI estimates that local contractors will employ approximately 100 people to provide direct support services for the Project. A portion of these contractors will work onsite at the Project while the remainder will provide certain maintenance and fabrication services out of local shops. Because of the Project's proximity to the San Carlos Apache Reservation, employment opportunities for tribal members will be available through both direct employment and through contractors that may be located on the Reservation. Estimated total payrolls for local contractors working at or for the Project range from $2.5 to $3.0 million annually.

Partial Backfill of San Juan Alternative

This action alternative proposes mining, processing, mine support, environmental protection, closure and reclamation, and employment that are identical to those of the Proposed Action with one exception: approximately 60 - 80 million tons of development rock would be backfilled into the mined-out portion of the San Juan pit instead of placed on the West and East development rock stockpiles. As a result, the ultimate heights of both development rock stockpiles would be approximately one lift (about 50 ft) lower than the

heights anticipated for the Proposed Action alternative. This alternative would also preclude future potential development of any copper resources remaining in the San Juan pit that are not economic to mine at this time.

No Action Alternative

This alternative involves no federal actions – the COE would not issue its Clean Water Act Section 404 permit and BLM would reject the MPO on the basis of undue or unnecessary degradation of the environment. The result would be no mining on public lands. This alternative does not meet the purpose and need for the project but is a requirement under NEPA.

Land Exchange Alternatives Set

Land Exchange Alternative

This alternative proposes exchange of approximately 16,297 acres of public lands desired by PDSI for approximately 3,867 acres of private lands that PD owns in five counties in Arizona. In disposing of the selected lands, BLM relinquishes authority for those lands, including oversight of the MPO, reclamation, and post-mining land uses. Under this alternative, the State Mine Inspector's Office would have jurisdiction over reclamation on the selected lands. The selected and offered lands and their foreseeable uses under the exchange are described below.

Selected Lands and Their Foreseeable Uses. The approximately 16,297 acres of selected lands are located north of Safford on the southern slopes of the Gila Mountains. These lands, which are heavily encumbered by PD-owned lode mining claims, would be used in the near term for mining, as described under the Proposed Action alternative, including continued use of an office building and other facilities located on the Sanchez parcel for mining support-related activities such as mine process technology research. Other foreseeable uses of the selected lands would include support for potential future development activities for the known Dos Pobres deep sulfide and Lone Star oxide deposits, both of which are located on existing PD lands. Assuming all required permits and clearances are received, these potential projects could be implemented during the latter period of mining at the Dos Pobres/San Juan Project.

The Dos Pobres deep sulfide and Lone Star oxide projects are still conceptual and only general footprints of potential disturbance are available at this time. The potential mining activities and facilities associated with these conceptual plans have been identified by PDSI and categorized into three types of foreseeable uses of the selected lands. The first foreseeable use category, referred to as Production Operations and Support Areas, would include uses such as open pits, leach pad(s), stockpiles, SX/EW processing facilities, support facilities, tailings impoundment, concentrator, and haul roads. This use category for both the Dos Pobres deep sulfide and the Lone Star projects would affect approximately 1,730 acres of the selected lands and 7,578 acres of PD lands. The Transitional foreseeable uses category, in which mine dump runout areas and access roads would be located, would affect 356 acres of BLM land and 785 acres of PD lands. The third foreseeable use category, Intermittent uses, would involve use of the lands for spatial, safety, and site security buffers, and would affect 12,280 acres of BLM lands and 9,848 acres of PD lands.

Offered Lands and Their Foreseeable Uses. The 11 offered properties are located within special management areas or areas identified by the Safford Field Office as Long-Term Management Areas (LTMA). Offered lands comprise the Amado and Curtis properties located in the Gila Box RNCA; the Musnicki, Freeland, and Butler-Borg properties located in the Dos Cabezas Mountains LTMA; the Schock, Feulner, Clyne I and Clyne II properties in the Empire-Cienega LTMA; the Norton property in the Southwest Gila Valley LTMA; and the Tavasci Marsh property in the congressionally designated boundary of the Tuzigoot National

Monument. The foreseeable uses of these 11 offered properties with regard to public lands uses such as grazing, mineral entry, and recreation, would be consistent with the management decisions approved in applicable federal management or activity plan. These include the Final Gila Box Management Plan for the Amado and most of the Curtis property; the Safford District RMP, as amended, for the remainder of the Curtis property, Norton, Musnicki, Freeland, and Butler-Borg properties; the Proposed Las Cienegas Resource Conservation Area Management Plan for the Schock, Feulner, Clyne I, and II properties; and the Tuzigoot Statement for Management for the Tavasci Marsh property.

No Land Exchange Alternative

This alternative involves no land exchange, which would result in BLM retaining the selected lands under public management and PD retaining ownership and management of the 11 offered properties. This alternative would require the BLM to make a decision under the Mine Plan Alternatives Set regarding the MPO submitted by PD and if an action alternative is selected, oversee implementation of the MPO, reclamation, and post-mining land uses on BLM lands. Impacts of this alternative include direct and indirect realty-related impacts of the exchange itself and the foreseeable uses of the selected lands would result in the mining impacts described under the Proposed Action as well as impacts anticipated to result from the future potential Dos Pobres sulfide and Lone Star projects.

SCOPING ISSUES

Two scoping efforts were made for this Project; an initial scoping took place in December 1994 and a second scoping occurred in October 1996 after PDSI submitted their MPO. The summary of the scoping issues analyzed in this EIS as determined by the Interdisciplinary Team for this EIS is presented in Table S-1 below; see also Table 1-4 in the body of the document.

Table S-1. Summary of Scoping Issues Analyzed in the Dos Pobres/San Juan Project EIS

- Land Use
  - Public Lands Management
  - Access and Recreation
  - Encumbrances
  - Agriculture and Grazing
  - Mineral Rights
  - Surface Water Rights
  - Noise and Vibrations
  - Visual Resources
  - Hazardous Materials
- Physical Resources
  - Climate
  - Air Quality
  - Geology
  - Soil
  - Groundwater Quality/Quantity
  - Surface Water Quality/Quantity, including Waters of the U.S.
- Biological Resources
  - Vegetation
  - Wildlife Resources
  - Special Interest Species/Critical Habitat
  - Biodiversity
- Cultural Resources
  - Archaeological Resources
  - Traditional Cultural Properties
- Socioeconomic Resources
  - Population and Demographics
  - Local and Regional Economy
  - Infrastructure
  - Transportation
- Indian Trust Resources
  - Indian Trust Assets

IMPACTS

Table 2-15 in the body of the document (Volume 1) presents a comprehensive, comparative summary of the direct, indirect, and cumulative impacts of the all five alternatives evaluated in this EIS. The basis for this summary is the detailed environmental analyses provided in Chapter 4 of the EIS.

MITIGATION

Wherever possible, mitigation measures have been developed and incorporated into the Proposed Action or other alternatives to minimize or mitigate potentially adverse impacts. Table 4-45 in the body of the document (Volume 1) summarizes the mitigation measures that would be implemented under each alternative.

CHAPTER 1

PURPOSE AND NEED

1.1 INTRODUCTION

The Proposed Action analyzed in this Environmental Impact Statement (EIS) is the Dos Pobres/San Juan Project, as described in a Mining Plan of Operations (MPO) submitted to the Safford Field Office of the Bureau of Land Management (BLM) by Phelps Dodge Safford, Inc. (PDSI)[2]. As proposed in the MPO, the Dos Pobres/San Juan Project (Project), located near Safford, Graham County, Arizona, would consist of two open pit copper mines with one leach pad, one shared solution extraction/electrowinning (SX/EW) processing facility, and shared infrastructure and support facilities. As an alternative to approval of the MPO, the BLM is considering a land exchange alternative with Phelps Dodge (PD) that would enable the Dos Pobres/San Juan Project to proceed on private lands without BLM oversight, assuming that PDSI is able to obtain all necessary environmental permits. Authorizing the MPO or approving the land exchange constitutes two separate but related federal actions, both of which are addressed in this single EIS per the National Environmental Policy Act (NEPA) of 1969. To keep the distinction between the two actions clear, the alternatives presented and analyzed in this document have been grouped into two sets: a Mining Plan Alternatives Set (including the MPO, which is the Proposed Action) and a Land Exchange Alternatives Set. Each set includes a "No Action" alternative pertinent to the decision(s) to be made by the agencies cooperating on this EIS. All the alternatives, with the exception of the No Action alternative under the Mining Plan Alternatives Set, would result in development of the Dos Pobres/San Juan Project within the constraints of federal and state environmental permitting requirements.

Both a proposed MPO and a proposed land exchange involving public lands are subject to review under NEPA. The BLM, as the primary decision-making agency for these actions, has determined that an EIS is required and is serving as the lead agency responsible for preparation of the EIS. Cooperating agencies are the U.S. Army Corps of Engineers (COE), which has permitting responsibilities under the Clean Water Act, and the Environmental Protection Agency (EPA). Resource specialists from the BLM make up the Interdisciplinary Team (ID Team), who, along with representatives of the cooperating agencies, form the group responsible for the preparation of this EIS.

1.2 DOCUMENT ORGANIZATION

This Final Environmental Impact Statement (FEIS) follows the basic format guidelines provided by the Council on Environmental Quality (CEQ) at Section 1502 of Title 40 of the Code of Federal Regulations (40 CFR § 1502). The FEIS is presented in two volumes to facilitate simultaneous review of text and figures. Volume 1 includes seven chapters and front and back matter; Volume 2 includes figures and appendices. The Table of Contents identifies the key sections and subsections within each of the seven chapters. A brief summary of the content of each chapter is provided below.

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[2] Phelps Dodge Safford, Inc. is a wholly owned subsidiary of Phelps Dodge Corporation. In this document, the abbreviation "PDSI" refers to Phelps Dodge Safford, Inc.; "PD" refers to the parent corporation and its subsidiary operations held under the mining division named Phelps Dodge Mining Company.

Chapter 1, "Purpose and Need," summarizes the Project's history, identifies the Project's purpose and need, describes the decisions to be made by the lead and cooperating agencies, provides the regulatory framework that guides those decisions, summarizes the issues raised during public and agency scoping efforts, and provides a matrix for tracking scoping issues analyzed in this EIS.

Chapter 2, "Alternatives," describes the processes used by the ID Team to formulate alternatives, describes the two sets of alternatives that are analyzed in detail (i.e., the Mine Plan Alternatives Set and Land Exchange Alternatives Set, both of which include a No Action alternative); identifies alternatives considered but not analyzed in detail; and provides a comparative summary of the environmental impacts of the alternatives.

Chapter 3, "Affected Environment," describes the existing environment potentially affected by the Project, specifically those resources identified during scoping, and discusses the resources involved in both the MPO and the land exchange alternatives. This section describes the baseline conditions for determining the potential effects of the alternatives.

Chapter 4, "Environmental Consequences," analyzes the direct, indirect, and cumulative impacts of the Proposed Action and its alternatives on the existing environment. This chapter provides the analyses for the summary table of impacts provided in Chapter 2.

Chapter 5, "Consultation and Coordination," summarizes the efforts of the agencies to inform the public, including federal, state, and local agencies, and to involve them in the analysis of the Project's impacts. Also included in this chapter is a summary determination of whether the environmental analysis for the Project has complied with Executive Order 12898 regarding Environmental Justice.

Chapter 6, "List of Preparers," identifies those persons primarily responsible for contributing to the preparation of this EIS and lists their qualifications.

Chapter 7, "Responses to Comments," summarizes the DEIS public notification and comment processes, provides excerpts of comments, and gives specific and general responses to substantive comments received on the DEIS.

1.3 PROJECT HISTORY AND BACKGROUND

The Dos Pobres/San Juan Project is located in the Safford Mining District in Graham County, Arizona, about seven to eight miles north of the City of Safford (Figure 1-1). The Safford Mining District consists of four known, undeveloped porphyry copper deposits (Dos Pobres, San Juan, Lone Star, and Sanchez) located along the southwestern slope of the Gila Mountains north of the Gila River. Most of these mineral deposits are located on land owned by PD, but some extend onto public lands administered by the BLM. The portions of the deposits on BLM land are controlled by PD through mining claims filed under the auspices of the General Mining Law of 1872.

In 1994, in an effort to consolidate their surface and mineral holdings in the Safford Mining District, PD proposed a land exchange with the BLM and both parties later signed an Agreement to Initiate (ATI), which begins formal consideration of the land exchange. Through the proposed exchange, PD would acquire public lands (referred to as the selected lands) within and adjacent to its existing private property in the Mining

District in trade for other lands (the offered lands) in Arizona currently owned by PD. Figure 1-2 shows the selected lands and the project area[3] in relation to the general layout of the mine plan.

The BLM determined that, before making a decision about the land exchange, they would prepare an EIS to comply with provisions of NEPA. After the parties agreed to formally consider a land exchange, public scoping took place in late fall of 1994 and baseline studies commenced. Late in 1995, PD learned that the COE would likely require an EIS as part of their environmental review for a Section 404 permit to implement the foreseeable mining uses if the land exchange was authorized. About the same time, PD accelerated the planning and development schedules for the Dos Pobres/San Juan Project. PD submitted a Mining Plan of Operations (MPO) in May 1996, which allowed the BLM, COE, and EPA as cooperating agencies, to consolidate their respective environmental reviews for the proposed mining activities (Note: EPA no longer has permit authority in Arizona through Section 402 of the CWA and will not be issuing a permit). Analysis of the MPO alternative provides agency decision-makers and the general public with more detailed and specific information on which to assess potential impacts from the foreseeable mining uses of the selected lands and also conforms with CEQ regulations at 43 CFR 1502.4 and guidelines in "NEPA's Forty Most Asked Questions."

Development of the selected lands through an MPO entails requesting approval from the BLM to develop the Dos Pobres/San Juan Project on public lands pursuant to the General Mining Law of 1872 and surface management regulations at 43 CFR 3809. After PD submitted their MPO, called the *Dos Pobres/San Juan Project Plan of Operations,* to BLM in May 1996, they established Phelps Dodge Safford, Inc. (PDSI) as a wholly owned subsidiary to be the operating entity to oversee the Project. In December 1996, PDSI submitted a revised MPO, which included several minor revisions as ongoing mine planning studies were completed (PDSI 1996).

In response to PDSI's submittal of an MPO, the BLM 1) determined that the EIS should reflect the fact that an MPO is now the Proposed Action; 2) made the land exchange proposal one alternative to the MPO; and 3) involved the COE, which has responsibilities for the Clean Water Act (CWA) Section 404 permitting requirements of the MPO, and the EPA as cooperating agencies in the EIS process. The EIS was renamed the *Dos Pobres/San Juan Project Environmental Impact Statement.*

BLM then reinitiated the scoping process in 1996 because submittal of the MPO was a significant change in scope from the original land exchange proposal. Public scoping efforts for the Project are summarized in Section 1.6 of this chapter and are described in more detail in Chapter 5. In December 1997, BIA became a cooperating agency in the preparation of this EIS specifically to contribute its expertise in the areas of Indian Trust Resources and tribal consultation.

In September 1998, the Draft EIS was published, followed by a 60-day public comment period that was extended twice, and during which public and tribal open house meetings were held in four locations. A lengthy and detailed review of the groundwater model, its results, and the Model, Monitor, and Mitigate (3M) Program by BIA, their consultant, and BLM hydrologists occurred through fall of 2002. During this review, which BLM believes affirmed the validity of the modeling approach, the BIA withdrew as a cooperator in June 2000 without facilitating consultations with Indian tribes regarding potential impacts to trust resources. In April 2001, BLM reinitiated direct consultations with the Gila River Indian Community and the San Carlos Apache Tribe, which are ongoing.

[3] Throughout this document, the term "project area" refers to both the public lands selected for the proposed land exchange as well as the public and private lands potentially impacted by the MPO.

As recently as August 2001, PDSI submitted an updated MPO (PDSI 2001) that addressed several concerns raised during the DEIS public comment period. Specifically, PDSI modified the crushing, pretreatment, and material handling elements of the MPO to reduce impacts and increase the efficiencies of the ore production processes. As a result of PD's continuing optimization efforts, the projected water usage, truck haulage and associated air emissions, tank storage, and sulfuric acid truck deliveries have been meaningfully reduced. The subsequent reductions in anticipated impacts to water quantity, air quality, traffic, nighttime lighting, and other resources are reflected in the updated analyses presented in Chapter 4.

1.4 PURPOSE AND NEED FOR ACTION

Phelps Dodge currently owns approximately 20,000 acres of land north of Safford, Arizona, which includes all of the Dos Pobres copper deposit and portions of the nearby San Juan deposit. Additionally, PD holds existing lode mining claims to both the remainder of the San Juan deposit, which is on adjacent BLM-managed federal lands, and to mineral resources on federal lands surrounding both deposits. The proximity of the Dos Pobres and San Juan orebodies to one another provides an opportunity for PD to increase mining efficiency by combining certain elements of mine infrastructure. PD would like to develop both the Dos Pobres and San Juan orebodies, and because some BLM-managed land would be involved in mine development, PD has submitted a mining plan of operations (MPO) to BLM. BLM, under the authority of the 1872 General Mining Law, as amended, and BLM's Surface Management Regulations at 43 CFR 3809, must respond to PD's proposed MPO for the Dos Pobres/San Juan Project.

The purpose of the Proposed Action (the Dos Pobres/San Juan Project) is to enable PD to develop its mining claims and the mineral resources associated with the Dos Pobres and San Juan leachable copper ore deposits as an integrated project. The Project is necessary for PD, one of the largest manufacturers of copper and copper products, to continue meeting national and worldwide demand for copper.

As an alternative to developing the proposed Project on BLM-managed lands, the BLM and PD have agreed to consider a land exchange. Although the primary purpose and need for the land exchange alternative is to exchange public for private lands to achieve improved management of federal lands and federal acquisition of lands containing important resource values, the exchange alternative is also consistent with the purpose and need for the Proposed Action. Approval of the land exchange would still allow PD to develop the Dos Pobres and San Juan ore deposits should PD obtain the required federal and state permits to do so. In addition, PD would acquire lands that they anticipate using for possible future development of the nearby Lone Star deposit, which they own. Under either an MPO or a land exchange scenario, the Dos Pobres/San Juan Project must be authorized by the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act, and by Arizona Department of Environmental Quality (ADEQ) under the State of Arizona Pollutant Discharge Elimination System (AZPDES) and Arizona Revised Statutes (ARS) 49-241 and 49-408 (Aquifer Protection Permit and Air Quality Permit), among others permits and authorizations, prior to implementing the proposed mining operations. Both the Proposed Action alternative and the land exchange alternative are in conformance with the BLM's Safford District (now Field Office) Resource Management Plan, as adopted in the Partial Record of Decision I (BLM 1992a) and the Partial Record of Decision II (USDI BLM 1994b).

The land exchange alternative is the BLM's preferred alternative and is consistent with the land exchange provisions of the Federal Land Policy and Management Act (FLPMA), as amended by the Federal Land Exchange Facilitation Act (FLEFA) and regulations governing federal land exchanges at 43 CFR 2200.

1.4.1 Decisions to be Made

The BLM and COE will make their respective decisions based upon the environmental analyses documented herein. The BLM will issue a Record of Decision (ROD) regarding the land exchange or the MPO and the COE will issue a separate ROD with its permit decision. Figure 1-3 graphically depicts the federal agency decisions that are to be made in this process and the outcomes that would result from the respective decisions made by BLM and COE. The decisions to be made by the BLM and COE are summarized below.

The BLM's authorizing official must:

< approve the land exchange alternative; *or*

< approve the proposed MPO; *or*

< in the event that analysis shows that the proposed MPO would cause unnecessary or undue degradation of the environment, select a mining plan alternative that would not cause such degradation; *or*

< select the No Action alternative if analysis shows that unnecessary or undue degradation of the environment would occur from the proposed MPO *and* any other mining plan alternative under consideration.

The BLM manages the public lands that would be affected by both the proposed mining activity and the proposed land exchange. As such, the BLM has regulatory oversight responsibilities under 43 CFR 3809 and could select one of the mining plan alternatives or, if it determines that both mine plan alternatives would result in unnecessary or undue degradation of the environment,[4] select the No Action alternative under the Mining Plan Alternatives Set. On the other hand, if the BLM decides to trade the selected land into private ownership by choosing to authorize the land exchange alternative, it would relinquish its regulatory oversight responsibilities for those lands and, consequently, its involvement with the Dos Pobres/San Juan Project, and the choice of mine plan alternatives (see Figure 1-3).

The COE's authorizing official must:

< issue PDSI an individual CWA Section 404 permit for the discharge of dredged or fill material into waters of the United States based upon a mine plan alternative in this EIS; *or*

< select the No Action alternative and deny the permit.

The COE has no jurisdiction over the exchange of public lands, therefore, its authority extends only to the environmental impacts of the proposed mining operations, and its permitting responsibilities are the same whether the proposed mining operations take place on public land or on private land. The COE will select one of the mine plan alternatives on which to issue its Section 404 permit or will select the No Action (no permit) alternative under the Mining Plan Alternatives Set.

[4] Unnecessary or undue degradation means surface disturbance greater than what would normally result when an activity is being accomplished by a prudent operator in usual, customary, and proficient operations of similar character and taking into consideration the effects of operations on other resources and land uses, including those resources and uses outside the area of operations [43 CFR § 3809.5].

1.5 REGULATORY FRAMEWORK AND AUTHORIZING ACTIONS

The proposed Project and its alternatives must conform with numerous federal, state, and local laws and regulations. The major federal laws and regulations that provide the BLM, and COE with the ability to authorize various aspects of the Project, including a land exchange alternative, are briefly discussed below.

1.5.1 Mining Plan of Operations

As part of its mission to manage multiple resources on public lands, the Department of the Interior (through the BLM) maintains a policy, as decreed by Congress, to encourage the development of federal mineral resources and reclamation of public lands. By submitting an MPO to the BLM, PDSI has invoked plan approval procedures found at 43 CFR 3809.400[5] and within the Safford District's Resource Management Plan (RMP) as amended (BLM 1991, 1994b). Under these procedures, and as required by NEPA, the BLM is required to analyze the proposed MPO to ensure that:

< adequate provisions are included in the mine plan to prevent undue or unnecessary degradation of federal lands as a result of authorized mining activities;

< measures are included to provide for reclamation of disturbed land; and

< proposed operations would comply with other applicable federal and state laws and regulations.

The provisions of the General Mining Law of 1872; the Federal Land Policy and Management Act (FLPMA) of 1976; the Mining and Mineral Policy Act of 1970; and the National Materials and Minerals Policy, Research, and Development Act of 1980 authorize PDSI to operate a mine on public lands under an approved MPO, assuming all necessary environmental permits and authorizations are received. Table 1-1 summarizes permits and authorizations necessary to implement the proposed mining and/or the land exchange.

Included among the permits that PDSI must obtain to begin mining activities are two federally issued permits required by provisions of the Clean Water Act (CWA). The COE has assumed a cooperating agency role in this EIS process because of its permitting authority over these aspects of the proposed Project. A Section 404 permit is issued by the COE to control the discharge of dredged and/or fill material into waters of the United States (WUS),[6] including adjacent wetlands. Typical mining and mining-support activities that would require a Section 404 permit include constructing stormwater management facilities and road crossings over drainages, stockpiling leach ore and development rock in WUS, and engaging in any other activity that results in a discharge of dredged and/or fill material into a WUS (33 CFR 323). Through issuance of this federal

[5] The regulations at 43 CFR 3809 were revised effective January 20, 2001 and then revised again effective January 21, 2002; however, except for reclamation bonding requirements, this project is grandfathered under the 1980 regulations. It was recognized by the BLM in the revisions of the regulations that if a draft EIS for an MPO had already been prepared and issued to the public by January 20, 2001 (as in the case of the Dos Pobres/San Juan Project), then the MPO would not be subject to the new mining plan content requirements or performance standards. The performance standards of the current and 1980 regulations, however, are essentially the same. The only significant difference is the new regulations also address acid mine drainage and the use of cyanide and other leachates. Moreover, the PD MPO addresses all performance standards listed in the regulations effective January 20, 2001, as well as those in the current and original regulations.

[6] "The Clean Water Act defines this as surface waters, including streams, streambeds, rivers, lakes, reservoirs, arroyos, washes, and other ephemeral watercourses and wetlands" (COE 1993).

permit, the COE has regulatory jurisdiction over aspects of the proposed Project, regardless of whether it is implemented on public lands or on private lands.

Another major Clean Water Act permit required for this Project is the Arizona Pollutant Discharge Elimination System (AZPDES) permit issued by the ADEQ for point source and general stormwater discharges into Waters of the U.S. Formerly under the jurisdiction of the EPA and known as the 402, NPDES, or National Pollutant Discharge Elimination System permit, the permit authority was delegated to ADEQ in December 2002 and is now called AZPDES. This permit continues to distinguish between three types of discharges that are regulated: stormwater, process wastewaters, and mine drainage. Stormwater includes snowmelt; surface drainage that does not come in contact with raw materials, product, or mine drainage; and runoff from waste rock piles, some kinds of access roads, dikes not constructed of development rock, and certain ancillary structures or reclaimed areas. Facilities discharging stormwater are required to prepare a Stormwater Pollution Prevention Plan.

Process waters are prohibited from being discharged and include leach pad runoff or seepage and pregnant leach solutions. Mine drainage is any water drained, pumped, or siphoned from a mine (including pits or adits), and includes process waters mixed with stormwater and stormwater that comes into contact with any materials used in the mining process. Such drainage must meet nationwide, technology-based effluent limitations (40 CFR 440) and state water quality standards for numerous specific pollutants. If the technology-based effluent limitations and state water quality standards differ, ADEQ selects the most stringent limitation for each parameter of concern. Before issuance of the final AZPDES permit, a draft permit will be circulated to the public for a minimum 30-day public comment period. Although the EPA remains a cooperating agency in the preparation of this EIS, the AZPDES permit for the Project would be issued by ADEQ.

Emissions addressed during the permitting process include particulates (dust) from mining and crushing operations, sulfuric acid mist from electrowinning operations, combustion gases from boilers, and volatile organic compounds (VOC) from solution extraction and fuel storage operations. The Air Quality Control Permit to be issued by ADEQ will specify the applicable emission limits for project operations and/or

Table 1-1. Federal, State and Local Regulatory Requirements Applicable to the Dos Pobres/San Juan Project and Alternatives

		APPLIES TO	
LAWS/REGULATIONS	**REGULATES**	**MPO***	**Land Exchange****
FEDERAL			
General Mining Law of 1872; 17 Stat. 94	federal minerals	U	--
Mining and Mineral Policy Act (1970); 30 USC § 21a	federal minerals	U	--
Nat'l Materials & Mineral Policy, Research, & Development Act (1980) 30 USC § 1601-1605	federal minerals	U	--
Federal Land Policy & Management Act (FLPMA) of 1976; 43 USC § 1701 (as amended by FLEFA)	management of federal lands	U	U
BLM Mining Regulations at 43 CFR § 3809	federal minerals	U	--
Mining Claim Occupancy Regulations at 43 CFR § 3715	federal minerals	U	--
National Environmental Policy Act (NEPA) (1969) 42 USC §§ 4321 *et seq.*, as amended	federal undertakings	U	U

Federal Land Exchange Facilitation Act (FLEFA); 43 USC § 1716, § 1740	federal land exchanges	--	U
American Indian Religious Freedom Act (AIRFA); 42 USC §§ 1996	Native Am. religious places and access	U	U

Table 1-1, continued. Federal, State and Local Regulatory Requirements Applicable to the Dos Pobres/San Juan Project and Alternatives

		APPLIES TO	
LAWS/REGULATIONS	**REGULATES**	**MPO***	**Land Exchange****
Native Am. Graves Protection & Repatriation Act (NAGPRA); 25 USC §§ 3001 *et seq.*	treatment of human remains and affiliated cultural items	U	U
Archaeological Resources Protection Act (ARPA); 16 USC §§ 470	archaeological resources	U	U
National Historic Preservation Act (NHPA); 16 USC §§ 470 *et seq.*	historic properties incl. TCPs	U	U
Clean Air Act (CAA); 42 USC §§ 7401 *et seq.*	air quality	U	U
Safe Drinking Water Act (SDWA); 42 USC § 300f *et seq.*	drinking water quality	U	U
Clean Water Act (CWA); 33 USC § 1344 *et seq.*	surface water quality	U	U
Endangered Species Act (ESA); 16 USC §§ 1531 *et seq.*, as amended	threat. & endang. species	U	U
Resource Conservation and Recovery Act (RCRA); 42 USC § 6901 *et seq.*	hazardous or solid waste	U	U
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA); 42 USC § 9615	hazardous or solid waste	U	U
Emergency Planning & Community Right-to-Know Act (EPCRA) of 1986; 42 USC § 11005	hazardous or toxic materials	U	U
Pollution Prevention Act of 1990	hazardous or toxic materials	U	U
Executive Order 11988	floodplain management	U	U
Executive Order 12898	environmental justice	U	U
Executive Order 11990	wetlands	U	U
Executive Order 13007	Indian sacred sites	U	U
Executive Order 13112	invasive, nonnative species	U	U
STATE AND LOCAL			
Environmental Quality Act (EQA) - Aquifer Protection Permit ARS 49-241-251	aquifer water quality	U	U
Section 401 State Water Quality Certification	surface water quality	U	U
Arizona Pollutant Discharge Elimination System (AZPDES)	surface water quality	U	U
Comprehensive Air Quality Act - Air Quality Permit; ARS 49-408	air quality	U	U

Arizona Mined Lands Reclamation Act; ARS 27-901-1026	mining reclamation	--	U
Transmission Line Certificate of Environmental Compatibility, ARS 40-360	transmission line siting	U	U
Well Permits; ARS 45-592	wells	U	U

Table 1-1, continued. Federal, State and Local Regulatory Requirements Applicable to the Dos Pobres/San Juan Project and Alternatives

		APPLIES TO	
LAWS/REGULATIONS	**REGULATES**	**MPO***	**Land Exchange****
Dam Safety Permit; ARS 45-1203	stormwater mgmt. facilities	U	U
Arizona Native Plant Law; ARS 03-903	Arizona native plants	U	U
Graham County Lighting Ordinance	outdoor lighting	U	U
Graham County Flood Damage Prevention Ordinance	floodplain protection	U	U
Graham County Septic Permit	septic/waste disposal	U	U

* Mining on Public Lands; **w/Mining on Private Lands

PDSI must also obtain a Class II air quality control permit from the Arizona Department of Environmental Quality (ADEQ). The State of Arizona issues such permits as part of its federally mandated Clean Air Act Title V program to meet National Ambient Air Quality Standards (NAAQS). A Class II permit is necessary for new and modified sources of air pollutants as defined in the Arizona Administrative Code (A.C.R18-2-302[B]). The permit will also contain requirements relating to emission control equipment or practices, record keeping and reporting procedures. PDSI submitted its Class II Permit application to ADEQ on November 9, 1998; PDSI anticipates resubmitting an updated application in light of the revised MPO by the end of 2002.

ADEQ, which has oversight for groundwater protection in Arizona, has determined that potentially discharging facilities proposed for the Dos Pobres/San Juan Project are subject to environmental review under the state's Aquifer Protection Permit (APP) Program. As part of the APP compliance process, PD must demonstrate that discharging facilities will not cause an exceedance of aquifer water quality standards. In addition to this technical demonstration, PD will be required to monitor groundwater quality during operations and through mine closure. PDSI submitted its APP application on October 2, 1998 (J. Korolsky, PDSI, pers. comm.).

Finally, FLPMA Section 302(a), BLM NEPA procedures, and federal Resource Management Planning regulations (43 CFR 1610) require that the Proposed Action conform with decisions in the applicable RMP(s). BLM has determined that the proposed MPO is in conformance with the applicable decisions in the Safford District RMP, as amended (BLM 1991, 1994b).

Table 1-2. Federal Land Use, Management, or Activity Plans Under Which the Offered Lands Would be Managed If Acquired by the Public

Applicable Management Plan	**Offered Lands**
Safford District Resource Management Plan (amended)	Musnicki, Freeland, Butler-Borg, Norton
Gila Box Management Plan	Amado, Curtis
Las Cienegas Resource Managment Plan	Feulner, Schock, Clyne I, Clyne II, Davison*

Statement for Management, Tuzigoot National Monument	Tavasci Marsh
San Pedro River Riparian Management Plan	Lehner Ranch*
Lower Gila Resource Area Management Framework Plan	Lincoln Ranch*

* The Davison, Lehner Ranch, and Lincoln Ranch properties were part of the original offered lands package but were not selected for inclusion in the land exchange alternative analyzed in this EIS.

1.5.2 Land Exchange

The land exchange alternative in this EIS conforms with all applicable federal management plans. The selected lands have been identified for disposal in the Safford District RMP, as amended (BLM 1991, 1994b). All of the offered lands have been identified for acquisition in federal management plans. Table 1-2 lists the federal management plans or area-specific plans that would apply to management of the offered properties if acquired through the exchange. More detailed information about these properties and the proposed and foreseeable uses of them based on these management plans is provided in Chapter 2 in Section 2.2.2.1.3.
.
Before authorizing an exchange, the BLM must comply with NEPA, Federal Land Policy Management Act (FLPMA) of 1976 as amended by the Federal Land Exchange Facilitation Act (FLEFA) of 1988, and other federal regulations, and must coordinate with other federal, state, and local agencies whose responsibilities may include some aspects of the foreseeable uses of the selected lands. Refer to Table 1-1 for a list of the federal and state laws and regulations that apply to a federal land exchange.

1.5.3 Water Rights Authority

As described in Chapter 2 in this EIS, the Dos Pobres/San Juan Project would involve groundwater pumping at the mine site and retention of stormwater runoff. Because both groundwater and surface runoff in the project area are hydrologically connected to the Gila River, decreed waters of that river form part of the context for the analyses presented in this EIS. Water rights concerns in the Gila River basin are highly controversial. The water uses proposed for the Dos Pobres/San Juan Project are subject to additional authority beyond that of the BLM and the COE. This section briefly addresses the legal framework that may bear on the anticipated water uses, impacts, and possible mitigation measures associated with the Project. However, we must emphasize that an EIS is fundamentally a scientific and technical document, based on facts and data and reasonable extrapolations from such facts and data. It is not a legal document and does not purport to claim or otherwise state any legal position by any of the federal agencies involved in its preparation.

Accordingly, what is set forth in this section and in all other sections of this EIS that may implicate legal issues will be stated in the most general and neutral terms, the aim of which is to inform the reader about the overall and complex legal context in which the environmental issues must be analyzed and evaluated. The purely legal issues that will affect the Project, which include several pending lawsuits in state and federal court, must be considered in a forum separate from this EIS.

1.5.3.1 Gila River Water Issues

The Gila River is a perennial stream which becomes intermittent due to agricultural diversions during periods of low flow. The Dos Pobres/San Juan Project proposes to pump groundwater for mining purposes from a well field located approximately seven miles north of the Gila River. The available scientific evidence indicates that the cumulative effect of proposed pumping, stormwater management activities, and evaporation from the anticipated pit lakes would eventually reduce existing flows in the Gila River by an unmeasurable volume each year in perpetuity (details of the groundwater model results are provided in Sections 4.3.2.5.1 and 4.3.2.6.1). Project development is predicted to result in a reduction of the overall volume of water that would otherwise

reach the Gila River and become “appropriable” water (i.e., subject to appropriation and beneficial use). Under Arizona’s state water rights law, water rights pertain only to appropriable water.

Phelps Dodge has proposed mitigation measures (see Appendix F) to compensate for potential impacts to surface flows and/or senior appropriators in the Gila River. The proposed mitigation is to fallow farmlands with decreed water rights owned by PD on an alternate year schedule, thus decreasing consumptive use in the Gila River system by an amount no less than the predicted depletion in surface flows anticipated to occur as a result of development of the Dos Pobres/San Juan Project. (See Section 4.9 for a full description of the Alternate Year Fallowing Program, which provides for mitigation that is more than three times the current predicted impact.) The amount of land which must be fallowed to offset predicted surface flow impacts, and the duration of the mitigation, are tied to the Model, Monitor, and Mitigate Program (3M Program, see Section 3 of Appendix F). This program anticipates that alternate year fallowing would occur in perpetuity.

The Decree entered June 29, 1935, in the case entitled United States v. The Gila Valley Irrigation District, et al., Globe Equity No. 59, (D. Arizona 1935) (unreported), commonly called the Globe Equity No. 59 Decree, established the rights of the United States and other claimants to use water from the Gila River. Except for certain entities identified in the Globe Equity No. 59 Decree, the rights to use water from the Gila River were authorized for decreed lands solely for irrigation purposes. Among the beneficial owners of the rights decreed to the United States were the San Carlos Apache Tribe and the Gila River Indian Community. Although PD was not decreed rights to use water from the Gila River under the Globe Equity No. 59 Decree, PD has since purchased farmlands in the Safford Valley with decreed rights to waters of the Gila River.

Article XIII of the Globe Equity No. 59 Decree prohibits all parties holding decreed rights from "...diverting, taking, or interfering in any way with the waters of the Gila River or any part thereof, so as in any manner to prevent or interfere with the diversion, use, or enjoyment of said waters by the owners of prior or superior rights therein as defined and established by this Decree...." The Gila Water Commissioner, an appointee of the U.S. District Court, administers and enforces the Globe Equity No. 59 Decree.

In the State of Arizona, pumping groundwater on private lands outside of an Active Management Area (AMA; the Gila River basin is not an AMA) only requires filing a Notice of Intent to Drill a Well with the Arizona Department of Water Resources (ADWR). The source and amount of groundwater pumped are not regulated. A lawsuit filed in U.S. District Court, United States, et al. V. Gila Valley Irrigation District, No. Globe Equity No. 59 (JCC), challenges whether certain wells in the upper Gila River basin are pumping waters of the Gila River (i.e., pumping appropriable subflows of the river) and whether such pumping is allowed under the Globe Equity No. 59 Decree. The court has stayed further action on this suit pending resolution of other water resources issues by state courts. A general stream adjudication of the entire Gila River system and source, In re the General Adjudication of All Rights to Use Water in the Gila River System and Source, Maricopa County Nos. W-1 through W-4, ("the Gila River Adjudication") is pending in state court. Within this general adjudication is a concurrent Contested Case, *In Re: Subflow Technical Report, San Pedro Watershed*, in which the subflow issue as to state law will be decided, based on establishing the existence and boundaries of the saturated floodplain of the Holocene alluvium over which the San Pedro River flows. A decision in that Contested Case, now pending, may affect the related proceeding in the Globe Equity No. 59 case.

During public scoping for this EIS, concerns were raised as to whether the Project's proposed groundwater pumping and alternate year fallowing program were permissible under the Globe Equity No. 59 Decree and Gila River general stream adjudication. Because of those concerns and the ongoing adjudication and litigation related to Gila River water rights, BLM included a discussion in the DEIS (i.e., in this section) of the regulatory authorities pertinent to these issues. During public review of the DEIS, BLM received numerous comments that either disagreed with some of the statements made or provided additional information for BLM's

consideration. Two interpretations of the legal framework surrounding surface water and groundwater use in the Safford Valley were represented in these comments.

The first interpretation is that PD is prohibited by the Globe Equity No. 59 Decree from reducing surface flows in the Gila River (i.e., using “waters of the Gila River”) by pumping groundwater and by retaining stormwater on-site, some of which would otherwise flow into the Gila River. Also according to this interpretation, PD’s plans to mitigate for the predicted surface water impact by fallowing decreed lands on alternate years to reduce consumptive river water use would be a change in point of diversion and change in use from agriculture to mining, since the mitigation is for mining impacts. Furthermore, this interpretation posits that to do this under the Globe Equity No. 59 Decree, PD must seek authorization 1) from the Gila Water Commissioner to change the use and point of diversion and to pump groundwater; and 2) from U.S. District Court to pump groundwater if the Gila Water Commissioner does not authorize groundwater pumping. According to this interpretation, until these authorizations are secured, neither the BLM nor the COE can issue their respective decisions regarding this proposed Project.

According to the second interpretation, groundwater pumping by PD on their privately owned, non-decreed lands seven miles north of the Gila River is legal in the State of Arizona and is not subject to the Globe Equity No. 59 Decree, nor does it require permission by the Gila Water Commissioner, U.S. District Court, BLM, COE, EPA, San Carlos Irrigation District, ADWR (which only requires notification of the intent to drill a well), or any other entity. Under this interpretation, water in tributaries to the Gila River is also not subject to the Globe Equity No. 59 Decree; therefore, retention of stormwater on the mine site does not interfere with rights to water of the Gila River. Furthermore, while mining-related activities are expected to result in a reduction of Gila River surface flows by some small, but unmeasurable, amount each year, those activities would not interfere in any unlawful manner with the rights of senior appropriators. PD has elected to mitigate for the modeled impact on Gila River flows by reducing consumptive agricultural water use on its decreed agricultural lands by leaving some fields fallow on an alternate year schedule. This interpretation further posits that the proposed fallowing involves no change in use (river water is still being used for agricultural irrigation on farmed portions of the decreed fields) nor change in point of diversion (the location of the diversion remains the same); therefore, (a) no authorization for this proposed mitigation is required under the Globe Equity No. 59 Decree, (b) none of the proposed pumping, retention, or fallowing activities proposed for the Project requires authorizations from the Gila Water Commissioner or U.S. District Court, and (c) a decision by BLM, or COE, to approve the proposed Project would not cause a violation of the Globe Equity No. 59 Decree. Until the U.S. District Court decides United States, et al. v. Gila Valley Irrigation District, No. Globe Equity No. 59 (JCC), regarding whether certain wells in the Gila Valley are pumping waters of the Gila River, it may not violate current state water law to pump groundwater in the Safford Valley depending on the location of the wells. Moreover, it is uncertain whether groundwater wells located seven miles distant from the Gila River would be considered by the court to be pumping subflow, or appropriable waters, of the Gila River.

In a DEIS comment letter, BLM received information from the Gila Water Commissioner giving his opinion as to his authority with regard to the proposed pumping and stormwater diversions. The Commissioner wrote that "it has been the historical position of the Office of the Gila Water Commissioner that before the powers of enforcement granted to the Gila Water Commissioner under Article XII can be exercised, it must be established that waters of the Gila River are being interfered with by someone holding a decreed water right under Article V of the Decree" (comment letter to BLM from D. Weesner, GWC, December 14, 1998). According to the Commissioner, he "does not ... have any jurisdiction over the pumping planned by Phelps Dodge in connection with its proposed mining project ... [and] furthermore, he does not believe he can take any action to restrict or regulate the use of surface waters that might flow in the Gila River, at least until the United States District Court has issued its order for him to do so" (ibid.).

Regardless of pending water rights litigation, BLM has determined that it has authority to issue a ROD relating to proposed mining uses of public lands. Entities who wish to address water rights issues may do so in other forums; for example, the Globe Equity No. 59 Decree proceedings or the Gila River Adjudication. Given the complex legal framework surrounding the Project's use of surface water and groundwater resources, it is important to note that the respective decisions by BLM and COE in this NEPA environmental process do not constitute approvals or denials with respect to rights to the use of water resources. PD is aware of and has assumed the risk that its proposed water uses for the Dos Pobres/San Juan Project may result in PD's being drawn into water rights litigation, perhaps even by the United States.

1.5.3.2 Groundwater Issues

The available scientific evidence indicates that the proposed groundwater pumping activities may result in two effects on groundwater on the San Carlos Apache Reservation. First, there is a projected increase in the flow of deep regional groundwater away from portions of the Reservation southward towards the mining area (an existing condition that would be increased by an unmeasurable amount). Second, some lowering of the groundwater table may occur near the Reservation boundary, although the decrease is predicted to be nearly zero (see Sections 4.3.2.5.1).

After the DEIS was issued in 1998, two major developments occurred with respect to groundwater which have the potential to impact the Dos Pobres/San Juan Project. The first major development was the execution of the San Carlos Apache Tribe Water Rights Settlement Agreement ("Settlement Agreement") on March 30, 1999. This Settlement Agreement was executed by the Secretary of the Interior, the San Carlos Apache Tribe, and others. PD is not a party to the Settlement Agreement and is not bound by it. BLM, on the other hand, acts as an agent of the Secretary of the Interior and is bound by the Settlement Agreement. The Settlement Agreement states that:

> The Tribe and the United States acting on behalf of the Tribe shall have the permanent right to the on-Reservation diversion, use, and storage of all Groundwater beneath the Reservation, subject to the Groundwater Management Plan referred to in Section 3710(d) of the Act.

The Groundwater Management Plan referred to in the Settlement Agreement has not yet been drafted.

The second major development with respect to groundwater was a November 19, 1999, decision by the Arizona Supreme Court arising out of the Gila River general stream adjudication. The court held that:

> Federal reserved rights extend to groundwater to the extent groundwater is necessary to accomplish the purpose of a reservation.
>
> * * *
>
> A reserved right to groundwater may only be found where other waters are inadequate to accomplish the purpose of a reservation. To determine the purpose of a reservation and to determine the waters necessary to accomplish that purpose are inevitably fact-intensive inquiries that must be made on a reservation-by-reservation basis.

It is unknown at this time what the Gila River Adjudication court's determination will be with respect to a reserved right to groundwater for the San Carlos Apache Tribe. PD is aware that any such ruling may impact its ability to pump groundwater.

1.6 ISSUES RAISED DURING SCOPING

1.6.1 Scoping Process and Efforts

The BLM conducted two public scoping efforts for the Project. An initial scoping period ("Scoping I") was held in late fall of 1994 when the Proposed Action was solely a land exchange, and a second scoping effort ("Scoping II") was held in October 1996 after PD submitted an MPO (refer to Chapter 5, Coordination and Consultation, for a detailed description of the BLM's public and agency scoping efforts). In Scoping I, a total of 133 letters were received, in which 383 comments were identified and categorized. During Scoping II, a total of 77 letters were received, in which 233 comments were identified and categorized. Letters were received from private citizens and businesses; federal, state, and local agencies; Indian tribes or their representatives; non-governmental organizations and special-interest groups; and elected officials.

1.6.2 Summary of Scoping Issues

For the purpose of determining the scope of analysis for this EIS all issues raised during scoping were grouped into major categories and subcategories as listed in Table 1-3. To ease tracking of issues in this EIS, Chapter 3 and the majority of Chapter 4 in this document are organized according to this categorization of issues.

Table 1-4 summarizes the issues and comments that BLM determined are within the scope and analyzed in this EIS and assists the reader in tracking the analysis of issues through this EIS. Other sources for tracking issues include the Table of Contents and the Index. Whenever possible, comments listed in Table 1-4 were rephrased into neutral questions, but some are direct quotes from commentors. Section 1.6.2.2 lists the scoping issues that the ID Team has determined to be beyond the scope of analysis for this EIS and will not be considered further. Section 1.6.2.3 responds to other scoping issues or comments that are essentially requests for more information; these are also issues that will not be analyzed in this EIS.

1.6.2.1 Issues Beyond the Scope of this EIS

The ID Team determined that the following comments/issues are beyond the scope of analysis for this EIS; these issues will not be further analyzed in this document.

Table 1-3. Summary of Scoping Issues Organized by Major Categories and Subcategories

LAND USE
- Public Lands Management
- Access/Recreation
- Encumbrances
- Agriculture/Grazing
- Mineral Rights
- Surface Water Rights
- Noise/Vibration
- Visual Resources
- Hazardous Materials
- Foreseeable Uses

PHYSICAL RESOURCES
- Climate
- Air Quality
- Geology
- Soils
- Groundwater
- Surface Water (including Waters of the U.S.)

BIOLOGICAL RESOURCES
- Vegetation
- Wildlife
- Special Interest Species
- Biodiversity

CULTURAL RESOURCES
- Archaeological Resources
- Traditional Cultural Properties

SOCIOECONOMIC RESOURCES
- Population/Demographics
- Local/Regional Economy
- Infrastructure
- Transportation
- Quality of Life

INDIAN TRUST RESOURCES
- Indian Trust Assets

REALTY PROCESS
- Public Interest
- Appraisal Methods

REGULATORY/PERMITTING
- Environmental Protection Laws
- Operations Management
- Mining Plan of Operations

CONSULTATION AND COORDINATION
- NEPA Procedural Compliance
- Environmental Justice

1.6.2.1.1 Socioeconomic Resources

< The effects of the Project on the nation's trade imbalance and importation of copper

< The effects of the Project on the American standard of living

1.6.2.1.2 Regulatory/Permitting

< The relative environmental impacts of mining copper in the U.S. or abroad based on domestic vs. foreign environmental standards and regulations

< Whether the "Preferred Alternative [interpreted to mean the MPO] maximizes PD's efficiency and productivity"

1.6.2.2 Issues Addressed but Not Tracked in this EIS

The following section presents issues and comments (in italics) that the ID Team determined to be pertinent to the EIS but will not be tracked through the EIS. In general, these comments are mainly requests for information or questions about the NEPA or realty processes, and BLM determined that these comments warranted responses rather than analysis within this EIS. The ID Team's responses to these comments are organized by the major resource categories and subcategories as presented in Table 1-3.

1.6.2.2.1 Land Use

Why doesn't the BLM buy the offered lands using the Land and Water Conservation Fund?
This alternative method of acquiring the offered lands has not been pursued for the following reasons: 1) the offered lands have not been offered for sale, only for exchange; 2) BLM policy, as expressed in Instruction Memorandum No. 96-04 (BLM 1995a) and in the Safford District RMP, as amended, reaffirms previous BLM policy statements that identify land exchanges as the agency's preferred method of disposing of unwanted federal lands and acquiring desirable private lands; 3) purchasing the offered lands using the Land and Water Conservation Fund (LWCF) (assuming the lands were available for sale) would require the BLM to embark on a lengthy, uncertain, and competitive process to acquire the necessary funds; and 4) even if BLM's proposal to acquire these lands was selected in the national selection process, Congress could decide not to authorize the needed funds. For these reasons, BLM cannot and is not pursuing use of Land and Water Conservation Funds as a means to acquire the offered lands.

The San Carlos Apache Tribe disputes the southern boundary of its current reservation and claims that some lands proposed for exchange rightfully belong to the Tribe.
This comment reflects a longstanding issue between the San Carlos Apache Tribe (Tribe) and the federal government. The area of concern to the Tribe consists of about 40,000 acres of public and private land south of the current San Carlos Apache Reservation boundary in the vicinity of Lone Star Mountain eastwards toward Bonita Creek. This area includes a portion of selected lands as well as two of the offered properties currently proposed for exchange with PDSI in the Land Exchange Alternative, as described in Chapter 2, Section 2.2.2.1.1. The Tribe also raised this issue in 1991 in protest of the Safford District Resource Management Plan; in 1994 during scoping for the Morenci and Safford Land Exchange EISs; and to the Assistant Secretary for Indian Affairs in December 1994.

Table 1-4. Scoping Issues Analyzed for the Proposed Dos Pobres/San Juan Project and Sections in this EIS Where Each Issue Is Addressed

MAJOR CATEGORY	SUBCATEGORY		COMMENT	DISCUSSED IN SECTIONS
Land Use	Public Lands Management	C	What are the impacts to federal management of public lands?	3.2.1.1; 4.3.1.1; 4.4.1.1
		C	Would the proposed exchange result in isolating state land and/or non-PD private tracts?	3.2.1.1.1; 4.3.1.2; 4.4.1.2
		C	What are the impacts of the exchange on designated special management areas (i.e., Wilderness, Wild & Scenic Rivers, ACECs, NCAs)?	3.2.1.1.2; 4.3.1.1; 4.4.1.1
		C	What are the impacts from loss of BLM authority over mining activities if the lands are exchanged?	1.6.2.2.4; 3.2.1.1; 4.4.1.1
		C	Would surface water rights be exchanged?	2.2.2; 3.2.1.6; 4.4.1.6.1
	Access/Recreation	C	How would public access and recreation use (hunting, rockhounding, hikers, outfitters, etc.) of public lands be affected?	3.2.1.2; 4.3.1.2; 4.4.1.2
		C	How would public access on San Juan Mine Road to the Gila Mountains and to the Melody Claims be impacted?	3.2.1.2; 4.3.1.2; 4.4.1.2
		C	What are the impacts of the Project on the historic Safford-Morenci Trail?	3.2.1.2.2; 4.4.1.2
	Agriculture/Grazing	C	What are the impacts to prime/unique farmlands?	3.2.1.4; 4.3.1.4; 4.4.1.4
		C	What are the impacts to cattle grazing and allottees?	3.2.1.4; 4.3.1.4; 4.4.1.4
	Encumbrances	C	What are the impacts to existing rights-of-ways and easements, including the telephone easements on the Musnicki property?	3.2.1.3; 3.3.1.2.1; 4.3.1.3; 4.4.1.3
	Mineral Rights	C	What are the impacts to the state's mineral estate in Section 32, T5S, R27E?	3.2.1.5; 4.3.1.5; 4.4.1.5
		C	What are the impacts to third-party mining claims (i.e., Melody Claims)?	3.2.1.5; 4.3.1.5; 4.4.1.5
		C	Would mineral rights of the selected and offered lands also be exchanged?	2.2.2; 3.2.1.5; 4.3.1.5; 4.4.1.5
	Surface Water Rights	C	Would surface water rights be exchanged?	2.2.2; 3.2.1.6; 4.3.1.6; 4.4.1.6
	Noise/Vibration	C	What are the impacts from blasting on the Mount Graham observatories?	3.2.1.7; 4.3.1.7; 4.4.1.7
	Visual Resources	C	Will the Project affect nighttime visibility for the Mt. Graham observatories?	3.2.1.8.5; 4.3.1.8; 4.4.1.8
		C	Will the Project affect the visual quality of the Gila Mountains?	3.2.1.8; 4.3.1.8; 4.4.1.8

Table 1-4 (continued). Scoping Issues Analyzed for the Proposed Dos Pobres/San Juan Project and Sections in this EIS Where Each Issue Is Addressed

MAJOR CATEGORY	SUBCATEGORY		COMMENT	DISCUSSED IN SECTIONS
	Hazardous Materials	C	Would the Project affect hazardous materials?	3.2.1.9; 4.3.1.9; 4.4.1.9
Physical Resources	Climate	C	What are the impacts to microclimate?	3.2.2.1; 4.3.2.1; 4.4.2.1
	Air Quality	C	What are the impacts to air quality to the region and to the San Carlos Apache Reservation from emissions from criteria pollutants, including acids using in leaching?	3.2.2.2; 4.3.2.2; 4.4.2.2
		C	Would any Class I airsheds within 100 km of the Project be impacted?	3.2.2.2.2; 4.3.2.2; 4.4.2.2
		C	Does the Project conform with the State Implementation Plan?	4.3.2.2; 4.4.2.2
	Geology	C	What is the mineral potential of the selected lands?	3.2.2.3.2.
	Soils	C	What are the impacts on soils?	3.2.2.4; 4.3.2.4; 4.4.1.4
	Groundwater	C	What are the impacts to groundwater quality?	3.2.2.5; 3.2.2.5.1; 4.3.2.5.2; 4.4.2.5.2
		C	What are the impacts to groundwater quantity?	3.2.2.5.1; 4.3.2.5.1; 4.4.2.5.1
	Surface Water	C	How would the Project affect water quality of the Gila River?	Table 4-40; 4.3.2.6.2
		C	Would the Project affect water quantity of the Gila River?	3.2.2.6; 4.3.2.6.1
		C	How would erosion potential and sedimentation be impacted?	4.3.2.4; 4.4.2.4
		C	How would drainage patterns be impacted?	2.1.2.3.2; 3.2.2.6.4; 4.3.2.6.1; 4.3.2.6.4; 4.3.2.6.5
		C	How will the Project affect floodplains (100-year frequency floods)?	3.2.2.6.4; 4.3.2.6.4
		C	Will the mine pits fill with water, and if so, what would the water quality of these lakes be?	3.2.2.6.3; 4.3.2.6.3
		C	What are the impacts to “waters of the U.S.” (including streams and washes)?	3.2.2.6.5; 4.3.2.6.5
Biological Resources	Vegetation	C	What are the impacts of the Project on riparian areas?	3.2.2.6.5; 3.2.3.1.2; 4.3.2.6.5; 4.3.3.1; 4.4.3.1
		C	Will the Project impact wetlands?	3.2.2.6.5; 3.2.3.1.2; 4.3.2.6.5; 4.3.3.1; 4.4.3.1
	Wildlife	C	What are the impacts of the Project on wildlife and wildlife habitats?	3.2.3.1; 3.2.3.2; 4.3.3.1; 4.3.3.2; 4.4.3.2
		C	What are the impacts to wildlife (i.e., migratory birds, bats) from potential exposure to solution ponds/process waters?	4.3.3.2; 4.3.3.3
		C	Will the Project impact big-game species?	3.2.3.2.1; 4.3.3.2; 4.4.3.2

Table 1-4 (continued). Scoping Issues Analyzed for the Proposed Dos Pobres/San Juan Project and Sections in this EIS Where Each Issue Is Addressed

MAJOR CATEGORY	SUBCATEGORY		COMMENT	DISCUSSED IN SECTIONS
	Special Status Species	C	Would special interest species be impacted by the proposed Project?	3.2.3.3; 4.3.3.3; 4.4.3.3
		C	Will the Project impact state-protected plant species?	3.2.3.3.1; 4.3.3.3; 4.4.3.3
	Biodiversity	C	Will the Project adversely affect biodiversity in the region?	3.2.3.4; 4.3.3.4; 4.4.3.4
Cultural Resources	Archaeological Resources	C	What are the impacts to historic and prehistoric resources?	3.2.4.1; 4.3.4.1; 4.4.4.1
		C	What are the cultural resources and their cultural affiliations on the selected lands?	3.2.4; 4.3.4.1; 4.4.4.1
	Traditional Cultural Properties	C	What are the impacts to traditional cultural properties?	3.2.4.2; 4.3.4.2;4.4.4.2
Socioeconomic Resources	Population/ Demographics	C	What are the impacts to the local population and demographics?	3.2.5.1; 4.3.5.1; 4.4.5.1
		C	What are the impacts of the Project on minority populations and/or low income groups?	3.2.5.1.1; 5.2
	Economy	C	What are the impacts to the local and regional economy?	3.2.5.2; 4.3.5.2; 4.4.5.2
		C	What are the impacts to Graham County's direct and indirect employment?	3.2.5.2.1; 4.3.5.2.1; 4.4.5.2.1
		C	Will the Project impact nearby Indian communities? If so, how?	3.2.5.1.1; 4.3.5.2; 4.3.5.3; 4.3.6
		C	How would the Project affect the local (county), state, and federal tax bases?	3.2.5.2.3; 4.3.5.2.3; 4.4.5.2.3
	Infrastructure	C	How would the Project affect Graham County infrastructure (schools, medical facilities, utilities, etc.)?	3.2.5.3; 4.3.5.3; 4.4.5.3
	Transportation	C	How would the Project affect local transportation and traffic?	2.1.2.3.5; 2.1.2.3.6; 3.2.5.4; 4.3.5.4; 4.4.5.4
Indian Trust Resources	Indian Trust Assets	C	What are the impacts to Indian trust assets, including perfected and decreed water rights held by tribes from water use for mining?	3.2.6; 3.2.2.6; 4.3.6; 4.4.6; 4.3.2.6.1
Consultation and Coordination	Environmental Justice	C	What efforts are being made to comply with environmental justice (vis-a-vis minorities, low-income, tribes)?	5.2

About a year after creation of the San Carlos Apache Reservation in 1872, subsequent Executive Orders in 1873 and 1874 shifted the southern and eastern boundaries of the reservation, thereby returning some of the former reservation land to the public domain. In 1883, the General Land Office (GLO) issued Special Instructions to surveyor Paul Riecker to survey the new southern and eastern boundaries of the reservation. This survey established the current San Carlos Apache Reservation's southern boundary location as depicted in Figure 1-1. In response to the San Carlos Apache Tribe's concerns, the location of the Reservation boundary was reviewed in 1919 and in 1936 by the federal government. In 1919, the boundary location was reviewed by the Commissioner of the GLO and approved by the First Assistant Secretary of the Department of the Interior; in 1936, the location was again reviewed by the Office of the Solicitor and approved by the Acting Secretary of the Department of the Interior. Both reviews upheld the current boundary location as defined by the Riecker survey, which included, but were not limited to, lands covered in the Executive Orders of 1873 and 1874. The Commission awarded the San Carlos and White Mountain Apache tribes a final settlement of $4,900,000 in 1972 as fair compensation for all aboriginal lands that previously had been taken from the tribes without compensation, including all lands within the disputed area. Both the San Carlos and White Mountain Apache tribes agreed to accept this settlement by means of resolutions passed unanimously by both tribal councils.

The Indian Claims Commission was set up in 1946 by Congress to address longstanding land and treaty grievances of various tribes. In June 1969, the Commission found that the San Carlos and White Mountain Apache tribes were entitled to recover the "fair market value of their aboriginal title lands," which included, but were not limited to, lands covered in the Executive Orders of 1873 and 1874. The Commission awarded the San Carlos and White Mountain Apache tribes a final settlement of $4,900,000 in 1972 as fair compensation for all aboriginal lands that previously had been taken from the tribes with out compensation, including all lands within the disputed area. Both the San Carlos and White Mountain Apache tribes agreed to accept this settlement by means of resolutions passed unanimously by both tribal councils.

When the San Carlos Apache Tribe raised the boundary dispute again in 1991 in its protest of the Safford District RMP, BLM acknowledged "the concern on the part of the San Carlos Apache Tribe over the land ownership in the Bonita Creek and mineral strip areas" (BLM's Partial Record of Decision, 1992, p.14). However, in correspondence with then-Acting Tribal Chairman Raleigh Thompson, then-Arizona BLM State Director Lester Rosenkrance stated that after three separate governmental reviews of documentation pertinent to this issue (in 1919, 1936, and 1992), "we [BLM] must agree that the position of the southerly boundary of the San Carlos Indian Reservation, as identified by the monuments on the ground and surveys on file, as determined by the General Land Office and affirmed by the Secretary of the Interior, does reflect the true location of the boundary" (Rosenkrance to Raleigh Thompson, 1992, p. 4). By this, BLM meant that, in its judgment, the existing boundary conforms to the original survey instructions issued by the General Land Office on May 19, 1883.

It is BLM's current position that this issue has been repeatedly reviewed and addressed adequately by BLM and other federal entities; that the Tribe accepted fair compensation for all disputed aboriginal lands; and that no new information concerning the southern boundary of the reservation has been provided by the Tribe or the Bureau of Indian Affairs that warrants yet another review of the issue. Therefore, this issue will not be carried forth for further consideration in this EIS.

What are the foreseeable uses of the Lone Star area?
Section 2.2.2.1.2 in Chapter 2 describes the foreseeable uses of the selected lands, including the Lone Star area, as identified by PDSI.

What are the foreseeable uses of the offered lands with regard to development, grazing, and mineral entry?
Please refer to Chapter 2, Section 2.2.2.1.3 for a description of the foreseeable uses of the offered lands with regard to these land uses.

1.6.2.2.2 Socioeconomic Resources

Will the Project affect Safford's customs, culture, and small-town lifestyle?
This question is a quality-of-life issue of a highly subjective nature. The ID Team has determined that this issue should be addressed more directly through analysis of impacts to specific socioeconomic resources of the community that may contribute to an individual's quality of life in Safford. These resources include population and demographics, employment, taxes, traffic, housing, and infrastructure, all of which are addressed in this document. Individual readers can then determine whether the quality of life in Safford, as influenced by these community resources, will be impacted by the Project.

1.6.2.2.3 Realty Process

Will the mineral potential value of the selected lands be considered in the appraisals?
Yes. The mineral values of the selected lands are listed in Chapter 3 and are but one of the many variables considered in the land appraisals. The mineral values are derived from a BLM-approved mineral potential evaluation completed by a third-party contractor. It should be noted that all of the economic orebody for the Dos Pobres mine and some for the San Juan mine are located on private lands already owned by PD.

Is the exchange fair in terms of resource values and acreage?
There are numerous federal regulations that the BLM must follow in considering a land exchange alternative to ensure that it is fair in terms of dollar values and in the public's interest (see Table 1-1). On the basis of the data and analyses presented in this EIS, the authorizing officer at the BLM will decide whether the public interest would be served by the exchange alternative(s) and the BLM's Record of Decision will reflect this consideration.

Are land exchanges with such acreage disparities common?
Yes, disparities in acreages are more common than not for federal land exchanges. The regulations governing federal land exchanges require that, among other things, the selected and offered lands be of equal monetary value. It is rare that any two parcels of land of equal acreage but with different resources and/or different locations would be appraised at the same dollar value. For this Project, the acreage ratio of selected lands to offered lands is about 4.4 to 1. Given that the selected lands are located in a rural area and adjacent to private lands owned by PD, and that some of the offered lands, such as Tavasci Marsh and the properties in the Sonoita Valley Acquisition Planning District, are located in or near areas that are desirable or that have high potential for residential/suburban development, this acreage disparity is not unexpected in order for the monetary values of the selected and offered lands to be equal.

Who will conduct the appraisals?
As individual offered properties as well as the selected lands must be appraised, both contract and BLM staff appraisers completed the appraisals for this project. All appraisers are "Certified General Appraisers" under Arizona law. All of the appraisals were reviewed by an independent BLM review appraiser to ensure adherence to standards and conformance with federal regulations.

What appraisal methods will be used to calculate the monetary value of the lands?
Appraisals completed by the BLM are regulated by federal laws, including the Federal Financial Institutions Reform, Recovery, and Enforcement Act of 1988 and Uniform Relocation Assistance and Real Property Act of 1970; appraisals are conducted under guidelines contained in the Uniform Appraisal Standards for Federal Land Acquisitions (Interagency Land Acquisition Conference 1992). These laws and regulations ensure that standardized procedures are used to determine the monetary values of the selected and offered lands.

In determining the market value of both the selected and offered lands, it is important to note that not all acres are created equal—for instance, an acre in downtown Phoenix does not have the same monetary value as an acre in downtown Safford. Among other variables, the appraisals consider the current and potential uses of the lands; the sales of similar types of land under arms-length circumstances; and the mineral potential of lands in which the mineral estate is being exchanged.

1.6.2.2.4 Regulatory/Permitting

What regulatory requirements (e.g., NEPA) would there be for future mining (i.e., Lone Star) if the land becomes private?
Loss of BLM administration and public ownership of the selected lands through an exchange does not mean loss of federal and/or state jurisdiction over mining or mining-related activities. Regardless of whether possible future mining activities at Lone Star or for sulfide operations at Dos Pobres occur on public or private lands, PDSI must secure a number of federal and state authorizations to implement such mining or mining-related activities. Table 1-1 provides a summary of these authorizations. Furthermore, many of these state-required permits, such as the Clean Air Act Title V air quality permit (ADEQ jurisdiction), the Aquifer Protection Permit (ADEQ jurisdiction), and the Arizona Mined Lands Reclamation requirements (State Mine Inspector's jurisdiction), provide for public notification and review prior to issuance of the permits, as well as review and reauthorization for any proposed major modifications of the mine activities for which a permit has been issued.

For mining activities on private lands in Arizona, the loss of BLM jurisdiction has two implications for the applicability of NEPA: 1) NEPA analysis *of an MPO by the BLM* would not apply; and 2) state reclamation requirements would replace federal reclamation requirements. Once BLM-administered public lands pass into private ownership, BLM is no longer responsible for authorization of the MPO under 43 CFR 3809 or NEPA analysis of an MPO. However, in order to implement mining on private lands, specific activities in a proponent's mine plan must be authorized by other federal agencies, such as the COE, which would continue to have jurisdiction over aspects of the proposed mining under the Clean Water Act. Some of these permit approvals constitute major federal actions that would also be subject to NEPA analysis. In those instances, a federal agency other than the BLM would conduct NEPA analysis of the proposed mine activities within its jurisdiction even though the land is privately owned. Therefore, it is the loss of BLM authority in particular, and not federal authority in general, that is the consequence of the proposed land exchange.

With regard to the NEPA analysis of any future development of the Lone Star and Dos Pobres sulfide orebodies if the land exchange is approved (i.e., the lands become private), the currently known foreseeable uses, when formally proposed, would be subject to Clean Water Act permitting under the jurisdiction of the COE. With regard to state versus federal reclamation requirements, Table 4-27 provides a comparative summary of the similarities and differences between federal and state requirements.

"BLM should require PD to demonstrate they have practiced sound environmental management while operating the Morenci, Dos Pobres, and Lone Star mines."
Environmental standards have changed significantly over the 30+ past years. Management practices that were considered acceptable in the past may no longer be adequate or permissible by today's standards. Thus, the decision of whether to authorize PDSI to implement its proposed MPO on public lands will be based on Phelps Dodge's ability to demonstrate to the BLM and its cooperators that they can meet current, applicable environmental standards and will operate the Project in a prudent manner that prevents undue and unnecessary degradation of the land, as required by federal surface management regulations (43 CFR 3809). In addition, PDSI must demonstrate that they have met the environmental permitting standards of the state and other federal agencies, including the ADEQ and COE. Considering the array and extent of environmental permitting and monitoring requirements involved in the permitting of a new mine on public or private lands and PD's long presence in the region, a review of past management practices will not be tracked as an issue in this EIS.

What measures are proposed for compliance monitoring for permits and reclamation? For monitoring the effectiveness of mitigation measures? What measures are proposed for compliance with NPDES and stormwater permit requirements?
Compliance monitoring is required by several laws and/or for the major permits to be issued for this Project: Air Quality Operating Permit; Aquifer Protection Permit; AZPDES permit; solid and hazardous waste laws and regulations, including the Emergency Planning and Community Right-to-Know Act (EPCRA); and Arizona Mined Lands Reclamation Act. Monitoring activities for these permits and reclamation are briefly summarized below. Measures for monitoring the effectiveness of habitat mitigation and surface water quantity mitigation measures are identified in Appendix F.

< **Air Quality Operating Permit.** ADEQ has the responsibility to require adequate monitoring, record-keeping and reporting for all permitted sources. Where an applicable requirement does not already exist, ADEQ is required to establish the appropriate monitoring, record-keeping, and reporting requirements. The crushers, screens, conveyor transfer points, and ore bins associated with the Crushing/Material Handling System will be subject to federal New Source Performance Standards (NSPS) which require performance testing to ensure compliance with applicable particulate emission standards. Additionally, ADEQ will require, through conditions in the air quality operating permit, that PDSI comply with monitoring, record-keeping, and reporting requirements for various other fugitive and point sources, including sources not subject to NSPS. ADEQ conducts periodic random inspections of permitted facilities to ensure compliance with permit requirements.

< **Aquifer Protection Permit (APP).** Under the APP Program, ADEQ requires periodic monitoring of wells located down-gradient from potentially discharging facilities. Analytical results of water quality sampling are submitted to ADEQ at a frequency determined by the agency in their permit. Other monitoring results, such as leak detection inspections of process ponds, are also included in the monitoring reports. ADEQ conducts periodic inspections of facilities permitted under the APP Program.

< **AZPDES (formerly NPDES) Permit.** Facilities with CWA Section 402 (AZPDES) point source permits are required to monitor and report the water quality and volume of surface water discharges from specified outfalls to "Waters of the United States." These reports are submitted to ADEQ on a monthly basis. Additionally, ADEQ conducts periodic compliance inspections of AZPDES-permitted facilities.

< **Solid and Hazardous Waste.** PDSI will be required to comply with the federal Resource Conservation and Recovery Act (RCRA) and state laws and regulations regulating solid and hazardous waste. These laws and regulations include requirements for handling, storage,

transportation, and disposal of hazardous wastes, as well as mandatory record-keeping, reporting, and personnel training requirements. Additionally, EPA and ADEQ conduct periodic hazardous waste compliance inspections of facilities.

< **Emergency Planning and Community Right-to-Know Act.** PDSI will be subject to the Emergency Planning and Community Right-to-Know Act (EPCRA) which requires, under Section 313, that facilities in certain Standard Industrial Codes (SIC) meeting threshold requirements submit to EPA and the state-designated agency an annual Toxic Chemical Release Inventory (TRI) Reporting Form (Form R). Facilities are required to report annual chemical use, releases and other waste management activities of Section 313 chemicals, provided that certain activity thresholds are met, on the TRI Form R report. Section 313 includes a list of over 650 chemicals and chemical categories.

Other sections of EPCRA require:

C Notification to the State Emergency Response Commission (SERC) and Local Emergency Planning Committee (LEPC) if a facility has one or more “extremely hazardous substances” present on site in quantities greater than Threshold Planning Quantities (TPQs) established by EPA (Section 302-303);

C Immediate notification to the SERC and LEPC of the release of any “extremely hazardous substance” or any hazardous substance under CERCLA in amounts at or above the specified Reportable Quantities that EPA establishes for each substance (Section 304);

C Submission to the SERC, LEPC and local fire department a list of Material Data Safety Sheets (MSDSs), or copies of MSDSs, for any OSHA “hazardous chemical” present on site in quantities greater than 10,000 pounds (Section 311);

C Submission of other hazardous chemical inventory information (Section 312).

< **Arizona Mined Lands Reclamation Act.** The Arizona Mined Lands Reclamation Act (AMLRA) provides that the Arizona State Mine Inspector may enter and inspect any mining facility subject to AMLRA. Facilities subject to the AMLRA are also required to submit detailed annual reclamation status reports to the State Mine Inspector.

What measures are proposed in the Project’s pollution and spill prevention plans?
PD must develop, keep on-site, and make available for agency review a stormwater pollution prevention plan as part of its AZPDES permit compliance, as well as a spill prevention control and countermeasure plan as required by 40 CFR Part 112 Oil Pollution Prevention for the storage of petroleum products above a threshold amount. At this time, these measures are being developed as part of Project’s environmental compliance. Pollution and spill prevention measures generally include best-management practices for erosion and sediment control, waste disposal control, and reducing the risk of spills or other accidental exposures of material and substances to stormwater runoff.

What level of reclamation bonding will be required?
A discussion of reclamation bonding is provided in Chapter 2, Section 2.1.2.4.6, Reclamation Costs and Bonding.

What measures are proposed to address mine waste and reclamation?
These measures are described in Chapter 2 in Section 2.1.2.3.4, Waste Management, in Section 2.1.2.3.5, Hazardous Materials Storage, Handling, and Transportation, and in Section 2.1.2.4, Closure and Reclamation Measures.

What is the acid-generating potential of stockpiles and pit walls and what preventative measures are proposed to protect groundwater and surface water from acid-generation?
Acid-base accounting studies conducted on composite samples of development rock indicated that there is very low potential for acid-generation from development rock stockpiles (see Section 2.1.2.1.6 for discussion of acid-base accounting studies) and from pit walls (Water Management Consultants 2002). Please refer to Chapter 2, Sections 2.1.2.3.2 and 2.1.2.3.3 for description of surface water and groundwater protection measures, respectively.

What is the projected water use of the mine?
PDSI projects its water needs at an average of 3,430 gallons per minute (5,533 af/yr) throughout the 16-year life of the Project. For more information, refer to Chapter 2, Section 2.3.1.4.1, Water Demand and Supply.

What would be the water source for the mine?
Groundwater pumped from a volcanic aquifer source has been identified as the Project's water source. For more information, refer to Chapter 2, Section 2.3.1.4.1, Water Demand and Supply.

What is the potential impact to pit lake chemistry from using ammonium nitrate and fuel oil (ANFO) in the blasting process?
No impacts are expected to pit lake chemistry as a result of using ANFO as the amount of the explosive used is calculated to be entirely consumed during the blast (K. Byrne, Southwest Energy, pers. comm.). It is possible that minute amounts of unconsumed ANFO may remain as residue after blasting, but since such residue would eventually be mined out of the pit(s) along with leach ore and development rock, it is expected that there would not be any ANFO left in the pit to affect pit lake chemistry.

1.6.2.2.5 Consultation and Coordination

"BLM and PD are colluding to facilitate an unfair exchange."
There have been no secret meetings or agreements between the BLM and PD for deceitful or fraudulent purposes (i.e., collusion).

CHAPTER 2

ALTERNATIVES CONSIDERED

This chapter presents the alternatives considered for the Dos Pobres/San Juan Project. Alternatives that were considered but not studied in detail are also described. The permitting agencies' preferred alternatives are identified. A summary table comparing environmental impacts of each alternative is provided at the end of this chapter.

For the purposes of this EIS, different agencies have permitting authority over the various alternatives analyzed in the EIS. For example, a land exchange alternative is only relevant to the actions and decisions of the Bureau of Land Management (BLM), the lead agency (refer to Figure 1-3). Action required by the Corps of Engineers (COE) focuses on mining activities described in the proposed Mining Plan of Operations (MPO) and alternatives developed for that action during NEPA and Clean Water Act (CWA) review.

Because the decisions relevant to the decision-making agencies pertain to either mining-related activities or a land exchange, two "sets" of alternatives have been developed and are analyzed in this EIS. This organization is intended to clarify for the reader the respective decisions to be made by the BLM and the COE regarding the proposed Project, in light of each agency's specific land management and/or permitting authority. Each set of alternatives is presented separately. The first set, the Mine Plan Alternatives Set, presents the proposed Mining Plan of Operations (MPO) for the Project and alternative mine plans[7] developed by Phelps Dodge Safford, Inc. (PDSI). The second set, called the Land Exchange Alternatives Set, presents a land exchange alternative that is based upon PDSI's original land exchange proposal made in 1994 to the BLM and since modified. Each set includes a No Action alternative that pertains to the specific agency decisions available within that set of alternatives. The No Action alternative is required by NEPA to provide a baseline against which impacts from action alternatives can be compared.

The only agency that can act upon the Land Exchange Alternatives Set is the BLM. If BLM selects the land exchange alternative, the result of this decision would be that PDSI would acquire ownership of the BLM-administered public lands identified in the land exchange alternative, including lands proposed for mining in their MPO. Under this scenario, BLM would not authorize or oversee an MPO since BLM has no authority to regulate mining on private lands (see Figure 1-3). If BLM selects the No Land Exchange (no action) alternative under the Land Exchange Alternatives Set, BLM must then select an alternative from the Mine Plan Alternatives Set to fulfill Section 3809 requirements under FLPMA. Regardless of the BLM decision(s), the permit decision of the COE pertains only to activities described in one of the alternatives in the Mine Plan Alternatives Set, including a No Action (no permit) alternative.

As noted above, federal oversight of mining activities does not necessarily require a BLM presence. If BLM selects the land exchange alternative, it would not oversee the proposed mining, but PDSI's mining activities would still be subject to federal oversight through the COE's jurisdiction under Section 404 of the CWA, the Mine Safety and Health Administration (MSHA), and various other federal regulations listed in Table 1-1 in Chapter 1. Arizona Department of Environmental Quality would continue to oversee compliance with the Arizona Aquifer Protection Permit (APP) Program, Section 402 (Arizona Pollutant Discharge Elimination System or AZPDES), and Clean Air Act air quality permit. The only other change in jurisdiction under the land

[7] The COE, pursuant to 40 CFR § 230, completes an analysis of alternatives to identify the least environmentally damaging practicable alternative.

exchange would be that the State Mine Inspector's Office and not the BLM, would oversee reclamation for mining.

2.1 MINE PLAN ALTERNATIVES SET

In this set, two mine plan alternatives are described: the Proposed Action (also called the Project or Alternative I in Appendix A) and the Partial Backfill of San Juan alternative (Alternative C in Appendix A).

2.1.1 Formulation of Mine Plan Alternatives

The formulation of alternatives to the proposed Mining Plan of Operations has been based upon information provided by PDSI, BLM, COE, and EPA. The processes underlying the identification of MPO alternatives analyzed in this EIS are summarized below.

As part of CWA Section 404 permitting compliance, the COE conducts an analysis of alternatives[8] to identify practicable alternatives to the project which minimize impacts to waters of the United States. Practicable alternatives are defined as those that are "available and capable of being done, taking into account cost, existing technology, and logistics, in light of project purposes" (40 CFR§ 230.10(a)(2)). The COE's 404(b)(1) alternatives analysis is provided as Appendix A to this EIS.

NEPA requires that all reasonable alternatives be considered. Two MPO alternatives identified in the COE's 404(b)(1) alternatives analysis (including the Proposed Action) as practicable have been carried forth in this EIS under the Mine Plan Alternatives Set (SWCA 1997c). These alternatives, and other reasonable alternatives, such as the land exchange alternative, developed to meet the Project's purpose and need, are further analyzed herein using additional evaluation criteria developed to address the issues raised during scoping (see Table 1-4 in Chapter 1). The two mine plan alternatives, one of which is the Proposed Action, are described in Sections 2.1.2 and 2.1.3.

2.1.2 Proposed Action Alternative

The following description of the Proposed Action, the Dos Pobres/San Juan Project, has been updated based on a revised Mine Plan of Operations submitted by Phelps Dodge to the BLM in August 2001 (PDSI 2001; see Section 1.3 for Project History and Background). To assist the reader in identifying the meaningful changes that have been made since the DEIS, Table 2-1 summarizes the key differences between the MPO described in the DEIS and the current version.

The Dos Pobres/San Juan Project (the Project) is an integrated mining operation that includes the development of two open pit mines, a crushing and material handling system, a common Solution Extraction/Electrowinning (SX/EW) processing facility, and shared infrastructure and support facilities. Figure 2-1 provides a detailed site
plan of the proposed Project. Based upon the current Mining Plan of Operations, the Project will produce approximately 2.9 billion pounds of salable copper over the Project's estimated 16-year mine production life.

[8] This analysis is referred to as a 404(b)(1) alternatives analysis pursuant to 40 CFR § 230.

Table 2-1. Differences between the Original MPO in the DEIS and the Revised MPO in the FEIS, and Expected Consequences of the Changes

Original MPO in DEIS	Revised MPO in FEIS	Consequences of MPO Revision
The crushing facility consisted of a two-stage crushing system that reduced ROM ore to a 1-inch nominal size. It was located on the northeast corner of the leach pad.	The crushing facility now consists of a three-stage crushing system and an agglomeration system that reduces ROM material to a nominal 0.5-inch minus size, resulting in increased leaching efficiency. It is located at the northern end of the leach pad, south of the Dos Pobres pit.	Increased leaching efficiency (1) decreases the amount of sulfuric acid used, stored, and trucked to the project site; (2) decreases the number and/or size of mixer-tanks and sulfuric acid and process solution storage tanks on-site; (3) decreases the amount of water used by the project; i.e., groundwater pumped (5,533 af/yr rather than 6,891 af/yr, thus further reducing the estimated potential impact on groundwater supply, Gila River flows, and San Carlos Apache Reservation groundwater, and (4) decreases the volume of PLS circulating through the pad (20,000 gpm rather than 35,000 gpm). Since the excess process solution impoundment and stormwater impoundment have not been correspondingly reduced in size, the capacity to contain process solutions and runoff from storm events is even greater than it was in the original conservative design.
Crushed ore would have been moved by conveyor from the crushing plant to two, 1,000-ton-capacity truck loadout bins. Concentrated sulfuric acid would have been added to the ore stream as it was transferred to the load-out bins to precondition the ore.	Crushed ore will be moved by conveyor from the crushing plant to an agglomeration facility located at the northern edge of the leach pad. The agglomeration drums will tumble the crushed ore with sulfuric acid and water to agglomerate fines to the larger rock particles, thus producing a more homogeneous product with uniformly wetted particles. This results in higher copper extraction and improved solution flow through the leach ore.	
Sulfuric acid consumption rates over the life of the Project were estimated to average about 2,500 tpd (about 312,500 gpd), requiring approximately 94 truck loads of acid per day, on average.	Sulfuric acid consumption rates over the life of the Project are estimated to average about 1,600 tpd (about 200,300 gpd), requiring approximately 70 truck loads of acid per day, on average.	Reduced usage of sulfuric acid reduces the number of acid delivery trucks, which lowers the risk of spills and contamination both on-site and en route.
Preconditioned crushed ore would have been loaded onto haul trucks for transport to, and placement on, the leach pad.	Agglomerated crushed ore will be delivered to the leach pad by overland conveyor and placed onto the pad by a stacker system.	Use of conveyor rather than trucks for transfer of crushed ore to the leach pad reduces fugitive dust, vehicle emissions, fuel usage, and nighttime lighting, but increases use of electricity (however, the proposed electrical supply is still sufficient).

Table 2-1, continued. Differences between the Original MPO in the DEIS and the Revised MPO in the FEIS, and Expected Consequences of the Changes

Original MPO in DEIS	Revised MPO in FEIS	Consequences of MPO Revision
Water demand over the 16-yr Project ranged from 2,059 to 8,041af/year and averaged 6,895 af/yr of groundwater pumping.	Water demand over the 16-yr Project averages 5,533 af/yr, a nearly 20% reduction. Range is from 2,048 to 6,604 af/yr.	Reduced groundwater pumping reduces overall predicted long-term surface flow and groundwater impacts.
On-site storage tanks included one, 1-million-gal PLS tank; 16 mixer-settler tanks in the SX plant; two, 1-million-gal raffinate tanks; and one, 1-million-gal runoff collection tank in the tankfarm. Concentrated sulfuric acid was stored in one, 335,000-gal tank at the SX/EW plant, and in two, 1,330,000-gal tanks near the crushing plant.	The PLS tank has been eliminated. Storage tanks now include 6 mixer-settler tanks in the SX plant; one, 426,000-gal raffinate tank; and one, 1.9-million-gal runoff collection tank in the tankfarm. Concentrated sulfuric acid will now be stored in one, 10,000-gal tank at the SX/EW plant, and in two, 312,500-gal tanks near the crushing plant.	The reduction in the number and size of processing and storage tanks decreases the size of the combined footprint of the SX/EW plant and tankfarm.
Two raffinate booster stations were planned, the second during later years of leaching operations.	One raffinate booster station may be required during later years of leaching operations.	This design change would slightly reduce the area of surface disturbance.
The mine fuel station was located between the Dos Pobres and San Juan pits.	The mine fuel station will be located south of the Dos Pobres Mine, northwest of the crusher facility.	No effect; however, other operating changes (conveyor/stacking system) will reduce fuel usage and deliveries.
Maximum height of lifts on the leach pad was 25 feet; maximum height of the pad as a whole was approximately 450 feet.	Maximum height of lifts on the leach pad will be 40 feet, but maximum height of the pad as a whole will remain approximately 450 feet.	No effect.
20% of the top surfaces of the leach pad and development rock stockpiles was to be revegetated in discrete patches (microsites). Microsites were to be capped with 12 inches of Basin Fill sediment or comparable growth media and seeded with native species.	100% of the top surface of the leach pad and development rock stockpiles will be capped with 12 inches of Basin Fill sediment or comparable growth media and revegetated (seeded) with native species.	Revegetion of the entire top surface of the leach pad and development rock stockpiles will occur sooner than if only 20% of the top surfaces were covered by revegetated microsites.

Project production will include the mining of approximately 626 million tons of oxide and sulfide leach ore and 385 million tons of lower grade and unmineralized material referred to herein as development rock. Total minable material amounts to approximately 1.01 billion tons resulting in a 0.6:1.0 non-ore to ore ratio.

Construction of the SX/EW plant, crushing and material handling system, and associated support facilities will require approximately 15 months to complete and will start after completion of the Project's environmental permitting requirements. The Project will involve PD private lands and BLM-administered lands. Table 2-2

lists the approximate surface area[9] (in acres) disturbance by facility type and property ownership for the Project at completion of mining.

Table 2-2. Approximate Surface Area Disturbance by Facility Type and Property Status for the Dos Pobres/San Juan Project at Completion of Mining

Facility Description	Property Status (acres)		
	PDSI	BLM	TOTAL
Open Pits			
Dos Pobres*	308	0	308
San Juan*	179	162	341
Stockpiles			
Leach Pad	111	811	922
West Development Rock Stockpile	368	365	733
East Development Rock Stockpile	0	101	101
Other Facilities			
SX/EW Facility	0	26	26
Stormwater Impoundment	0	30	30
PLS Collection	0	12	12
Crush/Conveyor System and Acid Unloading	17	8	25
Stormwater Diversions*	20	10	30
Retention/Detention Dams	8	2	10
Dos Pobres Site No. 1*	35	0	35
Dos Pobres Site No. 2*	50	0	50
Truck Shop Service Complex	0	20	20
Compactible Soil Borrow Source and Overburden Stockpiles	74	0	74
New Roads (Access and Haul)**	112	188	300
Soil Stockpiles	91	32	123
Aggregate Borrow Sources	49	89	138
Utilities/Communications	7	3	10
Temporary Laydown Areas	0	65	65
Miscellaneous (Main Gate, etc.)	0	7	7
TOTAL	**1,429**	**1,931**	**3,360**

* Some surface disturbance already exists at these locations.
** Does not include roads within pits or stockpiles.

Mine and mining-related support facilities and operations that will be developed as part of this Project are described in detail below and organized into the following five subsections: Mining and Ore Processing Operations, Support and Ancillary Facilities, Environmental Protection Measures, Closure and Reclamation Measures, and Employment.

[9] All acreages throughout this EIS are approximate. Final acreage for realty actions will be determined by cadastral survey or some other approved method.

2.1.2.1 Mining and Ore Processing Operations

2.1.2.1.1 Open Pits. Under this plan of operations, two open pit mines, Dos Pobres and San Juan (see Figure 2-1), will be developed. Table 2-3 provides a summary of projected production rates for each of the mines during the 16-year life of the Project. Production rates are estimates based upon the current Project mine plan and could change as conditions and technologies change.[10]

Table 2-3. Projected Annual Production Rate in Tons for the Dos Pobres/ San Juan Project

Project Year	Dos Pobres Mine	San Juan Mine	ANNUAL TOTAL
1	0	0	0
2	74,695,000	0	74,695,000
3	93,677,000	0	93,677,000
4	92,637,000	0	92,637,000
5	55,182,000	35,755,000	90,937,000
6	64,432,000	26,485,000	90,917,000
7	35,515,000	55,205,000	90,720,000
8	81,342,000	8,840,000	90,182,000
9	54,861,000	23,457,000	78,318,000
10	27,813,000	37,054,000	64,867,000
11	24,717,000	29,913,000	54,630,000
12	20,283,000	34,941,000	55,224,000
13	10,477,000	41,290,000	51,767,000
14	0	50,062,000	50,062,000
15	0	24,128,000	24,128,000
16	0	8,343,000	8,343,000
TOTAL	**635,631,000**	**375,473,000**	**1,011,104,000**

The Dos Pobres open pit mine is located entirely on PDSI patented lands. Phelps Dodge implemented development work on the property for an underground mining operation during the 1960s and 1970s. Underground development of the sulfide orebody at Dos Pobres ceased in the early 1980s; however, the buildings and other facilities at Site No. 1 and Site No. 2 (see Figure 2-1) continue to be used by PDSI for mineral exploration work and other activities.

[10] This projection reflects the best data available from current mining planning and is the basis for the environmental evaluation herein. However, any significant increase in estimated production rates or footprint expansion would require modifying permits for air quality, groundwater protection, and surface waters under Section 404 and 402 of the Clean Water Act and would thereby trigger additional environmental evaluation.

Surrounding the planned Dos Pobres pit is an approximately 1,300-foot setback in which no leach pad or development rock stockpiles are planned (see Figure 2-1). This setback has been designed to allow for potential future mining of the deeper sulfide milling reserves that underlie the leachable ore at Dos Pobres.

At completion of leach mining operations, the Dos Pobres pit will be nearly circular with a diameter of approximately 4,200 feet and a depth of about 1,400 feet (2,600 feet above mean sea level). The pit design specifies a 50-foot bench height and 120-foot-wide haul roads with 10 percent gradient haulage ramps to develop a smoothed pit design and minable reserves. A 100-foot-high, 48° double bench configuration will be used for all areas of the pit except in the Tertiary Gila Mountain Volcanics located on the upper southwestern area of the deposit, where a 48° single bench design will be incorporated. Once the pit is further developed, the stability of side slopes will be reevaluated and bench design modified as necessary.

The San Juan property was mined for a short period around the turn of the century following discovery of high-grade chalcocite copper veins. Mining resumed at San Juan during the late 1960s and early 1970s with processing of ore from a small open pit to produce copper precipitate. Existing areas of disturbance at San Juan include the former mine pit, leach pads, development rock stockpiles, and concrete foundations from facilities associated with the former leach process operations. These existing disturbances occur on both private lands owned by PD and on public lands managed by the BLM.

Phelps Dodge acquired the San Juan property in 1994 and has since undertaken efforts to mitigate the effects of past mining activities. Cleanup efforts have included removing debris; installing an impermeable composite liner system in the existing leach solution collection pond; constructing six shallow reclaim wells in an interception trench upgradient of the stormwater collection pond, and construction of diversions to manage stormwater. Most of the areas of existing disturbance associated with the San Juan property fall within the San Juan pit limits currently planned for the Project.

At completion of mining, the San Juan pit will be somewhat oval-shaped with a length and width of approximately 5,000 feet and 3,800 feet, respectively. The ultimate depth of the pit will be approximately 1,000 feet (3,150 feet above mean sea level). The interamp angle for San Juan is based on a 48 degree, 100-foot-high, double bench configuration for all areas of the pit.

Leach ore and development rock (unmineralized and low-grade material) will be mined from the proposed Dos Pobres and San Juan open pits using conventional drilling and blasting techniques. Blast holes will be drilled in a grid pattern to an average depth of 65 feet, loaded with ammonium nitrate and fuel oil (ANFO) and topped off with a sand and gravel mixture. When the explosives are detonated, usually once a day and always during daylight hours, the hard rock will be reduced to a manageable size (called run-of-mine or ROM) for loading and hauling.

Depending on its copper content, ROM leach ore will be either hauled directly to the leach pad or hauled to a crushing system. Development rock will be hauled to two unlined development rock stockpiles, identified as East and West development rock stockpiles in Figure 2-1 (see also Section 2.1.2.1.6).

Mining will occur on a 24-hour-per-day, 365-day-per-year schedule over the 16-year life of the mines. Operations will divided into three distinct periods. The first period, which covers Years 1 through 4, involves mining leach material exclusively from the Dos Pobres deposit (see Table 2-3). A pre-production period of four months will be required to expose the orebody and place ore on the leach pad to provide the surface area required to support initial operations. Mining rate during Years 1 to 4 will average approximately 238,000 tons per day (tpd). Three electric shovels with 53 cubic-yard capacities, assisted by one, 21-cubic-yard hydraulic front-end loader, will provide the loading capacity required to maintain production. The drill fleet will consist

of four production units capable of drilling 9⅞ inch- to 12¼-inch-diameter holes. Twenty-two haul trucks with 240-ton to 300-ton capacities will be required during this period.

During the second period (Years 5 to 13), mining operations at the Dos Pobres and San Juan deposits will be combined. During this time, the higher grade, higher stripping ratio leach ore from Dos Pobres will be mined in conjunction with the lower grade, lower stripping ratio leach ore from San Juan. By blending the leach ores from the two deposits, the overall mining rate will be held relatively constant at an average of approximately 248,000 tpd from Years 5 through 8. During this period, the required fleet of haul trucks will reach a peak of twenty-six, 240- to 300-ton capacity trucks due to longer haulage profiles. During the remainder of the period (Years 9 - 13), the mining rate and haul truck requirements will decline, with the mining rate averaging approximately 167,000 tpd. The Dos Pobres oxide leach reserve will be depleted at the end of this period.

The third period, Years 14 - 16, will consist entirely of mining the remainder of the San Juan deposit. Mining rates and copper cathode production will decline during this period. Average mining rates will be approximately 75,000 tpd. The San Juan reserves will be depleted at the end of this period.

2.1.2.1.2 Crushing and Material Handling. The higher-grade leach ore will be delivered to a crushing facility consisting of a three-stage crushing system (primary, secondary, and tertiary plants), conveyors and feeders for handling materials, and an agglomeration system. This facility will be capable of reducing ROM material to a nominal 0.5-inch minus size at a planned production rate of 100,000 tpd. The crushing plants will be centrally located between the Dos Pobres and San Juan pits, while the agglomeration facility will be located at the northern edge of the leach pad. Figure 2-2 presents a flow diagram of the crushing and materials handling process.

The primary crushing plant may include either a fixed 60 inches x 109 inches primary gyratory crusher or a 48 inches x 60 inches primary jaw crusher that will be fed by 240- to 300-ton-capacity haulage trucks. The primary crushing plant will produce an 80 percent passing 7 inches crushed ore product, which will be conveyed to a coarse ore surge pile. From there, ore will be moved by belt feeders to the secondary crushing plant.

In the secondary crushing plant, two primary vibrating screens will separate minus 3-inch material from the ore flow stream, and the oversize material will be crushed by two MP1000 secondary crushers, set at a closed side setting of 1.25 inches. The secondary crusher product will be combined with the screen undersize product and conveyed to the tertiary circuit surge bin. In the tertiary crushing plant, material will be reclaimed from the bin by five belt feeders, each of which will directly feed five tertiary screens. The tertiary vibrating screens will separate the minus 7/8-inch material from the material flow stream, and the oversize material will be crushed by five MP1000 tertiary crushers, set at a closed side setting of 0.5 inch.

The final product from the tertiary crushing system will be conveyed to a fine ore surge pile, and from there to a splitter chute. The splitter will divert the material to either of two conveyors that will directly feed two parallel agglomeration drums. Each agglomeration drum will be approximately 15 feet in diameter and 45 feet long. Crushed ore within the drums is pre-treated with 20 to 30 pounds of sulfuric acid and water per ton of ore to reach an approximate moisture content of between 6 and 8 percent. As the drums rotate, the wetted ore tumbles, enabling uniform contact of the acid and water with the ore. This causes the fines to adhere to the larger rocks and the resulting agglomerate. The agglomerated ore will then be transferred to an overland conveyor that delivers it to the leach pad. The agglomeration area and overland conveyor will incorporate a lined containment system designed to drain to the leach pad.

2.1.2.1.3 Leach Pad. A single, rectangular, approximately 922-acre leach pad will be located south of the Dos Pobres pit, between Cottonwood Wash on the east and Watson Wash on the west (see Figure 2-1). The leach pad will be developed from south to north in 20- to 40-foot-high lifts. Based on current projected production rates, the leach pad is expected to reach a height of approximately 450 feet, but as stated on p. 5-3, will be designed to accommodate a potential ultimate height up to 600 feet[11]. The leach pad will be constructed with setback benches to achieve a final overall slope of no greater than two horizontal to one vertical (2H:1V) (see Figure 2-3). The top surface of the pad will ultimately slope at approximately the same degree as the existing natural terrain.

The site selected for the leach pad offers sufficient slope (generally steeper than four percent) to allow use of the natural contours of the terrain for collection of the copper-laden pregnant leach solution (PLS). Existing terrain in the northern portion of the pad is significantly steeper than in the southern portion.

The entire leach pad will be lined. The key elements of the design include a prepared subgrade, a composite liner system consisting of underliner material and a synthetic geomembrane liner, and overliner material (see Figure 2-3). The subgrade will be cleared of all plants and grubbed of shallow roots. Regrading of the natural terrain will be limited to what is required to ensure drainage and that the internal base slopes of the pad are no steeper than 3H:1V.

The underliner consists of low-permeability bedding soil, which will be laid down, graded, moisture-conditioned, and compacted to 90 percent maximum dry density (ASTM-1557), at a moisture content several percentage points dry of optimum. The low-permeability soil will be placed in a single loose lift of 18 inches compacted to the nominal 12-inch compacted thickness. The compacted surface will be smooth-rolled and promptly covered with geomembrane to minimize the opportunity for dessication and cracking. The low-permeability soil will have a saturated hydraulic conductivity of approximately 10^{-6} cm/sec. A suitable source of low-permeability, compactible soil has been identified on Phelps Dodge's patented land north of the Safford Municipal Airport (see Figure 2-1).

Covering the underliner material will be a synthetic 60-mil Linear Low Density Polyethylene (LLDP) geomembrane liner. Atop the synthetic liner will be an 18- to 24-inch "buffer" layer of overliner material (potentially crushed or screened rock) to protect the pad against the impact from placement of the crushed and ROM leach material. The overliner material will also facilitate proper drainage of the pad to minimize hydraulic head over the liner.

Construction of the composite liner system will begin at the downstream toe of the pad and proceed in an upstream direction. The liner system will be built incrementally over the first several years of operations. The leach pad will utilize existing ridge lines, constructed berms, and perimeter channels and internal piping to manage stormwater and PLS routing through and around the leach pad. Stormwater management activities associated with the leach pad will minimize the volume of stormwater that comes into contact with the pad and control stormwater that has come into contact with leach material.

The leach pad design includes an internal stormwater collection channel (Figure 2-4) that will divert clean stormwater away from the pad during early years of operation, when the leach pad is confined to the southern portion of the site below the ditch. Later, this ditch will be incorporated into the leach pad drainage system

[11] Stability analyses were conducted for the leach pad to simulate static and pseudo static (earthquake) loading conditions at various stages of pad development, up to 600 feet high. In all cases, the factors of safety calculated for the leach pad surpass the minimum requirements set forth by ADEQ BADCT guidelines. Additionally, liner testing (puncture) for the pad was conducted to simulate a pad height of 600 feet with a 50 percent safety factor (liner loading actually simulated the pressure that would result from ore 900 feet high). The liner did not fail (puncture) under the stresses applied (PDSI 1998).

to provide for internal collection of PLS flows during leaching on the northern portion of the pad. The ditch will intercept PLS flows from the northern portion of the leach pad and direct them to the east edge of the pad where they will flow to the leach pad solution collection channel.

Agglomerated ore from the crushing facility will be transported and placed on the leach pad by a series of belt conveyors and a radial stacker. Lower-grade, ROM-sized leach ore from the pits will be conventionally placed on the leach pad by haul trucks, primarily around the perimeter of the crushed ore. Raffinate, an acidic aqueous solution, will be applied to the surface of the leach pad using drip irrigation lines. A process flowrate of approximately 20,000 gpm of raffinate at 0.002 to 0.004 gpm/square foot application rate is planned. As the leach solution percolates through the copper-bearing ore, it will dissolve soluble copper minerals contained in the rock. The copper-laden water (i.e., PLS) will flow by gravity into a series of perforated pipes that conduct the flow by gravity into a downstream, perimeter solution collection ditch. The solution collection ditch is located on the downgradient edges of the leach pad at the southern and southeastern limits (Figure 2-4). The solution collection ditch transfers PLS to the low point in the leach pad, which is immediately adjacent to the southeast corner. PLS will then exit the lined leach pad and be routed to one of two basins within the lined excess process solution impoundment located at the southeastern toe of the pad. From there it will be routed to the SX/EW plant.

2.1.2.1.4 Leach Solution Collection/Distribution Facilities. The leach solution collection/distribution system includes an excess process solution impoundment located at the southeastern toe of the leach pad, a raffinate tank at the SX/EW lined tankfarm, and various piping and conveyance systems. The excess process solution impoundment is located upgradient of the stormwater impoundment, and is designed such that excess flows are directed via a lined channel to the stormwater impoundment.

PLS from the leach pad solution collection ditch flows to the excess process solution impoundment. From there, the PLS flows by gravity through a pipeline to the SX/EW plant. Flows greater than that which can be processed by the SX/EW plant are stored in the excess process solution impoundment or routed from the excess process solution impoundment into the raffinate tank. The raffinate tank provides surge capacity for raffinate and/or excess PLS to be sent back to the leaching operation.

The excess process solution impoundment will be a double-lined process solution pond constructed through excavation and placement of an earth fill embankment along the downstream edge. It will cover approximately eight acres and have a total capacity of 25 million gallons divided between two cells of 12.5 million gallons each. Construction will be similar to that of the leach pad. The subgrade will be cleared, grubbed, and compacted, and overlain with a composite liner system consisting of a minimum of six inches of compacted clayey soil and a geomembrane double liner and leak collection and removal system (LCRS). The lower liner will consist of a single geomembrane of at least 60-mil thickness over a minimum six inches of soil compacted to achieve a saturated hydraulic conductivity of no greater than 10^{-6} cm/sec. The upper liner will be a single geomembrane of at least 60-mil thickness. Sandwiched between the two will be the LCRS, which has been designed to result in minimal hydraulic head on the lower liner and provide for the collection and removal of liquid between the upper and lower liners. Any PLS in the LCRS will be rerouted into the raffinate collection tank for reprocessing.

At the SX/EW plant, copper will be extracted from the PLS. The resulting solution, called raffinate, will then be processed through an organic reagent recovery tank prior to being pumped back to the leach pad through HDPE and stainless steel pipelines. A raffinate booster station may be required during later years of leaching operations. The extracted copper, will be plated onto sheets producing copper cathode for shipment off-site.

2.1.2.1.5 Solution Extraction and Electrowinning (SX/EW) Processing Facility. The solution extraction (SX) and electrowinning (EW) processing facility will consist of two primary components (SX plant and EW tankhouse) (see Figure 2-5) and is located southwest of the leach pad.

The solution extraction plant (SX plant) will be located adjacent to the electrowinning tankhouse (EW tankhouse) at a site west of the stormwater impoundment. The SX plant will receive PLS from the excess process solution impoundment and will extract copper from the PLS for further processing in the EW tankhouse.

The SX plant will include one train of mixer-settler tanks configured in a series parallel arrangement, a tankfarm (including a raffinate tank and a runoff collection tank), and pumping systems. The SX train will include two series extraction mixer-settlers, one parallel extraction mixer-settler, one wash mixer-settler, and two stripping mixer-settlers. In the extraction mixer-settler tanks, PLS is mixed vigorously with an equal volume of an organic solution containing 90 percent petroleum-based diluent and 10 percent copper extraction reagent. After mixing, the solutions are allowed to separate. The aqueous solution, which has been stripped of its copper, is again called raffinate and settles to the bottom of the mixing tank and is then sent to an organic recovery tank to recover and recycle residual organic reagent back to the extraction tanks. This raffinate solution is then sent back to the leach pad for another leach cycle. The organic solution containing the copper ions, now called loaded organic, floats to the top of the settling tank and is pumped to the wash mixer-settler tank.

In the wash mixer-settler tank, the loaded organic solution is mixed with water to remove impurities. The washed organic solution then flows to the stripper mixer-settler unit and is mixed with an aqueous solution containing 20 percent sulfuric acid (electrolyte). An ion exchange process causes the copper ions to transfer from the loaded organic to the electrolyte, now referred to as rich electrolyte. Rich electrolyte is then pumped to the EW tankhouse.

The tankfarm will contain a 426,000-gallon raffinate tank, a 1.9-million-gallon runoff collection tank, electrolyte and reagent storage and process tanks, and solution filtration systems. The tankfarm will be an open air facility, constructed in a concrete-lined containment area excavated and designed to contain stormwater runoff and excess process solutions from the SX/EW operations area. These solutions will be collected in the runoff collection tank. To keep organic solutions separated from aqueous solutions, all the loaded organic tanks, diluent and extractant storage tanks, and organic processing equipment are located together in one contained area of the tankfarm.

The electrowinning tankhouse, adjacent to the SX plant (refer to Figure 2-5), will house electrowinning cells constructed of polymer-concrete, overhead cranes, and a cathode stripping machine. Rectifiers used to convert incoming electric power to direct current for the electrowinning process will be located outside the tankhouse. Propane or natural gas-fired boilers, used for heating rich electrolyte to 110°F to 125°F to increase electrowinning efficiency, will be housed in a small building nearby.

Inside the electrowinning tankhouse, the electrolyte is routed through a series of tanks, in which insoluble lead plates are hung as anodes. Stainless steel plates (also called “blanks”) are suspended in the cells between the anodes and serve as cathodes onto which the copper will plate. Direct current electricity is applied to the anodes causing the copper ions in the electrolyte to plate onto the stainless steel blanks. The cathodes are removed from the cells after approximately seven days, and the copper is stripped from the stainless steel blank. Copper from the Dos Pobres/San Juan Project will be delivered by truck from the EW tankhouse to the PD copper rod mills in Miami, Arizona, and El Paso, Texas, or to other customers. The partially depleted electrolyte solution in the EW cells is pumped back to the tankfarm for reuse, and the entire leaching and copper extraction process repeats itself.

2.1.2.1.6 Development Rock Stockpiles. Unmineralized and low-grade material (referred to herein as development rock) will be hauled at ROM size to two unlined stockpiles that will not be leached. Development rock stockpiles will occupy approximately 834 acres total. One stockpile will be situated to the west of the Dos Pobres pit (the West development rock stockpile), and the other to the south of the San Juan pit (the East development rock stockpile; see Figure 2-1). Stockpiles will be constructed in 50-foot lifts to approximately 400 feet above ground level.

A liner is not proposed for these development rock stockpiles as the neutralization capacity of the non-ore material (i.e., development rock) present within the orebody exceeds the rock's acid-generating potential (Dames & Moore 1997a). Analysis was performed on representative composite samples collected from the existing drill pulp archives for the Dos Pobres and San Juan orebodies. Twenty-two composite samples, representing more than 11,900 feet of drill core, were analyzed for acid-base accounting (ABA), synthetic precipitation leach procedure (SPLP), and a suite of 21 elements. Based on the ABA testing, the potential for development rock to generate a low (acidic) pH effluent is considered very low (PDSI 1996, Water Management Consultants 1998). The weighted average net neutralization potential of the composite samples is 49 tons calcite equivalent per 1,000 tons.[12] SPLP tests were run on 22 composite samples representative of the range of lithological and mineralogical material to be included in the development rock stockpiles. The metal content of the effluent from each test was below Arizona Primary Drinking Water Standards maximum contaminant levels (mcl) (ibid.).

2.1.2.1.7 Soil and Growth Medium Stockpiles. Soil excavated during leach pad site preparation and suitable rock material excavated during mine pre-stripping will be stockpiled for use as growth media and capping material. Seven soil and growth medium stockpiles covering a total of roughly 123 acres will be created. They range in size from about 2 acres to about 51 acres. The locations of these stockpiles are depicted in Figure 2 -1. These stockpiles will be stabilized, as necessary, to prevent excessive losses from erosion and marked with signs identifying the material as soil. Other soil stockpiles may be developed if it is determined that sufficient soils exist in the footprints of the development rock stockpiles to economically justify excavation prior to the lateral build-out of the development rock stockpiles.

Stabilization of soil stockpiles would be accomplished by shaping slopes to minimize erosion and placing silt fence structures, as necessary, around the downgradient slope of the stockpiles. The side slopes will be shaped by a bulldozer traveling perpendicular to the slope, forming small berms to trap precipitation. Side-slopes and the tops of the soil stockpiles may be seeded with native perennial species as an additional erosion control measure if necessary.

2.1.2.2 Support and Ancillary Facilities

2.1.2.2.1 Water Supply. Based upon the results of the groundwater investigation program, PDSI has determined that an aquifer located in the volcanic rocks near Dos Pobres and San Juan will be developed to meet Project water requirements. This aquifer has historically provided approximately 1,400 gallons per minute (gpm) to the No. 1 shaft at Site No. 1. Investigations which have been underway since June of 1995 have indicated the presence of an aquifer capable of sustaining at least 5,000 gpm (8,065 af/yr) flow rate.

Water demand estimates for the Project have been based upon historical mine, shop, and SX/EW make-up requirements at other Phelps Dodge operations in Arizona and New Mexico as well as additional information developed during a Feasibility Study conducted by PDSI. The average amount of water required for the

[12] According to the British Columbia Acid Mine Drainage Task Force (BCAMDTF) criteria, rock that is non-acid-generating has a net neutralizing potential (NNP) of equal to or greater than 20 tons calcium carbonate over 1,000 tons of rock.

Project is forecast at 3,431 gpm (5,533 af/yr), while the total water demand over the life of the project is predicted to be 88,528 af (PDSI 2001). On average, six percent of the leach solution flow rate will have to be replaced due to loss through evaporation and initial wetting of new leach ore. Table 2-4 summarizes the projected average water demand through the life of the Project.

Table 2-4. Projected Water Demand for the Dos Pobres/San Juan Project

Project Year	Mining Dust Control [1] (gpm)	Crushing and Material Handling[2] (gpm)	SX/EW [3] (gpm)	Ore Moisture Consumption[4] (gpm)	Potable and Misc. (gpm)	Total (gpm)	Total Volume (af/yr)
1	1,260	0	0	0	10	1,270	2,048
2	1,260	347	800	389	10	2,805	4,523
3	1,890	347	1,100	429	10	3,776	6,089
4	1,890	347	1,100	442	10	3,789	6,110
5	1,890	347	1,100	362	10	3,709	5,981
6	1,890	347	1,100	409	10	3,756	6,057
7	1,890	347	2,100	743	10	4,090	6,604
8	1,890	347	2,100	743	15	4,095	6,604
9	1,890	347	2,100	449	15	3,801	6,130
10	1,890	347	2,100	596	15	3,948	6,367
11	1,890	347	2,100	489	15	3,841	6,194
12	1,890	347	2,100	516	15	3,868	6,238
13	1,890	347	2,100	502	15	3,854	6,215
14	1,890	347	2,100	509	10	3,856	6,218
15	1,260	222	1,800	214	10	2,506	4,041
16	1,260	76	1,800	74	10	1,920	3,096
Avg.	**1,733**	**301**	**956**	**429**	**12**	**3,431**	**5,533**
TOTAL	**-**	**-**	**-**	**-**	**-**	**-**	**88,528 af**

[1] Assumes 630 gpm of water per water truck required for dust suppression purposes, based on historic water use of other PD facilities and includes water for drilling, dust suppression on roads, and for other mining-related activities.

[2] Assumes 5 gal/ton ore processed.

[3] Assumes 6% make-up for evaporative water loss, offset by an estimated gain from precipitation equivalent to 100 gpm (assume 25% net precipitation enters system after evaporation).

[4] Crushed ore moisture raised from 4% from pit to 7% through dust control wetting and agglomeration in the curshing/material handling system. The ore moisture is increased during leaching to above 10% and decreased after leaching to approximately 9%. Net water consumption is 2% of crushed ore tonnage by weight (9% - 7%). ROM ore moisture is estimated at 4% from the pit. It is increased during leaching to above 10% and decreased after leaching to about 8%. Net water consumption is 4% of ROM tonnage by weight (8% - 4%).

Groundwater near the Dos Pobres and San Juan mines will be developed for use by the Project. Five 1,350 gpm vertical pumps are currently planned to will be established at wells constructed in the project area. Water will be pumped from wells to water storage tanks that will gravity feed to various project facilities. The main

distribution tank (420,000 gallons) will be located near the mine fuel station; two head tanks (188,000 gallons each) will be located above Site No. 2; and a smaller tank (50,000 gallons) will be located at Site No. 1. The main distribution tank will supply water to the mines, the truck shop complex, and the crushing/material handling system. The head tanks at Site No. 2 will supply water to the SX/EW plant as well as to facilities at Site No. 2.

2.1.2.2.2 Electric Power. Total average power requirements for the Project are estimated to be 59.9 megawatts. The power system for the Project will include construction of about seven miles of a primary 230 kilovolt (kV) transmission line from the existing 230 kV Hackberry line to a main substation that will be located on Phelps Dodge's property west of the Lone Star Road. At the main substation, power will be transformed to 69 kV and distributed via approximately 17 miles of overhead transmission line to the mine areas, stormwater impoundment, raffinate booster station, crushing/material handling system, and the SX/EW substation.

A 69 kV powerline will be constructed around the Dos Pobres and San Juan pits to power two mine substations, a crusher substation, a maintenance area substation, a pumping substation, and the Site No. 2 substation. The mine substations will supply 7,200 volts (V) of power to the electric shovels and drills. The crusher substation will supply 4,160 V power for the crushing and material handling system. The maintenance area substation will provide 4,160 V power to the truckshop and maintenance shops near San Juan. The pumping substation will supply 4,160 V power for the raffinate pumps and stormwater impoundment dewatering pumps. The Site No. 2 substation will provide 4,160 V power to that area. A separate 69 kV powerline will be constructed from the main substation to the SX/EW substation where voltage will be reduced to 13.8 kV for distribution to the EW tankhouse and the SX plant.

Transmission lines will be constructed using single pole structures for the 69 kV lines and H-frame double pole structures for the 230 kV line. All poles will be wooden or metal and will range in height from 45 to 65 feet, except for the 230 kV power line structures, which will range in height from 75 to 85 feet. Transmission and distribution lines will be constructed to include raptor-protection to minimize the potential for electrocution of perching birds of prey.

2.1.2.2.3 Compactible Soil Borrow Area. The Lone Star Compactible Soil Borrow Source is located on PD's private lands in Sec. 25, T6S, R26E (Figure 2-1). This site is approximately 4.5 miles southeast of the leach pad. Material from this borrow source will be used to construct the composite liner system for the leach pad and will be transported by truck to the leach pad along an approximately 110-foot-wide aggregate roadway. The borrow area will be approximately 49 acres in size.

The compactible soil material to be mined is approximately 10 feet below the surface; total excavation depth will be approximately 50 feet. Overburden removed to access the soil material will be stockpiled west of the borrow source and will cover roughly 18 acres. The compactible soil is primarily clay from a lake-bed deposit and is relatively homogeneous, with only occasional layers of fine sand or low plasticity clay and silt. The clay in this deposit is generally stiff and dry to lightly moist. Dust control measures per ADEQ requirements will be implemented at the borrow area.

2.1.2.2.4 Shops, Office, and Administration. A service complex that includes a heavy duty truck shop, maintenance shop, fire truck and ambulance building, cable repair shop, recycling center, oil and lubricant storage, fuel station, and a truck wash facility will be built south of the San Juan mine. A mine fuel service station will also be located south of the Dos Pobres Mine, northwest of the crusher facility.

Site No. 2, west of the proposed leach pad location, is an existing facility that contains general offices, a change room building, and a warehouse facility. This site will be refurbished. All administrative support functions for the Project, such as operations management, mine planning, drafting, ore control, and safety will be conducted from the general offices. Mine operations and crew line-up will also be conducted from this site. The existing warehouse contains 11,000 square feet of storage space, which will be used for receiving, storing, and disbursing supplies and materials. In addition, Site No. 2 will be equipped with a service station for small vehicles.

2.1.2.2.5 Communications. Communications for the Project will include hard wiring of a telephone cable in a loop configuration between the main security gate, Site No. 2, the truck shop complex, and the SX/EW plant. Radio communications require construction of a repeater transmitter tower on a hill located south of the San Juan Mine (see Figure 2-1) and three base stations for use at the administration building, mine office, and SX/EW facility. The repeater facility will be a steel lattice structure approximately 120 feet tall with a 17 x 17 foot base, will cover approximately one acre, and will include a 12 x 16 foot concrete building to house radio equipment.

2.1.2.2.6 Transportation/Access/Security. New infrastructure requirements for the Project include upgrading existing access roads, constructing employee parking facilities, and establishing additional security gates. Road crossings and access and haul roads will be constructed with culverts or at grade. A fence will be constructed around the mine facility as needed to provide for security and safety and to keep cattle on adjacent lands off the mine property. This fence will tie into existing grazing allotment boundary fences wherever possible. A main security gate will be installed on the Phelps Dodge Mine Road (PD Mine Road) to control all traffic and access to the mines and SX/EW site. A secondary security gate will be installed on the San Juan Mine Road at the boundary of public and private lands, eliminating public access on this road. The main security gate will be equipped with automatic truck weigh scales which will weigh incoming and outgoing truck traffic and record deliveries through the use of bar coding. Employee parking will be provided at Site No. 2 and the SX/EW plant site.

PD Mine Road will be chip-sealed from its intersection with the Safford-Bryce Road to Site No. 2, roughly seven miles. Beyond this point, PD Mine Road and other access roads will be surfaced with aggregate. The current at-grade crossing of Talley Wash will be upgraded to a box culvert crossing to allow all-weather access.

New traffic to and from the site is expected to occur in two distinct phases: the 15-month construction phase and the 16-year operational phase. During the construction phase, traffic to and from the mine site will be associated primarily with construction workers and equipment deliveries and is estimated to peak at 1,708 vehicle trips per day (854 round trips), of which 208 are projected for deliveries and 1,500 are worker trips. Figure 2-6 depicts the anticipated peak distribution of vehicle trips over main roads and bridges during the construction phase of the Project; Figure 2-7 depicts average trip distribution for both trucks and employees over major roads in the region during the operational phase.

During the operational phase, average daily traffic is forecasted at 325 employee round trips and 80-90 truck round trips (Figure 2-7). Of the approximately 80 to 90 truck round trips to and from the Project, about 75 percent (60-68 round trips) are expected to come from the east and south and use the Solomon Bridge to cross the Gila River. The remaining 25 percent of trucks (20-22 round trips) are expected to arrive from the west and use the Thatcher Bridge (Reay Lane Bridge) to access the project site. These routes minimize truck travel through the major commercial area of Safford and the potential for traffic impacts.

The shipping company that PD will select to transport sulfuric acid to the mine will be required to comply with the applicable federal and state regulations governing the transport of cargo, including hazardous materials. One potential company has described the following internal controls that would apply to the transport of sulfuric acid (M. Maxwell, BJ Cecil Trucking, pers. comm.):

< No tanker deliveries will exceed the maximum 80,000 gross vehicle weight, therefore, overweight permits will not be necessary.

< Truck speeds are governed to 64 mph with a maximum cruising speed of 62 mph.

< Drivers must have MSHA and OSHA training.

< Mandatory vehicle check points will be established at specific locations along all haul routes.

< Vehicles will be checked by drivers at least every two hours or 100 miles.

< The tank trailers will be state-of-the-art with safety valves and rupture disks designed to minimize the potential for spills.

< In the event of an acid leak, soda ash or lime can be used to neutralize the acid.

2.1.2.2.7 Powder Magazine and Prill Storage. The powder magazine and ammonium nitrate prill storage will be located in the vicinity of Site No. 1, south of the existing Site No. 1 stormwater diversion channel.

2.1.2.2.8 Aggregate Materials. Aggregate materials will be used for a variety of purposes, including road base fill material, riprap for stormwater diversion channels and road crossings, aggregate for concrete, and other uses. Two aggregate borrow sources totaling about 136 acres have been identified within the project area (Figure 2-1). One is located just south of the leach pad; the other at an existing aggregate borrow source Watson Wash, west of the leach pad. Approximately 19 million tons of material will be excavated from aggregate borrow sources over the life of the Project. Of the material excavated, 40 to 60 percent could be suitable for use as aggregate after screening. The remainder of the material will be stockpiled for use in reclamation activities.

2.1.2.3 Environmental Protection Measures

A variety of environmental protection measures have been incorporated into the Mining Plan of Operations to meet applicable standards including those of regulatory agencies such as the ADEQ and COE that have review and approval authority over the proposed Project. These measures range from integrated stormwater management programs to concurrent and post-closure reclamation plans. Environmental protection measures that have been incorporated into the mine plan are summarized below.

2.1.2.3.1 Wastewater Treatment (Non-Process Related). Septic systems will be constructed to handle sewage treatment at the SX/EW plant Site No. 1, Site No. 2, and the truck shop complex area. Septic sytems will be developed in compliance with ADEQ and Graham County's septic permits requirements.

2.1.2.3.2 Surface Water Management. The Project will be constructed and operated as a "zero-discharge" facility, meaning that all process waters and stormwaters that come into contact with process facilities will be contained on-site rather than discharged off-site into waters of the United States. Development of the Project as a zero-discharge facility will necessitate diverting stormwater around the project area to reduce run-on into

the pits and ponding against stockpiles, and to prevent release of flows potentially impacted by the leaching or mining operations into surface waters. The stormwater management facilities are designed to ensure that there are no potential points of stormwater discharge from the mines for storms as large as the 100-year/24-hour and 100-year/10-day storm events. The stormwater impoundment will retain all incidental flows from the leach pad (including stormwater and leach pad drain-down that would occur during a power outage of up to 24-hours in duration). A series of retention dams located upstream, downstream, and within the footprints of the development rock stockpiles will prevent off-site surface water discharge from storms during the early years of mine development. As the size of the stockpiles increases, the potential runoff volumes will decrease, and the same structures are likely to provide equivalent protection against even large precipitation events. The general siting of proposed surface water control structures is depicted in Figure 2-1 and discussed in detail in the following sections.

< **Surface Water Diversions.** Four diversion channels, South, Peterson Wash, West, and Site No. 1, will be constructed upgradient of the stockpiles and open pits to divert clean stormwater runoff around and through the site, preventing the water from being impacted by mining activities. A typical cross section of a diversion channel is provided on Figure 2-8. The diversion channels will require energy dissipation structures at the outfalls and areas of fill where the alignments cross small drainages. A typical cross section of riprap reinforced channel transition area is depicted in Figure 2-9. Energy dissipation riprap structures will be placed at locations where diversion channels discharge into existing washes. The criteria for riprap sizing and for apron dimensions are from Hydraulic Design of Energy Dissipaters for Culverts and Channels, Hydraulic Engineering Circular (HEC) 14, published by the Federal Highway Administration. Riprap is placed in areas of the apron excavated within alluvium and may not be in the areas of the apron excavated in rock.

In order to minimize the potential for erosion, specific design criteria have been developed to reduce the sharpness of curves in portions of the West and South diversion channels.[13] Channel sections that contain sharp curves will be constructed of riprap-lined fill material, with 2.5H:1V side-slopes. A conceptual detail for these areas of reduced radius of curvature is provided in Figure 2-10.

All four diversions are designed to control stormwater runoff from the 100-year/24-hour storm event (Dames & Moore 1999a). Each is briefly described below.

C **West Diversion**. This channel will run east to west across Watson Wash and unnamed tributaries of Watson Wash, upstream of the Dos Pobres development rock stockpile, and will convey stormwater runoff into an unnamed tributary of Coyote Wash. The West Diversion system will require three deep cuts through natural saddles along the alignment. The channel will be approximately 13,500 feet long, with about 27 percent of its length requiring blasting.

The channel alignments for the lower and upper portions of West Diversion are shown on Figures 2-11 and 2-12, respectively. The channel slope is set at 0.5 percent. Table 2-5 provides channel and fill dimensions at locations (identified as CRW1 through CRW6 on Figures 2-11 and 2-12) where steep topography makes reduction of the channel curves necessary. Table 2-6 provides dimensions of these energy dissipation riprap structures at locations where the channel discharges into the wash, for locations shown on Figures 2-11

[13] The design criterion that was applied for the maximum radius of curvature is to maintain superelevation of design (100-year) flow depths against outer channel banks to less than 0.5 feet and maintain a radius of curvature at least twice the width of the channel top width or 50 feet, whichever is greater.

and 2-12. A riprap apron is not planned at the outfall at section W9, shown on Figure 2-12, because of the relatively small contribution of flow at that location to the existing wash.

- **Site No. 1 Diversion**. This is an existing stormwater diversion structure and is approximately 2,800 feet in length. It runs generally west to east across Talley Wash, upstream of the Dos Pobres pit, and conveys stormwater runoff to an existing collection pond. It is designed to discharge stormwater to Cottonwood Wash only during the 100-year/24-hour event.
- **South Diversion**. This channel will run north to south across drainages northeast of the San Juan mine, and will convey stormwater into an unnamed tributary of Peterson Wash. The channel length will be approximately 2,800 feet long and will be constructed in soil or rippable material.

The channel alignment for the South Diversion is shown in Figure 2-13. The channel slope is set at 0.5 percent. Table 2-5 provides channel and fill dimensions at locations where curve reduction will be necessary (shown as cross sections CRS1 and CSR2 on Figure 2-13). Table 2-5 provides dimensions of energy dissipation riprap structures for the South Diversion channel transition into a tributary of Peterson Wash, as shown on Figure 2-13.

Table 2-5. Dimensions for Radius of Curvature for Diversion Channels

Diversion Channel Curve	Min. Radius of Curvature* (ft)	Flow Depth (ft)	Channel Depth (ft)	Channel Bed Width (ft)	Ave. Width of Fill (ft)
West CRW1	82	4.2	5.5	20	115
West CRW2	85	4.5	6.0	20	130
West CRW3	85	4.5	6.0	20	100
West CRW4	85	4.5	6.0	20	120
West CRW5	85	4.5	6.0	20	170
West CRW6	110	7.0	9.0	20	300
South CRS1	68	2.9	4.0	15	120
South CRS2	59	3.8	5.0	15	170

[Note: The radius of curvature reduction dimensions refer to Figure 2-10, where h = flow depth, H = channel depth, W = channel bed width, and L = average width of fill.]

Source: Dames & Moore 1999b, Table 2
* For 0.5 ft of difference in superelevation

- **Peterson Wash Diversion**. This diversion will consist of an embankment in Peterson Wash and a channel that will run east to west upstream of the San Juan pit. The embankment structure will divert stormwater runoff into the channel on the west side of the wash. The embankment structure will be approximately 15 feet tall and will traverse the entire width of Peterson Wash. The channel length will be approximately 2,500 feet long and will be constructed in soil or rippable material.

The channel alignment for the diversion from Peterson Wash to Cottonwood Wash is shown in Figure 2-14. The channel slope varies between 1.5 to 4.0 percent and no curve reduction is anticipated. Table 2-6 provides dimensions of the energy dissipation riprap structures at locations where the channel will discharge into Cottonwood Wash as shown on Figure 2-14.

A typical cross section of the Peterson Wash diversion dam is depicted in Figure 2-15. The embankment would be 15 feet tall, constructed of impermeable material, have upstream and downstream slopes of 2H:1V and have a 15-foot crest width. The dam is designed to discharge directly into the constructed diversion channel and to have no reservoir storage.

< **Stormwater Retention Management System.** An integrated stormwater retention management system will be used to control stormwater run-on and runoff from the leach pad and the West and East development rock stockpiles. The system will use lined collection ditches; both a lined excess process solution impoundment and a lined stormwater impoundment below the leach pad; and a series of retention dams below, within, and above the footprints of the development rock stockpiles. Stormwater collected by the leach pad perimeter ditches and the solution collection ditch will be conveyed to the excess process impoundment at the southeastern toe of the leach pad. Overflow from the excess process impoundment will be directed by an HDPE-lined overflow channel to the stormwater impoundment. These facilities were designed for the worst-case scenario of 100-year/24-hour storm event, during the period of pad development that corresponds to the potential maximum stormwater runoff (Dames & Moore 1999a).

Table 2-6. Conceptual Design Dimensions for Riprap Apron (see Figure 2-9)

Riprap Location	Design Flow Rate (cfs)	Riprap Size, d_{50} (ft)	Dissipater Pool Length (ft)	Dissipater Pool Depth, h_s (ft)	Apron Length (ft)
West Diversion Outfall at Section W5	1,776	2.0	60	4.5	25
West Diversion Outfall at Section W3	2,000	2.0	60	5.5	30
West Diversion Outfall at Section W1	2,000	2.0	60	6.0	30
South Diversion Outfall at Section SO3	799	1.5	45	4.5	25
Peterson Wash Diversion Outfall at Section P2	2,670	2.0	75	7.5	40

Source: Dames & Moore, 1999b, Table 3

C **Stormwater Impoundment**. The stormwater impoundment is designed to have a storage capacity volume sufficient to contain both drain-down of PLS and stormwater runoff from the leach pad that would occur if there was a 24-hour power outage at the mine during a 100-year/24-hour storm event (Figure 2-16). Based on these and other conservative assumptions (such as not accounting for the availability of emergency backup generators), the storage requirement for the stormwater impoundment is 317 af plus freeboard (URS 2002b). The current design of the stormwater impoundment (390 af of storage plus 2 feet of freeboard, for a total capacity of 430 af) has not been revised to reflect the reduction in process solution flow rates estimated by PDSI in the revised MPO (20,000 gpm of total flow currently estimated compared to previous assumptions of average and total flows of 30,000 and 45,000 gpm, respectively). The final design of the stormwater impoundment may not change; however, if revised the design will still provide a minimum total containment volume for 317 af of storage plus freeboard. Based on the current design, the total surface area of the impoundment footprint is approximately 30 acres. It will be lined with a single, 60-mil, HDPE liner over six inches of 3/8-inch-minus bedding soil compacted to 95 percent maximum dry

density of standard Proctor (ASTM-698). The height of the embankment containing the impoundment will be about 10 feet above the downstream toe. A small depression approximately 20 feet deep will be constructed in the south corner of the impoundment to serve as a pump sump. The stormwater evacuation system for the impoundment will consist of a 48-inch gravity feed pipeline with a capacity of 3,000 gpm. This pipeline will convey stormwater to the SX/EW plant for use as raffinate make-up water. Table 2-7 provides design characteristics of the stormwater impoundment.

Table 2-7. Current Design Characteristics of the Stormwater Impoundment

Design Characteristic	Specification
Storage Capacity (af)	430
Total Surface Area (ac)	28
Spillway Elevation (ft-msl)	3,430
Embankment Elevation (ft-msl)	3,433
Height of Embankment Above Downstream Toe (ft)	10
Downstream Embankment Slope (h:v)	2.5:1
Upstream Embankment Slope (h:v)	3:1
Stormwater Removal Capacity (gpm)	3,000

Source: Dames & Moore 1999b, Table 4

< **Emergency Spillway**. To comply with dam safety design criteria, the stormwater impoundment's U-shaped embankment will be constructed with an emergency spillway at the northeast corner, preventing catastrophic dam overtopping by allowing flood waters to safely exit the dam. The spillway will be a side-channel type, cut into natural ground and lined with concrete as required to prevent scour. Assuming a full reservoir, no evacuation from the impoundment, and PLS inflow of 35,000 gpm during a storm event, the spillway is designed to discharge into a natural drainage that is tributary to Talley Wash and has a minimum design capacity of the 100-year/24-hour peak outflow from the impoundment.

C **Retention Dams.** Retention dams are designed collect stormwater runoff from the West and East development rock stockpiles. Additional retention dams will collect stormwater runoff upstream of the West development rock stockpile. The retention dams are located in four general locations relative to the West development rock stockpile footprint: 12 dams are located upstream (R dams), 11 dams are located within the footprint (W dams), and four dams are located downstream (DP dams); four other retention dams are located downstream of the East development rock stockpile (SJ dams). The locations of the retention dams upstream of, within the footprint, and below the West development rock stockpiles are shown on Figure 2-17. The retention dams downstream of the East development rock stockpiles are shown on Figure 2-18. The dams located within the footprints of the stockpiles and pad will be removed as necessary as the stockpiles and/or pad expand over their locations. The retention dams are sized to contain the 100-year/10-day storm event without discharge. Each dam is designed with 2H:1V upstream and downstream side-slopes, and with a 15-foot crest width (see Figure 2-19 for typical cross section). Retention dam heights and storage capacities that correspond to the locations depicted in Figures 2-17 and 2-18 are summarized in Table 2-8.

The runoff volume estimated to reach each dam does not include rainfall on the top surface of the development rock stockpiles because the probability is low that the stockpiles will become sufficiently saturated to allow that water to report to the dams. Small berms will be placed, as needed, to direct runoff from the stockpile slopes to the dammed drainages. The dams will be constructed at a reasonable distance from the stockpile to avoid damage from the run-out of dumped development rock. Stormwater runoff retained behind the dams will either evaporate or seep into groundwater. None is slated for use in mining operations.

- **Internal Drainage Ditch.** A drainage ditch will be constructed approximately half-way along the alignment of the pad footprint to divert into Cottonwood Wash stormwater runoff that has not come into contact with mining activities. The ditch is designed to pass the 100-year/24-hour peak flow of approximately 912 cfs; this peak flow reflects the delayed flows captured in the detention dams constructed upstream. The ditch will be lined as construction of the leach pad progresses northward and will be used as a conduit for pipelines that will capture and transport PLS.

< **Other Facility Surface Water Management Systems.** Diluent, reagents, fuel, and other petroleum products used in the operations will be stored in above-ground tanks within impervious secondary containment systems to avoid possible discharge to surface waters. All tanks will have leak detection systems. Secondary containment systems will have a capacity of at least 110 percent of the volume of the largest tank contained within the secondary containment facility. Sulfuric acid will be stored in tanks located within containment structures that can be drained to other containment facilities, such as the lined leach pad or the SX/EW tankfarm runoff tank. The SX/EW plant will be designed as a zero-discharge facility, incorporating drainage design features and containment tanks. The agglomeration area and overland conveyor will incorporate a lined containment system designed to drain surface runoff to the leach pad.

Table 2-8. Design Characteristics of Retention Dams

Dam	Spillway Height (ft)	Crest Height (ft)	Storage Capacity (af)	Approximate Width of Dam Base (ft)	Approximate Length of Dam Crest (ft)
R1	23.0	25.0	27.60	120	347
R2	24.2	26.2	16.10	120	238
R3	22.9	24.9	14.70	115	198
R4	28.9	30.9	13.40	145	237
R5	34.4	36.4	14.70	165	142
R6	15.7	17.7	8.00	90	226
R7	21.6	23.6	13.10	110	137
R8	39.2	38.2	13.40	175	142
R9	20.4	22.4	10.60	105	139
R10	19.0	21.0	4.20	n/a	76
R11	26.9	28.9	14.50	130	189
R12	22.3	24.3	4.60	115	185
W1	21.2	23.2	39.70	110	485
W2	12.5	14.5	3.60	75	240
W3	24.0	26.0	17.30	120	257
W4	21.0	23.0	13.40	110	101
W5	24.0	26.0	16.50	120	111

W6	20.3	22.3	8.60	105	94
W7	23.3	25.3	15.50	120	79
W8	24.0	26.0	22.40	120	153
W9	24.0	26.0	18.60	120	197
W10	23.4	25.4	24.80	120	267
W11	24.0	26.0	19.30	120	142
DP1	21.0	23.0	26.90	110	348
DP2	24.0	26.0	19.00	120	337

Table 2-8, continued. Design Characteristics of Retention Dams

Dam	Spillway Height (ft)	Crest Height (ft)	Storage Capacity (af)	Approximate Width of Dam Base (ft)	Approximate Length of Dam Crest (ft)
SJ1	9.0	11.0	13.80	60	81
SJ2	11.7	13.7	2.20	75	220
SJ3	23.1	25.1	7.80	120	231
SJ4	21.4	23.4	21.40	110	247

Source: Dames & Moore, 1999b, Table 5
Note: Dams constructed with spillway heights less than 25 ft and storage capacities less than 50 af are non-jurisdictional under ADWR Dam Safety Regulations. Dams with storage capacities less than 15 af are non-jurisdictional, regardless of spillway height.

2.1.2.3.3 Groundwater Protection. Project facilities are subject to the requirements of the State of Arizona's APP Program (Arizona Administrative Code R18-9-101 through 113), and PDSI is in the process of APP application review. Proposed groundwater protection measures include use of a liner system beneath the leach pad, stormwater controls, pumping systems, tank containment systems, and other features and operations designed to meet APP requirements. Key APP rules require that, among other things:

< PD demonstrate that the discharging facility(s) will not cause or contribute to a violation of numeric Aquifer Water Quality Standards;

< the facility(s) be designed, constructed, and operated so as to ensure the greatest degree of discharge reduction achievable through application of Best Available Demonstrated Control Technology (BADCT), processes, operating methods, or other alternatives;

< there be regular monitoring of groundwater quality and quarterly reporting; and

< conceptual closure and post-closure plans describe measures to be taken to ensure continued compliance with applicable numeric Aquifer Water Quality Standards after closure of the facility(s).

PDSI has incorporated BADCT into facility designs to protect groundwater. Incorporation of BADCT design criteria demonstrates the facility(s) will be developed in a manner that achieves the greatest degree of demonstratable discharge reduction. The leach pad and excess process solution impoundment liner systems, lined storm water impoundment, septic tank systems, truckwash, sulfuric acid storage, and other facilities and operations have been designed to meet BADCT criteria.

A groundwater monitoring program to verify that numeric Aquifer Water Quality Standards are not exceeded will be incorporated into the APP. Monitoring requirements include collection and analysis of groundwater

samples from monitor wells to be installed at approved points of compliance for the mining operations. ADEQ will specify groundwater quality constituents to be monitored in the APP based on results of groundwater quality and material characterization studies.

A conceptual closure and post-closure strategy for the Project has been developed and included in the project's APP application. ADEQ requires conceptual closure strategies in the APP application that minimize stormwater run-on and infiltration and/or seepage from mine facilities that would affect aquifer water quality. In general, all potentially discharging facilities will either be closed in place or will undergo clean closure. Closure in place consists of leaving solid materials in place and, if necessary, providing a containment system that meets BADCT requirements. Possible closure in place activities include installing an infiltration-control cap or detoxifying the facility (by means of rinsing) such that further discharge is unlikely. Clean closure consists of removing and properly disposing of all liquid and solid waste, unused or recyclable chemicals, and impacted materials from the facility (including removing underlying impacted soils to appropriate industrial health- or risk-based levels). The APP closure strategy for the Project will complement the proposed reclamation plan to achieve continued compliance with applicable numeric Aquifer Water Quality Standards.

2.1.2.3.4 Waste Management. Solid waste generated at the Project will be disposed of in a manner consistent with ADEQ regulations. Solid waste will be transported off-site to an approved disposal or recycling facility. Office trash will be disposed of at the county landfill near Safford. Used petroleum products will be transported to a contracted recycling company in accordance with state and federal regulations. Nearly all scrap metal, most used HDPE pipe, and some construction debris will be recycled. Wastes determined to be hazardous under state and federal laws will be properly packaged and transported by a permitted transporter to an EPA-approved hazardous waste treatment, storage, or disposal facility. A pollution prevention plan, as required by the ADEQ, will be developed by PDSI prior to Project construction to minimize waste generation at the Project through source reduction, reuse, and recycling.

2.1.2.3.5 Hazardous Materials Storage, Handling, and Transport. Sulfuric acid, diluent, reagents, fuel, and other petroleum products used in the operations will be stored in above-ground tanks situated within impervious secondary containment systems having a containment capacity of at least 110 percent of the volume of the largest tank therein. Table 2-9 provides a list of regulated materials, the approximate on-site storage capacity, and their locations of use at the Project.

PDSI personnel handling hazardous materials will receive appropriate training that meets the applicable requirements prescribed by ADEQ, EPA, and the U.S. Department of Transportation. Additionally, employees will receive safety training required by the Mine Safety and Health Administration (MSHA) and other training prescribed by PDSI policies. PDSI will require that contractors transporting sulfuric acid or other hazardous materials to or from the Project certify that their drivers meet all the applicable training requirements prescribed by law and perform in accordance with PDSI environmental policies and safety standards.

PDSI estimates that approximately three-fourths of the daily tanker truck deliveries will arrive from the south via Highway 191 or east via Highway 70 and the remaining one-fourth will arrive from the west via Highway 70 from Globe (see Figure 2-7). Trucks arriving to the Project from the west will cross the Gila River at the Reay Lane Bridge and enter the mine site via PD Mine Road. Trucks coming from the south on Highway 191 or from the east on Highway 70 will cross the river at the Solomon Bridge and then access the Project via PD Mine Road. No tanker trucks are expected to use the existing, narrow 8th Avenue (Safford) Bridge to access the mine site in order to minimize traffic impacts in town.

2.1.2.3.6 Sulfuric Acid Storage and Transport. Sulfuric acid will be shipped to the Project in 3,500-gallon capacity tanker trucks and stored on-site in carbon steel tanks. The operations will include two 2,500-ton

(312,500-gal) sulfuric acid storage tanks near the north end of the leach pad for acid addition in the agglomeration system and one 80-ton (10,000-gal) storage tank at the SX/EW facility to provide make-up acid to the SX plant. All three tanks will be situated in acid-resistant, concrete secondary containment facilities that can be gravity-drained to other containment areas, such as the lined leach pad and the 1.9-million-gallon stainless steel runoff collection tank located in the tankfarm.

Sulfuric acid consumption rates over the life of the Project are estimated to average about 1,600 tpd (about 200,300 gpd) during years of full production. These rates will require, on average, approximately 70 truck loads of acid per day.

Probable sources of sulfuric acid include existing copper smelting operations northwest of the Project in Globe, Arizona, or to the east at Hurley, New Mexico, where sulfuric acid is a byproduct.

2.1.2.3.7 Other Reagents. Reagents used and stored in the SX/EW area include diluent, extractant, and cobalt sulfate. These reagents will be stored in tanks located in the SX/EW tankfarm, which is designed as a containment area. It is excavated to provide required solution head to allow gravity flow piping to enter the associated tanks. Process solution bypasses and stormwater runoff are collected in the tankfarm drainage system, which incorporates the 1.9-million-gallon runoff tank located within the tankfarm.

Table 2-9. Regulated Materials to be Used and Stored at the Dos Pobres/San Juan Project

Tank Location	Regulated Material	On-site Storage Capacity*	Use
Site no. 1 explosive storage area (powder magazine)	Diesel fuel	25,000 gal	Used for blasting (fuel oil component of ANFO)
	Miscellaneous blasting materials	Various quantities of boosters, primer cord, delay caps, etc.	Used for blasting
Site no. 2 Fueling station	Gasoline	20,000 gal (two 10,000-gal tanks)	Small vehicle service
	Diesel fuel	5,000 gal	Small vehicle service
	Propane	15,000 gal	Used in water heaters and heating of offices
Sx/ew plant	Concentrated sulfuric acid (92-94%)	10,000 gal	Provides make-up acid for electrolyte
	Propane	30,000 gal (two15,000-gal tanks)	Used in water boilers
Sx/ew plant (Ew tankhouse)	EW surfactant	264-gal totes (supplied in totes, no storage tank)	Added to electrolyte
Sx/ew tankfarm	Diluent	8,000 gal	Used in SX process
	Extraction reagent	264-gal totes (supplied in totes, no storage tank)	Used in SX process
	Cobalt sulfate pentahydrate (~8% cobalt solution)	264-gal totes (supplied in totes, no storage tank)	Added to electrolyte
Truck shop service complex	Gasoline	20,000 gal (two 10,000-gal tanks)	Small vehicle service
	Diesel fuel	10,000 gal	Misc. vehicle service
	Anti-freeze (ethylene glycol)	23,500 gal (one15,000-gal storage tank, one 8,500-gal mix tank)	Misc. vehicle service

	Propane	15,000 gal	Heating and water heaters
Mine fueling station	Gasoline	20,000 gal (two 10,000-gal tanks)	Small vehicle service
	Diesel fuel	175,000 gal	Haul truck/heavy equip. service
Near crushing plant (north end of Leach pad)	Concentrated sulfuric acid (92-94%)	625,000 gal (two 312,500-gal tanks)	Acid addition in agglomeration system

Source: J. Korolsky, PDSI

* Tank storage capacity does not necessarily represent amount actually used or stored on-site.

The SX/EW tankfarm areas are provided with a concrete floor and concrete equipment bases. All tank and pump bases in the tankfarm will be covered with a PVC protective covering. To keep the organic and aqueous solutions separated within the tankfarm, all of the loaded organic tanks, diluent and extractant storage tanks, and organic processing equipment are located together in one contained area of the tankfarm. This containment area for organic solutions is equipped with a sump and pump for recovering the solutions to the holding tanks.

SX diluent will be supplied by tanker truck and stored in an 11-foot-diameter carbon steel tank located in the containment area of the tankfarm. Diluent can be pumped either to the organic mixing tanks, or directly to the SX trains. SX extractants, oxime-based chelating agents, will be supplied in 264-gal totes and stored in extraction reagent storage tanks located in the tankfarm. Each tank is equipped with a centrifugal pump for distribution to the organic mixing tanks for reagent mixing.

Cobalt sulfate pentahydrate solution will be supplied in 264-gal totes. The cobalt solution will be metered by one pump into the electrolyte recirculation tank to make up for the amount removed from the EW electrolyte inventory.

2.1.2.3.8 Fuel Storage and Distribution. Diesel fuel and gasoline will be supplied to the Project by tanker trucks. The trucks will travel directly to one of three fueling stations and offload into above-ground storage tanks that will be provided with secondary containment systems. The first fueling station, the mine fuel station, will be located south of the Dos Pobres mine, northwest of the crusher facility. It will service mine haul trucks as well as smaller vehicles. Storage tanks for this fueling station will be within a bermed area lined with polyvinyl chloride (PVC) or HDPE. A heavy equipment fuel dispensing area will be located on one side of the storage area, and a dispensing area for smaller vehicles will be located on the opposite side.

The second fuel station, servicing smaller vehicles and equipment, will be located at the truck shop complex. Storage tanks for this station will be mounted on skids and placed within a concrete containment area equipped with a sump. In addition, a steel, pre-engineered fuel, lubrication, and storage building will be placed at this site.

The third fuel station, the Mine Office Fuel Station, will be located at Site No. 2 and will only service smaller vehicles. As part of its AZPDES permit requirements, PDSI will develop a Spill Prevention Control and Countermeasures (SPCC) Plan to address requirements for preventing accidental spills of petroleum products and procedures to be followed in the event of a spill.

2.1.2.3.9 Air Resources.

< **Air Quality Control Permit.** The Project must and will meet all applicable state and federal air quality standards. These standards prescribe emission limits, operational practices and administrative requirements. The purpose of these standards is to ensure that emissions are sufficiently reduced so as to prevent any exceedances of health-based, maximum allowable ambient concentrations.

PDSI will utilize proven control equipment, innovative process designs, and responsible operating practices as methods to minimize air emissions. These operating practices and compliance with the terms and conditions of the permit will ensure that Project operations are in compliance with applicable air quality standards. The following sections discuss control measures to be implemented to minimize emissions from Project activities and processes.

< **Crushing and Material Handling Dust Control System.** Dust control for the crushing and material handling system will be accomplished by a combination of dust collection and suppression applications by specific area. These methods are described below. Refer to the crushing and material handling system flow diagram (Figure 2-2) for additional information.

< **Primary Crushing Plant.** Each side of the truck dump pocket will have fog nozzles located in the pocket. The fog nozzles will be activated by a proximity sensor to control dust formation as each haul truck unloads into the primary crusher.

Dust-laden air will be filtered and exhausted from the crusher discharge box, from the belt feeder discharge chute, and at the tail end of the coarse ore conveyor. The system will include an air pulse, baghouse dust collector and will be sized to exhaust approximately 18,000 standard cubic feet per minute (scfm). Cleaned air will be exhausted to the atmosphere via an exhaust fan. Collected dust will be discharged to the crusher discharge conveyor and sprayed with water.

< **Coarse Ore Surge Pile.** Two water-wetting systems will be installed for dust control and suppression at the discharge point of the primary crushing discharge conveyor (CV-001) to the coarse ore surge pile. The first system will pre-wet the ore stream on CV-001 before it discharges onto the coarse ore surge pile. The second system will control fine material at the discharge point with a ring spray header installed around the discharge ore flow stream. This dual-wetting system will control dust formation before the crushed ore falls onto the surge pile. Each reclaim belt feeder will have fog nozzles installed at the hooded discharge to the coarse ore conveyor to control dust formation.

< **Secondary and Tertiary Crushing and Screening Plant.** Fog nozzles will be provided at two locations above the secondary and tertiary crushing surge bins, one at the discharge chute of the feed conveyor (CV-003) to the secondary bin and the second at the tripper conveyor (CV-011) discharge to the tertiary bins.

Two 45,000-scfm pulse-type baghouses (DC-005 and DC-007), one at each end of the building, will control dust generated from all material handling facilities within the plant.

The first baghouse unit (DC-005) will provide dust collection and suppression for:

- 3 surge bins reclaim feeders (BF-009, BF-011, and BF-013)
- 2 primary screens (SC-003 and SC-005)
- 1 secondary screen (SC-007)
- 2 secondary crushers (CR-003 and CR-005)

- 1 tertiary crusher (CR-007)
- 3 conveyor transfer points (CV-005, CV-013, and CV-015)

The second unit (DC-007) will provide dust collection and suppression for:

- 4 surge bin reclaim feeders (BF-015, BF-017, BF-019, and BF-021)
- 4 secondary screens (SC-009, SC-011, SC-013, and SC-015)
- 4 tertiary crushers (CR-009, CR-011, CR-013, and CR-015)

Additionally, a smaller 10,000-scfm baghouse will be used to control dust at the conveyor transfers located outside the plant, which include CV-007, CV-009, and CV-015.

< **Fine Ore Surge Pile.** The fine ore stockpile will include an enclosure structure. Fog nozzles will be provided above the enclosed fine ore stockpile to suppress dust generated as the final product discharges onto the pile. A 10,000 scfm baghouse (DC-016) will be provided at the fine ore stockpile enclosure to collect dust generated from the incoming volume of material and air to minimize dust emissions from the enclosure.

Fog nozzles will be used to suppress dust at each of the three belt feeders (BF-023, BF-025 and BF-027) in the fine ore reclaim tunnel.

< **Agglomeration and Stockpile Stacking.** A 10,000-scfm baghouse (DC-015) will control dust at the splitter box which transfers ore from the fine ore reclaim conveyor (CV-019) to the two agglomerator feed conveyors (CV-021 and CV-023).

Acid and water are added to the ore as it is fed into the agglomeration drums, raising the moisture content of the material to a range of six to eight percent moisture. When the ore is agglomerated in the drums the fine particles adhere to the larger rocks. Due to the increased moisture content and agglomerated condition of the ore when it exits the drums, no additional dust suppression is needed after the agglomeration process.

< **Tankhouse Acid Mist Suppression.** During the electrowinning process, oxygen liberated from the electrolyte solution at the face of the anode forms small bubbles which rise through the solution. As the bubbles reach the surface, they release droplets of sulfuric acid solution immediately above the cell. Some droplets coalesce and settle back into the cell, while others become suspended in the air in the form of a fine mist. A portion of the acid mist eventually settles out elsewhere in the tankhouse; however, some of acid mist may exit the building through openings in the tankhouse roof or sides.

Acid mist that is generated in the tankhouse from electrowinning processes will be controlled with the use of a combination of passive control systems. Control methods currently being evaluated include:

- **Heat-retention beads (HRBs).** These small plastic devices form a floating layer of insulation on top of the cell that helps reduce heat loss from the electrolyte. The floating layer of beads also serves to coalesce the droplets generated by the bursting bubbles, significantly reducing the amount of mist that becomes airborne.

- **Surfactants.** These specialized chemicals modify the surface tension of the electrolyte at the surface of the cell, effectively altering the way bubbles form and burst. This action reduces the amount of mist that is generated.

- **Foggers.** PDSI is currently evaluating the practicability and effectiveness of water fogging systems for reducing acid mist emissions. Water sprays are typically used to control sulfate buildup above electrowinning cells. Very fine water mist spray systems (fogging systems) above the cells are being evaluated to determine if they would also be effective in controlling acid mist by creating a saturated zone immediately above the cell where droplets of acid would coalesce and settle back into the cell.

- **Cell brushes.** Cell brushes are plastic or fiber devices that attach to the anodes above the surface of the electrolyte. The cell brushes serve to coalesce the mist droplets such that the droplets eventually fall and are reabsorbed into the electrolyte. PDSI is currently testing cell brushes to determine if operational problems associated with the devices can be overcome.

< **Volatile Organic Compounds (VOCs).** Emissions of volatile organic compounds (VOCs) result from the combustion or evaporation of certain organic compounds, such as petroleum-based fuels, solvents, and diluents. The primary source of VOC emissions at the Project is expected to be the evaporation of diluent used in the solution extraction process. Diluent is a highly refined petroleum product that is used as a carrier for the viscous copper extraction reagent. Together these products comprise the organic solution used in the SX process. Typically, the organic solution contains about 90 to 95 percent diluent and 5 to 10 percent copper extraction reagent.

The emissions of VOCs from SX process tanks will be minimized through engineering designs and reagent selection. Solution extraction mix boxes will be totally enclosed and settling tanks will be constructed with enclosures extending beyond the organic weirs.

PDSI will evaluate various diluents available from different manufacturers in order to select a product that will meet operational requirements and have a sufficiently low vapor pressure such that evaporation losses are minimized.

< **Fugitive Particulate Emissions from Roads.** Fugitive particulate (dust) emissions from haul roads and unpaved primary access roads will be controlled by the application of water and, in certain areas, commercial dust suppressants. Water trucks will be employed 24 hours per day, as needed, to water haul roads and major access roads.

< **Boiler Combustion Gases.** Boilers will be used at the SX/EW facility to heat water which will then be used to heat electrolyte to improve electrowinning efficiency. Combustion gases will be generated by the burning of fuel in the boilers. Emissions of regulated pollutants from the boilers will be minimized through the use of clean-burning fuels, such as propane and/or natural gas.

2.1.2.4 Closure and Reclamation Measures

In addition to the conceptual closure plan submitted in its APP application, PDSI prepared and submitted a reclamation plan to the BLM (PDSI 2003). This plan was developed to meet both federal and state reclamation requirements. The reclamation measures presented in the plan were intended to achieve productive post-mining land uses (PMLU) as required by both federal and state regulations. Types of PMLUs envisioned for the project area include 1) wildlife habitat and limited grazing; 2) recreation, tourism, and

education; 3) industrial development; 4) future mineral exploration and mine development; and 5) management of environmental resources including visual, air, water, and soil. The long-term reclamation objectives of the Dos Pobres/San Juan Project Reclamation Plan are listed below.

< Establish wildlife habitat at selected facilities including the development rock stockpiles, borrow sites, and locations where buildings and other structures are removed.

< Provide scenic overview location(s) in the mining district that support education and tourism for people traveling in the area, thereby, enhancing the economic base of Graham County and addressing visual and recreation resource values.

< Protect public health and safety by controlling access to certain mining facilities, such as the open pits, through proper management of access roads, fencing, and gates.

< Provide the basis of an expanded commercial and industrial complex (e.g., a small industrial park) during mining and post-mining by utilization of existing infrastructure (e.g., truck shop).

< Anticipate future mineral exploration and development as technologies advance which may support the reprocessing of stockpile material, and mining of material below the current ore cut-off grade.

< Maintain access to recreation resources near and adjacent the project area to the extent practicable while protecting the safety of recreational users.

< Implement interim and concurrent reclamation and drainage control programs to facilitate long-term stabilization and closure requirements.

< Coordinate reclamation activities with requirements of the Arizona Department of Environmental Quality's APP Program to efficiently meet the collective reclamation and closure requirements including management of process materials.

< Establish stable slopes and appropriate vegetation ground cover using native plant materials as described in PDSI's reclamation plan.

Reclamation of surface disturbance within the project area will be an ongoing component of Project operations. Interim reclamation and testing programs, such as revegetation on the pad side slopes, will help to identify practicable and effective reclamation techniques for concurrent reclamation efforts and development of long-term strategies. Interim programs will focus on the reduction and prevention of erosion through implementation of drainage stabilization and erosion control programs, and a program involving selective contouring and seeding of surface disturbances associated with Project construction, such as peripheral areas around buildings, areas adjacent to roads, soil stockpiles, etc. Revegetation will involve application of a native seed mix as Pure Live Seed. Species planned for use (and average pounds of seed to be applied per acre) are Western honey mesquite (1), fourwing saltbush (2), side-oats gramma (2), foxtail fescue (2), desert needlegrass (1), and purple threeawns (2). This seed mixture was developed by Phelps Dodge in cooperation with the BLM Safford Field Office, the Natural Resources Conservation Service, and the University of Arizona Agricultural Research Center (PDSI 2003). Revegetation will not necessarily be limited to these plant species; PDSI will continue to evaluate other plants that may be suitable to meet revegetation requirements. Success of revegetation efforts will be demonstrated by establishment of a diverse native vegetative cover that retains soils and encourages wildlife habitat establishment. Success criteria for revegetation will be self-sustaining (without irrigation for not less than three years) vegetation at not less than 70 percent of the average densities

of native species on the area itself as measured prior to disturbance or on adjacent undisturbed areas. If density measurements demonstrate that initial revegetation has been unsuccessful in meeting this criterion, additional hydroseeding may be employed until it is demonstrated that revegetated areas are self-sustaining (no supplemental irrigation) and with suitable cover. It is anticipated that revegetation success to meet both BLM and Arizona State standards will be demonstrable in not less than three successive growing seasons. To lessen the potential spread of noxious and invasive plants, PD will ensure that all soil, seed, and vegetative material will be removed from earth-moving equipment prior to the equipment being transported to the mine site. Concurrent reclamation and testing activities will be implemented at selected mining units, including portions of the leach pad and development rock stockpiles as they become permanently inactive. Primary elements of the reclamation plan are summarized below and discussed in greater detail in the Dos Pobres/San Juan Reclamation Plan submitted to the BLM (PDSI 2003).

2.1.2.4.1 Public Safety. One of the primary objectives of BLM regulations and the Arizona State Mined Land Reclamation Act is to ensure public safety. The following measures will be implemented prior to and during reclamation to reduce or eliminate potential hazards within disturbed areas after mine closure: 1) construction of physical barriers such as fences, berms, and rocks; 2) placement of warning signs; 3) stabilization of slopes; 4) demolition of unneeded buildings; and 5) proper disposal of debris.

When practical, physical barriers will be constructed around open pits to restrict public access. Standard four-strand barbed wire safety fences will be constructed around most of the pit perimeter and six-foot-high chain link fencing will be placed along sections of the open pits that are accessible to public traffic, including designated public overlooks and other areas adjacent to public roads.

The final configurations of leach pad and development rock stockpiles are characterized by geotechnically and erosionally sound slopes (SRK Consulting 1998). The non-uniformity of particle sizes of the ROM-sized material results in a filtering or packing effect which naturally limits erosion. While the overall slope design of the leach pad is expected to minimize erosion in areas composed of crushed ore, PDSI will evaluate these areas during leach operations to determine if other erosion mitigation measures are necessary. The final configuration of the leach pad has been determined to be geotechnically stable under static and pseudo-static conditions (ibid).

While pit wall stability during mining is mandated by Mine Safety and Health Administration (MSHA) regulations, the design of economic pit slopes does not always result in the long-term stability of the inter-bench pit walls following mine closure. Following mine closure it is expected that the inter-bench walls will gradually ravel and deposit small rock-falls on benches. The accumulation of these small rock-falls will, over time, gradually produce talus slopes at an angle of repose for the material.

Some buildings and ancillary facility structures will remain after completion of the mining operations for use as part of the industrial PMLU, future mining PMLU, and long-term environmental monitoring required by the Arizona APP Program. Areas where buildings are removed will be reclaimed to eliminate hazardous conditions and achieve PMLU objectives.

2.1.2.4.2 Leach Pad. At closure, the leach pad will be allowed to drain to remove residual process solutions, consistent with APP requirements. To achieve the PMLU of wildlife habitat and limited grazing, the following measures will be implemented:

< In the course of operations, PDSI will construct stormwater diversions and management systems.

< The top surfaces of each of the last lifts of the leach pad will be graded after leach operations cease to direct the flow of stormwater to the center of the top lifts of the leach pad, where it will be collected to control infiltration (Figure 2-20). Designated ponding areas will be compacted and/or capped to minimize infiltration and enhance evaporative loss.

< The entire top surface area of the leach pad will be covered with approximately 12 inches of Basin Fill sediment or comparable growth media and seeded with native species. PDSI will evaluate opportunities for salvaging state-protected plants such as barrel cactus as part of Project development activities. If plants are salvaged, their use as part of reclamation activities would also be evaluated.

< A test program will be undertaken concurrently with mine operations to determine the optimum method for reclamation of the leach pad side-slopes. To maintain an overall side-slope of 2H:1V, setbacks averaging approximately 20 feet wide will be made following the placement of approximately every second lift. The revegetation test program will involve rinsing the surface of the flat area of the setback and outer slope with fresh water to remove residual salts. Following rinsing, the flat area of the setback will be capped with approximately 12 inches of Basin Fill sediment or comparable growth medium and seeded with native species. A minimum of 12 inches of similar growth medium will be placed on the side-slopes of each lift and hydroseeded with a BLM-approved native seed mix. This test program could potentially begin during Year 3 of the operation. Monitoring of the test program will determine optimum, concurrent reclamation methods, and optimum growth media thickness to achieve revegetation goals.

2.1.2.4.3 Development Rock Stockpiles. The following reclamation measures will be implemented to support the wildlife habitat and limited grazing PMLUs planned for the development rock stockpiles.

< In the course of operations, PDSI will construct stormwater diversions and management systems.

< The top surfaces of the development rock stockpiles will be graded during final placement of material to minimize random ponding and infiltration, to direct stormwater flows to compacted areas within the interior of the surface area for collection and evaporation, and to arrive at the final configuration. The top portions of slopes will be crown chained or dozed to stabilize slope faces.

< The entire top surfaces of the stockpiles will be revegetated and capped with approximately 12 inches of Basin Fill sediment or comparable growth medium and seeded with native species. As a general rule for acceptable reclamation for both BLM and Arizona State requirements, revegetation has to be self-sustaining for a reasonable period such that it is obvious that the vegetation is surviving without irrigation, generally not less than three succesive growing seasons. Also, it is a goal of the revegetation efforts that revegetated areas will have similar plant densities as the adjacent undisturbed areas.

< Growth medium will be used extensively on the side-slopes of the stockpile for revegetation purposes. In addition, the stockpile slopes will be broadcast seeded, hydroseeded, or hydromulched. PDSI will evaluate opportunities for salvaging state-protected plants such as barrel cactus as part of Project development activities. If plants are salvaged, their use as part of reclamation activities would also be evaluated.

2.1.2.4.4 Open Pits. Revegetation of pit areas would interfere with potential future mining opportunities in the Mining District and is therefore not proposed. The open pit areas will be maintained for possible future access to mineral resources. Management of these areas will be in accordance with the PMLU of future mineral exploration and mine development in addition to education and tourism. Public access to the open

pit areas may be allowed under controlled circumstances as part of the education and tourism PMLU objective. Visitor information center(s) will be developed to support tourism and to enhance awareness of mining and the history of the Mining District through educational displays.

Through time, a pit lake is expected to develop in each of the open pits. As documented in Chapter 4, water quality within the pit lakes is expected to be satisfactory and specific remedies or reclamation activities are not anticipated to be necessary.

2.1.2.4.5 Roads and Traffic. The post-reclamation configuration of roads has been designed to meet the access requirements for future industrial uses, education, and tourism uses, maintenance and security functions, and environmental monitoring. Roads that are retained as part of PMLU objectives will have public access controls (i.e., gates) for safety purposes, will be reduced in width as appropriate, and will be maintained in accordance with designated PMLUs. Approximately 300 acres of access and haul roads (excluding areas within the pits) will exist at the project site upon closure. Paved roads will be retained and maintained for long-term site access.

The following reclamation measures will be employed for access roads:

< For roads that are reclaimed, slopes on both sides of the roadway will be graded to blend in with the surrounding terrain. Where possible, drainages will be established to provide stable drainage conditions. Typical sediment barriers will be placed in accordance with BLM standards.

< After contouring and grading are completed, ripping of road surfaces and scarifying of the underlying materials will be performed to a depth ranging from one or two feet to reduce compaction and to prepare a seed bed. The prepared roadbeds will then be seeded with native species.

< Public access will be discouraged by the placement of earth berms, boulders, or gates at roadways around the site. Appropriate signage will be placed at all retained roads to provide warning of potential hazards associated with unauthorized access.

The following reclamation measures will be employed for haul roads:

< Haul roads will be reduced in width to allow two-way traffic of standard vehicles to access the former stockpile areas for PMLU management. Reclaimed portions of haul roads will be contoured and graded to control direct surface drainage. Safety berms that have been constructed will be retained along the outside edges of retained haul roads as necessary to ensure safety.

< After contouring and grading are completed, ripping of road surfaces and scarifying of the underlying materials will be performed to a depth ranging from one to two feet to reduce compaction and to allow for revegetation through natural colonization.

2.1.2.4.6 Reclamation Costs and Bonding. The estimated grand total for reclamation costs for the Project is $10,992,000 (2003 dollars), of which $9,926,000 is the estimated cost for the proposed reclamation measures and $1,066,000 is the estimated cost for closure requirements identified for PD's Aquifer Protection Permit (PDSI 2003). Ongoing maintenance costs during the period of reclamation will be funded through the 10 percent contingency added to the estimated total reclamation cost. These costs are summarized in Table 2-10.

Table 2-10. Projected Closure and Reclamation Cost Summary for the Dos Pobres/San Juan Project

Mine Facility	Projected Cost (2003$)
Leach Pad Surface	826,000
Leach Pad Slopes	1,806,000
Development Rock Stockpiles	1,689,000
Development Rock Stockpile Slopes	702,000
Process and Support Facilities	509,000
Haul and Access Roads	91,000
Open Pits	217,000
Support and Miscellaneous	397,000
Subtotal Reclamation Cost	**6,237,000**
	624,000
Contingency @ 10% of Reclamation Cost	
Insurance @ 1.5% of Total Labor	20,000
Performance Bond @ 1.5% of Reclamation Cost	94,000

Table 2-10, continued. Projected Closure and Reclamation Cost Summary for the Dos Pobres/San Juan Project

Mine Facility	Projected Cost (2003$)
BLM Administration @ 17.8% of Reclamation Cost	1,110,000
BLM Indirect Costs @ 18.0% of Reclamation Cost	1,123,000
Subtotal Indirect Costs	**3,689,000**
TOTAL RECLAMATION COST	**9,926,000**
APP Closure Costs	1,066,000
GRAND TOTAL RECLAMATION & CLOSURE COSTS	**$10,992,000**

Source: PDSI 2003

In consultation with BLM and the State Mine Inspector, PD will select an appropriate financial assurance mechanism(s) for reclamation costs. Potential financial assurance mechanisms include any one or a combination of the following: surety bond, cash, irrevocable letter of credit, certificate of deposit or savings accounts, securities or bonds, or insurance.

2.1.2.5 Projected Employment

The Project will provide both short-term construction employment and long-term employment in the form of direct employment by PDSI, local contractor employment in direct support of project operations, and local indirect employment (jobs created or maintained as a result of direct employee needs for goods and services).

During the 15-month construction phase, employment is expected to average approximately 470 full-time workers, with peak employment reaching about 980 workers during the eighth month of construction. Table 2-11 summarizes estimated construction employment and payroll for this short-term phase of the Project.

Table 2-11. Estimated Employment and Payroll for the 15-Month Construction Phase of the Project

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Total Employment (FT jobs)	150	220	400	450	570	800	890	980	960	600	320	270	220	170	50
Estimated Payroll ($000s)	538	789	1435	1614	2044	2869	3192	3515	3443	2152	1148	968	789	610	179

Source: PDSI 1996

For the operational phase of the Project (16 years), approximately 250 full-time employees, with an average annual per-capita salary of $36,000 (1997 dollars) plus benefits, will be employed annually by PDSI. It is expected that roughly 80 percent or more of the positions would be filled by applicants residing in the local Graham and Greenlee counties area, including some PD employees currently working at PD's Morenci Mine.

PDSI estimates that local contractors will employ approximately 100 people to provide direct support services for the Project. A portion of these contractors will work onsite at the Project while the remainder will provide certain maintenance and fabrication services out of local shops. Because of the Project's proximity to the San Carlos Apache Reservation, employment opportunities for tribal members will be available through both direct employment and through contractors that may be located on the reservation. Estimated total payrolls for local contractors working at or for the Project range from $2.5 to $3.0 million annually.

2.1.3 Partial Backfill of San Juan Alternative

This alternative to the Proposed Action was identified in the 404(b)(1) Alternatives Analysis (see Alternative C in Appendix A) as practicable, which is defined as "available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes" (40 CRF §230.3[q]). This alternative would preclude development of additional leach ore resources at the San Juan pit assuming future conditions (economics, technology, etc.) would otherwise result in more economic reserves on the fringes of the currently planned pit. The mine plan for this alternative is described below and depicted in Figure 2-21.

2.1.3.1 Mining and Ore Processing Operations

This alternative is identical to the Proposed Action for mining production and pit configuration and sizing except that the portions of the San Juan pit would be partially backfilled with roughly 60 to 80 million tons of development rock from both the San Juan and Dos Pobres pits starting in Year 10 of the Project (see Figure 2-21). The backfilled development rock would be placed on the upper benches on the mined-out west side of the pit, starting at about the 3,650-foot elevation bench and rising to about the 4,150-foot elevation in two lifts. The stockpile would ultimately cover roughly 141 acres in the pit. The ultimate pit lake elevation is projected at the 3,300-foot elevation and is therefore not expected to contact the backfilled material (Water Management Consultants 2002). Placing a portion of the development rock in the San Juan pit, while not a usual and customary mining practice, would reduce the heights of the East and West development rock stockpiles by approximately 50 feet, to 4,200 and 4,100 feet above msl, respectively, with relatively minor reductions in the footprints of the development rock stockpiles. Drilling and blasting procedures would be identical to the Proposed Action alternative.

This alternative does not propose backfilling of the Dos Pobres pit, as the distribution of oxide ore reserves and the known sulfide ore resource precludes full or partial backfilling at this pit. Therefore, the Partial Backfill

alternative also proposes the 1,300-foot setback around the Dos Pobres pit to allow for potential future mining of deeper sulfide ore.

All ore processing facilities and operations, such as crushing, leach pad construction and operation, and SX/EW operations, would be identical to those described in the Proposed Action alternative.

2.1.3.2 Support and Ancillary Facilities

Support and ancillary facilities and operations, such as water supply, electrical power, compactible soil borrow source, shops, communications, transportation, access and haul roads, site security, powder magazine, and aggregate materials facilities, would be identical to those described in the Proposed Action alternative.

2.1.3.3 Environmental Protection Measures

Environmental protection measures involving wastewater treatment, surface water management, groundwater protection, solid waste and hazardous materials management, and air quality would be identical to those described in the Proposed Action alternative.

2.1.3.4 Closure and Reclamation Plan

The post-mining land uses for this alternative are the same as those proposed for the Proposed Action alternative. The closure and reclamation plan for this alternative would be similar to that described in the Proposed Action alternative. Development rock backfilled into the San Juan pit would be stabilized and reclaimed in a fashion similar to that proposed for the West and East development rock stockpiles. The closure and reclamation costs are expected to be the same as the Proposed Action alternative.

2.1.3.5 Projected Employment

The Partial Backfill alternative would require the same levels of direct and indirect employment as projected for the Proposed Action during the construction and operational phases of development. Backfilling of development rock into the San Juan pit would occur simultaneous with mining in other portions of the pit and is not anticipated to require additional haul trucks or employment.

2.1.4 No Action Alternative

The No Action alternative in this Mine Plan Alternatives Set would involve denying all federal actions being analyzed in this set: BLM would reject the proposed MPO and the Partial Backfill alternative; the COE would deny PDSI a Section 404 permit. The result would be no authorized MPO and no issuance of a federal permit for mining activities subject to Section 404 of the Clean Water Act. This alternative would effectively result in no mining at the Dos Pobres/San Juan Project.

The No Action alternative is a NEPA requirement that serves as a baseline for comparing and evaluating the environmental consequences of the Proposed Action and project alternatives. However, for the BLM, the No Action alternative in this set is not consistent with BLM's authority under the General Mining Law of 1872, as amended; the Federal Land Policy and Management Act (FLPMA) of 1976; the Mining and Mineral Policy Act of 1970; and the National Materials and Minerals Policy, Research, and Development Act of 1980. These laws and regulations authorize a mining claimant to explore for, extract, and process the mineral resources on public lands in a manner consistent with applicable state and federal laws and regulations. In evaluating

whether to approve an MPO, the BLM, as a public lands manager, has the responsibility under FLPMA and 43 CFR 3809 to ensure that:

< proposed mining operations include adequate provisions to prevent unnecessary and undue degradation of the environment (as defined in 43 CFR 3809.0-5);

< measures are included to provide for reclamation of disturbed land; and

< proposed operations would comply with other applicable federal and state laws and regulation.

The BLM thus disallows proposed mineral development activities on public lands if the activities would violate applicable state and federal regulations and/or BLM standards. In such cases, BLM indicates the changes in the proposed mining activities that would allow for approval of the plan. Under the current laws, BLM does not have the authority to deny an otherwise adequate or reasonable Mining Plan of Operations (i.e., selection of the No Action alternative is precluded because BLM typically works with the applicant to develop an acceptable MPO).

.1.5 Mine Plan Alternatives Eliminated from Further Consideration

2.1.5.1 Mine Plan Alternatives Considered in 404(b)(1) Alternatives Analysis

An analysis of alternatives is required by the COE under guidelines established under the Clean Water Act, Section 404(b)(1) (40 CFR 230). The objective of this analysis is to identify the least environmentally damaging, most practicable alternative for the Project that avoids or minimizes impacts to waters of the U.S. A copy of the 404(b)(1) alternatives analysis completed for this project is provided in Appendix A.

A total of 15 alternatives or alternative mine plan components were considered in the alternatives analysis, including 9 alternative mine plan configurations, 2 site development sequence alternatives, 2 compactible soil borrow source alternatives, and 2 SX/EW location alternatives. Of the nine configuration alternatives and two site development sequence alternatives considered, only two alternative mine plan configurations (Alternative C, *Partial Backfill of San Juan Pit*, and Alternative I, *Single Leach Pad/Crush Convey w/ Haul Truck Placement* [the Proposed Action alternative]), were found to be practicable in light of cost, technical, and logistic considerations. These two alternatives were carried forth for further analysis in this EIS. The seven mine plan alternatives eliminated from further study were determined to be impracticable for logistic reasons and/or cost considerations (see Table 4 in Appendix A). These alternatives and the reasons for their elimination from further consideration are described in Appendix A.

The alternatives considered in the COE's 404(b)(1) Alternatives Analysis represent a reasonable range of mine plan alternatives that exist to achieve the Project's purpose and need and are technically capable of being accomplished. Considering the constraints imposed by the orebodies, the distribution of other ore reserves in the project area, and the nature and distribution of waters of the U.S. in the project area, it is unlikely that other practicable alternatives that meet the purpose and need and that significantly minimize or avoid impacts to waters of the United States could be developed.

2.1.5.2 Alternative Mine Plan Elements Considered but Eliminated

Alternatives to some elements of the mining plan of operations were considered in preliminary planning and feasibility phases but eliminated from further analysis due to logistical or technical reasons. These alternative elements and the reason(s) for their elimination are described below.

2.1.5.2.1 Alternative SX/EW Plant Location. In the early planning phases of the Project, PD considered locating the SX/EW Plant in a central area with regard to PD's long-term potential development of their holdings within the Safford Mining District. Called the East SX/EW Plant, this site is located about 2.5 miles south-southeast of the San Juan pit in the east half of Section 13 (T6S, R26E) on PDSI's patented Lone Star property. The East SX/EW Plant would receive copper-laden pregnant leach solution (PLS) delivered through stainless steel and HDPE pipelines from the PLS collection tank at the toe of the leach pad. Plant feed and raffinate pipelines approximately four miles long would be constructed along a common corridor that would parallel the haul road to the Lone Star compactible clay borrow source. The pipeline system would be designed as a zero discharge system.

Given the time horizon for PD's long-term development plans at this time within the Safford Mining District, the uncertainties of environmental permitting, and the high capital and operating costs associated with the PLS and other pipelines to an East SX/EW Plant, this alternative was eliminated from further consideration at this time.

2.1.5.2.2 Alternative Supplemental Water Source. As a partial alternative to groundwater pumping, PDSI investigated the possibility of using treated effluent from the City of Safford as a supplemental source of process water for the Project. The City of Safford currently operates a wastewater treatment plant that processes about 875,000 gallons of effluent per day (D. Gordon, Chief, Water and Reclamation Plant Operations, Gila Resources, pers. comm., 10/24/02). The treated wastewater is currently used to irrigate the City-owned golf course.

PDSI has not included the use of effluent in its current Project development plans because it has not been determined whether it is feasible or economic to transport the volume of effluent available from the new plant, which is located south of the Gila River, to the project area. Furthermore, it is unknown whether effluent water quality would be suitable or compatible for use in the leaching and SX/EW process. Without this information, no agreements can or have been made to purchase the City's effluent at this time. Since this alternative is not available at this time and may not be available in the future, it is not considered further in this EIS; however, PD will continue to evaluate this option as more data become available.

2.1.5.2.3 Off-Site Mine Alternative. PD considered two off-site mine alternatives in its 404(b)(1) Alternatives Analysis (see Appendix A): mining of the Sanchez orebody under the currently approved MPO (USDI BLM 1992) and mining of the Lone Star ore deposit. The Sanchez Mine alternative was determined to be not practicable due to various technological considerations requiring the need for further evaluation of the current engineering design, metallurgical data, and hydrogeologic regime. The Lone Star Mine alternative is not practicable at this time because of the limited information available upon which to prepare a mine plan and determine project feasibility. As geologic exploration studies to characterize the Lone Star orebody and its extent are still ongoing, this mine project is conceptual only.

2.2 LAND EXCHANGE ALTERNATIVES SET

Only the BLM can act on the alternatives presented in this set. Although PD's original proposed project was a land exchange and not an MPO, PD has extended the exchange proposal as an alternative to BLM authorizing the proposed MPO. By selecting a land exchange alternative, BLM would relinquish its jurisdiction over mining on public lands. Within this set of alternatives to the Project, one land exchange alternative has been identified by the BLM for detailed analysis.

Federal land exchange packages consist of public lands desired by the proponent (the selected lands) and private lands being offered to the federal agency in exchange (the offered lands). Land exchanges are discretionary and voluntary actions; that is, the BLM is not obligated to process every exchange proposal it receives (43 CFR 2200.0-6). Generally, BLM will respond to a land exchange proposal if it 1) conforms with the land tenure objectives of applicable BLM resource management plans; and 2) has the potential to serve the public interest. The regulatory and realty considerations that circumscribe the range of reasonable land exchange alternatives that were developed and considered for this Project are briefly explained below.

2.2.1 Considerations in Formulating Land Exchange Alternatives

Several considerations played a role in BLM's development of land exchange alternatives. Among them are the public interest objectives and equal value requirements under FLPMA and FLEFA, BLM's resource management objectives, and constraints on the configuration of selected and offered lands from which to develop alternatives. These considerations as they shaped how land exchange alternatives were formulated for this Project, are briefly described below.

2.2.1.1 Equal Value

Federal Land Exchange Facilitation Act (FLEFA) and 43 CFR 2201.6 require that the lands being exchanged be of equal value, meaning that the monetary value of the offered and selected lands must be equal. To achieve this, any difference in monetary values, up to 25 percent of the value of the public lands leaving federal ownership (selected lands), must be equalized through a cash payment by the exchange proponent or by the agency. This requirement ensures that the exchange is fair, despite potential acreage differences, since not all land is worth the same dollar amount per acre.

2.2.1.2 Public Interest and Resource Values

That an exchange be in the public interest is a requirement under Federal Land Policy Management Act (FLPMA), FLEFA, and 43 CFR 2200.0-6. In considering whether an exchange is in the public interest, FLPMA directs the Secretary to "give full consideration to better federal land management and the needs of State and local people, including needs for lands for the economy, community expansion, recreation, areas, food, fiber, minerals, and fish and wildlife..." (FLPMA Section 206[a]).

In addition, Section 206(a) of FLPMA also requires that the values of, and the management objectives served by, the lands being acquired (the offered lands) be greater than, or at least equal to, the values of and management objectives served by the public lands being disposed of (the selected lands). This means that the resource values of the lands the BLM would acquire be equal to or greater than the values of the lands leaving public ownership. In meeting the public interest requirement, the authorizing officer must generally determine that the values of the resources being exchanged are comparable or are in the public's favor in terms of quantity or quality.

2.2.1.3 Mutual Agreement on Configuration of Exchange Lands

Since federal land exchanges are discretionary, both the BLM and the exchange proponent must agree to the configuration of the selected and offered lands. The considerations affecting the configuration of selected and offered lands are briefly described below.

2.2.1.3.1 Selected Lands. Previous decisions by the Interior Board of Land Appeals (IBLA) have defined the range of alternative exchange configurations the BLM must consider. In *124 IBLA 44 (August 26, 1992)*, the IBLA determined that "in conducting an environmental review of a proposal to exchange public for private land, *BLM need not consider the alternative of conveying other land if it is not desired by the private party involved in the exchange and conveyance of such land would not satisfy the purpose of the exchange*" (emphasis added). Thus, the range of alternative selected lands is restricted to those configurations that are mutually acceptable to the exchange proponent and BLM.

2.2.1.3.2 Offered Lands. For this alternative set, any offered lands package had to meet one constraint: properties that PD originally offered to BLM in 1994 must be included as a "base package." At BLM's request, the base package was reduced from seven to five of the original properties to provide BLM more flexibility in considering and developing alternative offered lands packages. All five base properties are lands within Long-Term Management Areas (LTMAs)[14] identified in the Safford District RMP, as amended, Map 27. These LTMAs are the Gila Box Riparian National Conservation Area (RNCA); the Dos Cabezas LTMA; and the Las

[14] Long-Term Management Areas are areas in which the BLM would like to maintain its long-term management presence.

Cienegas National Conservation Area (NCA)/Sonoita Valley Acquisition Planning District. The five base properties have been appraised by BLM at $1,463,000 and are described in Section 2.2.3.

To develop offered lands packages that met BLM's resource value and land management objectives and that was within 25 percent of the dollar value of the selected lands, PD made nine additional offered properties available to BLM. These properties are located within areas administered by the Safford Field Office, as well as in other BLM field offices, and were identified by BLM as desirable for public ownership. The BLM members of the ID Team then developed and considered seven land exchange packages (see discussion of these alternatives in Section 2.2.4). Of these, BLM resource specialists identified one land exchange action alternative, which is described below in Section 2.2.2, as the most desirable alternative.

2.2.2 Land Exchange Alternative

Under this alternative, the BLM would dispose of approximately 16,297 acres of selected lands, both surface and mineral estate, north of Safford, including public lands containing the Sanchez office building. In exchange, BLM would acquire a total of 3,867 acres of private lands, both surface and mineral estate, composed of five base package properties (2,135 acres) and six optional properties (1,732 acres). Table 2-12 summarizes the total acres and appraised values of the selected and offered lands.

The exchange includes the transfer of all the rights and privileges, including surface water rights, that are appurtenant to the selected and offered lands and owned by the BLM and PD, respectively. The exchange of both selected and offered lands would be subject to existing rights-of-way and easement agreements; when those expire, the new landowner could decide whether or not to renew or renegotiate the agreement. Prior to the exchange, current grazing leases on both the selected and offered lands would be terminated; however, BLM would likely offer the current leasee first right of refusal for those offered properties acquired by BLM on which grazing will be allowed by the applicable resource management plan. Similarly, PD has indicated that if the exchange is authorized, it would renegotiate grazing leases with the current allottees for portions of the selected lands not directly involved in the proposed Dos Pobres/San Juan Project.

In developing this alternative, the BLM sought to maximize the management benefits and maintain a diversity in the resource values of lands that would come into federal ownership while minimizing the discrepancy in appraised dollar values between the selected and offered lands. Resource values associated with this offered lands package that would come into public ownership and federal management include, but are not limited to, riparian and wetland habitats; wildlife; threatened and endangered species habitats; cultural resources; recreation; public lands access to special management areas; and public land consolidation.

A description of the selected and offered lands and the foreseeable uses of the lands as identified by PDSI and applicable BLM land use and resource management plans, respectively, is provided below as required by 40 CFR 1508.7 and 1508.8. The foreseeable uses provide the context for analyzing the anticipated impacts of the land exchange alternative in Chapter 4.

Table 2-12. Summary of Acreages and Appraised Values of Selected and Offered Lands in the Land Exchange Alternative

Parcel	Acres	Total Value
Offered Lands (Private Lands)		
Base Package		
Amado	180	$59,000.00
Curtis	755	$208,000.00
Musnicki	640	$360,000.00
Schock	240	$420,000.00
Feulner	320	$416,000.00
Optional Package		
Tavasci Marsh	324	$1,625,000.00
Freeland	140	$57,200.00
Butler-Borg	308	$114,000.00
Norton	400	$120,000.00
Clyne I	160	$240,000.00
Clyne II	400	$600,000.00
Total Offered	**3,867**	**$4,219,200.00**
Selected Lands (Public Lands)		
Total Selected	**16,297**	**$3,958,500.00**
Difference/Discrepancy	**12,430 acres in favor of PD**	**$260,700 in favor of BLM (6.5% discrepancy)**

2.2.2.1 Description and Foreseeable Uses of Exchange Lands

2.2.2.1.1 Selected Lands. PD has selected approximately 16,297 acres of BLM-administered public lands (selected lands) located north of Safford in Graham County in the Safford Mining District (see Figure 1-2) for exchange. The selected lands include 190 acres of the San Juan ore deposit that lie on public lands and 14.36 acres of public lands north of the town of Sanchez containing an approximately 6,500-square-foot office building constructed by the AZCO Mining Company for the Sanchez Mine project. The Sanchez parcel is located about eight miles southeast of the San Juan pit north of the Gila River. The selected lands are encumbered by 844 mining claims, all held by PD. Two inholdings are excluded from the selected lands. One is an approximately 628-acre parcel, comprising 40 mining claims held by the Melody Claims Group. This parcel would remain under BLM management. The second is the patented Horseshoe Claims, a private inholding within the selected lands that would remain under current land ownership. The appraised value of the selected lands is $3,958,500, which includes valuation of the mineral potential of the selected lands, including those portions of the San Juan deposit on public lands. Photographs of the selected lands are provided in Figure 2-22; legal descriptions of these lands are provided in Appendix B.

2.2.2.1.2 Foreseeable Uses. The potential future uses of the lands after an exchange are referred to in this document as "foreseeable uses." The foreseeable uses of the selected lands can be differentiated into two general groups by their different stages of planning. The first group includes the specific mining and mining-related support activities described in detail under the Proposed Action alternative (see Figure 2-1) which would directly impact approximately 1,931 acres of the public lands selected for exchange. In addition, PDSI will continue to use the office building and other facilities located on the Sanchez parcel for activities related to mining support, including mine process technology research.[15] These foreseeable uses would be implemented upon approval of the land exchange or MPO and all necessary permits.

The second group of foreseeable uses describes future mining or mining-related support activities that are still conceptual but anticipated for the potential future development of the Dos Pobres sulfide orebody and the Lone Star orebody (Figure 2-23). If future feasibility studies indicate that it is technically and economically feasible to do so and assuming all necessary permits and authorizations are secured for each project, PDSI anticipates that it could initiate mining of the Dos Pobres sulfide orebody and could start development of its Lone Star mine toward the end of the Dos Pobres/San Juan Project (PDSI 1996). At this time, PDSI has developed only preliminary conceptual plans for development of the sulfide orebody and the Lone Star deposit based on the limited exploratory and geological data collected to date. These conceptual plans include three kinds of foreseeable uses for the selected lands that would be involved in these potential projects: production operations and support areas; transition areas; and intermittent use areas. The kinds of activities anticipated for each of these foreseeable use categories are described below and the approximate acreage each category comprises are summarized in Table 2-13.

Table 2-13. Approximate Acreage in Foreseeable Use Categories by Land Ownership

Land Ownership	Dos Pobres Sulfide		Lone Star		Intermittent	SUB-TOTAL	DP/SJ Project	TOTAL
	POS	Trans.	POS	Trans.				
BLM	630	133	1,100	223	12,280	**14,366**	1,931	**16,297**
PD Private	2,829	489	4,749	296	9,848	**18,211**	1,429	**19,640**
TOTAL	**3,459**	**622**	**5,849**	**519**	**22,128**	**32,577**	**3,360**	**35,937**

< **Production Operations and Support Areas (POS).** Anticipated mining activities in this area include open pit mining; crushing, leach pad, and development rock stockpiling; tailings impoundment development; soil stockpiling; mining support activities (shops, plants, etc.). Facilities in this area would include haul roads, borrow areas, and processing facilities like an SX/EW plant and/or concentrator. Potential surface disturbance could affect 26 to 100 percent of the land within this foreseeable use category. This category comprises 1,713 acres of the selected lands.

< **Transitional Areas.** This area was arbitrarily set as a 100-yard-wide safety buffer zone surrounding Production Operations and Support areas. Foreseeable uses in Transition Areas include access roads, safety berms, and run-out areas for stockpiles. Together, transitional areas for both potential

[15] PDSI is conducting these activities at the Sanchez parcel under the authorization of the approved Sanchez Copper Project Mine Plan of Operations (USDI BLM 1992a).

projects would impact about 364 acres of the selected lands, of which approximately 6 to 25 percent of the land surface within this use category would be disturbed by these activities.

< **Intermittent Use Areas.** This area includes all other public lands in the project area that would not be developed for the Dos Pobres/San Juan Project and not identified as Production Operations and Support Areas or Transition Areas. This area comprises roughly 12,921 acres (76 percent) of the selected lands. Potential primary uses of this area include environmental monitoring and spatial buffers between production facilities and project area boundaries for maintenance of site security. Use of the former administration building on the Sanchez parcel for ongoing mine support and technology research is included in this category (USDI BLM 1992b). Anticipated levels of surface disturbance within the Intermittent Use area range from zero to five percent of the land surface.

2.2.2.1.3 Offered Lands and Their Foreseeable Uses. The total offered lands package consists of 11 private properties totaling 3,867 acres. Figure 2-24 shows the regional locations of the offered lands within the state. The base properties are the Amado, Curtis, Musnicki, Schock, and Feulner properties, which total 2,135 acres. The remaining six properties included in the package consist of Tavasci Marsh, Freeland, Butler-Borg, Norton, Clyne I, and Clyne II properties, which total 1,732 acres. Together, the 11 properties have been appraised at $4,219,200.[16] Photographs of the offered properties are provided in Figures 2-25 and 2-26. Each property and its foreseeable use per applicable federal management/land use plans are briefly described below; legal descriptions are provided in Appendix B. More detailed information about the resources of each property is provided in Chapter 3, the Affected Environment.

< **Amado Property.** This 180-acre property held in two tracts is located on Bonita Creek within the boundaries of the Gila Box RNCA in Graham County (Figure 2-27). Both tracts straddle Bonita Creek. This property is one of 15 remaining private inholdings in the Gila Box RNCA, which lies within the BLM's Safford Field Office boundaries. The property is currently leased for grazing; no residential improvements or other structures have been built on the property. The southerly tract abuts the Curtis property.

If acquired by the BLM, the entire Amado property would be incorporated into the Gila Box RNCA, as it lies within the congressionally approved boundary. This property would be managed in a manner consistent with the management prescriptions described in the Final Gila Box Management Plan (BLM 1998). As stated in the Final Plan, general management objectives for the Gila Box RNCA, which was designated by Congress under the Arizona Desert Wilderness Act of 1990, Title II, are to conserve, protect and enhance its riparian areas and associated resources. Currently, the Gila Box RNCA is withdrawn from mineral entry.

< **Curtis Property.** This 755-acre property, also held in two tracts, is located on Bonita Creek. All but approximately 80 acres of the southern tract lie within the congressionally approved boundaries of the Gila Box RNCA in Graham County. Both tracts straddle Bonita Creek and are located just downstream of the Amado property (Figure 2-27). The northern tract of the Curtis property includes a five-acre area that is excluded from the proposed exchange; the landowner that PD bought this property from has retained this five-acre exclusion area as private land. The Curtis property is one of 15 remaining private inholdings within the Gila Box RNCA. The property is currently leased for grazing and contains some range improvements; no residential improvements or other structures have been built on the property.

[16] BLM updated the appraisals, originally made in 1995-1997, in 1999.

If acquired by the BLM, 675 acres of the 755-acre Curtis property would be incorporated into the Gila Box RNCA and would be managed in a manner consistent with the management prescriptions described in the Final Gila Box Management Plan (BLM 1998). As stated in the Final Plan, general management objectives for the Gila Box RNCA, which was designated by Congress under the Arizona Desert Wilderness Act of 1990, Title II, are to conserve, protect and enhance its riparian areas and associated resources. Currently, the Gila Box RNCA is withdrawn from mineral entry. The remaining 80-acre portion of the Curtis property, which is not within the Gila Box RNCA boundary but directly adjacent to it, would be managed according to the decisions in the Safford District RMP, as amended, which call for multiple use including but not limited to livestock grazing, wildlife habitat, dispersed recreation, public access, and mineral entry.

< **Musnicki Property.** This 640-acre property abuts the northeast boundary of the Dos Cabezas Mountains Wilderness in Cochise County (Figure 2-28); to its north lies the Peterson property, which was acquired by BLM as part of the Morenci Land Exchange (BLM 1996b). The property includes the abandoned Musnicki ranch house, the former headquarters of the Nine-Mile Ranch. This property is currently leased for grazing.

If acquired by the BLM, this property would help to consolidate BLM holdings in the Dos Cabezas LTMA and improve public access to the Dos Cabezas Mountains Wilderness, especially to the central portion of the Wilderness. The property would be administered by the Safford Field Office according to the decisions in Safford District RMP, as amended, which states that lands within the LTMA are to be managed for their multiple resource values as defined in FLPMA. General management objectives for other BLM lands in the Dos Cabezas LTMA include livestock grazing, recreation, wildlife habitat, mineral entry, and other uses. Off-highway vehicle use would be limited to existing roads and trails. The existing Musnicki Ranch House would be left intact but not specially managed.

< **Schock Property.** This 240-acre property is located in Santa Cruz County, east of Sonoita at the base of Mt. Bruce at the northern end of the Mustang Mountains (Figure 2-29). The property lies within the BLM's Sonoita Valley Acquisition Planning District and borders the newly created Las Cienegas NCA. The property is currently grazed; no residential improvements or other structures have been built on the property.

If acquired by the BLM, this property would be administered by the BLM's Tucson Field Office. It would be incorporated into the Las Cienegas NCA as would any land contiguous with the NCA acquired by the BLM, and be managed per the objectives of the Las Cienegas NCA RMP, on which an ROD was issued in July 2003 (BLM 2003). Specifically, the approved RMP 1) identifies which roads will be open to motorized vehicle travel; 2) authorizes the continuation of valid leases, grants, and permits through their expiration dates, including livestock grazing and utility rights-of-way; 3) closes public lands in the NCA to locatable and leasable mineral exploration and extraction; 4) establishes recreation opportunity zones and an Empire-Cienega trail system; 5) provides for hunting, as authorized by the State of Arizona; 6) applies existing federal and state laws pertaining to the protection of fish, wildlife, vegetation, and cultural resources to the public lands in the NCA; 7) closes certain roads to motor vehicle travel in erosion-prone areas; 8) provides for suppression of natural and human-caused wildfire after first ensuring public safety and property protection; 9) allocates periodic ranger patrols to the NCA to investigate violations of federal law; and 10) specifies management direction for numerous other land and resource management issues in the NCA. Currently, 95 percent of public lands in the Las Cienegas NCA are closed to mineral location and mineral leasing.

< **Feulner Property.** This 320-acre property is located in Pima County about one mile east of Cienega Creek in BLM's Sonoita Valley Acquisition Planning District, about one mile outside the boundary of the Las Cienegas NCA. The property straddles an unnamed drainage that is tributary to Cienega Creek (Figure 2-30). The property is currently leased for grazing; no residential improvements or other structures have been built on the property.

If acquired by the BLM, the Feulner property would be administered by the BLM's Tucson Field Office. It would remain within the boundary of the Sonoita Valley Acquisition Planning District and, like all BLM holdings in that District, be managed per the objectives of the Las Cienegas NCA RMP. It would not, however, be incorporated into the NCA because it does not abut the Las Cienegas NCA boundary. The Feulner property would be managed similarly to the Schock property.

< **Tavasci Marsh Property.** This property consists of approximately 324 acres in sections 15 and 22 of Township 16 North, Range 3 East, near Clarkdale, in Yavapai County, Arizona. The offered property is the site of the Tavasci Marsh Habitat Restoration Project, a cooperative effort between Phelps Dodge Corporation and the Arizona Game and Fish Department. The property, which includes Tavasci Marsh and some surrounding uplands (Figure 2-31), is not grazed and is currently managed by AGFD under a cooperative management agreement with Phelps Dodge for public recreation, fish, wildlife, and wetland habitat (Phelps Dodge Corporation and Arizona Game and Fish Commission 1990 — Agreement and Amendment of Agreement for Show Low Lake and Tavasci and Packard Ranch Riparian Areas). The property actually lies within the congressionally approved boundary of the Tuzigoot National Monument (Section 3.3.2.1.1 provides an explanation of the relationship of this property to the existing Monument boundary) and is adjacent to the Tuzigoot Pueblo ruins.

If acquired in the exchange, the National Park Service (NPS), which administers the Tuzigoot National Monument, would manage the Tavasci Marsh property. The NPS would continue to follow the management objectives set forth in an existing Cooperative Management Agreement signed by PD and AGFD (G. Henderson, NPS, personal communication, July 10, 1997) but may also undertake other management actions consistent with the *Tuzigoot Statement for Management* (US NPS 1995). One of the objectives of the Monument's management plan is to acquire the Tavasci Marsh property since it "currently separates the Monument from Dead Horse Ranch State Park [which] precludes joint development for public use of the Marsh" (ibid., p. 13). The following general management objectives would apply to the Tavasci Marsh property: preserve the historic and prehistoric integrity of the Monument and surrounding lands, maintain the environmental integrity of the Monument, and retain the native vegetative community (ibid.). This property would not be open to mineral entry.

< **Freeland Property.** This property consists of three separate tracts (West, North, and East) totaling 140 acres north of the Dos Cabezas Mountains Wilderness in Cochise County (Figure 2-32). The West tract is 20 acres in size and is adjacent to the Stewart Trust property, which was acquired by BLM as part of the Morenci Land Exchange (BLM 1996b). The North tract is 80 acres and the East tract is 40 acres. All tracts fall within the Dos Cabezas LTMA. The property is currently leased for grazing and contains no residential structures.

Foreseeable management and authorized uses of this property under this alternative would be identical to that described for the Musnicki property.

< **Butler-Borg Property.** This 308-acre property abuts the boundary of the Dos Cabezas Mountains Wilderness in Cochise County (Figure 2-32). Although located outside of the Wilderness, this

property, together with the Freeland West tract and the Stewart Trust property included in the Morenci Land Exchange, provide public and physical access to the central part of the Wilderness. If acquired, this property would help consolidate BLM holdings in the Dos Cabezas LTMA. The property is currently leased for grazing and contains no residential structures.

Foreseeable management and authorized uses of this property under the land exchange alternative would be identical to that described for the Musnicki property.

< **Norton Property.** This 400-acre property is held in two tracts and is located within the floodplain of Black Rock Wash in Graham County (Figure 2-33). Formerly part of the Norton family ranch, these tracts are surrounded by BLM-administered lands, are currently leased for grazing, but do not contain any residential structures. They fall within the Southwest Gila Valley LTMA.

If acquired through the exchange, BLM's Safford Field Office would manage this property per the Safford District RMP, as amended. Current management objectives for the Southwest Gila Valley LTMA include public access, livestock grazing, wildlife, mineral entry, and dispersed recreation.

< **Clyne I Property.** This 160-acre property is located in Pima County within the Tucson Field Office's Sonoita Valley Acquisition Planning District and bordering the Las Cienegas NCA (Figure 2-34). Formerly part of a 240-acre property originally offered for the Morenci Land Exchange, this 160-acre portion (SW1/4, Section 10, T19S, R18E) was removed from that exchange to reduce the Morenci offered lands values to match those of the selected lands. PD has made this remaining 160-acre portion of the property available for this land exchange alternative. The Clyne I property straddles the middle portions of Bear Spring Canyon below Blacktail Spring and is currently leased for grazing. The property contains no residential structures.

This parcel would be incorporated into the Las Cienegas NCA and the management and foreseeable use of this property would be identical to the management described for the Schock property.

< **Clyne II Property.** This 400-acre property is located in Pima County approximately 0.75 mile south of the Clyne I property and straddles Mud Spring Canyon (Figure 2-34). It falls within the Tucson Field Office's Sonoita Valley Acquisition Planning District, about one mile outside the boundary of the Las Cienegas NCA. A large unnamed stocktank lies in the southwest corner of the property within Mud Spring Canyon. The property is currently leased for grazing and is not encumbered by any residential or other leases; it contains no residential structures.

Like the Feulner parcel, this parcel would not be incorporated into the Las Cienegas NCA, however, the foreseeable use of this property would be identical to the management described for the Feulner property.

2.2.3 No Land Exchange Alternative

This is the second alternative in the Land Exchange Alternatives Set and involves BLM rejecting the exchange and retaining the selected lands under public ownership and federal management. Likewise, the offered lands would remain in PD's private ownership and the public would not acquire any of the resources associated with those properties.

Retaining the selected lands under BLM administration would result in a requirement for further BLM action on whether to authorize the proposed MPO or another alternative or select the No Action alternative in the

Mine Plan Alternatives Set. Under this alternative, impacts to the human environment are expected to be the same as those described under either the Proposed Action alternative or the Partial Backfill alternative. This conclusion is based on the following: 1) PDSI has submitted a Mining Plan of Operations (MPO) to the BLM for authorization, and 2) under 43 CFR 3809, the BLM authorizes any mining plan that: a) includes adequate provisions to prevent unnecessary and undue degradation of the environment; b) includes measures to provide for reclamation of disturbed land, and; c) complies with other applicable federal and state laws and regulations. It is reasonable to assume that, since the submitted MPO and the Partial Backfill alternative are also being evaluated by the COE as part of Clean Water Act permitting, that these alternatives or some modification of either will fulfill these three requirements. Therefore, it is reasonable to assume that mining activities would proceed on portions of the selected lands whether the proposed land exchange is approved or not.

2.2.4 Land Exchange Alternatives Considered but Eliminated

BLM developed and considered other alternatives to the proposed land exchange alternative discussed above, including alternative methods of acquiring the offered lands. This section briefly describes these alternatives and provides BLM's rationale for not considering them further.

2.2.4.1 Alternative Configurations of Selected and Offered Lands

The range of exchange alternatives is limited to some extent by the exchange process itself, which requires that the dollar values of the selected and offered lands be equal.[17] Because land exchanges are discretionary actions, the BLM goes forward with an analysis of the exchange proposal only when the package of lands is mutually agreeable to both parties. The exchange alternative considered and analyzed in this EIS reflects offered and selected land packages mutually agreed upon by the BLM and PD.

No alternative selected lands configurations were considered because the selected lands are heavily encumbered by PD-owned mining claims; have been identified for disposal in the Safford District RMP, as amended (BLM 1994); and the proposed land ownership boundaries would simplify the current public and private land ownership pattern in the Safford Field Office.

To arrive at mutually-agreed upon land exchange alternatives, BLM undertook a process to develop and evaluate various alternative offered lands packages within the constraints of the five base and nine optional offered properties. BLM developed seven alternative offered lands packages that represent a reasonable range of alternatives which had the potential to meet the public interest requirement of FLPMA and were within the 25 percent allowable discrepancy in dollar values between the selected lands and offered lands (base plus optional) packages. The BLM members of the Interdisciplinary Team then ranked each alternative from 1 to 7 (1 being most preferred; 7 being least preferred) based on resource values that would be acquired and resource management considerations. Individual rankings were then summed to become a "score" for each alternative. The lower the total score, the more preferable the alternative to the ID Team. Based on this total score, a single alternative, Alternative 6, clearly stood out from all other land exchange alternatives as the one most preferred by the BLM members of the ID Team from a resource and management perspective. BLM determined that only this alternative would be carried forth for analysis. Alternative 6 is the land exchange alternative described in Section 2.2.5 and includes six of the nine optional offered lands, in addition to the five base properties.

[17] An exchange is considered to be of equal monetary value if the cash value of the offered lands is within 25 percent of the cash value of the selected lands (FLPMA, 90 Stat.2756, 43 USC § 1716 §206[b]). Discrepancies up to 25 percent are then equalized by a cash payment to make up the difference.

The seven land exchange alternatives developed by the BLM, their individual total scores, and their acreage and appraised values are summarized in Table 2-14. The three optional offered properties which were not included in the land exchange alternative (Lehner Ranch, Davison, and Lincoln Ranch) are described in Appendix E, along with a brief description of BLM's foreseeable uses had they been included in a land exchange alternative preferred by the BLM.

2.2.4.2 Alternative Land Tenure Adjustment Methods

Alternative methods of adjusting federal land ownership, such as direct purchase/sale or acquisition by donation instead of a land exchange, were considered by BLM but eliminated from further consideration. Section 203 of FLPMA provides for sales of public land by competitive bidding, by modified competition, or direct sale with no competition. All sales must comply with at least one of the following sale criteria as stated in Section 203 of FLPMA: "1) difficult or uneconomic to manage, 2) needed for an important public objective, or 3) acquired for a specific purpose and no longer needed for that purpose." The Safford District RMP, as amended, states that disposal of federal land by exchange is the preferred method. Because the disposal of the selected lands by sale may not fall under one of these three criteria, because exchange is the BLM's preferred method of disposal, and because PD has not offered to sell their private lands to BLM, a sale was not considered further. Furthermore, the BLM's ability to buy the offered lands directly is limited by budget constraints, and funds for purchasing all but one the offered lands are not available at this time nor will be in the foreseeable future.[18] Acquisition of the offered lands by donation was eliminated from further consideration since PD has not proposed this and wishes to receive lands of equal value to those they propose to exchange with the BLM.

2.3 PREFERRED ALTERNATIVE

The BLM's preferred alternative is the land exchange alternative. This alternative would allow the BLM to achieve its objectives for public lands management and land tenure adjustments as stated in the Safford District RMP, as amended, while still meeting the purpose and need for the proposed Dos Pobres/San Juan Project. Under this alternative, federal oversight of the Project is still provided by the COE's direct involvement; the State Mine Inspector's Office would take jurisdiction over reclamation of the mined private lands. Although the selected lands would become privately owned by PD under this alternative, potential future mining projects on these lands would still be subject to COE's federal jurisdiction through its permitting authorities under the Clean Water Act. Furthermore, other federal laws such as the Clean Air Act would also likely trigger federal involvement in such future activities.

The COE, as a cooperating agency, will select the least environmentally damaging, practicable alternative as its preferred alternative. The EPA, also a cooperating agency, delegated authority for Section 402 compliance to ADEQ in December 2002, and has no permit to issue for this project.

2.4 COMPARATIVE SUMMARY OF ENVIRONMENTAL IMPACTS OF ALTERNATIVES

Table 2-15 concisely summarizes each alternative's direct, indirect, and cumulative impacts for the issues raised during scoping and for critical elements whose consideration is required by BLM NEPA guidelines. Like

[18] The only offered property that is currently authorized for purchase using LWCF monies is the Lehner property, which lies within the San Pedro RNCA.

Chapter 4, the information in Table 2-15 is organized into two alternative sets: the Mine Plan Alternatives Set and the Land Exchange Alternatives Set. Both sets include separate “no action” alternatives (the No Action alternative and the No Land Exchange alternative) as well as the action alternatives. The basis for this summary is the analysis of direct, indirect, and cumulative impacts presented in Chapter 4.

Table 2-14. Summary of Seven Land Exchange Alternatives Formulated for the Dos Pobres/San Juan Project

All alternatives include the base package of lands plus the optional properties identified in column 2. Amounts in parentheses for Dollar Discrepancy column are negative, meaning the value of offered lands is greater than the value of selected lands; under these alternatives, BLM would owe the difference to PD (or PD has the option to donate this amount). Rank is the cumulative score given by BLM ID Team members; the lower the score, the more the BLM preferred the alternative.

Codes for resource values are: rip=riparian, wet=wetlands, t&e=listed species, rec=recreation, con=consolidation, wsr=Wild & Scenic Rivers, pw=perennial water, sprnca= San Pedro rnca, tuzigootnm=Tuzigoot National Monument, dcmw=Dos Cabezas Mountains Wilderness, svad=Sonoita Valley Acquisition Planning District, rawhidemw=Rawhide Mountains Wilderness

Alternative	Optional Properties Included in Alternative	Total Acres (Base + Optional)	Total Appraised Value (Base + Optional)	Dollar Discrepancy w/Selected Lands	Percent Discrepancy	Associated Resource Values (excluding base package lands)	Total Score/ Rank
Alt 1	Tavasci, Lehner, Clyne I, Freeland, Butler-Borg, Norton	3,518	$3,757,200	$201,300	5.1%	rip, wet, t&e, sprnca, access, tuzigootnm, rec, svapd, con	42
Alt 2	Tavasci, Lehner, Clyne I, Clyne II, Norton	3,470	$4,186,000	($227,500)	(5.7%)	rip, wet, t&e, sprnca, svapd, rec, con, pw, tuzigootnm	43
Alt 3	Tavasci, Lehner, Clyne I, Clyne II, Freeland	3,219	$4,123,200	($164,700)	(4.2%)	rip, wet, t&e, sprnca, svapd, access, tuzigootnm, rec, con	31
Alt 4	Tavasci, Lehner, Clyne II, Freeland, Butler-Borg, Norton	3,758	$4,117,200	($158,700)	(4.0%)	rip, wet, t&e, sprnca, pw, access, rec, con, svapd, dcmw, tuzigootnm	27
Alt 5	Tavasci, Clyne I, Freeland, Butler-Borg, Davison	3,495	$4,182,200	($223,700)	(5.7%)	rip, wet, t&e, rec, con, pw, access, dcmw, svapd, tuzigootnm	40
Alt 6	Tavasci, Clyne I, Clyne II, Freeland, Butler-Borg, Norton	3,867	$4,219,200	($260,700)	(6.6%)	rip, wet, t&e, rec, con, pw, access, dcmw, svapd, tuzigootnm	14
Alt 7	Tavasci, Lincoln, Clyne II	3,861	$4,318,000	($359,500)	(9.1%)	rip, wet, t&e, rec, con, pw, wsr, rawhidemw, svapd, tuzigootnm	55

Table 2-15. Comparative Summary Table of Impacts of Alternatives for the Dos Pobres/San Juan Project

Resource/Issue	Mine Plan Alternatives Set			Land Exchange Alternatives Set		
	No Action	***Proposed Action***	***Partial Backfill of San Juan***	***No Land Exchange***	***Land Exchange Alternative***	
					Selected Lands	*Offered Lands*
LAND USE						
Access/ Recreation	No direct, indirect, or cumulative impacts to access to and recreation on public lands. The status quo would be maintained.	Public access on San Juan Mine Road would be discontinued; Johnny Creek Ride permit could not include public lands used for mining for public safety and site security concerns; five existing BLM special use permits would be modified to exclude use of proposed mining areas; public lands available for hunting in AGFD Hunt Unit 28 reduced by about 5,169 acres (acreage that will be fenced off around Project). Access to Gila Mountains and Johnny Creek would still be available through Solomon Pass Road, a portion of which would be upgraded to mitigate for the loss of public use of the San Juan Mine Road to access the Gila Mountains.	Direct and indirect impacts are expected to be identical to those of the Proposed Action.	This alternative would not, in itself, cause changes to existing public access or recreational uses of the offered or selected lands. However, given that mining would likely occur on portions of the selected lands, impacts identical to those described under the Proposed Action are anticipated.	In disposing of selected lands, physical and public access to and dispersed recreation on the selected lands would no longer be controlled by BLM, but by PDSI. BLM would retain access on portions of Salt Tank Trap Rd, Solomon Pass Rd, and West Ranch Rd for continued public and physical access through PD lands to Gila Mountains and Gila Box RNCA. Owners of Horseshoe Claims would have access to their lands through BLM easement on spur road from Solomon Pass Rd. Foreseeable uses at DP/SJ Project would result in same impacts to public access and recreation as the Proposed Action. Foreseeable mining uses at DP sulfide and Lone Star projects would not be expected to further affect dispersed recreation opportunities or public access than those effects described above.	Through acquisition of offered lands, public access to the Dos Cabezas Mountains Wilderness, in the Gila Box RNCA, and in the Empire-Cienega RCA would be improved. Developed recreational facilities at Tavasci Marsh come into public ownership and management; dispersed recreational opportunities would be increased in BLM Safford and Tucson Field Offices.
Encumbrances	No direct, indirect, or cumulative impacts on existing rights-of-way or easements on public lands.	Seven ROWs are directly impacted by proposed mining and would be relocated to provide utilities to the Project. This is not expected to be an adverse impact as existing ROWs are for utilities to current or past mining operators.	Direct and indirect impacts expected to be identical to those of the Proposed Action.	This alternative would not, in itself, cause changes to existing encumbrances on offered or selected lands; however, given that mining would likely occur on portions of the selected lands, impacts identical to those described under the Proposed Action are anticipated.	No direct, indirect, or cumulative impacts to encumbrances on the selected lands as disposal of 16,297 acres of selected lands would be subject to conditions of existing ROWs. Physical impacts from foreseeable uses would be identical to those described under the Proposed Action, but these are not expected to be adverse.	No direct, indirect, or cumulative impacts to existing encumbrances on offered lands as exchange is “subject to” conditions of existing legal agreements appurtenant to the lands.
Agriculture/ Grazing	No direct, indirect, or cumulative impacts to prime farmlands or to grazing are expected.	No direct impacts to agricultural lands, but minor indirect, long-term impacts to agricultural production through implementation of Alternate Year Fallowing Program for water resources mitigation (see Appendix F). Eight range improvements within four allotments, comprising a total of 5,169 acres of public lands would be directly impacted by proposed mining as these resources would be fenced off for security and safety purposes. BLM’s grazing receipts reduced by about $144/yr resulting from 107 AUM reduction in BLM stocking capacity within the allotments affected by this alternative.	Direct and indirect impacts of this alternative are expected to be identical to those of the Proposed Action.	This alternative would not, in itself, cause changes to existing agricultural or grazing practices on offered or selected lands; however, given that mining would likely occur on portions of the selected lands, impacts identical to those described under the Proposed Action are anticipated.	No direct, indirect, or cumulative impacts to agricultural lands. Disposal of the selected lands would adversely and directly impact 16,297 acres of public lands in 6 BLM allotments, totaling 653 AUMs. This would reduce BLM grazing receipts by nearly $882/yr and impact 24 range improvements. In the short-term, some grazing use of the selected lands outside the proposed security fence would occur, as PD would lease back a portion of the selected lands until such time as other foreseeable uses at the DP sulfide and Lone Star projects were implemented. At that time, PD would likely terminate grazing use on additional, but unknown areas within the selected lands in order to develop these projects. The maximum total physical impacts by foreseeable uses would be about 10,431 acres. The majority of intermittent use areas could still be grazed, but PD would own the land and receive the annual grazing income that currently is paid to BLM.	Acquisition of offered lands and the availability of those lands for grazing (except Tavasci Marsh and riparian areas of Amado and Curtis) would offset slightly the loss of public grazing use of selected lands. Foreseeable uses of the offered land under public management would not affect agricultural uses or productivity.
Mineral Rights	No direct, indirect, or cumulative impacts to mineral rights on public lands are expected. This alternative would not affect PD’s ability to mine its claims under a permittable MPO.	No direct, indirect, or cumulative impacts to PD’s or third-parties’ mineral rights on public lands are expected.	Impacts of this alternative are expected to be identical to those of the Proposed Action.	No direct, indirect, or cumulative impacts are expected as a result of this alternative.	PD’s acquisition of the selected lands would extinguish their mining claims filed with BLM, as they would now own the selected lands on which their claims had been filed. No direct, indirect, or cumulative impacts to Melody or Horseshoe claims from this alternative.	PD would relinquish right to extract minerals on offered lands. Public acquires right to extract mineral resources on Norton, Musnicki, Freeland, and Butler-Borg properties per applicable management plans. All other offered properties would be withdrawn from mineral entry if acquired through the exchange.

Table 2-15, continued. Comparative Summary Table of Impacts of Alternatives for the Dos Pobres/San Juan Project

Resource/Issue	Mine Plan Alternatives Set			Land Exchange Alternatives Set		
	No Action	***Proposed Action***	***Partial Backfill of San Juan***	***No Land Exchange***	***Land Exchange Alternative***	
					Selected Lands	*Offered Lands*
LAND USE						
Blasting Noise/ Vibrations	No direct, indirect, or cumulative impacts to existing levels of noise and vibrations in the region from this alterative because no blasting would occur.	In Safford, daily short-duration noise and vibration impacts from mine blasts would not reach levels commonly considered to be annoying; these impacts would last the life of the Project (16 years). The effects will be almost imperceptible at Mt. Graham and are not likely to affect astronomical observation activities.	Direct and indirect impacts are expected to be identical to those of the Proposed Action.	This alternative would not, in itself, cause changes to existing noise levels on offered or selected lands; however, given that mining would likely occur on portions of the selected lands, impacts identical to those described under the Proposed Action are anticipated.	No impacts on existing noise and vibration levels in Safford as a result of the land exchange itself. The foreseeable mining at the DP/SJ Project would have impacts identical to those described under the Proposed Action. Noise and vibrations generated by the foreseeable uses at the DP sulfide and Lone Star projects would continue those impacts and be similar in magnitude to those of the Proposed Action alternative, but the number of blasts per day may vary.	No direct, indirect, or cumulative impacts to existing noise and vibration levels on the offered lands are expected as a result of the exchange.
Hazardous Materials	No direct, indirect, or cumulative impacts expected from hazardous materials as a result of this alternative. The zipACIDS site would remain and no additional hazardous material would be brought on site.	There would be a beneficial effect from elimination of the San Juan zipACIDS site as a result of the Project. Through environmental compliance with MSHA, OSHA, RCRA, EPCRA, and other regulations for hazardous materials, all regulated materials are expected to be transported, handled, stored, and disposed of properly; however, a risk of environmental damage is incurred by the transport of such materials and their presence on site (due to human error, etc). USFWS has concurred with BLM in their Biological Opinion that risk of impacts from acid spills on Gila River and listed species is minima and unlikely to have adverse effects. As part of mine closure and reclamation, many facilities would be razed and materials disposed of at an authorized waste disposal site.	Direct and indirect impacts are expected to be identical to those of the Proposed Action.	This alternative would not, in itself, cause changes to the state of hazardous materials on offered or selected lands; however, given that mining would likely occur on portions of the selected lands, impacts identical to those described under the Proposed Action are anticipated.	Disposal of the selected lands would reduce federal liabilities for any hazardous materials associated with mined lands. In implementing the foreseeable uses on private lands, PD, as the new landowner, would assume responsibility for reclamation (with oversight from the State Mine Inspector) and proper treatment of hazardous materials associated with mining operations as required by MSHA, OSHA, RCRA, EPCRA, and other regulations for hazardous materials. Implementing the foreseeable uses would entail risks of environmental contamination associated with transporting, handling, and storing hazardous materials needed for mining. USFWS has concurred with BLM that impacts to Gila River and listed species from increased risk of acid spills is unlikely to have adverse effects.	No direct, indirect, or cumulative impacts expected. Acquisition of the offered lands would not increase federal liabilities for hazardous materials as no known such sites have been identified on the offered lands.
Visual Resources	No direct, indirect, or cumulative impacts to public lands visual resources. The visual character of the area would be retained.	Visual character of the landscape will be permanently modified in a major way, primarily through changes in topography and creation of contrasting land forms, lines, and contrasting colors of disturbed areas with undisturbed areas. Visual impacts from in-town views probably will be less noticeable as compared to views from above or near the higher elevations of the Gila Mtns. Slightly increased nighttime lighting in the project area will be a long-term effect but is not expected to impact observations at Mt. Graham as PDSI will comply with Graham County Nighttime Lighting Ordinance and use of conveyor will reduce need for haul truck lighting and headlights. The Proposed Action alternative and mine-related Reasonably Foreseeable Future Actions (RFFAs) will contribute cumulatively to visual impacts to the northern-facing viewsheds of the Safford Valley.	For in-town views of the project area, this alternative will result in similar but slightly reduced direct visual resource impacts as a result of slightly lower stockpile heights. Nighttime lighting impacts may also be slightly reduced due to portable light plants located below surface elevation in the San Juan pit for the latter part of the Project. Otherwise all impacts would be identical to those described for the Proposed Action.	This alternative would not, in itself, cause changes to existing visual resources on offered or selected lands; however, given that mining would likely occur on portions of the selected lands, impacts identical to those described under the Proposed Action are anticipated.	In disposing of the selected lands, BLM VRM objectives for those lands would no longer apply. The foreseeable mining uses could be implemented without BLM input on visual mitigation measures. Foreseeable uses at the DP/SJ Project would result in impacts identical to those described for the Proposed Action alternative. Foreseeable uses at DP sulfide and Lone Star projects would extend those impacts, adding to cumulative visual impacts in the Safford Valley. Together, the foreseeable mining uses would alter the landscape of the Gila Mountains and its southern flank, affecting the silhouette of Lone Star Mountain. The massing effect of the three mines across the base of the Gila Mountains would create a zone below the horizon of large-scale, mesa-like or terrace-like forms, with various structures, roads, and contrasting colors visible from the Safford Valley.	Offered lands would become subject to public management of visual resources per VRM objectives for adjacent public lands as stated in the applicable management plan for each property.
PHYSICAL RESOURCES						
Climate	No direct, indirect, or cumulative impacts on climate would result from this alternative.	Direct impacts to localized wind patterns at a microclimatic scale due to permanent changes in local topography on the project area as a result of mining activities would be imperceptible outside of the project area.	Impacts of this alternative are expected to be identical to those of the Proposed Action.	This alternative would not, in itself, cause changes to existing climatic conditions; however, given that mining would likely occur on portions of the selected lands, impacts identical to those described under the Proposed Action are anticipated.	No direct, indirect, or cumulative impacts on climate on a local or regional scale. Foreseeable uses would have identical impacts as the Proposed Action; DP sulfide and Lone Star projects would have similar impacts in that localized changes in topography may have microclimatic impacts on wind patterns; these are expected to be imperceptible outside the project area.	No direct, indirect, or cumulative impacts on climate on local or regional scale are expected as a result of public acquisition or management.

Table 2-15, continued. Comparative Summary Table of Impacts of Alternatives for the Dos Pobres/San Juan Project

Resource/Issue	Mine Plan Alternatives Set			Land Exchange Alternatives Set		
	No Action	***Proposed Action***	***Partial Backfill of San Juan***	***No Land Exchange***	***Land Exchange Alternative***	
					Selected Lands	*Offered Lands*
PHYSICAL RESOURCES						
Air Quality	No direct, indirect, or cumulative impacts on air quality would result from this alternative. Ambient air quality is retained.	The ambient air quality is expected to decrease but stay within federal and state standards. Model-predicted emissions of criteria pollutants at a localized level during the life of the Project would not exceed standards at the process boundary or at four special receptor sites (the southern tip of the San Carlos Apache Reservation, in the town of Safford, or at the Galiuro or Gila wildernesses). No visual plume impacts expected in Gila and Galiuro Wildernesses (Class I airsheds) as a result of the project. Cumulatively, the concentration of some criteria air pollutants is likely to increase in Safford Valley as a result of growth, the Project, and RFFAs. However, ADEQ, through their permitting authority, must ensure that concentrations do not exceed applicable standards.	Impacts of this alternative are expected to be identical to those of the Proposed Action.	This alternative would not, in itself, cause changes to existing air quality on offered or selected lands; however, given that mining would likely occur on portions of the selected lands, impacts identical to those described under the Proposed Action are anticipated. .	No direct, indirect, or cumulative impacts to air quality from the disposal of selected lands; impacts of foreseeable uses at the DP/SJ Project on criteria air pollutants in the region including two Class I airsheds would be identical to Proposed Action alternative. All foreseeable uses would likely result in increased ambient concentrations of criteria pollutants but within standards. DP sulfide project would likely require a Class I air quality permit; Lone Star project would likely require a Class II air quality permit.	No direct, indirect, or cumulative impacts to air quality from criteria air pollutants as a result of public acquisition or management of the offered lands.
Geology	No direct, indirect, or cumulative impacts on geological resources would result from this alternative.	Direct, permanent impact to locatable mineral resources as allowed by the General Mining Law of 1872 and other surface management regulations. Economic mineral potential (metals and common variety minerals) of public lands will be realized under this alternative.	Impacts of this alternative are expected to be identical to those of the Proposed Action.	This alternative would not, in itself, cause changes to existing mineral resources on offered or selected lands; however, given that mining would likely occur on portions of the selected lands, impacts identical to those described under the Proposed Action are anticipated.	Mineral resources of the selected lands would become the property of PD, which currently owns 100% of 844 mining claims that encumber the selected lands. Mineral resources would be developed under the foreseeable uses through implementation of the Dos Pobres/San Juan mine, DP sulfide, and Lone Star projects. No adverse impacts to salable minerals as a result of the exchange.	Acquisition of offered lands would increase public lands available for mineral entry in the Dos Cabezas and Northwest Gila Valley LTMAs; mineral entry would not be allowed on properties acquired in the Gila Box RNCA , Empire-Cienega RCA, and Tuzigoot NM.
Soils	No direct, indirect, or cumulative impacts on soils would result from this alternative.	Direct, long-term impacts to soil complexes (generally poor, low-productivity soils). Some productivity regained through reclamation. Mitigation includes stormwater control measures to limit erosion potential, watering during construction and operations to control soil loss by wind erosion, stockpiling soils for reclamation, revegetation programs, and contouring sides and tops of stockpiles to reduce wind and water erosion effects. Long-term losses of soil productivity would occur in areas not subject to active reclamation programs and would continue until natural successional processes resulted in the re-establishment of vegetation and productive soil profiles.	Impacts of this alternative are expected to be identical to those of the Proposed Action.	This alternative would not, in itself, cause changes to existing soils on offered or selected lands; however, given that mining would likely occur on portions of the selected lands, impacts identical to those described under the Proposed Action are anticipated.	No direct physical impacts to soils as a result of exchange; foreseeable mining uses would result in long-term reduction in soil productivity although not for soils that will be stockpiled and used as growth media at reclamation. Erosion potential of soils would increase as a result of clearing of vegetation, but resultant increased sedimentation effects are not expected outside the project area, and bedloads recover well before reaching the Gila River.	Public acquires soil resources and BLM manages productivity of soils of the offered lands.

Table 2-15, continued. Comparative Summary Table of Impacts of Alternatives for the Dos Pobres/San Juan Project

Resource/Issue	Mine Plan Alternatives Set			Land Exchange Alternatives Set		
	No Action	***Proposed Action***	***Partial Backfill of San Juan***	***No Land Exchange***	***Land Exchange Alternative***	
					Selected Lands	*Offered Lands*
PHYSICAL RESOURCES						
Groundwater	No direct, indirect, or cumulative impacts on groundwater quality or quantity would result from this alternative.	Model-predicted maximum drawdown of water table is 800 feet after Year 16 centered in the San Juan pit, with the drawdown cone as defined by the one-foot contour line not reaching the Gila River, Bonita Creek, or the boundary of the San Carlos Apache Reservation. Increase in groundwater flow southward from the Reservation, peaking at 0.2 af/yr, or about 0.07 percent of estimated current flow, in Year 50; decline of water table beneath the Reservation predicted to be nearly zero. DP Seep would be destroyed. Wellhead pressure at Watson Wash artesian well is predicted to be reduced by a maximum of 0.72 ft at Year 1200. Cumulative impacts are likely but are not expected to adversely impact known production wells of other municipal or industrial water users. Magnitude of cumulative effects will be more accurately predicted in the future, as monitoring programs for the DP/SJ Project help to refine the groundwater model's predictive capabilities and as each RFFA is subjected to required environmental permitting and review. No direct, indirect, or cumulative impacts expected to existing groundwater quality through compliance during or after mining with BADCT design standards for potentially discharging mine facilities through APP permit. Risk of discharge to groundwater would be reduced by these measures but cannot be eliminated completely. (See also Indian Trust Resources discussion in this Table)	Impacts of this alternative are expected to be identical to those of the Proposed Action.	This alternative would not, in itself, cause changes to existing groundwater conditions on offered or selected lands; however, given that mining would likely occur on portions of the selected lands, impacts identical to those described under the Proposed Action are anticipated.	No direct, indirect, or cumulative impacts to groundwater quantity or quality as a result of the exchange. Foreseeable mining uses at DP/SJ Project would result in the same impacts as described for the Proposed Action alternative. Foreseeable mining uses at DP sulfide and Lone Star projects would likely draw on the same aquifer as the DP/SJ Project, adding to its impacts and extending them over time and area. The magnitude and significance of the physical impacts of the DP sulfide and Lone Star projects on water resources (e.g., surface flows of Gila River and Indian trust assets such as water rights and groundwater of the San Carlos Apache Tribe) would have to be estimated at the time of future federal permitting for these projects. Foreseeable mining uses are not expected to adversely impact groundwater quality because they would be subject to APP requirements.	Public acquisition of the offered lands would not directly, indirectly, or cumulatively impact groundwater quality or quantity.
Surface Water	No direct, indirect, or cumulative impacts on surface water quantity or quality, waters of the U.S., or surface flows of the Gila River would result from this alternative.	The maximum model-predicted reduction in flows in the Gila River as a result of the Project is 149 af/yr at Year 450. Of this volume, 34 af/yr is from groundwater pumping impacts, 21 af/yr is from the pit lake effect, and 94 af/yr is attributable to stormwater runoff impacts. The proposed Alternate Year Fallowing Program to mitigate for Gila River surface flow impacts is described in Appendix F. Predicted impacts to Bonita Creek flows are nearly zero. No adverse cumulative impacts to surface water are expected upon implementation of this mitigation for physical effects to surface water. Direct and indirect impacts to drainages from sedimentation and scour resulting from stormwater retention and detention in major tributaries such as Cottonwood and Peterson Washes are not expected to reach the Gila River. Direct impacts to about 21.4 acres of waters of the U.S. and 93.2 acres of indirect impacts to waters. Direct and indirect impacts to waters of the U.S. mitigated through implementation of COE's Mitigation and Monitoring Plan (Appendix F); therefore no significant adverse cumulative impacts to waters of the U.S. A pit lake would be created at Dos Pobres and the existing pit lake at San Juan would be pumped, mined out, and would refill after the proposed mining there is complete. The pH of the water in both pits is expected to be neutral and heavy metal concentrations within federal and state standards.	Impacts of this alternative are expected to be identical to those of the Proposed Action.	This alternative would not, in itself, cause changes to existing surface water resources on offered or selected lands; however, given that mining would likely occur on portions of the selected lands, impacts identical to those described under the Proposed Action are anticipated.	Disposal of selected lands would not result in direct, indirect, or cumulative impacts on surface water quantity or quality. Foreseeable mining uses at DP/SJ Project would directly impact surface water quantity as described under Proposed Action alternative. Mitigation in perpetuity for this reduction in surface flows would preclude indirect and cumulative adverse impacts to surface water quantity in the project area region. Monitoring program will show if model predictions warrant changes in mitigation requirements. Foreseeable mining use at DP sulfide and Lone Star would contribute cumulatively to surface water quantity reductions to an unknown degree; however, mitigation requirements associated with future COE permitting, requirements of the Endangered Species Act, and the mitigate for the anticipated physical effects to surface flows (including protecting the existing water rights of downstream users and Indian tribes) would be expected to negate such impacts.	Surface water quantity and quality would not be directly, indirectly, or cumulatively affected by public acquisition of the offered lands.

Table 2-15, continued. Comparative Summary Table of Impacts of Alternatives for the Dos Pobres/San Juan Project

Resource/Issue	Mine Plan Alternatives Set			Land Exchange Alternatives Set		
	No Action	***Proposed Action***	***Partial Backfill of San Juan***	***No Land Exchange***	***Land Exchange Alternative***	
					Selected Lands	*Offered Lands*
BIOLOGICAL RESOURCES						
Vegetation	No direct, indirect, or cumulative impacts to vegetation from this alternative.	A total of about 3,360 acres of land to be impacted, including about 1,931 acres of BLM land (527 acres of Sonoran Desertscrub, 1,220 acres of Sonoran Desertscrub-Semidesert Grassland Ecotone, and 184 acres of existing disturbed lands) and 1,429 acres of PD private lands (290 acres Sonoran Desertscrub, 1,026 acres Sonoran Desertscrub-Semidesert Grassland Ecotone, and 113 acres disturbed land). This alternative is unlikely to cause or promote the introduction or spread of invasive species. Cumulative impacts to vegetation in the Safford Valley are expected; however, on a regional or statewide scale these impacts are not considered cumulatively significant.	Impacts would be identical those of the Proposed Action.	This alternative would not, in itself, cause changes to the status or condition of vegetation (including invasive species) on offered or selected lands; however, given that mining would likely occur on portions of the selected lands, impacts identical to those described under the Proposed Action are anticipated.	No physical direct, indirect, or cumulative impacts on vegetation, including invasive species, from the exchange; vegetation resources, including Walnut Spring, would be under PD management; foreseeable use impacts would be identical to those of Proposed Action, with an additional 5,059 acres of similar types of impacts in the future possible from development of DP sulfide and Lone Star projects. Foreseeable uses would contribute to minor cumulative adverse impacts to these habitats. Revegetation at reclamation is expected to offset some of the impacts to vegetation expected as a result of foreseeable uses.	Public acquisition of riparian habitats at Gila Box RNCA, wetland habitat at Tuzigoot NM, and various xeroriparian habitats in LTMAs in Safford and Tucson Field Offices would exceed acreage of such habitats disposed of with selected lands. Net loss of widespread and common upland habitats within the Safford Field Office. Vegetation resources, including any potential invasive species, on offered lands become subject to federal management practices.
Wildlife	No direct, indirect, or cumulative impacts to wildlife would occur from this alternative.	Direct impacts to game and non-game wildlife inhabiting the project area; estimated direct impacts to up to 35 mule deer and 15 javelina as a result of habitat destruction on both BLM and PD lands. No adverse impacts expected to wildlife from pit lake water quality at the Dos Pobres and San Juan Mines. A very small potential for adverse impacts to wildlife (birds, bats) exists from exposure to excess process solution impoundment; PDSI will monitor pond for wildlife use for at least 1 year to see if wildlife is adversely affected. Cumulative impacts to wildlife in the Safford Valley are expected; however, on a regional or statewide scale these impacts are not considered cumulatively significant.	Impacts would be identical those of the Proposed Action.	This alternative would not, in itself, cause changes to wildlife; however, given that mining would likely occur on portions of the selected lands, impacts identical to those described under the Proposed Action are anticipated.	No direct, indirect, or cumulative impacts to wildlife on selected lands due to exchange as all wildlife remains under AGFD jurisdiction regardless of land ownership; direct, indirect, and cumulative impacts to wildlife from foreseeable uses on selected lands would be identical to those of Proposed Action, plus additional similar impacts (32 - 55 mule deer lost and 12 - 24 javelina lost) would be expected as a result of potential future development of DP sulfide and Lone Star projects.	No direct impacts of exchange on wildlife on offered lands; AGFD retains jurisdiction of wildlife regardless of land ownership. Additional 3,543 acres of offered properties (except Tavasci Marsh property) would become available for game hunting in applicable AGFD hunt units. Wildlife habitats on the offered lands would be subject to federal management and protection.
Special Interest Species	No direct, indirect, or cumulative impacts to special interest species from this alternative.	No impacts to federally listed species expected. Implementation of mitigation measures as described in Appendix F for predicted physical effects on water resources is expected to preclude any potential for direct, indirect, or cumulative impacts to listed, proposed, or candidate species, or designated or proposed critical habitat. In their Biological Opinion, USFWS concurred that habitat mitigation and monitoring activities for Section 404 permit were unlikely to adversely affect listed species or critical habitat.	Impacts would be identical those of the Proposed Action.	This alternative would not, in itself, cause changes to the status or condition of special interest species; however, given that mining would likely occur on portions of the selected lands, impacts identical to those described under the Proposed Action are anticipated.	Special status plant species would receive consideration under ESA if a federal nexus (e.g., permit or authorization) is triggered; otherwise Arizona Native Plant Law regulations would apply. Habitat for Pima Indian mallow (BLM sensitive species) goes into private ownership and management and one location is expected to be affected by foreseeable uses. Protection of federally listed animal species continues but under COE (not BLM) as lead agency in Section 7 consultation with USFWS. Nine mine features adversely impacted by foreseeable mining uses, but none are considered important bat roosts No adverse cumulative impact is expected.	Public would acquire potentially suitable habitat for 13 federally listed species, 1 proposed endangered species, and 2 candidate species that are known to occur or may occur on the offered lands. Public jurisdiction would be extended to Tavasci Marsh, which is known to support southwestern willow flycatcher, Yuma clapper rail, and yellow-billed cuckoo, and to portions of Bonita Creek that support Gila chub and yellow-billed cuckoo. Additional areas designated as critical habitat for spikedace, loachminnow, razorback sucker, southwestern willow flycatcher, and Gila topminnow would come into public lands management through acquisition of some of the offered properties (e.g., Tavasci, Curtis, Amado).
Biodiversity	No direct, indirect, or cumulative impacts on the region's biodiversity as a result of this alternative.	No direct, indirect, or cumulative impacts on the region's biodiversity of the region are expected from this alternative.	Impacts would be identical those of the Proposed Action.	No direct, indirect, or cumulative impacts on the region's biodiversity as a result of this alternative.	No direct, indirect, or cumulative impacts on the region's biodiversity are expected from this alternative.	No direct, indirect, or cumulative impacts on the region's biodiversity are expected from this alternative.

Table 2-15, continued. Comparative Summary Table of Impacts of Alternatives for the Dos Pobres/San Juan Project

Resource/Issue	Mine Plan Alternatives Set			Land Exchange Alternatives Set		
	No Action	***Proposed Action***	***Partial Backfill of San Juan***	***No Land Exchange***	***Land Exchange Alternative***	
					Selected Lands	*Offered Lands*
CULTURAL RESOURCES						
Archaeological Sites	No direct, indirect, or cumulative impacts expected as a result of this alternative.	This alternative would directly destroy or damage 37 of the 115 archaeological sites recorded on the project area (this includes 13 sites on BLM land and 24 on PD land). Thirty-six of the sites are considered eligible for nomination to the National Register of Historic Places. It is probable that at least 16 of these sites will be avoided by judicial placement of transmission line components, road alignments, and stockpiled soils. Additional sites would be lost as a result of RFFAs; however, adverse cumulative impact to the information potential of archaeological sites is not expected to be significant because of mitigation requirements under NHPA.	Impacts of this alternative are expected to be identical to those of the Proposed Action.	This alternative would not, in itself, cause changes to existing cultural resources on offered or selected lands; however, given that mining would likely occur on portions of the selected lands, impacts identical to those described under the Proposed Action are anticipated.	Disposal of the selected lands would affect all 61 archaeological sites on selected lands through loss of federal management. DP/SJ Project would physically impact 13 sites; DP sulfide and Lone Star could physically impact 9 sites. Mitigation for loss of federal protection and impacts of foreseeable mining uses of the selected lands would involve implementing a testing and data recovery plan for all or a representative sample of the impacted sites at the time of exchange approval. No significant adverse cumulative impact to the sites' information potential is expected because of testing and data recovery requirements.	Archaeological resources occurring on the offered lands would come under federal protection and management. This includes historic and prehistoric sites adjacent to the ruins at the Tuzigoot National Monument on the Tavasci Marsh property; sites along Bonita Creek in the Gila Box on the Curtis and Amado properties; and various sites on the offered properties in the Dos Cabezas LTMA.
Traditional Cultural Properties	No direct, indirect, or cumulative impacts expected as a result of this alternative.	Eleven Indian tribes were consulted about TCPs and sacred sites in the project area. Tribes identified 76 of the 115 archaeological sites as potential TCPs, 43 of which are located on BLM lands. Of the 76 potential TCPs, 26 would be damaged or destroyed by the Proposed Action (10 on public lands, 16 on PD lands). Four potential TCPs (AZ CC:2:200, 211, 225, and 234) have also been identified by Indian tribes as sacred sites. Three of these sites (AZ CC:2:200, 211, and 234) would be avoided under this alternative and access by tribes would be permitted with reasonable notice. No determination of eligibility as TCPs has yet been made for impacted sites.	Impacts of this alternative are expected to be identical to those of the Proposed Action.	This alternative would not, in itself, cause changes to TCPs on offered or selected lands; however, given that mining would likely occur on portions of the selected lands, impacts identical to those described under the Proposed Action are anticipated.	Disposal of selected lands would not physically impact the 43 potential TCPs, including 4 sacred sites, on the selected lands but would have regulatory implications. Sites on private lands are considered private property; as such, sites would not be subject to consideration under the American Indian Religious Freedom Act or under Exec. Order 13007 regarding sacred sites. Access to TCPs and sacred sites on the selected lands under this alternative would be controlled by PD, which has told BLM and the Four Southern Tribes that it would, with reasonable notice, allow Indian groups access to the sacred sites. Foreseeable uses of selected lands would result in impacts to TCPs identical to those described under the Proposed Action. Loss of federal protection is considered an impact and BLM will require mitigation for TCPs as described for Proposed Action. Three sacred sites would be avoided and protected in perpetuity.	Although no tribes identified any potential TCPs on the offered lands, federal protection and access would be provided to any such sites under this alternative.
SOCIOECONOMIC RESOURCES						
Population and Demographics	No direct, indirect, or cumulative impacts.	Direct, indirect, and cumulative but minor impacts in the Safford area by increasing population by 3.1% (from 1995) with the addition of an estimated 145 households, or 448 individuals. Anticipated growth and the subsequent increased demand upon public services and schools resulting from the Proposed Action are relatively small percentages of the growth projected for Graham County area from 1995 to 2005 without the Project. New demands on infrastructure should be adequately met through increased tax revenue generated directly and indirectly by the Project. Direct and indirect benefits to local population, including minority and low-income groups, by increased general employment opportunities. Because the largest populations of Native Americans are geographically distant from the Safford area, this group as a whole would be less affected than nearby Hispanic populations in the Safford Valley.	Direct and indirect impacts expected to be identical to those of the Proposed Action.	No direct, indirect, or cumulative impacts.	No direct, indirect, or cumulative impacts to population resulting from exchange. Implementing the foreseeable uses at Dos Pobres/San Juan would result in the impacts described under the Proposed Action. Foreseeable uses at DP sulfide and Lone Star orebodies would also likely affect population size and demographics in the Safford area, but as no information is yet available about the scale of the potential future mining operations, there is insufficient information available to predict the magnitude or significance of those effects.	No impacts on population size or demographics in or near the offered lands.
Local and Regional Economy	No direct, indirect, or cumulative impacts.	Direct, indirect, and cumulative beneficial impacts stemming from increased employment and tax revenues in the Safford area: construction phase employment would average 470 full-time jobs over 15 mos.; long-term direct and indirect employment would total 644 jobs by the end of the Project; for life of Project, PDSI's cumulative payroll would total $214 million); cumulative local tax revenue would total $57.6 million; PDSI would pay a cumulative total of over $420 million in federal, state, and local taxes (all figures are estimates in 1997 dollars). No adverse cumulative impacts to the local and regional economy are expected.	Direct and indirect impacts expected to be identical to those of the Proposed Action.	No direct, indirect, or cumulative impacts.	No direct, indirect, or cumulative impacts on employment and income expected from the exchange. Graham County would lose $19,634 (1997 $) in PILT payments and gain an undetermined, but likely higher amount in private property tax revenue. Impacts of foreseeable uses at the DP/SJ Project are expected to be identical to those of the Proposed Action. Potential future development of the DP sulfide and Lone Star orebodies would likely affect the local and regional economy, but insufficient information is available at this time to predict the magnitude or significance of those effects, but they are not expected to be adverse.	No impacts on local or regional employment or income in or near the offered lands. Pima, Graham, Santa Cruz, Cochise, and Yavapai counties would lose tax revenue from the federalization of the offered lands but these would be offset by PILT. Net change in tax revenues (1997 $) for the counties after PILT are not expected to be significant on a county-wide basis: Graham: +$972; Pima: -$1,661; Santa Cruz: -$823; Cochise: +$181; Yavapai: -$4,264.

Table 2-15, continued. Comparative Summary Table of Impacts of Alternatives for the Dos Pobres/San Juan Project

Resource/Issue	Mine Plan Alternatives Set			Land Exchange Alternatives Set		
	No Action	***Proposed Action***	***Partial Backfill of San Juan***	***No Land Exchange***	***Land Exchange Alternative***	
					Selected Lands	*Offered Lands*
SOCIOECONOMIC RESOURCES						
Infrastructure	No direct, indirect, or cumulative impacts.	Direct, indirect, and cumulative but minor impacts to housing, schools, utilities, and emergency response services in the Safford area. The Project is predicted to generate an increase of 3.1% in the local population; increases in local tax revenues resulting from the Project would be disproportionately higher than this population growth resulting from the Project. This increase in revenues is expected to offset any potentially adverse impacts to existing infrastructure generated by the relatively small increase in population attributable to the Project. No adverse cumulative impacts are expected.	Direct and indirect impacts expected to be identical to those of the Proposed Action.	No direct, indirect, or cumulative impacts.	No effects on local infrastructure from disposal of the selected lands. Foreseeable uses at DP/SJ Project would have identical effects on local infrastructure as those described under the Proposed Action. Potential future development of the DP sulfide and Lone Star orebodies may also affect the local infrastructure in a similar manner, but no information is yet available about the scale of these possible future mining operations, so predictions cannot be made regarding the magnitude or significance of those effects.	No impacts on infrastructure in or near the offered lands.
Transportation	No direct, indirect, or cumulative impacts.	No direct impacts. Indirect and cumulative impacts would be limited to a small overall increase in vehicle and truck traffic in the Safford area, most noticeably on the Safford-Bryce and Airport roads, but this increase is not expected to reduce the Level of Service (LOS) ratings of the roads. All roads and intersections would continue to operate at acceptable levels of service. Increases in local tax revenues resulting from the Project are expected to offset any adverse impact to pavement conditions caused by increased truck traffic.	Direct and indirect impacts expected to be identical to those of the Proposed Action.	No direct, indirect, or cumulative impacts.	No impacts expected from exchange on traffic and transportation. Indirect and cumulative impacts of the foreseeable uses at DP/SJ Project would be identical to those of the Proposed Action. Potential future development of the DP sulfide and Lone Star orebodies would likely affect transportation in the Safford area, but no information is yet available about the scale of the mining operations, so predictions cannot be made regarding the magnitude or significance of those effects.	No impacts on transportation in or near the offered lands.
INDIAN TRUST RESOURCES						
Indian Trust Assets	No direct, indirect, or cumulative impacts to Indian trust assets.	No direct, indirect, or cumulative impacts to water rights to the Gila River held by the San Carlos Apache Tribe and the Gila River Indian Community are expected. Predicted long-term physical effects on Gila River surface flows are avoided through implementation of the Alternate Year Fallowing Program. The Program will provide 480 af/yr of surface flows in perpetuity to offset the predicted total maximum effect to the Gila River of 149 af/yr resulting from the Project's groundwater pumping and stormwater diversions; this is more than 3 times the peak predicted impact. The excess benefit in reduced water consumption for agriculture (331 af/yr) will result in a net annual increase in surface water available in the Gila River and in the San Carlos Reservoir. The Project's predicted groundwater drawdown on the San Carlos Apache Reservation is short-term and unmeasurable, therefore, no significant, adverse impacts to this trust asset are expected.	Impacts expected to be identical to those of the Proposed Action.	No direct, indirect, or cumulative impacts to Indian trust assets.	No direct, indirect, or cumulative impacts to Indian trust assets as a result of the land exchange itself. Foreseeable use impacts from Dos Pobres/San Juan Project and mitigation for physical effects to Gila River surface flows are identical to those of the Proposed Action and preclude adverse impacts to trust assets. Foreseeable uses at DP sulfide and Lone Star projects would be expected to result in continued or increased reductions of Gila River flows if groundwater continues to be the water supply source and may affect groundwater under the San Carlos Apache Reservation; however, insufficient information exists at this time to predict whether or to what degree such an impact would occur. Future environmental analyses of these possible projects will occur under future federal and state permitting processes and specific analyses of groundwater and development of mitigation, if warranted, would be required at that time.	No Indian trust resources are known to be associated with offered lands. No direct, indirect, or cumulative impacts expected to trust resources through public acquisition of the offered lands.

CHAPTER 3

THE AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This chapter describes the existing natural and human environment that would potentially be affected by the Proposed Action and its alternatives. For purposes of analysis, the discussion focuses on two geographic areas: the project area and the offered lands. The term "project area" used throughout this document refers to an approximately 36,675-acre area (depicted in Figure 1-2) that encompasses lands involved in both the MPO and the exchange. The project area includes BLM-administered lands on which the proposed mine plan would occur; additional BLM administered lands selected by PD for the proposed land exchange; PD-owned private lands; and a non-PD-owned private inholding. The second geographic focus of this analysis, the offered lands, are PD-owned properties scattered among several locations throughout southern and central Arizona that are being offered by PD in exchange for the selected public lands in the project area.

The description of the project area begins with a regional overview, then proceeds with a more detailed treatment organized into six major resource categories: Land Use, Physical Resources, Biological Resources, Cultural Resources, Socioeconomic Resources, and Indian Trust Resources. For some resources, baseline data were collected within study areas. The location and extent of these study areas vary depending on the type of data being collected. The offered lands included in the land exchange alternative are described at the end of the chapter. They are grouped into either the base package of offered lands or the optional package of offered lands (see the Land Exchange Alternative Set in Chapter 2 for an explanation of these packages). Within these two divisions, each offered property is described according to the first five major resource categories listed above. The existing conditions of resources on the three optional properties that were not included in the land exchange alternative (Davison, Lehner Ranch, and Lincoln Ranch properties) are described in Appendix E.

3.2 PROJECT AREA

The approximately 36,675-acre project area[1] lies within the Safford Valley on the south-facing slope of the Gila Mountains, about seven to eight miles[2] north of the Gila River near the City of Safford, in Graham County, Arizona (see Figure 1-1 in Chapter 1). Safford is the county seat and serves as a regional service center for much of southeastern Arizona and parts of southwestern New Mexico. Its economy is mainly supported by retail, government, and agriculture (ESI 1997). Graham County's median household income ranks among the lowest in the State. The county is sparsely populated, with a large percentage of Native American and Hispanic residents. Most of the Native Americans live on the San Carlos Apache Reservation, which covers approximately the northern third of the county and lies in close proximity to the project area (see Figure 1-1).

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[1] The size of the project area (or study area) varies somewhat depending on the resource being analyzed. This and many other acreage figures provided in this document are approximate based on data retrieved through Computer-Aided Drafting (CAD) software. Table totals may not add up due to rounding error.

[2] As measured from the center of the Dos Pobres and San Juan pits to the north bank of the Gila River at the Safford (Eighth Avenue) Bridge.

The climate in the region is semi-arid, hot in the summer and moderate in the winter. Mean annual precipitation in Safford is 9.8 inches per year (Dames & Moore 1996a), with about half of the precipitation falling during summer thunderstorms and the remainder occurring as intermittent winter or spring storms (Sellers and Hill 1974). Prevailing daytime winds are generally from the northwest, blowing up the Safford Valley (Class One Technical Services 1997).

Figure 3-1 shows the topography and some of the major drainages of the project area. Elevations range from about 3,040 to 5,400 feet above mean sea level. Dominant landforms range from nearly level and gently sloping alluvial and colluvial terraces in the southern part of the project area to steep, rocky slopes in the northern part. The ground surface is generally rough, broken, covered by gravel and cobbles, and sparsely vegetated. Over much of the project area, the dominant plant association is the creosote-bursage association of the Sonoran Desertscrub biotic community (SWCA 1997a). Several large, ephemeral washes, including Peterson, Cottonwood, Talley, and Watson Washes, drain the area from roughly the northeast to the southwest, eventually flowing into the Gila River (Figure 3-1).

The project area is part of the Safford Mining District, an area containing several known copper mineral deposits, including the Dos Pobres, San Juan, Lone Star, and Sanchez deposits (see Figure 1-1). These deposits generally are located along a northwest-southeast alignment governed by regional structural geology. Portions of the Mining District have been mined intermittently since the late 1800s, mostly by small operators. Phelps Dodge Corporation entered the Safford Mining District in 1957 when it acquired existing mining claims north of Safford and discovered the Dos Pobres copper deposit the following year (PDSI 1996). Exploration progressed at Dos Pobres, and construction began in 1968 on underground workings to mine the deep sulfide orebody. Operations ceased in 1982 when declining copper prices resulted in unfavorable economics for the underground operation (ibid.). Interest in the Dos Pobres property was renewed in 1991 when additional exploration identified a leachable, primarily oxide, copper resource above the deeper sulfide portions of the deposit.

The San Juan deposit, located less than two miles to the southeast of Dos Pobres, was known long before PD's arrival in the Mining District. It was mined for a short period at the turn of the century following the discovery of chalcocite copper veins. Mining resumed there in the late 1960s-early 1970s, with ore from the small open pit being processed to produce copper precipitate (ibid.). Phelps Dodge acquired the San Juan mine property in 1994 from a consortium of private owners.

The Lone Star orebody, located southeast of the San Juan property, was discovered in 1955 by Kennecott Copper Corporation (ibid.). Kennecott conducted exploratory and assessment work at Lone Star from 1958 until the mid-1980s, including construction of an 800-foot shaft and underground workings to obtain bulk ore samples. Phelps Dodge purchased the Lone Star property from Kennecott in 1987.

The Sanchez copper deposit at the southeastern end of the Mining District has been evaluated for possible development by several mining companies over the years, most recently by AZCO Mining Inc. In 1993, AZCO received several environmental permits to develop the leachable copper deposit, including BLM approval of the Sanchez Copper Project's Plan of Operations (see USDI BLM 1992b). Phelps Dodge purchased rights to the approved Sanchez Copper Project in 1995.

3.2.1 Land Use

3.2.1.1 Public Lands Management

As a public lands management agency, BLM is responsible for the balanced management of public lands and resources and their various values so that they are maintained in a combination that best serves the needs of the American people. Such values include, but are not limited to, recreational, range, timber, mineral, watershed, fish and wildlife, wilderness and natural, scenic, scientific, and cultural values.

Since 1981, BLM has been responsible under regulations at 43 CFR 3809 for administering MPOs and Mining Notices filed for BLM-administered public lands. The Safford Field Office of the BLM currently administers six MPOs and 22 Mining Notices that have been submitted and authorized. BLM administration of mining plans and notices entails reviewing the plan or notice for completeness; preparing appropriate NEPA documents; authorizing reclamation plans and ensuring that the operator has secured the required reclamation bonds; advising the operator of any permits required by other agencies; conducting periodic inspections during operations for compliance with permit conditions; and inspecting reclamation efforts for consistency with the reclamation plan after closure. The reclaimed federal lands then return to the public domain and are managed for the post-mining land uses proposed in the reclamation plan.

In addition to following the general management prescriptions of the Safford District RMP, as amended (USDI BLM 1991, 1994b), BLM's other primary responsibilities in the project area include administering grazing allotments; maintaining existing public and physical access to public lands for recreation and other public uses; and negotiating rights-of-way, easements, and other realty actions allowed by the RMP (USDI BLM 1991).

3.2.1.1.1 Land Ownership. The land ownership pattern in the project area and surrounding environs is depicted in Figure 1-2 in Chapter 1. Table 3-1 summarizes the acres of land administered by the BLM and belonging to PD and non-PD private entities that would be affected by mining activities as proposed in the MPO, and the acres of similarly owned land in the project area. Since the DEIS was issued, PD has acquired a 320-acre parcel of state land on the north of the project area side (south half of Section 21, see Figure 1-2). Lands in the project area that will be avoided by the proposed Project consist of the patented (i.e., privately owned) Horseshoe Claims, which are owned by several private parties other than PD and located in portions of Sections 8 and 17, and the Melody Claims, which are federal lands encumbered by third-party mining claims located in portions of Sections 11 and 14 (see Figure 1-2).

Table 3-1. Land Ownership Acreage Summary for the MPO and the Project Area

	BLM-administered (Selected Lands)	Phelps Dodge	Other	TOTAL
MPO	1,931	1,429	0	3,360
Project Area	16,297	19,640	738*	36,675

* Includes the 628-acre Melody Claims (on BLM land) and the 110-acre Horseshoe Claims (privately owned).

Land ownership patterns and encumbrances such as rights-of-way and easements affect the management of public lands, as do parcel configuration factors, such as the number, size, and shape of parcels in a given area. The number of parcel "corners" shared with other landowners can be used as a rough index of management difficulty. In general, the more corners shared with other landowners, the more complex the management responsibilities. In the project area depicted in Figure 1-2, the BLM manages three federal land parcels bordered by approximately 78 miles of boundary lines. Currently, the BLM shares 116 corners with PD, and seven corners with non-PD private land owners (i.e., Horseshoe property) within the project area.

3.2.1.1.2 Special Management Areas. Special Management Areas are congressionally or administratively designated geographic areas within a BLM field office requiring explicit management to achieve BLM's special objectives. In the Safford Field Office, such areas include Wildernesses; Areas of Critical Environmental Concern (ACECs); and National Conservation Areas (NCAs, including the subgroup designated Riparian National Conservation Areas [RNCAs]). The Safford Field Office is responsible for managing public lands within six wildernesses and one wilderness study area totaling 78,560 acres, eleven ACECs totaling about 28,788 acres, and one RNCA totaling 21,767 acres (as listed in Table 3-2). In addition to these 19 special management areas, four river segments totaling 51.1 miles within the Safford Field Office have been recommended by the BLM and the Department of the Interior for designation as Wild and Scenic Rivers (W&SRs) (see Table 3-2). Although a legislative EIS for all river segments in Arizona considered eligible for W&SR status was completed in 1994, congressional approval of those segments recommended for designation by the BLM is still pending. In the meantime, the recommended segments within the Safford Field Office, including a 0.25-mi-wide corridor on either side of the stream, are being managed by the BLM to protect the identified wild and scenic values. Therefore, the Safford Field Office is responsible for managing a total of 23 special management areas.

For some, but not all, of the Special Management Areas listed above, the BLM has prepared a detailed plan that provides specific management guidance for the resources within that area. These plans may be in the form of an Activity Plan or a Management Plan. Special Management Areas for which some type of plan has been prepared are indicated with an "*" in Table 3-2. BLM manages the Special Management Areas that do not have such plans according to the general management prescriptions approved in the Safford District RMP, as amended.

3.2.1.2 Access and Recreation

3.2.1.2.1 Access. Four primary roads lead to or through the project area: Solomon Pass Road, Lone Star Mountain Road, San Juan Mine Road, and Phelps Dodge Mine Road (a.k.a. PD Mine Road or Dos Pobres Road) (see Figure 1-2) (SWCA 1997e). These roads provide varying degrees of physical access from Airport and Safford-Bryce roads northward toward the Gila Mountains. Lone Star Mountain and Phelps Dodge Mine roads are barred by gates as they enter PD's private lands and provide only limited public access to federal lands and no access to public recreational areas.

Users of Solomon Pass Road and San Juan Mine Road include, but are not limited to, the public for recreation and to reach public recreational areas, ranchers to manage livestock, PD and other mining claimants to reach their property and mining claims, a utility company in operation of a powerline, the BLM in the administration of the public lands, and state agencies. These two roads are linked at their northern ends by West Ranch Road, which runs east-west along the northeastern boundary of the project area (see Figure 1-2). All but the lower three miles of Solomon Pass Road and all of San Juan Mine and West Ranch roads are unpaved and suitable for two- or four-wheel-drive, high-clearance vehicles. Although these are considered ranch roads rather than official county roads, Graham County occasionally maintains them as a courtesy to ranchers. The lower three miles of Solomon Pass Road from its intersection with Airport Road are chip-sealed.

Table 3-2. Special Management Areas within the Safford Field Office	
Wilderness	North Santa Teresa Wilderness, Fishhooks Wilderness, Peloncillo Mountains Wilderness*, Dos Cabezas Mountains Wilderness*, Redfield Canyon Wilderness*, Aravaipa Canyon Wilderness*, Baker Canyon Wilderness Study Area
Areas of Critical Environmental Concern (ACEC)	111 Ranch Research Natural Area ACEC, Turkey Creek Riparian ACEC, Table Mountain Research Natural Area ACEC, Desert Grasslands Research Natural Ar ea ACEC, Hot Springs Watershed ACEC*, Bear Springs Badlands ACEC, Willcox Playa National Natural Landmark ACEC, Dos Cabezas Peaks ACEC, Eagle Creek Bat Cave ACEC, Bowie Mountain Scenic ACEC, Guadalupe Canyon Outstanding Natural Area ACEC
Recommended Wild & Scenic Rivers	Gila River (Gila Box)*, Lower San Francisco River, Aravaipa Creek, Bonita Creek*
Riparian National Conservation Area (RNCA)	Gila Box*

* Management plans, either in interim, draft, or final form, have been prepared for or apply to these areas.
Source: BLM 1991, 1994b; S. Knox, BLM.

Solomon Pass Road originates off of Airport Road near the Safford Municipal Airport. This road provides public and physical access to the eastern portion of the project area, to Bonita Creek and the Gila Box Riparian National Conservation Area (RNCA) via Lee Trail, and to the north-facing slopes of the Gila Mountains. San Juan Mine Road provides public and physical access to the Melody Claims; physical access onto the PD's privately held San Juan Mine property; and physical and public access to the Johnny Creek area of the Gila Mountains. PD currently allows access across their property on the San Juan Mine Road to reach areas of public land to the north. Access to the pit area, however, is limited to authorized personnel only. Owners of the patented Horseshoe Claims access their property via a dirt spur road off of Solomon Pass Road. Both Solomon Pass and San Juan Mine Roads join West Ranch Road, which forms the southern segment of the Johnny Creek Loop, a popular recreational drive that leads to public lands in Johnny Creek, a tributary of upper Bonita Creek. West Ranch Road also provides access to the Safford-Morenci trailhead, the starting point of a well-known historical and recreational trail.

3.2.1.2.2 Recreation. Recreational opportunities on the federal lands in the project area are dispersed; no developed recreational sites are present. Recreational use includes backcountry driving, hiking, horseback riding, mountain biking, and hunting. In addition, approximately 1,000 people use Solomon Pass Road each year, approximately half to view wildlife in the Gila Box RNCA and remainder who access Bonita Creek for hiking and backpacking (SWCA 1996e).

The BLM estimates that approximately 2,800 to 3,100 backcountry drivers use the ranch roads in and near the project area each year (S. Knox, Outdoor Recreation Planner, BLM Safford Field Office, pers. comm. 1998). Other recreational users of these roads include about 75 horseback riders and roughly 30 mountain bike riders a year. Most people use the Solomon Pass, San Juan Mine, West Ranch, and Johnny Creek Loop Roads, but a few use Phelps Dodge Mine Road and the unnamed smaller roads in the northwest portion of the project area.

The most important hiking trail in the area is the Safford-Morenci Trail. Approximately 15 miles long, the trail was used in the late 1800s-early 1900s as one of the routes between Safford and the mines around present-day Morenci. Haulers used the trail to carry meat and produce to the mining communities and fuelwood to the smelters. Because of its importance to historical events in the region, the Safford-Morenci Trail has been determined eligible for listing in the *National Register of Historic Places*. The west trailhead is located along West Ranch Road. From there, the trail's route crosses the Gila Mountains north of Lone Star Mountain and descends through Johnny Creek into Bonita Creek Canyon. From Bonita Creek, it climbs to the top of Turtle Mountain at Bellmeyer Saddle on the San Carlos

Apache Reservation.[3] The trail then descends into South Smith Canyon, terminating at its east trailhead near the Eagle Creek pumping station. The Safford-Morenci Trail has not been maintained by BLM for many years and requires the use of a topographic map and compass to follow, but, based on old visitor registers, it is estimated that 50 to 75 people per year hike the physically challenging and poorly marked Trail for recreation (S. Knox, Outdoor Recreation Planner, BLM Safford Field Office, pers. comm. 1998).

Through commercial special recreational permits, the BLM allows guides and outfitters to provide recreational services, including trail rides, hikes, pack trips, and hunting trips on the BLM-administered lands. The BLM Safford Field Office currently authorizes four such permits for activities in the project area. Since 1994, BLM has also granted a competitive special recreation permit for an annual 50-mile-long endurance horseback race called the Safford Johnny Creek Endurance Ride. This event crosses a portion of the project area. The permit is coordinated with other public land resources and uses and is subject to renewal on an annual basis. Participants include 85-90 riders and 30-40 spectators (S. Knox, Outdoor Recreation Planner, BLM Safford Field Office, pers. comm. 1998).

The project area is located within Arizona Game and Fish Department Management Unit 28 (often called “Hunt Unit 28”). Deer, javelina, quail, and dove are commonly hunted game species in the project area vicinity. Hunting most commonly occurs 1) on public lands along the northern edge of the project area; 2) west of Salt Trap Tank; and 3) adjacent to Solomon Pass, San Juan Mine Road, and PD Mine Road. No hunting is allowed on PD-owned private lands within the project area. The BLM estimates that approximately 240 hunters use the federal lands in the project area annually. Of this number, approximately 55 hunt deer, 45 hunt javelina, 110 hunt quail, and 30 hunt dove (S. Knox, Outdoor Recreation Planner, BLM Safford Field Office, pers. comm. 1998).

3.2.1.3 Encumbrances

Encumbrances on public lands include rights-of-way (ROWs) and easements. There are seven ROWs appurtenant to the project area (SWCA 1996f). Six of the ROWs were granted for transmission lines for either telephone and telegraph or electric power service to PD or previous mine operators. Table 3-3 below identifies the ROW grantees and the locations of the ROWs/authorizations. Locations of the ROWs are depicted on Figure 3-2.

3.2.1.4 Agriculture and Grazing

The U.S. Natural Resources Conservation Service (NRCS, formerly the Soil Conservation Service [SCS]) is responsible for identifying prime or unique farmlands. No prime farmlands have been designated in the project area (SCS November 1983 Map entitled “Important Farmlands, Graham County, Arizona”), although such lands have been designated south of the project area within the floodplain of the Gila River and along Highway 191 south of Safford.

The BLM Safford Field Office administers 260 grazing allotments. All the public lands proposed for mining use and exchange are currently included within six of these allotments: the Bryce, Talley Wash, Rest Haven, Johnny Creek allotment, Lone Star allotment, and Bonita Creek allotment (Figure 3-3). Table 3-4 gives the total acreage of BLM-administered lands and selected lands within these six allotments, the corresponding stocking capacity in Animal Unit Months (AUMs) supported by these lands, and BLM-registered range improvements on the selected lands for each allotment (SWCA 1997j). The locations of these range improvements are depicted in Figure 3-3.

BLM receives income from annual grazing fees paid by range allottees. At the anticipated 2000 federal grazing fee of $1.35 per AUM, Safford Field Office’s 2000 income from grazing revenues on the selected lands portions of the allotments would be approximately $882, which represents about eight percent of the Field Office’s total annual 1999 grazing receipts of $10,436 from these allotments (Table 3-5).

3.2.1.5 Mineral Rights

Real property carries with it certain rights that can be owned. Two of these rights are commonly referred to as the surface estate and the mineral estate. For any given property, a single entity can own both estates, creating what is commonly referred to as "whole estate," or different entities can own either estate independently of the other, creating what is commonly referred to as “split estate.” Within the project area, split estate occurs in Section 36 or Township 5 South, Range 26 East; Section 16 of Township 6 South, Range 26 East; and Section 32 of Township 5 South, Range 27 East, where the United States owns and BLM administers, the surface estate, while the State of Arizona owns the

[3] Trail users must contact the San Carlos Apache Tribe and the Arizona State Land Department to acquire the necessary permits to use the portions of the trail that traverse the San Carlos Apache Reservation and state lands, respectively.

mineral estate. In Section 21 of Township 5 South, Range 26 East, the BLM administers the mineral estate to the SW¼ of the NW¼ of that section, while the State owns the surface estate and the remainder of the mineral estate of the northern half. All property rights in the southern half of Section 21 are owned by PD.

In Sections 16, 32, and 36 discussed above, the split estate resulted from a land exchange between the BLM and the State of Arizona completed in 1941 and 1942, in which Arizona retained ownership to the mineral estate. In Section 21, a similar land exchange completed in 1945 resulted in the BLM retaining administrative responsibility for 40 acres of mineral estate.

3.2.1.5.1 Federal Minerals. On the BLM-administered lands within the project area, approximately 844 mining claims have been filed by PD (Wahl 1997a). R.L Whitmore and others own 40 claims on BLM lands near the project area, known as the Melody Claims (ibid.), which are excluded from the MPO and the exchange. The location of the Melody Claims relative to the project area is shown on Figures 1-2 and 3-2.

The BLM has not entered into any mineral leases, such as for oil, coal, or gas, or salable mineral contracts, such as for sand and gravel, for lands in the project area. In the Agreement to Initiate (ATI), BLM segregated the selected lands from further appropriation under mineral laws for a period of five years from the date of notation. The segregation was renewed in 1999 by BLM. This precludes additional mining claims from being made on the selected lands while the environmental review process for the Project is underway.

3.2.1.5.2 State of Arizona Minerals. The State of Arizona has retained the mineral rights to Sections 16, 32, and 36 within the project area; BLM administers the surface rights. Completion of a land exchange that includes these areas would be subject to the State's rights to these minerals. PD holds mineral exploration permits from the State for the northern half of the State-owned mineral estate and for Section 36, T5S, R26E and a mineral lease for the southern half in Section 32, T5S, R27E. There are no permits or leases on the state-owned minerals in Section 16, T6S, R26E.

Table 3-3. Rights-of-Way Authorized on the Project Area

Right-of-Way Type (BLM ROW #)	**Grantee**	**General Location**
Electric Power Distribution Line (AZA 1091)	Graham County Electric	SE¼SW¼, sec. 2; E½E½SE¼, sec. 10; W½, sec. 11; NW¼NW¼, sec. 14; E½E½, sec. 15, T6S, R26E
Telephone and Telegraph Line (AZA 2773)	Qwest Communications	Lots 2, 3, and 4, N½SE¼, sec. 34, T5S, R26E; and lots 6, 8, 9, E½SW¼, sec. 2, T6S, R26E
Electric Power Transmission Line (AZA 5340)	Graham County Electric	S½SE¼SW¼, sec. 2; N½NW¼NE¼, N½NE¼NW¼, sec. 11, T6S, R26E
230 kV Electric Power Transmission Line (AZA 9015)	Sierra Southwest Transco (fomerly AEPCO)	Lot 4, W½SW¼, sec. 4; NE¼, N½NW¼, sec. 9; S½NW¼, N½SW¼, SE¼, sec. 10; S½SW¼, sec. 11; NE¼, N½NW¼, sec. 14, T6S, R26E; S½NW¼, sec. 20, T6S, R27E
Radio Station Site and Access Road (AZAR 029939)	Qwest Communications	SE¼SW¼, SW¼SE¼, sec. 2, T6S, R26E
Telephone and Telegraph Line (AZA 11857)	Qwest Communications	N½NE¼, S½SE¼NW¼, NE¼NW¼SW¼, N½SE¼NW¼SW¼, S½SE¼NW¼SW¼ sec. 35, T6S, R27E

Table 3-3. Rights-of-Way Authorized on the Project Area

Right-of-Way Type (BLM ROW #)	**Grantee**	**General Location**
7.5 kV Electric Power Line (AZA 20635)	Phelps Dodge Corporation	S½SW¼, sec. 2; NW¼SW¼, N½SE¼SE¼, SW¼NE¼SE¼, S½NW¼SE¼, sec. 3; S½NE¼, SE¼NW¼, NW¼NW¼, NE¼NE¼SE¼, sec. 4; and lot 1, sec. 5, T6S, R26E

3.2.1.6 Surface Water Rights

Surface water rights are appurtenant to the lands upon which the water is beneficially used and the holder of a water right must own or possess the land to which the right is appurtenant (ADWR, Comment Letter No. 63). Surface water rights totaling 17.69 acre-feet per year (af/yr) have been filed for the selected lands and are listed in Table 3-6. On the selected lands, BLM holds 11 water rights totaling 9.06 af/yr; an individual, K.W. Curtis, holds four water rights totaling 2.50 af/yr; an individual, J. Menges, holds one water right for 0.61 af/yr; an individual, G.A. Golding, holds one water right for 1.12 af/yr; Page Land and Cattle Co. (PL&C) holds 10 water rights totaling 1.60 af/yr; and PD holds four water rights totaling 2.80 af/yr. All these surface water rights have been designated for stock watering or wildlife purposes. The selected lands are not in an Active Management Area (AMA) or Irrigation Non-Expansion Area (INA) under the State of Arizona 1980 Groundwater Management Act. On PD's private lands in the project area, four separate entities hold five water five rights totaling 77.65 af/yr (Table 3-7). All these water rights have been designated for stock watering or wildlife purposes.

Table 3-4. Approximate Acreages and Stocking Capacity for BLM Lands and Selected Lands within Six Range Allotments
(Percents given as percent of total allotment. Range Improvements listed for selected lands only)

ALLOTMENT (Operator)	ALLOTMENT ACREAGE			STOCKING CAPACITY (Animal Unit Months, or AUMs)		RANGE IMPROVEMENTS
	Total Allotment	BLM land	Selected Lands	Total BLM AUMs	Selected Lands AUMs	
Bryce Allotment (Gary Bryce)	54,000	20,470 (38%)	1,715 (3%)	1,407	45	1. Bryce/Talley Wash boundary fence (#48)
Talley Wash Allotment (Page Land & Cattle Co.)	9,703	6,901 (71%)	4,320 (45%)	127	57	1. Stewart/Golding fence (#274) 2. Dirt tank (#665) 3. Dirt tank (#666) 4. Dirt tank (#667)
Rest Haven Allotment (Bud Smith & Bob Bell)	2,317	1,868 (81%)	232 (10%)	Designated ephemeral--no stocking capacity indicated		1. 4612/4613 boundary fence77
Lone Star Allotment (Phelps Dodge Corp.)	31,829	18,264 (57%)	5,681 (18%)	1,052	189	1. GA reservoir (#1417) 2. John corral (#1340) 3. Storage house well (#1347) 4. Peterson Wash pipeline (#3555)
Johnny Creek Allotment (Jeff Menges)	23,291	20,069 (86%)	4,225 18%)	1,804	325	1. Rattlesnake fence (#923) 2. Rattlesnake tank (#926) 3. Mark tank (#1374) 4. Below Boo tank (#845) 5. Osito reservoir (#4088) 6. Interior Pasture Fence (#794) 7. Golding/West fence (#284) 8. Burro pipeline (#4428)
Bonita Creek Allotment (Carlos Amado)	25,171	24,361 (97%)	124 (<1%)	3,341	16	1. Dry Canyon tank (#1237) 2. Sam corral (#1243) 3. Boundary fence (#134)
TOTAL	**146,311**	**91,933 (63%)**	**16,297 (11%)**	**7,731**	**632**	**24 Improvements**

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(Percents given as percent of total allotment. Range Improvements listed for selected lands only)

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	Total Allotment	BLM land	Selected Lands	Total BLM AUMs	Selected Lands AUMs	
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Rest Haven Allotment (Bud Smith & Bob Bell)	2,317	1,868 (81%)	232 (10%)	Designated ephemeral--no stocking capacity indicated		1. 4612/4613 boundary fence77
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TOTAL	**146,311**	**91,933 (63%)**	**16,297 (11%)**	**7,731**	**632**	**24 Improvements**

Table 3-5. BLM Income for 1997 from Six Grazing Allotments and Selected Lands Portions of the Allotments

Allotment	Total 1997 BLM Grazing Fee	Fees from Selected Lands Portion Only	Percent of Total Income from Selected Lands
Bryce Allotment	$1,900	$61	3%
Talley Wash Allotment	$171	$77	45%
Rest Haven Allotment	$0	$0	N/A*
Lone Star Allotment	$1,420	$255	18%
Johnny Creek Allotment	$2,435	$439	18%
Bonita Creek Allotment	$4,510	$22	<1%
Total Income	**$10,436**	**$854**	**8%**

*N/A = not applicable to ephemeral allotments

3.2.1.7 Blasting Noise and Vibrations

There are currently no discharges of explosives or mining-related noise and vibrations in the project area.

3.2.1.8 Visual Resources

The project area lies on a gradually sloping, hummocky alluvial fan terrace and low foothills along the south-facing flank of the Gila Mountains. Numerous large and small drainages score the often-cobbly/gravelly landscape surface. The general landscape in the project area is predominately natural desert upland in character, with about 521 acres disturbed by former mine operations. The following characterization of the existing land/water, vegetation, and structures on the project area is based on the view from Highway 70 near 20th Avenue (Knox 1997). Foreground and middleground views (referred to here collectively as fore-middleground views) are defined as zero to two miles in distance from the viewpoint; background views range from two miles to the horizon at the crest of the Gila Mountains roughly 10 miles away. The project area lies within the background of a commonly viewed scene visible from the City of Safford; neighboring towns; and US 70 and US 191, the main transportation corridors in the vicinity of the project area.

3.2.1.8.1 Land/Water. As seen from the town center of Safford looking toward the Gila Mountains, the background view includes a natural terrace above the Gila River, sloping gently uphill to the toe of the Gila Mountains and its foothills. The Gila Mountains are steeply sloping, with angular and diagonal ridges rising to the crest of the mountains. The horizon is formed by the crest, which undulates against the skyline. The fore-middleground view is composed of flat agricultural fields that stretch from the observation point northward to the Gila River and its floodplain. Due to the distance between the project area and most in-town viewers, the landscape appears as fine or smooth-textured land, with occasional rough-textured cliffs, rock outcrops, and some dirt roads seen as curvilinear, gray-colored lines. The color of the mountains is mostly gray, with blue to purple tints that vary with the time of day.

Table 3-6. Surface Water Rights on the Selected Lands

Surface Water Right Number	Holder Name	Water Source	Annual Volume (af)	Specified Use[1]	Location			
					S	T	R	¼ Sec
36-0072391	Page Land & Cattle (PL&C)	Bowman Tank Draw	0.20	S	33	5S	26E	SE, SW
36-0072392	PL&C	Mineral Claim	0.15	S	3	6S	26E	SE, NW
36-0072393	PL&C	Cueto Tank	0.20	S	8	6S	26E	SW, NE
36-0072394	PL&C	Blocky Tank	0.15	S	9	6S	26E	NE, NW
36-0072395	PL&C	Stewart Tank	0.10	S	9	6S	26E	SW, NW
36-0081002	J. Menges	Walnut Spring	0.61	S	26	5S	26E	SE, SE
38-0019177	BLM	Unnamed	2.00	S, W	9	6S	27E	NE, NE
38-0019207	BLM	Unnamed	0.10	S, W	2	6S	26E	SW, NE
38-0019208	BLM	Talley Wash	0.10	S, W	4	6S	26E	SE, SW
38-0019209	BLM	Cottonwood Wash	0.10	S, W	3	6S	26E	NE, NE
38-0019287	BLM	Unnamed	1.30	S, W	35	5S	26E	SE, SE
38-0019390	BLM	Bear Spring	1.30	S, W	36	5S	26E	NW, NE
38-0019393	BLM	Bear Spring	3.80	S, W	31	5S	27E	SE, NW
38-0024930	P D	Runoff	0.70	S	17	6S	27E	NW, SW
38-0024931	P D	Runoff	0.70	S	33	5S	27E	SW, NW
38-0024934	P D	Runoff	0.70	S	3	6S	27E	SW, SW
38-0024941	P D	Runoff	0.70	S	2	6S	26E	SW, NE
38-0027727	K. W. Curtis	Ben Hur Canyon	0.25	S, W	31	5S	27E	NE, NW
38-0027731	K. W. Curtis	Ben Hur Canyon	0.25	S, W	36	5S	26E	NW, NE
38-0027734	K. W. Curtis	Spring Canyon	1.00	S, W	33	5S	27E	NE, NW
38-0027738	K. W. Curtis	Various Canyons	1.00	S, W	32	5S	27E	NE, SE
38-0072385	PL&C	Bowman Tank Draw	0.20	S	33	5S	26E	SE, SW
38-0072386	PL&C	Stewart Tank	0.10	S	9	6S	26E	SW, NW
38-0072387	PL&C	Blocky tank	0.15	S	9	6S	26E	NE, NW
38-0072388	PL&C	Cueto Tank	0.20	S	8	6S	26E	SW, NE
38-0072389	PL&C	Mineral Claim	0.15	S	3	6S	26E	SE,NW
38-0089916	BLM	Peterson Wash	0.10	S, W	26	5S	26E	NE, SE
38-0089919	BLM	Wilson Wash	0.13	S,W	14	6S	26E	NW, SW
38-0089920	BLM	Unnamed	0.06	S, W	17	6S	26E	NE, NW
38-0089921	BLM	Unnamed	0.07	S, W	3	6S	27E	NW, NW
4A-0001675	G.A. Golding	Cottonwood Wash	1.12	S	26	5S	26E	SE, SE
		TOTAL	**17.69**					

[1] S= Stock watering, W = Wildlife
Source: ADWR 1995 and 1996.

Table 3-7. Surface Water Rights on PD's Private Lands in the Project Area

Surface Water Right Number	Holder Name	Water Source	Annual Volume (af)	Specified Use[1]	Location			
					S	T	R	¼ Sec
36-0060073.1	G.A. Bryce	Little Spring No One	1.61	S	32	5S	26E	NW, NE
36-0072390	PL & C	Hackberry Spring	0.30	S, W	27	5S	26E	NW, NW
4A-0001418	PL & C	Fork of Hackberry Wash	72.38	S	27	5S	26E	NW, SW
4A-0002477	A.T. West	Cottonwood Spring	1.68	S	27	5S	26E	SE, SE
4A-0002478	G.A. Golding	Cottonwood Tunnel Spring	1.68	S	34	5S	26E	NE, NE
		TOTAL	**77.65**					

[1]S= Stock watering, W = Wildlife
Source: ADWR 1995 and 1996.

3.2.1.8.2 Vegetation. Vegetation (primarily clumps of creosote bush) on the project area is generally sparse and evenly distributed; from a distance, it appears fairly smooth and is not distinguishable as a separate visual resource from the landform on which it grows. No distinct lines are formed by the vegetation communities on the project area; rather, the vegetation appears to flow continuously over the landscape. During the growing season(s), the vegetation lends an overall olive-green tint to the landscape of the project area contrasting with the bright greens of the cotton fields and golden yellows of the wheat fields visible in the fore-middleground views. Although the Gila River lies in the fore-middleground, and cannot be seen from view points in town, the riparian vegetation along its banks is clearly visible from this viewpoint and provides a curvilinear greenbelt that helps to define the interface of fore-middleground with background views of the project area.

3.2.1.8.3 Structures. Existing tanks and buildings associated with former mining operations are visible on the lower elevations of the project area as tan-colored cylinders, rectangles, or squares. These structures form short horizontal and vertical lines. No structures protrude above the horizon at the crest of the Gila Mountains. Square, rectangular, and odd-shaped structures in the fore-middleground are primarily related to agricultural land uses and include tan buildings, gray-colored tanks, red and green farm equipment and machinery, and tan-colored power poles.

3.2.1.8.4 VRM Classification. The Safford District RMP (BLM 1991) designated the Gila Mountains a Visual Resource Management (VRM) Class III[4] area (see Appendix C for definition of classes). The RMP also designated lands south of the Gila Mountains VRM Class IV. The RMP, however, did not define the boundary between VRM Class III and Class IV in the vicinity of the project area. The BLM's VRM Manual states that "the approved VRM objectives shall result from, and conform with, the resource allocation decisions made in RMPs" (VRM Manual 8410.06 policy A.2, BLM 1986). For the purposes of this analysis, BLM has determined that the lands in the project area should be managed by VRM Class IV objectives for the following reasons: the project area is located in the foothills and alluvial fan terrace lying south of the Gila Mountains; the RMP did not withdraw public lands in the Gila Mountains from mineral entry; the RMP acknowledges the existence of mines and orebodies in the Safford Mining District; and the RMP predicts development of mines in the mining district. Class IV objectives would conform with other resource allocation decisions of the RMP and would be consistent with the visual characteristics of open pit copper mining.

3.2.1.8.5 Nighttime Lighting. Other than the few existing structures on the project area near Site No. 2 that have exterior lights,

[4] Under the BLM's Visual Resource Management (VRM) system, public lands are designated as one of four classes, depending upon the property's natural scenic value. Classes I and II apply to areas with the greatest scenic value; Class III to areas with moderate scenic value; and Class IV to areas with the least scenic value (BLM 1986; see Appendix C for the management objectives of Classes I through IV).

there are no nighttime activities currently on-site that illuminate the project area. In general, nighttime views of the Gila Mountains from town show a dark, unlit scene in which the project area cannot be discerned. In part, this is because scattered light from exterior lights in town and at the prison on the east side of town in the fore-middleground view obscure the few, small, exterior building lights that currently exist on the project area. It should be noted that the ability of the viewer to discern nighttime views of the Gila Mountains themselves varies with moonlight conditions; on moonlit nights, the Gila Mountains are silhouetted against the night sky and appear as a solid black landform with an undulating crest. On moonless nights, the Gila Mountains and sky merge into a solid dark flat "wall" with no discernible land/water, vegetation, or structural features.

3.2.1.9 Hazardous Materials

A Phase I Environmental Site Assessment for potential environmental liability of the public lands proposed for the Project was conducted (Zenitech 1998a). The assessment was conducted in accordance with American Society for Testing and Materials (ASTM) Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, E 1527, and involved aerial and site reconnaissance, review of public agency records and applicable federal, state and local records, and personal interviews. The results of this investigation for potential environmental liabilities are as follows (ibid):

< A review of agency databases indicated that none of the project area is located on or within one mile of a federal National Priority List site or an Arizona Water Quality Assurance Revolving Fund (WQARF)[5] site.

< One zipACIDS[6] site, the San Juan Mine zipACIDS site (EPA ID AZ0000309203), was located on or within one mile of the project area. This site is located primarily on existing PD-owned land, with a portion of the site on the selected lands. The zipACIDS list is a compilation of locations, sorted by zip code, subject to investigation under Arizona's WQARF program and the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for possible contamination of soil, surface water, or groundwater. Inclusion of any facility or site on this list *does not* mean that the location is contaminated, is causing contamination, or is in violation of state or federal statutes or regulations.

< No Resource Conservation and Recovery Act (RCRA) transport, storage, or disposal facilities are located on or within one mile of the project area.

< No Emergency Response Notification System (ERNS) sites are located on or in the vicinity of the project area.

< No registered Underground Storage Tanks (UST) sites are located on the project area or on adjacent properties.

< No Leaking Underground Storage Tanks (LUST) sites are located on or within 0.5 mile of the project area.

< No open or closed landfills are located on or within 0.5 mile of the project area.

PD was aware of the status of the San Juan Mine as a zipACIDS site when it purchased the mine in 1994 from a consortium of private owners. Upon acquisition of the property, PD initiated voluntary clean up activities on remedial disturbed areas that involved removal and disposal of tires, scrap metal, pipe, trash and other debris that remained from previous mining and leaching activities conducted by the former operators.

Additionally, PD contracted with a consultant to design and oversee the installation of a stormwater management system, which includes lined channels and pipe drains to divert stormwater flows from the northern area of the leach stockpiles to the existing open pit mine. While this drainage system was being installed, an existing, unlined leach collection pond downgradient from the leach stockpiles was converted to a lined stormwater collection and evaporation pond. To do this, a trench was dug down to bedrock between the stockpiles and the pond. The trench acted to intercept and temporarily store surface and subsurface stormwater flowing from the stockpiles to the pond. The pond area was allowed to dry up, then it was partially excavated, contoured, and lined with a composite liner system consisting of a sublayer of a minimum of six inches of compacted clay overlain by a high density polyethylene (HDPE) synthetic liner of 60 mil thickness. The liner was extended to the interception trench and draped down against the downgradient wall of the trench. The trench was then backfilled with gravel, and six shallow reclaim wells were installed to pump intercepted stormwater seepage from the ditch into the lined pond to be evaporated. The Arizona Department of Environmental Quality (ADEQ) has determined that these improvements to the existing leach collection pond at San Juan will be subject to the Aquifer Protection Permit review process and will be treated as a new facility.

3.2.2 Physical Resources

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[5] This is a state "Superfund" program which focuses on groundwater quality.

[6] Arizona CERCLA Information and Data System.

3.2.2.1 Local Climate

Climate in the Safford Valley is temperate and semi-arid, with a growing season of about 200 days per year (Sellers and Hill 1974). The average daily maximum and minimum temperatures are 80.8° and 47.7°F, respectively; recorded temperatures range between 7° and 114°F. Winters are warm and dry; summers, hot and somewhat wetter. Average annual precipitation is 9.8 inches; the evaporation rate is high. A mountain range, the over 10,000-foot-high Pinaleños, about thirteen air miles to the southwest of the City of Safford, produces a rain-shadow effect in which much of the winter precipitation falls on the windward side of the mountains before reaching Safford. Summer precipitation in the form of thunderstorms originates from the Gulf of Mexico and represents more than half the annual total rainfall received. The Gila Mountains, with maximum elevations exceeding 6,000 feet and a southeast-to-northwest orientation, serve to funnel summer thunderstorm activity northwestward down the valley. Winds measured in the project area during 1995-1996 blew predominantly from the west northwest and northwest (41.3 percent of measurements) and secondarily from the east and east southeast (19.8 percent of measurements) (Class One Technical Services 1997). This pattern is characteristic of drainage either up or down the Safford Valley. Such winds usually occur during the day at average or above average speeds. They tend to be more turbulent than nighttime winds, exhibiting greater potential for dispersion of pollutants. At night, winds most often blow at low speeds down the slope of the Gila Mountains from the east or east-northeast. Wind speeds during 1995-1996 averaged 15.3 feet (4.6 meters) per second (ibid.)

3.2.2.2 Air Quality

3.2.2.2.1 Criteria Pollutants.[7] Applied Environmental Consultants, Inc. (AEC) of Tempe, Arizona, conducted ambient air quality impact modeling for the project area (AEC 1999). Four criteria pollutants that might reasonably be expected to emanate from the proposed mining operations were assessed, particulate matter (PM_{10}), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), and carbon monoxide (CO), along with two types of pollutants from the Arizona Ambient Air Quality Guidelines (AAAQG) list, sulfuric acid (H_2SO_4) mist and speciated volatile organic compounds (VOCs). Within the model, one set of receptors traced the process area boundary[8] at 25-meter intervals, and three other sets formed a coarse grid with receptors spaced at 100-meter intervals extending outward from the process boundary to 1 kilometer, 200-meter intervals from 1 km to 5 km, and 500-meter intervals from 5 km to 10 km (see Figure 3-4). In addition, the model included special receptors in each of the following locations: downtown Safford, the Safford Municipal Airport, the nearest residence, the San Carlos Apache Reservation boundary, and two Class I areas (the Galiuro Wilderness and the Gila Wilderness).

The Safford area is currently classified as “attainment” (i.e., better than national standards) for SO_2, and “unclassifiable” for PM_{10}, NO_2, and CO. Background levels for each of these criteria pollutants are summarized in Table 3-8. Because representative long-term data are not available from the project area, the values used to represent “existing conditions” come from state monitoring sites with the most comparable conditions (AEC 1999, 2003a). Background concentrations of the AAAQG pollutants are not required and were not considered in the air quality analysis. A conformity analysis was not required because the project area is not located in a non-attainment area for a criteria pollutant.

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[7] Criteria pollutants are the six compounds most commonly associated with degraded air quality and for which the EPA has formulated National Ambient Air Quality Standards (NAAQS). The pollutants include the four compounds analyzed in this study plus lead and ozone. Typically, modeling for lead and ozone is conducted only in urban areas, where automobile and industrial emissions often result in concentrations of lead and ozone large enough to significantly degrade air quality. Precursors to ozone include nitrogen oxides (No_x), which were analyzed in this study.

[8] ADEQ policy for air permitting requires the delineation of a process boundary, a perimeter within which public access is reasonably limited and outside of which public access is not reasonably limited. Public exposure to airborne pollutants is assumed to occur only in areas where public access is not reasonably limited (Class One Technical Services 1997).

Major stationary sources of air pollution and major modifications to major stationary sources are required by the Clean Air Act (CAA) to obtain an air pollution permit before commencing construction. The process is called New Source Review (NSR) and is required whether the major source or modification is planned for an area where the NAAQS are exceeded (non-attainment areas) or an area where air quality is acceptable (attainment and unclassifiable areas). Permits for sources in attainment areas are referred to as prevention of significant air quality deterioration (PSD) permits; while permits for sources located in non-attainment areas are referred to as NAA permits. The entire program, including both PSD and NAA permit reviews, is referred to as the NSR program. The basic goals of the PSD regulations are: (1) to ensure that economic growth will occur in harmony with the preservation of existing clean air resources to prevent the development of any new non-attainment problems; (2) to protect the public health and welfare from any adverse effect which might occur even at air pollution levels better than the NAAQS; and (3) to preserve, protect, and enhance the air quality in areas of special natural recreational, scenic, or historic value, such as national parks and wilderness areas. The primary provisions of the PSD regulations require that new major stationary sources and major modifications be carefully reviewed prior to construction to ensure compliance with the NAAQS and the applicable PSD air quality.

Table 3-8. Summary of Background Concentrations of Criteria Pollutants Used in Modeling the Project Area

Pollutant	Averaging period	Background level	Source of background level estimate
PM_{10}	Annual	12.3 : g/m^3	Montezuma Castle monitoring site*
PM_{10}	24-hour	27.7 : g/m^3	Montezuma Castle monitoring site*
SO_2	Annual	1 : g/m^3	Springerville monitoring site**
SO_2	8-hour	22.0 : g/m^3	Springerville monitoring site**
SO_2	3-hour	94.0 : g/m^3	Springerville monitoring site**
NO_2	not given	1.9 : g/m^3	Springerville monitoring site**
CO	8-hour	1,219 : g/m^3	Casa Grande monitoring site**
CO	1-hour	3,200 : g/m^3	Casa Grande monitoring site**

* Although from a location outside of the project study area, Montezuma Castle monitoring station data were used because they are representative of the rural setting and elevation of the project site.
** All monitoring sites in Arizona that measure these three pollutants are closer to an electrical generating station, smelter, and/or a metropolitan area than the project area; therefore, all measured concentrations are likely to be higher than those in the project area. Following ADEQ guidance, the average from the last three years of available data was used to represent background concentrations.
Source: AEC 2003a.

The Project lies within the Southeast Arizona Intrastate Air Quality Control Region (AQCR) which encompasses the counties of Cochise, Graham (Project's County), Greenlee and Santa Cruz. This AQCR represents the "baseline area" for PSD purposes. The PM_{10}, SO_2 and NO_2 minor source baseline date for the Southeast Arizona Intrastate AQCR was triggered on April 5, 2002 by ADEQ's completeness determination for the Bowie Power Station Project application. The Project will be a minor stationary source and not subject to PSD permitting. For purposes of this EIS, however, it is assumed that the Project will consume PSD increments.

3.2.2.2.2 Class I Airsheds. A Class I airshed is a management designation for some, but not all, national parks, monuments, wildernesses, primitive areas, preserves, recreational areas, wild and scenic rivers, wildlife refuges, and lakeshores and seashores. Under the Clean Air Act regulations, projects are not allowed to further degrade the atmospheric visibility for any Class I airshed within 100 kilometers (62 miles) (40 CFR 50). Although the Project is not large enough to be subject to visibility analysis, PDSI voluntarily arranged for such an analysis to determine if visual impacts would occur for views within nearby Class I airsheds.

Figure 3-5 depicts the only two Class I airsheds within a 100-kilometer (62-mile) radius of the project area: the Galiuro Wilderness in the Coronado National Forest, Arizona, and the Gila Wilderness in the Gila National Forest, New Mexico. The closest boundary of the Galiuro Wilderness to the project area lies about 66.6 kilometers (41.4 miles) to the southwest. This wilderness is approximately 31 kilometers (19 miles) long and approximately 14 kilometers (9 miles) wide at the widest point. It consists of a northwest-southeast-trending mountain ridge dissected by two separate ridges in the north by Rattlesnake Creek and in the south by Redfield Canyon. The closest boundary of the Gila Wilderness is approximately 85 kilometers (52.8 miles) (measured in a straight line) east-northeast of the project area. The terrain along this straight line is rough and broken. It crosses several major river drainages, canyons, and mountains, rising to approximately 6,000 feet, approximately 1,800 feet above the average project area elevation. The highest elevation at the Gila Wilderness boundary is approximately 7,000 feet (Class One Technical Services 1997).

3.2.2.3 Geology

The project area lies along the northern margin of the Basin and Range Physiographic Province in Arizona. This province covers about a third of Arizona south of the imaginary diagonal line that runs from the head of Lake Mead in the northwest corner down to the vicinity of the Gila River's entry into Arizona in the southeast corner (Nations and Stump 1981). The Basin and Range province is characterized by heavily eroded, northwest-trending, elongated mountain ranges separated by broad valleys. The mountains are tilted blocks of often structurally deformed rock bounded by faults, and the valleys are intermontane basins that have been filled to great depths by sediments washed down from the adjacent eroding mountain ranges. If a stream has flowed through the valley or a lake formed, the basin fill could also include floodplain or lacustrine deposits. Both the mountain ranges and the deep basins were created during the Tertiary Period when the earth's crust stretched in this region, causing extensive movement along pre-existing and newly created fault zones. The blocks of rock between the faults moved and tilted, some slipping downward (called normal faulting) thousands of feet along the faults to form deep basins. The tilted blocks left in high relief formed the mountain ranges. The project area is located on the lower, south-facing slopes of one of these northwest-trending mountain ranges, the Gila Mountains.

3.2.2.3.1 Local Geology. Dames & Moore (1997a) defines five lithologic (rock or sediment) units in the project area. Beginning with the oldest, they are the 1) Safford Volcanics,[9] 2) quartz monzonite-granodiorite porphyry, 3) Gila Mountain Volcanics, 4) Lower Basin Fill, and 5) recent alluvium (see Figure 3-6 for surface geology and Figure 3-7 for cross-sectional view of the project area). The oldest lithologic unit, the Safford Volcanics, commonly referred to as the "premineral andesite," dates from the Late Cretaceous-Paleocene (Laramide age). It is composed primarily of andesite that was later (during the Paleocene and Eocene) intruded by the dikes, sills, and stocks of the second lithologic unit, the quartz monzonite-granodiorite porphyry. This porphyry is the mineralizing unit responsible for the copper deposits in the project area. The deposits include both copper oxides and copper sulfides, which are commercially processed using different extraction techniques. About 75 percent of the known copper ore in the Safford Mining District has been found along fractures in the Safford Volcanics, and about 25 percent has been found in the porphyritic intrusions themselves. The Safford Volcanics and some porphyritic rocks are exposed at the surface in the northeastern part of the project area, as depicted in surface geology map (Figure 3-6).

The third lithologic unit is the younger, unmineralized Gila Mountain Volcanics, which are Miocene-to-Late-Pliocene-age rocks composed of basalts, tuffs, rhyolites, and agglomerates. Located only in the western portion of the project area, these volcanics are overlain, for the most part, by the fourth unit, the Lower Basin Fill sediments of Pliocene and Early Pleistocene age. This unit comprises semiconsolidated to consolidated conglomerates washed down in great alluvial fans from the eroding Gila Mountains, and finer-grained lacustrine deposits left behind by a lake that once filled the Safford Basin. Basin Fill is estimated to have reached depths of 1,500 feet or more. Beginning in the Late Pleistocene, the Gila River began eroding the fill, carving the alluvial fans on both sides of the Valley into a series of more gently graded terraces. The lowest terrace face appears as a line of bluffs bordering each side of the current Gila River floodplain.

Overlying all earlier units in various locations throughout the project area are deposits of the fifth unit: recent alluvium. This is unconsolidated material has been deposited since the Pleistocene, primarily by runoff in wash channels and floodplains. Some of this recent material also takes the form of relatively small alluvial fans superimposed on the terraces.

Outside the project area, a sixth lithologic unit is recognized. This is the Upper Basin Fill, a fine-grained floodplain deposit that overlies the Lower Basin Fill on the Safford Valley floor. These deposits began to

[9] Called the Safford Metavolcanics by Langton and Williams (1982). Langton and Williams also recognized an overlying younger unit, the Baboon Metavolcanics (a postmineral andesite), in the project area. Dames & Moore (1997a) has subsumed the Baboon Metavolcanics into their Safford Volcanics unit.

form only after the ancient lake had filled in and a through-flowing river was established.

Three major fault systems have been identified in the project area: the Butte (Foothill) Fault, the Valley Fault, and the Southwest Fault (Figures 3-6 and 3-7). Several smaller faults and sheer zones are present as well. The Butte Fault is a regional, northwest-trending, Basin and Range normal fault. Movement along this fault has caused rocks to the southwest to slip downward relative to the rocks to the northeast. Consequently, rock layers that were actually deposited one on top of the other are now exposed at the surface side-by-side; the Gila Mountain Volcanics and Lower Basin Fill southwest of the fault are adjacent to the older Safford Volcanics northeast of the fault. Where the Butte Fault cuts across the Dos Pobres copper deposit, it has displaced the southwestern one-half to one-third of the deposit downward some 3,000 feet relative to the northeastern part (PDSI 1997). The proposed Dos Pobres pit will straddle the Butte Fault. Gila Mountain Volcanics will be exposed in the pit's southwestern walls, and Safford Volcanics and quartz monzonite porphyry will be exposed in the northeastern walls. In contrast, the ultimate San Juan pit will lie entirely to the northeast of the Butte Fault, so only Safford Volcanics and quartz monzonite porphyry will be exposed in its walls. All the rocks that will be exposed in the walls of both the Dos Pobres and San Juan pits are relatively low in hydrothermal sulfide concentrations, which are acid-generating, and high in alkali volcanics, which are calc-alkaline.

The Valley Fault, a west-northwest striking normal fault, lies generally southwest of the Butte Fault but angles toward it. The two faults intersect roughly a mile south of the San Juan pit (Figure 3-6). The wedge of rock between the faults has slid downward relative to the rocks on either side, forming a down-thrown feature called a graben (Figure 3-7). The rocks within the graben, consisting of Lower Basin Fill and Gila Mountain Volcanics, are highly fragmented as a result of this downward movement, and are generally more permeable than the older Safford Volcanics. South of the Valley Fault, the Lower Basin Fill thickens substantially, reaching depths of 1,000 feet in the southwestern-most part of the project area.

The Southwest Fault, located about three miles southwest of the Valley Fault and roughly parallel to it, is a normal fault that probably dips toward the southwest. The fault location is inferred from water quality and other geological data, but is not exposed at the surface.

3.2.2.3.2 Mineral Potential. Mineral resources are defined as concentrations of naturally occurring solid, liquid, or gaseous materials in or on the earth's crust in such form that economic extraction of a mineral resource is currently or potentially feasible (Wahl 1997a). Wahl evaluated the selected lands for the potential occurrence of mineral resources in the form of both disseminated copper and related mineralization (e.g., molybdenum, lead, zinc, gold, and silver), as well as underground mineral resources, as one of many considerations in the appraisal process for the selected lands. His study area comprised three blocks of selected lands labeled Dos Pobres, San Juan, and Lone Star (Figure 3-8). Areas corresponding to one-square-mile land sections within these blocks were evaluated for mineral potential. These areas are labeled alphabetically in Figure 3-8.

After reviewing extensive exploration data collected by PD for portions of the selected lands, and studying surface exposures, Wahl (1997a) determined that the potential[10] for accumulation of disseminated copper deposits suitable for open-pit mining in most of the selected lands is low at a moderate level of certainty (Table 3-9). However, parts of the selected lands are classified as having moderate to high open-pit mineral potential at moderate to high levels of certainty, as described below. The underground mineral potential was judged to be low to moderate at moderate levels of certainty (Table 3-10).

[10] "Potential" refers to the likelihood for occurrence of a concentration of one or more mineral resources. This mineral potential evaluation uses five categories: zero (0), low (L), moderate (M), high (H), or not determined (ND), with four levels of certainty (A-D), defined as follows: A = available data are insufficient and/or cannot be considered as direct or indirect evidence to support or refute the possible existence of mineral resources within the respective area; B = available data provide indirect evidence to support or refute the possible existence of mineral resources; C = available data provide direct evidence but are quantitatively minimal to support or refute the possible existence of mineral resources; D = available data provide abundant direct and indirect evidence to support or refute the possible existence of mineral resources.

Wahl (1997a) reported that primary sulfide mineralization appears to be well developed below leachable ore in the Dos Pobres and Lone Star deposits, but not in the San Juan deposit. Because development of sulfide mineralized deposits is seriously constrained by economic and environmental considerations at this time, mineral potential evaluation efforts were directed primarily toward leachable (oxide) mineral deposits.

The only selected lands determined to have high open-pit mineral potential at a high level of certainty occur in the San Juan block. They include approximately 190 acres of selected lands (about 1.2 percent of the total selected lands) immediately surrounding the San Juan pit in parts of areas H, I1, O, and P (see Figure 3-8). These areas on the selected lands represent leachable porphyry copper mineralization of the San Juan deposit on the order of approximately 133 million tons, roughly 32 percent of the total estimated 411 million tons of the San Juan deposit's leachable ore. The remainder of the San Juan deposit lies on PD-owned land.

Table 3-9. Open-Pit Mineral Potential of the Selected Lands (refer to Figure 3-8)

Area	Mineral Potential	Level of Certainty*
Dos Pobres Block		
C, D, G, M, N, R, S, T, U, AA, AB, & AC; parts of A, B, E, & F	Low	C
parts of A, B, E, & F	Moderate	B
Lone Star Block		
I2, J, L, AE, AF, AG, AH, AJ, AK, AL, AM, & AN; parts of K, & AI	Low	C
parts of K & AI	Moderate	B
San Juan Block		
X & AD; parts of H, I1, O, P, Q, V, W, Y, & Z	Low	C
parts of P, V, W, Y, & Z	Moderate	B
parts of H, I1, O, P, & Q	Moderate	C
parts of H, I1, O, & P	High	D
parts of H, P, & Q (Joy mineralization area)	High	C

* Level of Certainty key: A through D, with D = highest certainty and A = lowest certainty.
Source: Wahl 1997a.

Another area of the selected lands with high open-pit mineral potential, referred to as the Joy area mineralization, is located west and south of the San Juan deposit. Although not well tested, the Joy area mineralization covers approximately 75 acres (about 0.4 percent of the selected lands) and contains an estimated 150 million tons[11] of mineralized material overlain by approximately 112 million tons of unmineralized development rock.

Table 3-10. Underground Mineral Potential of the Selected Lands (refer to Figure 3-8)

Area	Mineral Potential	Level of Certainty*
Dos Pobres Block		
A, B, C, D, E, F, M, N, R, S, T, U, AA, AB, & AC; part of G	Low	C
part of G (Essex area)	Moderate	B
Lone Star Block		

[11] This estimate is based on a model that assumes a tonnage factor or 12.4 cubic feet per ton and that mineralization is uniform and continuous within the modeled blocks. Much additional drilling is required in the Joy area prior to a determination that an ore reserve has been established at this location.

J, K, L, AE, AG, AH, AJ, AL, AM, & AN; parts of I2, AF, AI, & AK	Low	C
parts of I2 & AF (including Blue Jay Mine area); AI, & AK	Moderate	B
San Juan Block		
H, I1, O, P, Q, V, W, X, Y, Z, & AD	Low	C

* Level of Certainty key: A through D, with D = highest certainty and A = lowest certainty.
Source: Wahl 1997a.

Three small areas of the selected lands in the Dos Pobres and Lone Star blocks exhibit moderate potential for accumulation of limited underground copper and other metal resources at a low level of certainty. These areas are described below (refer to Table 3-10), but no acreage has been estimated for the mineralized areas.

< **Essex area.** This portion of area G in the Dos Pobres block represents Dos Pobres mineralization down-dropped to the southwest by the Butte Fault. Any potential underground development of this area would likely be tied to potential future deep open-pit development of Dos Pobres sulfide mineralization on existing patented land.

< **Lone Star Block.** Moderate potential at a relatively low level of certainty is assigned along an east-northeast trending fault and dike system (in parts of areas AI, AK, AF, and I2) where geologic conditions and limited surface geochemical data indicate a permissive environment for accumulation of copper plus precious metal mineral resources in steep veins.

< **Blue Jay Mine area.** Moderate potential for the accumulation of small-scale underground mineral resources is assigned to a portions of areas AF and I2 containing narrow veins of the Blue Jay mine west of Lone Star. Copper oxides are present locally along the veins, and concentrations of copper and other metals could exist at depth.

Wahl (1997a) also reviewed the potential of the selected lands for other metallic and non-metallic minerals, including placer gold. This evaluation is summarized in Table 3-11.

3.2.2.4 Soils

The sediments that cover large portions of the project area are derived from the basalt, andesite, and rhyolite bedrock of the Gila Mountains. These sediments have been deposited on the broad Basin Fill terraces, in the ephemeral wash channels and floodplains, and on the rocky upper slopes that topographically characterize the project area. The Natural Resource Conservation Service (NRCS), formerly called the Soil Conservation Service (SCS), has identified and described the following soil types in each of the major topographic divisions (SCS 1970, 1981).

< **Lower Alluvial Fan Terraces.** On the lower terraces, sediments form level to gently sloping, broad, coalescent plains on bluffs overlooking the floodplain of the Gila River. This topography typifies the southernmost portion of the project area where the proposed compactible soil source area is located. These soil units in this area are all coarse-grained, containing and covered by large amounts of gravel. The soils tend to be deep. They are largely alkaline, particularly in the subsoils, and often have lime-cemented hardpan substrates. All the soils are well drained; permeability is very slow in the lime substrates, moderately slow in the Continental and Pinaleño soils, and moderately rapid to rapid in the Gravelly Alluvial Land. Available water holding capacity ranges from very low to moderate. All the soils present severe limitations for most recreational and building uses. Their suitability for roadfill ranges from poor to good; compaction characteristics are rated fair to good. Their suitability for top soil ranges from poor to fair (SCS 1970).

Table 3-11. Summary of Metallic and Non-Metallic Mineral Resource Potential on the Selected Lands

Mineral/Resource	Potential
coal, oil, gas, sodium, and potassium	not prospectively valuable
uranium and thorium	low potential
geothermal resources	portions considered favorable for development of low-temperature geothermal resources
non-metallic and industrial minerals (e.g., limestone, sandstone)	not known to exist in commercial quantities
common variety minerals (e.g., sand, gravel, decomposed organic, riprap rock, clays)	localized deposits present
placer gold and all other metallic minerals	low potential

Source: Wahl 1997a.

< **Upper Alluvial Fan Terraces.** The upper alluvial fan terraces typify the middle reaches of the project area in a band stretching diagonally from the northwest to the southeast. Several major components of the proposed mining activity will be located on these terraces. The soil units in this area contain and are often covered by coarse sediments: cobbles, gravel, and sometimes hardpan fragments. They tend to be deep in the lower reaches of the alluvial fans where the slopes are gentler, and shallow to very shallow in the upper reaches where the slopes are steeper. The soils, particularly the subsoils, are largely alkaline, with several units forming a substratum of silica- and lime-cemented hardpan at depths ranging from 40 inches in the Artesia series to two inches or less in the Orthents. All the soils are well drained; permeability is slow to moderately slow; available water capacity ranges from very low to moderate. All the soils present severe limitations for most recreational and building uses. Their suitability for roadfill ranges from poor to fair. Their suitability for top soil is uniformly poor. Their ability to support grasses is very poor; to support herbaceous plants and shrubs, generally fair; and to support rangeland wildlife habitat, poor to fair (SCS 1981).

< **Ephemeral Wash Beds and Floodplains.** Soil in this area has deposited in and alongside the numerous ephemeral washes that run diagonally across the project area and across both planned mining sites. This soil unit is deep and well drained. Permeability is rapid, and the available water capacity is very low to low (SCS 1981). Several facilities of the proposed mining activities will be located on patches of this soil type associated with Talley, Cottonwood, and Peterson Washes.

< **Rocky Upper Slopes.** Soil units in the rocky slopes, hills, and escarpments in the northeastern portion of the project area contain and are often covered by cobbles and gravel. They tend to be very shallow and shallow, with the exception of Limpia, which is deep. All the soils tend to be alkaline. They are well drained; permeability is slow to moderately slow; available water capacity ranges from very low to moderate. All the soils present severe limitations for most recreational and building uses. Their suitability for roadfill and topsoil is poor. Their ability to support grasses is very poor, and their ability to support herbaceous plants, shrubs, and rangeland wildlife habitat is fair to poor (SCS 1981).

3.2.2.5 Groundwater

The project area is located in the Gila sub-basin of the larger Safford groundwater basin. This sub-basin covers 1,642 square miles of the northwest-trending Safford Valley and the mountain ranges on either side. The Gila and Peloncillo mountains border the sub-basin on the northeast; the Pinaleño and Santa

Teresa mountains border on the southwest. Groundwater under the valley floor enters the Gila sub-basin from the southeast and exits to the northwest, following the same gradient as the Gila River on the surface. This through-flow is augmented by groundwater that drains down gradient from the mountains on both sides of the valley floor (Figure 3-9) (Dames & Moore 1997a).

In the immediate project area, groundwater generally flows from topographically high elevations in the Gila Mountains southwestward toward the valley floor. It moves through three hydrogeologic units that correspond to lithologic units. They are the 1) Safford Volcanic Unit, 2) Gila Mountain Volcanic aquifer, and 3) Lower Basin Fill aquifer (Figure 3-9). Outside and downslope from the project area on the Safford Valley floor, an additional unit, the Upper Basin Fill, overlies the Lower Basin Fill aquifer. In the project area, northeast of the Butte Fault, only the oldest hydrogeologic unit, the Safford Volcanic Unit, is present and available as a source of pumped groundwater. This unit contributes groundwater to both the Dos Pobres and San Juan pit sites. Southwest of the Butte Fault, in the graben between the Butte and Valley faults, the Gila Mountain Volcanic aquifer is the primary potential source of groundwater. It contributes groundwater to the Dos Pobres pit site but not to the San Juan pit site. The third aquifer, the Lower Basin Fill, is located primarily south-southwest of the Southwest Fault. It appears not to contribute to the Dos Pobres pit site, and definitely does not contribute to the San Juan pit site (ibid.).

To obtain data on groundwater and aquifer characteristics, 15 new monitor wells and 19 new piezometers (both in the AP-series) were installed in the project area during hydrogeologic field investigations conducted in 1995-1996 (Dames & Moore 1997a). These new wells joined 18 existing monitor wells in the project area (for a total of 33 monitor wells) and 19 existing piezometers (for a total of 38 piezometers) (Figure 3-10). From 1995-1998, 46 groundwater exploration wells (GI-series) were installed. The GI-series includes six pilot wells that were installed and tested to obtain data on aquifer characteristics, groundwater elevations, and drawdown characteristics (see Figure 3-11).

Aquifer characteristics including transmissivity, storativity, and hydraulic conductivity have been estimated from pumping test data (URS 2002a). The Safford Volcanics and the Gila Mountain Volcanics have both undergone aquifer characterization tests, but demonstrate highly variable transmissivity and storativity values depending upon the degree of fracturing in the well area. In general, the younger Gila Mountain Volcanics exhibit higher porosity/permeability and are more fractured than the older Safford Volcanics. The difference in hydraulic conductivity between the Safford Volcanics and Gila Mountain Volcanics indicates hydraulic connection between them is limited. In the project area, the Lower Basin Fill is not saturated and has not been tested. Table 3-12 presents aquifer characteristics in the project area.

Groundwater elevations in the project area are highest in the northeast where topographic elevations are highest, and lowest in the southwest where topographic elevations are lowest (see Figure 3-11 for the observed water table). Northeast of the Butte Fault, groundwater elevations range from 3,500 to 4,300 feet above mean sea level (msl), and southwest of the fault, they range from 3,000 to 3,500 feet above msl. In the graben, between the Butte and Valley faults, groundwater elevations range from 3,250 to 3,260 feet above msl. While the groundwater table in the project area tends to follow the topography, the distribution of areal recharge and the hydraulic conductivity (permeability) of the underlying aquifer materials strongly influences groundwater elevation and groundwater gradients, i.e., the ratio of vertical movement to horizontal movement (measured in feet per foot [ft/ft])(Dames & Moore 1997a).

Table 3-12. Aquifer Characteristics in the Project Area

Aquifer	Storativity (1/ft)	Transmissivity (ft^2/day)	Aquifer Thickness (ft)	Hydraulic Conductivity (ft/day)	Confined/ Unconfined
Safford Volcanic Unit (well GI-P3)	0.0005 - 0.17	1,000 - 6,000	600	13 - 70	confined

Gila Mountain Volcanic Aquifer (well GI-P2)	0.0004 - 0.03	5,000 - 40,000	1,200	33 - 254	semi-confined to confined
Lower Basin Fill Aquifer (well AP-27)	unknown	21,000 - 40,320,000	0 - $115	133 - 245	unconfined

Source: L. Person, Dames & Moore, pers. comm.

Northeast of the Butte Fault, areal recharge is higher in the Gila Mountains, and the Safford Volcanic Unit has low permeability; consequently, groundwater table gradients are relatively steep, ranging from 0.02 to 0.4 ft/ft. Depth to groundwater ranges from ground surface to several hundred feet below ground surface (bgs). Water levels are typically shallow near springs and seeps but range to greater than 700 feet bgs. Between the Butte and Valley faults, in the graben area, groundwater elevations are very consistent at approximately 3,255 feet above msl, varying with topography between roughly 600 and 750 feet bgs (Dames & Moore 1996b). South of the Southwest Fault, depth to groundwater is between approximately 100 and 500 feet bgs.

Recharge of groundwater in the project area occurs as infiltration of precipitation, with the greatest recharge occurring in the higher elevations of the Gila Mountains. The main area of groundwater recharge near the proposed mine sites is expected to occur along a major break in slope of the Gila Mountains located north of the pit sites. Annual precipitation is estimated to be more than 18 inches in the mountains and 12-15 inches in the project area (Dames & Moore 1996b). Areal recharge rate along the mountain front has been estimated to range from 0.115 in/yr in the higher portions of the Gila Mountains to as much as 1.90 in/yr along the mountain front where both precipitation and runoff from the mountains recharge fractured volcanic rocks and unconsolidated sediments (Dames & Moore 1997c). Water enters the groundwater system in the Safford Valley down-gradient of the mine from several sources. An estimated 4,871 af/yr enters from the Gila Mountains, 32,771 af/yr as lateral inflows of groundwater from adjacent basin areas, and infiltration of 40,094 af/yr from the Gila River (Dames & Moore 1997c).

Discharge of groundwater in the project area occurs naturally at four springs: Bryce Spring (located just outside the northern boundary, but its discharge flows into the project area) and Hackberry, Cottonwood, and Walnut springs (all within the project area) (see Figure 3-1). There are 120 wells in the project area, but they are used only for groundwater measuring, sampling, and exploration, and do not discharge significant quantities of water. Discharge of groundwater in the Safford Valley from the Lower Basin Fill aquifer occurs primarily as pumping for irrigation and seepage into the Gila River (Dames & Moore 1997a). Surface flow diversion is not sufficient to irrigate all the crops grown, and so groundwater is pumped from wells for direct irrigation as well as directly into the canals distributing the surface diversion. Considering that the irrigated crops consumptively use 153,000 af/yr (94,789 gpm), and 100,000 af/yr (61,954 gpm) is supplied by diversions from the Gila River, the estimated net groundwater withdrawal for irrigation is 52,683 af/yr (32,639 gpm) (Dames & Moore 1997c). The estimated outflow from the groundwater system to the Gila River is 21,161 af/yr (13,110 gpm), and an additional groundwater outflow to the northwest (Figure 3-9) of 3,697 af/yr (2,290 gpm), comprise the remainder of the outflows from the groundwater system (Dames & Moore 1997c).

3.2.2.5.1 Groundwater Quantity. The volume of groundwater moving through the area tapped by new and existing pilot-wells[12] is estimated to be approximately 4,570 af/yr (URS 2002a). This groundwater is not uniformly distributed throughout the rock mass but moves through discrete fractures; therefore, only a portion of this groundwater is available to any given well.

Constant rate pump testing was conducted at the four pilot-wells to determine drawdown of the aquifer. Three of the four wells were tested concurrently (Dames & Moore 1997c). Drawdown pumping from wells

[12] As calculated using the Darcy equation.

GI-P1, GI-P2, and GI-P4 appears to be confined by the Butte and Valley faults, which act as no-flow boundaries. The maximum spread of the cone of depression from GI-P3 after roughly 4.5 weeks of continuous pumping at 2,000 gpm (3,228 af/yr) is approximately 8,500 feet to the west-southwest. Spread of the cone of depression (i.e., drawdown) appears to be limited by the Valley Fault to the north, and, possibly, by the Southwest Fault to the south. The average production rate from each pilot-well through October 31, 1996, is provided in Table 3-13.

Table 3-13. Average Groundwater Production Rate from Four Pilot-Wells in the Project Area

Pilot well	Discharge Rate (gpm)	Drawdown (ft)	Pumping Period (weeks)
GI-P1	900 (1,453 af/yr)	21	2.44
GI-P2	2,000 (3,228 af/yr)	125	18.60
GI-P3	2,000 (3,228 af/yr)	204	4.46
GI-P4	3,200 (5,165 af/yr)	96	6.35

Source: Dames & Moore 1997b.

3.2.2.5.2 Groundwater Quality. Dames & Moore (1997a) collected groundwater quality data from 32 monitor wells in the project area, and from three springs (Bryce, Hackberry, and Cottonwood springs). The objectives of water quality testing were to assess the availability of groundwater of suitable quality for use in the proposed mining operations (i.e., groundwater with a chloride concentration of less than 200 mg/L), and to provide data for environmental analysis. These data will serve as a baseline to project, and later measure, any effects of the proposed mining activities on groundwater quality.

Groundwater quality varies significantly throughout the Safford Basin. Water quality in the Floodplain Alluvial aquifer in the center of the Safford Valley is poor, generally declining from east to west. Electrical conductivity (proportional to total dissolved solids [TDS]) varies from 2,000 µmhos near Solomon to 8,000 µmhos near Pima. Chloride concentrations vary from 400 ppm to 1,600 ppm over the same area. Groundwater quality in both the Floodplain Alluvial aquifer and the Upper Basin Fill is influenced by upward leakage from the artesian Lower Basin Fill aquifer and by downward percolation of irrigation water. The Lower Basin Fill aquifer is high in TDS and elevated in temperature. Few wells penetrate this unit due to its poor water quality.

Groundwater quality generally improves toward the mountains on both sides of the valley. Water quality differs between the northeastern and southwestern parts of the project area, with the inferred Southwest Fault appearing to act as a divide for groundwater quality. Northeast of the Southwest Fault, groundwater is drawn from either the Safford or the Gila Mountain Volcanics, where water quality is generally good. The inorganic geochemistry of the groundwater tends to be characterized by sodium/potassium and carbonate/bicarbonate, with a relatively low total ion content. Fluoride concentrations generally are less than 1.0 mg/L. Observed concentrations of TDS, sulfate, and chloride are also comparatively low. TDS concentrations typically range from about 250 to 1,000 mg/L, but are generally less than 500 mg/L. Sulfate concentrations typically range from nondetectable (>5 mg/L) to more than 800 mg/L but are generally less than 300 mg/L. Chloride concentrations range from 5 mg/L to as high as 450 mg/L, but are generally less than 200 mg/L. Compared to the Gila Mountains Volcanics, the Safford Volcanics has a slightly higher sulphate content but lower calcium and magnesium concentrations.

Southwest of the Southwest Fault, where the Lower Basin Fill is the principal aquifer, groundwater is dominated by sodium/potassium, and, to a lesser extent, sulfate. Ion composition of groundwater in the Lower Basin Fill is markedly different from that of the volcanics. Total ion content is relatively high. Fluoride concentrations in groundwater from five monitor wells in the area range from 4.2 to 8.6 mg/L, exceeding the numeric Aquifer Water Quality Standard (AWQS) of 4.0 mg/L. Observed concentrations of TDS, sulfate, and chloride are also comparatively high. TDS concentrations range from about 1,100 to 2,400 mg/L, sulfate concentrations range from 220 mg/L to 4300 mg/L, and chloride concentrations range from 450 mg/L to 1,200 mg/L. Groundwater conditions throughout the project area are alkaline, with laboratory pH values ranging between 6.4 and 12.1. Values from all but one well were greater than 7.0 and most values ranged between 7.0 and 9.0 (alkaline).

Seven metals with numeric AWQS were detected in groundwater in the project area: arsenic, barium, cadmium, chromium, lead, mercury, and nickel (Table 3-14). Only nickel exceeded the numeric AWQS (0.1 mg/L), with a concentration of 0.12 mg/L in one of three samples from a single well. The concentration was 0.09 mg/L in the second sample, and no nickel was detected in the third sample. The other metals detected in the groundwater in the project area (aluminum, copper, iron, manganese, silicon, and zinc) do not have numeric AWQS.

Concentrations of nitrite exceed the numeric AWQS (1 mg/L, as N) in samples from two wells (2.0 to 2.4 mg/L, as N). Concentrations of nitrate, as total nitrate and nitrite, do not exceed the numeric AWQS. Cyanide was detected in groundwater from three wells, but at concentrations (0.01, 0.01, and 0.03 mg/L) well below the numeric AWQS (0.2, as free cyanide). Low concentrations (< 2.5 mg/L) of total petroleum hydrocarbons (TPH) were detected in samples from four wells. Most concentrations of total organic carbon (TOC) range from nondetectable to 7.8 mg/L, and are typically below less than 5.0 mg/L. Samples from six wells range between 13 and 110 mg/L for TOC. Gross alpha particle activity values range from 0 to 23 picocuries per liter (pCi/L), and samples from two wells exceeded the AWQS (15 pCi/L). Gross beta particle activity values range from 0 to 240 picocuries per liter (pCi/L), but are typically less than 10 pCi/L, and exceed the AWQS (15 pCi/L) in samples from two wells. Values for radium 226 and radium 228 are below the numeric AWQS of 5 pCi/L.

Several wells in the project area demonstrated elevated water temperatures; however, the distribution of warm water in the project area does not appear to correlate with high TDS, fluoride, or sulfate (Dames & Moore 1998) and the geochemistry between these wells is distinct. For example, well GI-T18 (northwest of the Dos Pobres pit) has a temperature of 110°F and a TDS value of 280 mg/l and well AP-37 (along Cottonwood Wash south of the Dos Pobres pit) has a temperature of 98°F and a TDS value of 1600 mg/l. Groundwater in the area of the San Juan deposit is dominated by sulfate and is geochemically distinct from water in other parts of the project area (Dames & Moore 1997c); no elevated temperatures were observed in wells in this area. Previous studies conducted in the area of the Lone Star deposit located a borehole with highly mineralized thermal water with a temperature of 150°F and a TDS value of 4,555 mg/l. The borehole is probably associated with the Butte Fault. Thermal artesian waters encountered in wells such as at Watson Wash, located more than six miles southwest of the Dos Pobres mine, result from the presence of a thick clay layer in the upper part of the Lower Basin Fill. This geological stratum is not present at or below the water table elevation in the vicinity of the Dos Pobres mine.

Table 3-14. Metals with Numeric AWQS Detected in Groundwater in the Project Area

Metal	Numeric AWQS (mg/L)	Number of Wells with Detections	Number of Wells with Analytical Results That Exceed the Numeric AWQS
Arsenic	0.05	10	0
Barium	2.0	23	0
Cadmium	0.005	3	0
Chromium	0.1	9	0
Lead	0.05	4	0
Mercury	0.002	1	0
Nickel	0.1	1	1

Source: Dames & Moore 1997a.

3.2.2.6 Surface Water

The project area lies within the middle-Gila River watershed. The City of Safford does not draw water from the Gila River for municipal or industrial uses, depending instead on Bonita Creek, a tributary whose confluence is located approximately 16 miles upstream of Safford. The Bonita Creek watershed is separated from the project area by a ridge of the Gila Mountains.

The project area itself is drained by more than 150, primarily unnamed ephemeral washes (SWCA 1997e). Most of smaller washes feed into ten larger, named washes: Butler, Coyote, Watson, Talley, Cottonwood,

Peterson, Wilson, Lone Star, Tidwell, and Big Canyon Wash. Because Coyote Wash is tributary to Butler Wash, and Cottonwood Wash is tributary to Peterson Wash, these two drainage systems will often be referred to in this document as Coyote/Butler Wash and Cottonwood/Peterson Wash, respectively. The largest single wash is Peterson Wash, which runs just west of the proposed San Juan pit. Drainages in the project area run generally from the northeast toward the southwest, ultimately flowing into the Gila River about seven miles downslope (see Figure 3-1). The lower elevations of the project area, in which there is little topographic variation, are particularly subject to sheet flows, a phenomenon in which surface runoff flows in wide, shallow sheets rather than in channels.

The only other surface water in the project area comes from four isolated springs: Bryce Spring, Hackberry Spring, Cottonwood Spring, and Walnut Spring (Figure 3-1). The head of Bryce Spring is actually located just to the north of the project boundary, but its flow runs into the project area. Flows in each of these springs does not reach the Gila River but is used locally for watering stock. Bryce and Walnut springs are located on BLM lands and Hackberry and Cottonwood springs are located on PD patented land; all have been developed for stockwatering purposes.

3.2.2.6.1 Surface Water Quantity. Annual precipitation is estimated to vary from 9.8 inches in the City of Safford to more than 18 inches in the higher Gila Mountains (Dames & Moore 1996b). Precipitation in the project area is estimated to be 12-15 inches per year (ibid.). About half of this falls as light winter showers; the other half falls during summer thunderstorms. Summer high temperatures range between 100 and 115°F and winter lows range between 10 and 20°F (Dames & Moore 1997a).

The Gila River is the only perennial stream in the immediate vicinity, flowing through the Safford Valley at an annual average discharge of 477 cfs (about 345,000 af/yr), with a lowest annual mean of 101 cfs (79,500 af/yr) in 1951 and highest annual mean of 2,229 cfs (1,610,900 af/yr) in 1993 (USGS 1996). Consumptive use of water in the Safford Valley for agriculture is estimated to be about 153,000 af/yr, which is provided through river diversions and groundwater pumping (H. West, BLM, pers. comm.). This annual total water use represents nearly 44% of the average annual discharge of the Gila River. Surface flows in the Gila River have been allocated based on a system of priority surface water rights, which is currently subject to an ongoing adjudication in Maricopa County Superior Court.

The U.S. Geological Survey (USGS) reports that average annual runoff in the vicinity of the project area is approximately 0.2 inches.[13] Dames & Moore, in studying data from four gaging stations in the study region, calculated that the average annual runoffs for local watersheds in the project area is 0.22 inches for those areas below 5,000 feet elevation and 0.42 inches for areas above 5,000 feet (Dames & Moore 1996a). The difference between precipitation and runoff is attributable to infiltration and evapotranspiration. The estimated average annual runoff in the six largest washes in the project area is reported in Table 3-15 (Dames & Moore 1998).

3.2.2.6.2 Surface Water Quality. In *1996 Arizona Water Quality Assessment* [commonly referred to as the 305(b) report] (ADEQ 1996), surface water quality data are presented for 12.6 miles of the Gila River directly downstream from the project area, from the San Simon River to Peck Wash. The project area is tributary to this segment of the Gila River watershed. Based on a USFWS study conducted in 1990 of fish, water, and sediment contamination (King and Baker 1994), this segment of the Gila River was evaluated to be in "partial support"[14] of designated uses due to elevated levels of arsenic (in water), cadmium and thallium (in sediment), and copper and zinc (in fish). This segment is not classified as

[13] Runoff is reported here as the depth of water that would uniformly cover the entire area of interest.

[14] Water bodies are assessed to be in "partial support" of designated uses if one or more uses are impaired, but none substantially. Narrative violations may occur seasonally (e.g., excessive algal blooms or weeds), and toxic spills or discharges may occur with nominal or short-term effects (ADEQ 1996).

"Water Quality Limited."[15]

The average annual sediment yield in af/yr is reported for the five largest washes in the project area in Table 3-16.

Table 3-15. Average Annual Runoff Volume (af) for Six Washes in the Project Area

Butler Wash	Watson Wash	Talley Wash	Cottonwood/ Peterson Wash	Wilson Wash	Lone Star Wash
264	137	119	252	80	130

Source: Dames & Moore 1998f.

Table 3-16. Average Annual Sediment Yield (af/yr) for Five Washes in the Project Area

Butler Wash	Watson Wash	Talley Wash	Peterson Wash	Wilson Wash
0.9	2.9	1.3	1.5	3.0

Source: Dames & Moore 1996a.

3.2.2.6.3 Pit Lakes. Lakes form in mine pits from three sources: precipitation, surface runoff, and groundwater inflow through fractures in the rock walls. Water is lost from such lakes through evaporation and groundwater seepage. Water quality in a pit lake is a function of the quantity and quality of influent solutions, wallrock mineralogy, and chemical reactions within the lake. The water derived from high wall runoff flowing into a pit carries a dissolved mineral load resulting from weathering and oxidation of surface outcrops of mineralized rocks.

A small lake has formed in the existing San Juan pit, covering roughly seven percent of the pit surface (Water Management Consultants, Inc. 1997). Walls of the pit exposed above the lake surface are composed of alluvial cover (8 percent), Safford Volcanics (45 percent), and quartz monzonite porphyry (roughly 46 percent). Of these rocks, 7 percent are unmineralized and 93 percent are oxides. Acid-base accounting results for the rocks show that they are generally non-acid generating; in fact, they have a net neutralizing capacity (PDSI 1996; Water Management Consultants, Inc. 2002). This can be attributed to the absence of sulfides, the oxidation of which is the main source of acid rock drainage from mine workings.

In EPA 1312 testing to model characteristics the ultimate San Juan pit lake, the leachate derived from rocks in the wall of the existing pit was determined to have a pH between 7.72 and 8.34 (alkaline) with low metal concentrations that meets BLM benchmark values (BLM 1996a, Water Management Consultants, Inc. 1997).[16] According to modeling results, the predicted water quality of the existing lake, through the natural mixing of runoff from the pit walls and groundwater, would be expected to have neutral to slightly alkaline pH levels and a dissolved metals load within BLM benchmark concentrations and AWQS (ibid.).

[15] "Water Quality Limited" water bodies are assessed as having impaired uses that require more than existing technology and permit controls to achieve or maintain water quality standards (ADEQ 1996).

[16] Data are inconclusive for thallium concentrations because the BLM benchmark is 0.002 mg/l, below the detection limit of 0.0025 mg/l. Thallium was not detected in the EPA 1312 testing of San Juan pit lake water; therefore, concentrations fell below 0.0025 mg/l. Whether they also fell below 0.002 mg/l, the BLM benchmark, cannot be determined.

The average measured pH (3.0), however, is much more acidic than the predicted value, and concentrations of aluminum (193 mg/L), copper (827 mg/L), iron (46 mg/L), manganese (109 mg/L), nickel (1.5 mg/L), zinc (21 mg/L), and sulfate (10,500 mg/L) are dramatically higher than predicted by several orders of magnitude. Other metal concentrations show no significant enrichment compared to predicted values. This inconsistency suggests the current lake chemistry is being determined by sources other than those considered in the modeling (groundwater and runoff from pit walls). The source of the acid and heavy metal enriched water is likely historic leaching next to the existing San Juan pit. Surface water runoff into the pit likely includes acid leachate derived either from former leaching operations near the pit or from dissolution of residual products of previous leaching from the spent ore piles.

The water chemistry of the existing San Juan pit lake exceeds BLM benchmark levels for aluminum (21 mg/L), copper (1.1 mg/L), manganese (0.78 mg/L), and zinc (0.834 mg/L). It also exceeds AWQS for nickel (0.10 mg/L) (Water Management Consultants, Inc. 1997).

3.2.2.6.4 100-year Floodplains. One-hundred year floodplains are delineated by the Federal Emergency Management Agency (FEMA). FEMA has not determined base flood elevations or flood hazard factors for the reach of the Gila River south of the project area nor for the upstream portions of the major drainages that traverse the project area (FEMA 1984).Only portions of Watson, Talley, Cottonwood, Peterson, Wilson, and Lone Star Washes, as shown on Figure 3-12, have been delineated as Zone A floodplains (areas of 100-year flood for which the base flood elevations and flood hazard factors have not been determined).

3.2.2.6.5 Waters of the United States. Waters of the United States are defined in the Clean Water Act as “surface waters, including streams, streambeds, rivers, lakes, reservoirs, arroyos, washes, and other ephemeral watercourses and wetlands” (COE 1993). Waters of the United States (waters) on the project area, both on private and public lands, are under the jurisdiction of the COE, and activities that result in impacts to waters must be permitted by the COE under Section 404 of the Clean Water Act (see “Decisions to be Made” section in Chapter 1, Section 1.4.1). The COE also has regulatory authority over jurisdictional wetlands. Within an approximately 16,625-acre study area that includes the area proposed for mining, 113.92 acres of waters and 0.03 acres of wetlands were delineated as jurisdictional (SWCA 1997e).

< **Ephemeral Washes.** One-hundred-fifty-nine (159) ephemeral washes occurring on the study area were investigated as possible waters of the United States. Of these, 100 washes, ranging from large, named drainages with multiple braided channels, such as Peterson Wash, to smaller, unnamed, single-channel tributaries, were delineated. No perennial streams or reaches occur on the study area. The total area of jurisdictional waters on the project area is 113.92 acres.

< **Jurisdictional Wetlands.** To be a jurisdictional wetland, an area must meet three criteria: the presence of vegetation dominated by hydrophytic species, hydric soil conditions, and wetland hydrology. Four perennial springs and one seep occurring on the study area were investigated as possible jurisdictional wetlands: Bryce Spring, Hackberry Spring, Cottonwood Spring, Walnut Spring, and DP Seep. Portions of Bryce Spring and Cottonwood Spring met wetlands criteria and were delineated as jurisdictional wetlands. These two habitats are described below. The total area of jurisdictional wetlands on the project area is 1,178 square feet (0.03 acres).

In some cases, wetlands are disturbed by cattle grazing and stock watering use. In such situations, the lack of any given wetlands criteria must be evaluated in light of these circumstances.

C **Bryce Spring Wetland.** The head of Bryce Spring is located on BLM lands (see Figure 3-1) and lies within a small drainage at the northern end of the study area. Several small, shallow, bedrock pools are located about 0.75 mile downstream of the spring on PD property. These pools are inundated, have shallow soils exhibiting hydric conditions, and are vegetated with emergent species such as water speedwell (*Veronica anagallis-aquatica*), monkey-flower (*Mimulus guttatus*), pondweed (*Zannichellia palustris*), rabbitfoot

grass (*Polypogon monspeliensis*), and deergrass *(Muhlenbergia rigens*). The total jurisdictional area of these pools is estimated to be 1,078 square feet. Use of this area by cattle is evident by the close cropping of deergrass and rabbitfoot grass in accessible areas.

C **Cottonwood Spring Wetland.** The jurisdictional wetland at Cottonwood Spring consists of a small, shallow, apparently human-made pool (approximately 100 square feet and 8-12 inches deep) fed by a broken spring box on a small ridge above Cottonwood Wash. Water from the spring box flows in a small trickle into the pool, which contains emergent vegetation such as water speedwell *(Veronica anagallis-aquatica*) and cattail (*Typha* sp.). Adjacent to the pool are a single medium-sized cottonwood tree (*Populus fremontii*), a Goodding willow tree (*Salix gooddingii*), and several small seep-willows (*Baccharis salicifolia*); a small thicket of cottonwood saplings grows nearby. Cottonwood Spring is located entirely on PD property. The total jurisdictional area of this pool is estimated to be 100 square feet. Cattle graze and trample the area when they come to water.

3.2.3 Biological Resources

3.2.3.1 Vegetation

Four major upland plant communities and two riparian plant communities were identified in the project area (SWCA 1997a). All are common and widespread in the Southwest. The plant community classification used here follows Brown, Lowe, and Pase (1979).

3.2.3.1.1 Upland Plant Communities. The upland plant communities identified in the project area are 1) Sonoran Desertscrub, 2) Semidesert Grassland, 3) Sonoran Desertscrub/Semidesert Grassland ecotone, and 4) Disturbed Land. With the exception of disturbed land, each of these biotic communities in the project area succeeds the next in a progression from the southwest to the northeast, following general changes in elevation, topography, and soil (Figure 3-13). Generally, each biotic community grades gradually into the next, making depicted limits necessarily somewhat arbitrary. Similarly, species dominance and plant densities vary with local topography and exposure. Each biotic community is described below.

< **Sonoran Desertscrub.** This biome occurs on the bajada (gently sloping alluvial fans) at lower elevations in the southern reaches of the project area and on some of the south-facing slopes along the lower foothills of the Gila Mountains. It covers approximately 25,278 acres (49 percent) of the 51,930-acre study area that encompasses the project area (SWCA 1997a). In the study area, particularly on the bajada, this community is heavily dominated by creosotebush (*Larrea tridentata*). Although creosotebush also is dominant on foothill slopes, it is less abundant there and plants are more widely spaced than on the bajada. Other species commonly observed in this biome include ocotillo (*Fouquieria splendens*), blue paloverde (*Cercidium floridum*), mesquite (*Prosopis juliflora*), prickly pear (*Opuntia phaeacantha* and *O. chlorotica*), snakeweed (*Gutierrezia sarothrae*), catclaw acacia (*Acacia greggii*), banana yucca (*Yucca baccata*), barrel cactus (*Ferocactus wislizenii*), and devil's club cholla (*Opuntia stanlyi*). A few areas on the bajada show evidence of past disturbance, possibly from former cattle or mining operations. Mesquite, blue paloverde, and snakeweed are dominant in these areas.

< **Semidesert Grassland.** This open plant community, dominated by snakeweed and grasses with generally widely scattered shrubs and trees, occurs in the northwestern corner of the study area where elevations are highest and the terrain steepest and rockiest. It occupies approximately 9,958 acres (19 percent) of the 51,930-acre study area. Grasses include tobosa (*Hilaria mutica*), sand dropseed (*Sporobolus cryptandrus*), needle grama (*Bouteloua aristidoides*), sideoats grama (*Bouteloua curtipendula*), black grama (*Bouteloua eriopoda*), sixweeks grama (*Bouteloua barbata*), sixweeks threeawn (*Aristida adscensionis*), spidergrass (*Aristida ternipes*), tanglehead (*Heteropogon contortus*), bush muhly (*Muhlenbergia porteri*), and green sprangletop (*Leptochloa*

dubia). Shrubs and small trees include mesquite, Coahuila juniper (*Juniperus coahuilensis*), catclaw acacia, whitethorn acacia (*Acacia constricta*), scrub live oak (*Quercus turbinella*), banana yucca, soaptree yucca (*Yucca elata*), sotol (*Dasylirion wheeleri)*, beargrass (*Nolina microcarpa*), ocotillo, and prickly pear. On north facing-slopes and along some drainages at higher elevations on the northwestern part of the study area, a number of species typical of Interior Chaparral and Pinyon-Juniper Woodland, such as pinyon pine (*Pinus* sp.), juniper, canotia (*Canotia holocantha*), and scrub oak, are present. At a finer scale, some of these areas might be mapped as interior chaparral or Great Basin Conifer Woodland, but none of the areas is more than a few acres in size and many plants typical of Semidesert Grassland are present as well. Large areas of Great Basin Conifer Woodland are present just north of the study area.

< **Sonoran Desertscrub/Semidesert Grassland Ecotone.** Because of the gradual, relatively gentle change in elevation over much of the study area from the southwest to the northeast, the transition between creosotebush-dominated Sonoran Desertscrub and grass- or shrub-dominated Semidesert Grassland occurs over a relatively large area. Though this transition area could have been divided and the two parts grouped into either Sonoran Desertscrub and Semidesert Grassland, mapping the transition area as a separate community is more accurate. As one would expect, this area supports a mixture of species found in Sonoran Desertscrub and Semidesert Grassland. The only species of plant that appears to be more common in the transition area than in either the Sonoran Desertscrub or Semidesert Grassland is jojoba (*Simmondsia chinensis*), which occurs in dense patches on some north- and west-facing hillsides in the foothills of the Gila Mountains. Though the transition occurs gradually in many areas, relatively abrupt changes in vegetation occur in some places due to abrupt changes in elevation, exposure, and perhaps soil types. Sonoran Desertscrub/Semidesert Grassland Ecotone occupies approximately 16,157 acres (31 percent) of the 51,930-acre study area.

< **Disturbed Land.** Four sites formerly used for mining purposes are located within the study area (Figure 3-13). These sites include large bladed areas, development rock stockpiles, buildings, and abandoned mine equipment. They are largely unvegetated except for scattered Russian thistle (*Salsola iberica*) and other weedy species. Disturbed Land occupies approximately 521 acres (1 percent) of the 51,930-acre study area.

3.2.3.1.2 Riparian Plant Communities. Riparian plant communities identified in the study area include 1) Xeroriparian Mixed Scrub, associated with an ephemeral water supply, and 2) riparian vegetation, associated with perennial springs (SWCA 1997a). Xeroriparian habitats typically include plant species also found in adjacent uplands, but plants in xeroriparian habitats are typically larger and often occur in higher densities than those in adjacent uplands.

< **Xeroriparian Mixed Scrub.** This is the dominant riparian habitat type in the study area. Vegetation in Xeroriparian Mixed Scrub is similar to that found in adjacent uplands; therefore, Xeroriparian Mixed Scrub habitats are not depicted in Figure 3-13. The majority of Xeroriparian Mixed Scrub habitats in the study area are dominated by mesquite, catclaw acacia, whitethorn acacia, blue paloverde, and desert broom (*Baccharis sarothroides*). Seep-willow is locally common, and foothill washes occasionally contain desert hackberry (*Celtis spinosa*). Vegetation typically consists of well-spaced small trees along channel margins, with desert broom and seep-willow (*Baccharis salicifolia*) occasionally occurring as small isolated shrubs within channel margins. Two drainages in the northeastern-most portion of the study area, Bear Spring Canyon and Spring Canyon (see Figure 3-1), are dominated by scrub live oak. Codominants in these two drainages include Coahuila juniper, whitethorn acacia, and mesquite along channel margins, with scattered snakeweed and desert broom within channel margins.

< **Riparian Vegetation Associated with Perennial Springs and a Seep.** A variety of riparian vegetation types occur in association with four perennial springs and one seep in the study area: Bryce Spring, Hackberry Spring, Cottonwood Spring, Walnut Spring, and DP Seep (Figure 3-13). Bryce, Hackberry, Cottonwood, and Walnut Springs are naturally occurring, while DP Seep appears to be the result of past human activity. Because areas occupied by riparian vegetation in

the vicinity of these springs are so small, specific classification of plant communities in these areas was not warranted.

- **Bryce Spring.** This is a natural spring located in T5S, R26E, Section 20 on BLM land with flow entering onto PDSI private land. A series of pools occurring downstream in the drainage below the spring contain a variety of aquatic plants, including water speedwell (*Veronica anagallis-aquatica*), monkey-flower (*Mimulus guttatus*), pondweed (*Zannichellia palustris*), and rabbitfoot grass (*Polypogon monspeliensis*). These pools are located on PD private land. Along the lower reaches of the drainage, common plants include rabbitfoot grass, seep-willow, deergrass (*Muhlenbergia rigens*), and Goodding willow (*Salix gooddingii*). Less common species include blue paloverde, catclaw acacia, and whitethorn acacia. Use of this area by cattle is evident by the close cropping of deergrass and rabbitfoot grass in accessible areas.

- **Hackberry Spring.** This is a natural spring located in T5S, R26E, Section 27 on PDSI Land. The spring is located in a drainage, and water from the spring is piped into a metal tank for use by cattle. The drainage contains Bermuda grass (*Cynodon dactylon*), mesquite, netleaf hackberry (*Celtis reticulata*), and seep-willow, but no emergent vegetation. Seep-willow is relatively dense for approximately 200 yards below the spring.

- **Cottonwood Spring.** This is a natural spring located in T5S, R26E, Section 27 on PDSI. The spring originates on a hill where water fills a small shallow pool. A metal pipe carries water from the pool to a cement trough, located about 50-60 feet from the pool. The pool contains green algae and emergent wetland vegetation, including water speedwell and cattail (*Typha latifolia*) that have been grazed by cattle. A few cottonwood (*Populus fremontii*) saplings are present around the spring. In the drainage (Cottonwood Wash) adjacent to the spring is a stand of cottonwood trees, the largest of which is approximately 35 feet in height and has a diameter at breast height (dbh) of approximately two feet. Other species present in the drainage are netleaf hackberry, mesquite, seep-willow, and desert broom. Small cottonwood trees are present for approximately 75 yards down Cottonwood Wash from the spring.

- **Walnut Spring.** This is a natural seep located in a drainage in T5S, R26E, Section 26 on BLM-administered land. Shallow subsurface and surface water results in an approximately 70-foot stretch of the wash where vegetation differs from upstream and downstream portions and adjacent uplands. Shallow and exposed bedrock in the drainage bottom causes water to rise to the surface and flow as a slow trickle for approximately 275 feet before returning underground. Vegetation where surface water occurs and approximately 120 feet upstream of this area is dominated by Goodding willow and desert broom. Fremont cottonwood, mesquite, and seep-willow also occur in this stretch. Seep-willow and desert broom dominate for approximately 250 feet upstream of where the surface water begins.

- **DP Seep.** This feature, which is thought to be an artifact of past mining activity, is located in T5S, R26E, Section 27 on PD private land. Water seepage supports a hillside patch of seep-willow and Goodding willow ranging in height from 15 to 35 feet. A few small mesquites grow in the drainage directly below the seep. For the most part, however, the drainage bottom is devoid of vegetation, apparently as a result of cattle grazing. Wet conditions persist for approximately 100 feet down the drainage from the vicinity of the seep. Vegetation in this stretch is sparse, consisting primarily of seep-willow, desert tobacco (*Nicotiana trigonophylla*), and one large Goodding willow. Downstream of this area there are several large stands of dead seep-willow. The seep is situated directly downstream from inactive disposal areas and underground mine workings. The seep and vegetated area likely originated as a result of past mining activity directly up slope, and the source of water for this spring may be the overburden disposal area. It appears likely

that water collects in this area and is discharged into surrounding geologic features before resurfacing at the DP Seep. The relatively young age of the willow trees at the seep, and the presence of dead mesquite trees within the Goodding willow/seep-willow patch on the slope suggest a relatively recent origin for DP Seep.

3.2.3.2 Wildlife

Fourteen mammal species, thirty bird species, and eight reptile species within or near the project area observed incidentally during field work by SWCA (1997a) are listed in Table 3-17. These species are typical of Sonoran Desertscrub and Semidesert Grassland habitats in southeastern Arizona.

3.2.3.2.1 Game Species. Principal big game species known to inhabit the project area include mule deer (*Odocoileus hemionus*) and collared peccary (*Tayassu tajacu*). Mule deer and collared peccary densities in the vicinity of the project area are considered medium (4 to 7 per square mile and 1.5 to 3 per square mile, respectively) by the Arizona Game and Fish Department (AGFD). These density estimates are based on a combination of off-site wildlife survey data and estimated habitat capabilities rather than on site-specific population surveys. Mountain lions (*Felis concolor*) also are expected to occur. Gambel's quail (*Callipepla gambelii*) is the most abundant game bird, reaching relatively high densities within the project area according to the Arizona Game and Fish Department (AGFD). Wildlife densities in Xeroriparian Mixed Scrub habitats within the project area are expected to be similar to those in surrounding uplands.[17] However, small patches of relatively dense vegetation around springs likely support higher wildlife densities than surrounding uplands.

Table 3-17. Wildlife Species Observed in the Project Area

Mammals		
	Yuma antelope ground squirrel	*Ammospermophilus harrisii*
	Rock squirrel	*Spermophilus variegatus*
	Merriam kangaroo rat	*Dipodomys merriami*
	Cactus mouse	*Peromyscus eremicus*
	White-throated woodrat	*Neotoma albigula*
	Ringtail	*Bassaricus astutus*
	Coati	*Nasua nasua*
	Townsend’s big-eared bat	*Plecotus townsendii pallescens*
	California leaf-nosed bat	*Macrotus californicus*
	Cave myotis	*Myotis velifer*
Birds		
	Red-tailed hawk	*Buteo jamaicensis*
	Golden eagle	*Aquila chrysaetos*
	Common barn-owl	*Tyto alba*
	Great horned owl	*Bubo virginianus*
	Lesser nighthawk	*Chordeiles acutipennis*
	Ladder-backed woodpecker	*Picoides scalaris*
	Western kingbird	*Tyrannus verticalis*
	Say's phoebe	*Sayornis saya*
	Common raven	*Corvus corax*
	Verdin	*Auriparus flaviceps*

[17] Because it is impractical to measure all wildlife, or even all vertebrate species, associated with a given habitat type, indirect measures of wildlife value utilizing habitat parameters are typically used to quantify or estimate habitat value. Vegetation volume is one such parameter. In the arid Southwest higher volumes of vegetation are typically associated with increases in available moisture and thus normally would correlate strongly with productivity. Strong correlations have been established between breeding-bird density and vegetation volume (Mills et al. 1991). During visits to the project area, bird species composition and densities in xeroriparian habitats were observed to be similar to those in surrounding upland habitats, and no bird species typically restricted to riparian habitats in Arizona were observed.

Table 3-17, continued. Wildlife Species Observed in the Project Area

	Canyon wren	*Catherpes mexicanus*
	Rock wren	*Salpinctes obsoletus*
	Cactus wren	*Campylorhynchus brunneicapillus*
	Loggerhead shrike	*Lanius ludovicianus*
	Canyon towhee	*Pipilo fuscus*
	Black-throated sparrow	*Amphispiza bilineata*
	Brown-headed cowbird	*Molothrus ater*
House finch	*Carpodacus mexicanus*	
	Greater roadrunner	*Geococcyx californianus*
Reptiles		
	Greater earless lizard	*Cophosaurus texanus*
	Round-tailed horned lizard	*Phrynosoma modestum*
	Common collared lizard	*Crotaphytus collaris*
	Side-blotched lizard	Uta stansburiana
Reptiles		
	Desert spiny lizard	*Sceloporus magister*
	Western whiptail	*Cnemidophorus tigris*
	Western diamondback rattlesnake	*Crotalus atrox*

Source: SWCA 1997a. Observations were incidental to fieldwork.

3.2.3.2.2 Non-Game Species. Non-game wildlife species observed in the project area are expected to be typical of the habitats present. No attempt was made to document all species occurring on the project area, but species observed incidental to fieldwork are listed in Table 3-17.

3.2.3.3 Special Interest Species

Special interest species include those species that are listed or being considered for listing as threatened or endangered by the USFWS (federal endangered, threatened, proposed, or candidate species; USFWS 1994, 1996); or that are given sensitive species status by the BLM; or that are considered Wildlife of Special Concern in Arizona (WSCA) by the AGFD. Federally listed and proposed species and their designated critical habitat receive protection under the Endangered Species Act of 1973, as amended (ESA). The BLM sensitive species are those species that are not on federal or state lists as endangered, threatened, candidate, or proposed, but are designated by the BLM State Director for special management consideration. LM sensitive species status does not confer legal protection on a species; however, it does identify species that may need special management consideration. Designation as a WSCA species is intended to guide management decisions that involve wildlife and habitat.

Sixty-eight special interest species have been identified by the above-mentioned agencies as potentially occurring in the project area (Table 3-18). The likelihood of that occurrence has been evaluated through records searches, habitat evaluation, and, where appropriate, field surveys (SWCA 1994, 1996b, 1997a, 1997d, 1997f). Results of the evaluations are summarized in Table 3-18. Species accounts for those species that are either known to occur or have potential to occur in the project area follows the table. These accounts incorporate status changes published in the most recent editions of Animal Candidate Review (67 FR 40657-40679).

No federally listed, proposed, or candidate species are known to occur in the project area, and none was observed there during field surveys. One listed species, the threatened bald eagle, may occasionally fly over the area while foraging and/or migrating. No habitat suitable for federally listed species is present in the project area, but potentially suitable habitat for the southwestern willow flycatcher, bald eagle, cactus ferruginous pygmy-owl, and yellow-billed cuckoo exists along the Gila River downslope of the project area to the south and southwest. Southwestern willow

flycatchers are known to nest along this reach of the Gila River, and yellow-billed cuckoos, a candidate species, and Gila chub, a proposed endangered species, have been documented at Bonita Creek, which is approximately 10 miles east of the project area. Gila topminnow, an endangered species, has been documented in Watson Wash downslope of the project area to the southwest. An endangered least tern (*Sterna antillarum*) was observed by SWCA biologists south of the project area along the Gila River on April 18, 1997 (G.S. Mills, SWCA, pers. comm.). However, least tern is considered an accidental visitor to southeastern Arizona; therefore, the Project is extremely unlikely to affect the species and it is not considered further (ibid.). (For information about critical habitat designations, see Section 3.2.3.3.3.)

Table 3-18. Special Interest Species Potentially Occurring in the Vicinity of the Dos Pobres/San Juan Project, Graham County, Arizona

Species' Common Name	Scientific Name	Status*
Species That Are Known to Occur		
California leaf-nosed bat	*Macrotus californicus*	SS, WSCA
Cave myotis	*Myotis velifer*	SS
Common black-hawk	*Buteogallus anthracinus*	WSCA
Desert sucker	*Catostomus (Pantosteus) clarki*	SS
Gila chub	*Gila intermedia*	PE, WSCA
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	E, WSCA
Loggerhead shrike	*Lanius ludovicianus*	SS
Longfin dace	*Agosia chrysogaster*	SS
Lowland leopard frog	*Rana yavapaiensis*	WSCA
Pima Indian-mallow	*Abutilon parishii*	SR
Razorback sucker	*Xyrauchen texanus*	E, WSCA
Sonora sucker	*Catastomus insignis*	SS
Southwestern willow flycatcher	*Empidonax traillii extimus*	E, WSCA
Speckled dace	*Rhinichthys osculus*	SS
Townsend's big-eared bat	*Plecotus townsendii pallescens*	WSCA
Yellow-billed cuckoo	*Coccyzus americanus*	C, WSCA
Species That May Occur		
Allen's (Mexican) big-eared bat	*Idionycteris phyllotis*	SS
American peregrine falcon	*Falco peregrinus anatum*	WSCA
Arizona giant sedge	*Carex spissa* var. *ultra*	SS
Bald eagle	*Haliaeetus leucocephalus*	T, WSCA
Canyon spotted whiptail	*Cnemidophorus burti*	SS

Table 3-18, continued. Special Interest Species Potentially Occurring in the Vicinity of the Dos Pobres/San Juan Project, Graham County, Arizona

Species' Common Name	*Scientific Name*	Status*
Chiricahua water scavenger beetle	*Cymbiodyta arizonica*	SS
Ferruginous hawk	*Buteo regalis*	WSCA
Fringed myotis	*Myotis thysanodes*	SS
Loach minnow	*Tiaroga cobitis*	T, WSCA
Long-legged myotis	*Myotis volans*	SS
Species That May Occur		

Table 3-18, continued. Special Interest Species Potentially Occurring in the Vicinity of the Dos Pobres/San Juan Project, Graham County, Arizona

Species' Common Name	*Scientific Name*	Status*
Maricopa tiger beetle	*Cicindela oregona maricopa*	SS
Mexican garter snake	*Thamnophis eques*	WSCA
Mexican long-tongued bat	*Choeronycteris mexicana*	SS, WSCA
Northern gray hawk	*Asturina nitida maxima*	SS, WSCA
Northern goshawk	*Accipiter gentilis*	WSCA
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	SS
Small-footed myotis	*Myotis ciliolabrum*	SS
Spikedace	*Meda fulgida*	T, WSCA
Three-nerved scurfpea	*Pediomelum trinervatum*	SS
Western burrowing owl	*Athene cunicularia hypugea*	SS
Species Unlikely to Occur		
Arizona hedgehog cactus	*Echinocereus triglochidiatus arizonicus*	E, HS
Apache trout	*Onchorhynchus apache*	T, WSCA
Aravaipa woodfern	*Thelypteris puberula var. sonorensis*	SS
Aravaipa sage	*Salvia amissa*	SS
Arizona cliffrose	*Purshia subintegra*	E, HS
Black-tailed prairie dog	*Cynomys ludovicianus*	C, WSCA
Brown pelican	*Pelacanus occidentalis*	E, WSCA
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum cactorum*	E, WSCA
Chiricahua leopard frog	*Rana chiricahuaensis*	T, WSCA
Chuckwalla	*Sauromalus obesus*	SS
Desert pupfish	*Cyprinodon macularius*	E, WSCA
Fish Creek fleabane	*Erigeron piscaticus*	SS, SR
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	E, SS, WSCA
Little Colorado River sucker	*Catostomus sp.*	SS, WSCA
Mexican spotted owl	*Strix occidentalis lucida*	T, WSCA
Mt. Graham red squirrel	*Tamiasciurus hudsonicus*	E, WSCA
Northern sagebrush lizard	*Sceloporus graciosus graciosus*	SS
Occult little brown bat	*Myostis lucifugus occultus*	SS
Peebles bluestar	*Amsonia peeblesii*	SS
Rosy boa	*Lichanura trivirgata*	SS
Roundtail chub	*Gila robusta*	WSCA
Sonoran desert tortoise	*Gopherus agassizii*	SS
Spikedace	*Meda fulgida*	T, WSCA
Spotted bat	*Euderma maculata*	SS, WSCA
Texas horned lizard	*Phrynosoma cornutum*	SS
Wet canyon talussnail	*Sonorella macrophallus*	CA
White-faced ibis	*Plegadis chihi*	S
Likelihood of Occurrence is Unknown		

Table 3-18, continued. Special Interest Species Potentially Occurring in the Vicinity of the Dos Pobres/San Juan Project, Graham County, Arizona

Species' Common Name	*Scientific Name*	Status*
Arizona giant sand treader cricket	*Daihinibaenetes arizonenesis*	SS
Clifton rock daisy	*Perityle ambrosifolia*	SS
Goosefoot moonpod	*Ammocodon chenopodioides*	SS
Navaho Jerusalem cricket	*Stenopelmatus navajo*	SS
Round-leaf broom	*Errazuria rotundata*	SS, SR
Texas globeberry	*Ibervilliea tenuisecta*	SS

* Status Key: E = Federal Endangered; T = Federal Threatened; PE = Federal Proposed Endangered; C = Federal Candidate; CA = Conservation Agreement; SS = BLM Sensitive Species; WSCA = Wildlife of Special Concern in Arizona (AGFD 1996); SR = Salvage Restricted under Arizona Native Plant Law; HS = Highly Safeguarded under Arizona Native Plant Law.

Species known to occur in the project area include seven BLM sensitive species (California leaf-nosed bat, cave myotis, desert sucker, loggerhead shrike, longfin dace, Sonora sucker, and speckled dace), one species designated only as a WSCA (Townsend's big-eared bat), and one species (Pima Indian mallow) that is protected by the Arizona Native Plant Law.

Species that have some potential to occur within the project area include fourteen BLM sensitive species (Allen's big-eared bat, Arizona giant sedge, big free-tailed bat, canyon spotted whiptail, Chiricahua water scavenger beetle, long-legged myotis, fringed myotis, northern gray hawk, Maricopa tiger beetle, Mexican long-tongued bat, pocketed free-tailed bat, small-footed myotis, three-nerved scurfpea, and western burrowing owl) and six species designated only as WSCA by the AGFD (American peregrine falcon, common black hawk, ferruginous hawk, lowland leopard frog, Mexican garter snake, and northern goshawk). A life history account and habitat suitability evaluation are provided below for each special-interest species that is known to occur or has potential to occur within the study area.

3.2.3.3.1 Threatened and Endangered Plants

< **Hedgehog Cactus.** Hedgehog cacti (*Echinocereus* sp.) morphologically similar to Arizona hedgehog cactus (*Echinocereus triglochidiatus arizonicus*), a species listed as endangered in 1979 by the USFWS, were found within the northernmost portion of the project area (SWCA 1997a). The taxonomy of cacti in general and *Echinocereus* cacti in particular is complex and poorly understood. Benson (1982) provided a taxonomic treatment of *Echinocereus* in which he recognized six varieties of *E. triglochidiatus* occurring in Arizona. Although he provided no key to the varieties of *E. triglochidiatus*, he did present a table of "distinctive characters." Many of the "distinctive characters" listed by Benson vary widely, and the range of any single character in one variety frequently overlaps the range of the character in one or more other varieties. Overlaps in characters of some varieties, such as *E. arizonicus* and *E. neomexicanus*, are so extensive as to render individual plants from an unknown location unidentifiable. This situation is further complicated by more recent data which indicate that some of the "distinctive characters" listed from the type locality of *E. arizonicus* are in error. Since the 1997 surveys, morphometric studies of *E. arizonicus* and its allies (Baker, cited in USFWS 2002) verified that the hedgehog cacti within the project area are not the listed subspecies. Thus, this species is not considered further in this analysis.

No other threatened or endangered plants are known or are likely to occur within the action area.

3.2.3.3.2 Threatened, Endangered, Proposed and Candidate Animals. The following evaluations indicate the federal status as determined by the USFWS of each species potentially occurring in the project area, and states whether the AGFD has designated that species a Wildlife [species] of Special Concern in Arizona (WSCA). The designation WSCA, which identifies species whose occurrence in the State of Arizona is judged to be in jeopardy or potentially in jeopardy, is primarily intended to guide management decisions. In the following list, species are arranged by their federal status: endangered first, followed by proposed endangered, thenthreatened and candidate.

< **Bald Eagle** (*Haliaeetus leucocephalus*) is listed as threatened by the USFWS and as WSCA by the AGFD. Only a few bald eagles nest in Arizona, primarily along the Salt, Verde, and Bill Williams Rivers, but an estimated 200 to 300 birds winter in the State. Though most wintering birds are found near water or in grasslands in the White Mountains and along the Mogollon Rim, a few winter in southeastern Arizona. No suitable breeding or wintering habitat is present in the project area, but bald eagles may occur occasionally as visitors to the study area during migration or in winter. A small number of eagles may winter irregularly along the Gila River, Bonita Creek, and Eagle Creek.

< **Gila Chub** (*Gila intermedia*) was recently proposed as endangered by the USFWS and is listed as a WSCA by the AGFD. This small native fish occupies perennial creeks, cienegas, and small impoundments in the Verde, middle Gila, Santa Cruz, and San Pedro River drainages in central and southern Arizona. Gila chub is known to occur in Bonita Creek, a tributary to the Gila River that is approximately 10 miles east of the project area (B. Robles, BLM, pers. comm. 1997) Bonita Creek is included in proposed designated critical habitat for the Gila chub, but no suitable habitat for the species exists within the project area.

< **Gila Topminnow** (*Poeciliopsis occidentalis occidentalis*) is listed as endangered by the USFWS and as WSCA by the AGFD. Once abundant and widely distributed in low- and mid-elevation streams throughout the Gila River system, this small fish is now found only at isolated locations where it has persisted or been reintroduced. Because of the lack of any significant water, habitat for this species is not present within the project area. However, a small, introduced population of this species has been observed less than a mile from the edge of the project area in waters originating from a hot artesian well in Watson Wash near its confluence with the Gila River. Since 1999, mosquito fish (*Gambusia affinis*), a non-native competitor of the topminnow, has been detected at the site, and the Gila topminnow has not been detected there during the last two annual surveys (B. Robles, BLM, pers. comm. 2002).

< **Loach Minnow** (*Meda fulgida*) is listed as threatened by the USFWS and as WSCA by the AGFD. This small fish inhabits fast flowing portions of moderate to large perennial streams. The species was once abundant throughout most of the Gila River drainage, but presently populations are present only in portions of the middle Gila River, lower San Pedro River, Aravaipa Creek, Eagle Creek, and the Verde River. Because of the lack of any significant water, habitat for this species is not present within the project area. East of the project area, however, designated critical habitat for the species includes portions of the Gila River and Eagle and Bonita Creeks (65 FR 24328-24372).

< **Razorback Sucker** (*Xyrauchen texanus*) is listed as endangered by the USFWS and as WSCA by the AGFD. Razorback sucker formerly occupied all the larger streams in the Gila River basin including the mainstream Gila River and possibly Eagle Creek. Razorback sucker is believed to have been extirpated from the Gila River early in this century. Despite reintroductions into the Gila River and Eagle Creek between 1981 and 1989 (Hendrickson 1993), it appears doubtful that this species is currently present. An aquatic survey of the Gila River through the Safford Valley by BLM and AGFD in 2001, conducted using electroshocking and seining techniques, produced no razorback suckers or any other special status fish species (B. Robles, pers. comm. 2002). Nonetheless, designated critical habitat for the razorback sucker in Arizona includes the Gila River from the Arizona-New Mexico border to Coolidge Dam, including the Gila River just south of the project area (USFWS 1993). No suitable habitat for razorback sucker or any other fish occurs in the project area.

< **Southwestern Willow Flycatcher** (*Empidonax traillii extimus*) is listed as endangered by the USFWS and as WSCA by the AGFD. This small flycatcher is present in Arizona only during the nesting season. Nesting habitat is usually dominated by dense stands of willow (*Salix* spp.), tamarisk (*Tamarix ramosissima*), button bush (*Cephalanthus occidentalis*), or Fremont cottonwood exhibiting very high total vegetation volume up to at least 13 feet, with or without an overstory. No riparian habitat suitable as nesting habitat for this species exists within the project area.

Though it is extremely unlikely that southwestern willow flycatcher occurs regularly in the project area, the species is known to nest at several sites along the Gila River south of the project area. Three territorial male southwestern willow flycatchers and one nest were found along the Gila River south of the project area near the Solomon Bridge east of Safford in May 1995. In 1996, SWCA biologists surveyed potentially suitable habitat for southwestern willow flycatcher along the Gila River from the Solomon Bridge downstream to the confluence with Watson Wash, a stream distance of approximately 10 miles. They located willow flycatchers in two additional areas (SWCA 1996b). In the first location (Patch #3), approximately one mile west of the Solomon Bridge, they detected two to three singing willow flycatchers on each of three visits (June 12, 20, and 26). According to Troy Corman of the AGFD, this same area was monitored in 1996 by biologists from the National Biological Survey, who located four pairs of flycatchers. At the second location (Patch #11), approximately one mile northeast of Thatcher, SWCA biologists detected two southwestern willow flycatchers and found a nest (ibid.).

In a survey conducted in May-July 1997, from the Solomon Bridge to just west of the Pima Bridge, biologists were unable to resurvey Patch #3 because the landowner withheld permission, and they detected no flycatchers in Patch #11 (SWCA 1997f). However, southwestern willow flycatchers were found at three additional locations. In a riparian patch on the south side of the Gila River about 0.75 mile west of the Watson Wash confluence, approximately 18-20 flycatchers were heard singing on May 29-30, June 19, and July 1. Just across the river, in Patch #20, biologists detected one flycatcher on May 29; six-ten flycatchers on June 19; and one nest on July 1. Farther downstream, about 0.25 mile east of Pima Bridge (Patch #29), biologists detected two flycatchers on May 28; six-eight flycatchers on June 19; and three on July 1 (SWCA 1997f). In 1998, five flycatchers were detected at the Fort Thomas mitigation site, two at the Pima mitigation site, and two at the Solomon mitigation site. Subsequent surveys of the Pima mitigation site detected 15 flycatcher territories in 2000 and 36 flycatcher territories in 2001 (USFWS 2002).

< **Spikedace** (*Tiaroga cobitis*) is listed as threatened by the USFWS and as WSCA by the AGFD. This small bottom-dwelling fish inhabits shallow riffles in moderate to large perennial streams. The species was once common throughout much of the Gila River drainage, but presently only isolated populations exist in portions of the White River, Black River, Aravaipa Creek, San Francisco River, Blue River, and Campbell Blue Creek. Because of the lack of any significant water, habitat for this species is not present within the project area. East of the project area, however, designated critical habitat for the species includes portions of the Gila River and Eagle and Bonita Creeks (65 FR 24328-24372).

< **Yellow-billed Cuckoo** (*Coccyzus americanus)* is listed as a candidate species by the USFWS. In Arizona, this cuckoo nests primarily in well-developed riparian woodlands. In the project area, riparian woodlands near springs are too small to be suitable. Suitable woodlands are present, however, along parts of the Gila River south of the project area and to the east along Bonita and Eagle Creeks. The species has been documented along Bonita Creek (B. Robles, BLM, pers. comm. 2002).

3.2.3.3.3 Critical Habitat. No proposed or designated critical habitat for any listed or proposed threatened or endangered species occurs within the project area. However, designated critical habitat for the razorback sucker (endangered) in Arizona includes the Gila River from the Arizona-New Mexico border to Coolidge Dam, including a reach of the river just south of the project area (58 FR 6578-6597). USFWS recently designated critical habitat for two threatened species of native fish, loach minnow and spikedace, in reaches of Bonita Creek and the Gila River upstream of their confluence[18] (65 FR 24328-24372), and in other river segments in Arizona and New Mexico. Additionally, the recent proposal to list Gila chub as an endangered species included Bonita Creek as proposed critical habitat (67 FR 51948-51985).

3.2.3.3.4 BLM Sensitive Species and Wildlife Species of Concern in Arizona. Sensitive species are those species designated by the BLM State Director, in cooperation with a state agency responsible for managing the species, as sensitive. Such species may include 1) species under status review by the USFWS/National Marine Fisheries Service; 2) species whose numbers are declining so rapidly that federal listing may become necessary; 3) species with typically small and widely dispersed populations; or 4) species inhabiting ecological refugia or other

[18] Specifically, critical habitat for these two species in the Gila River extends from a point about 3 miles below the confluence (Brown Canal diversion) upstream into New Mexico. Critical habitat in Bonita Creek extends from the confluence upstream about 14.6 miles.

specialized or unique habitats. The following sensitive species were evaluated because they have the potential to occur in the region that includes the project area.

< **Allen's (Mexican) Big-eared Bat** (*Idionycteris phyllotis*) is a BLM sensitive species but is not listed by the AGFD. Summer records of this bat in Arizona are mostly from Ponderosa Pine Forest, Pinyon-Juniper Woodland, Madrean Evergreen Woodland, and Mohave Desertscrub. Nursery and maternity colonies are known from mine tunnels and caves. This bat is not known from the project area; the nearest known locality is near Klondyke, approximately 40 miles to the west (Hoffmeister 1986). This species is unlikely to occur regularly in the project area, though it may visit occasionally.

< **American Peregrine Falcon** (*Falco peregrinus anatum*) is listed by the AGFD but is not a BLM sensitive species. Probably the most important breeding habitat requirement of this species is the presence of tall cliffs (typically over 150 feet but sometimes as low as 60 feet), which serve both as nesting and perching sites. In Arizona, breeding activity was documented at 206 locations in 1995. Known peregrine nest sites are located more than 15 miles southwest and 15 miles north/northeast of the project area in the Pinaleño Mountains and along Eagle Creek, respectively (L. Ward, AGFD, pers. comm. 1994).

Cliffs and rock outcrops within the project area are not suitable for nesting by peregrine falcons, and there are no known nest sites within 10 miles. Despite the absence of nearby nest records, it is possible that peregrine falcons occasionally visit the project area to forage. If so, they are not expected to occur regularly.

< **Arizona Giant Sedge** (*Carex spissa* var. *ultra*) is a BLM sensitive species. This wetland plant inhabits saturated soil near or in perennial seeps, streams and springs form 2,500 to 6,000 feet in elevation (Arizona Rare Plant Committee 2002). Populations are generally found on southeast-facing shaded slopes (AGFD 2000). No suitable habitat for this plant is present within the project area. It is possible that this species may inhabit springs or drainages that surround the selected lands, however, the nearest known locations of this species are within the Chiricahua and Galliuro Mountains, both of which are distant from the project area.

< **Big Free-tailed Bat** (*Nyctinomops macrotis*) is a BLM sensitive species but is not listed by the AGFD. Big free-tailed bats are widely scattered throughout Arizona during the spring and summer (AGFD 1996). They have been found in a wide variety of habitats, including ponderosa pine, pinyon-juniper, Douglas fir, and Sonoran Desertscrub, but they probably prefer to roost in Sonoran Desertscrub (ibid.). This bat apparently roosts in rock crevices and fissures of mountain cliffs. A few individuals may remain in Arizona during the winter while the majority migrate south into Mexico (Hoffmeister 1986). Big free-tailed bats may roost and/or forage occasionally in the project area.

< **California Leaf-nosed Bat** (*Macrotus californicus*) is a BLM sensitive species and is considered a WSCA by AGFD. The species is a year-round resident of desertscrub habitats of southern and western Arizona, California, and Nevada where it roosts colonially in mines and caves. Short-term roosts include tunnels less than 35 feet deep, but more typically roosts are deep within tunnels several hundred feet long. California leaf-nosed bats were observed within the project area at site 3 (at least eight); at site 5 (one); at site 13 (more than twelve); and at site 21 (at least six) (Figure 3-14). Approximately 300 California leaf-nosed bats historically have been observed in the and these bats were found there again in January 2000 by BLM (B. Robles, BLM, pers. comm. 2002). This species also has been recorded near Pima and Glenbar (Hoffmeister 1986), about 10 miles west of the project area.

< **Canyon (Giant) Spotted Whiptail** (*Cnemidophorus burti stictogrammus*) is a BLM sensitive species but is not listed by the AGFD. *C. b. stictogrammus*, the giant spotted whiptail, is one of four subspecies of the canyon spotted whiptail. Its Arizona range extends from the Baboquivari and Pajarito Mountains in the west to Guadalupe Canyon in neighboring extreme southwestern New Mexico. This range includes the Santa Cruz and San Pedro river basins. Giant spotted whiptails are found in lower Sonoran (chiefly riparian areas) and upper Sonoran life zones (Lowe

1964) in mountain canyons, arroyos, and mesas in arid and semi-arid regions, entering lowland desert along stream courses. This species may occur occasionally in the project area.

< **Cave Myotis** (*Myotis velifer*) is a BLM sensitive species but is not listed by the AGFD. This bat generally inhabits mine shafts, tunnels, and caves, but may also roost under bridges. It is usually found in desertscrub habitats. Roosts are occasionally found in pine/oak vegetation. The majority of the Arizona population migrates to Mexico for the winter, with small numbers remaining in extreme southeastern Arizona. In the project area, more than 100 *Myotis velifer* were observed at site 12 (Figure 3-14). The floor of this adit was approximately 80 percent covered with guano, and entry past 200 feet was unsafe because of ammonia fumes from the guano. In addition, more than 200 cave myotis were observed at site 3; at least eight at site 5; five at site 6; and at least four at site 21 (Figure 3-14). A colony of cave myotis has also been reported near Thatcher (Hoffmeister 1986) within about 10 miles of the project area.

< **Chiricahua Water Scavenger Beetle** (*Cymbiodyta arizonica*) is a BLM sensitive species. Very little information is available regarding the natural history, habitat requirements or range of this species. As a member of the family Hydrophidae (Arnett, cited in Biotic Information System of New Mexico 2002) the species is likely aquatic throughout all or most of its life cycle. Assuming that the species is aquatic, no suitable habitat for this plant is present within the project area. It is possible, however, that this species may inhabit portions of the Gila River or springs or drainages that surround the selected lands and are included in the larger study area.

< **Common Black-hawk** (*Buteogallus anthracinus)* is a BLM sensitive species but is not listed by the AGFD. This hawk nests only along perennial streams with patches of well-developed riparian woodland. No suitable habitat is present within the project area. Black-hawks occur regularly along Bonita Creek and Eagle Creek. Though they are present farther upstream on the Gila River and its tributaries, lack of perennial water limits habitat suitability along the Gila River south of the project area. Black-hawks may occur on rare occasions in the project area during migration.

< **Desert Sucker** *(Catostomus* [= *Pantosteus*] *clarki*) is a BLM sensitive species but is not listed by the AGFD. No suitable habitat for desert sucker or any other fish occurs in the project area. The nearest locations where this species is known to occur are Bonita and Eagle creeks, 10-15 miles east/northeast of the project area.

< **Ferruginous Hawk** (*Buteo regalis*) is designated BLM sensitive and is listed as a WSCA by the AGFD. In Arizona, the species is considered an uncommon to rare and widely distributed summer resident of grasslands in the northern part of the State. It formerly occurred near Prescott and in the southeastern part of the State. Nest sites include trees and bushes, ledges, large rocks, riverbanks, and hillsides. In winter, this species is considered fairly common in open country, mainly irrigated and grassy areas, throughout southern Arizona.

Grassland habitats within the northernmost project area are patchily distributed and small in size, and do not appear typical of habitats used by ferruginous hawks. There are no irrigated agricultural lands within the project area, although irrigated farmlands are common just south of the project area near Safford. It is virtually certain that ferruginous hawk does not occur within the project area during the breeding season, but birds may occasionally visit the larger study area in winter or during migration.

< **Fringed Myotis** (*Myotis thysanodes*) is a BLM sensitive species but is not listed by the AGFD. In Arizona, this species is widespread during summer, except in the southwestern part of the State. Within its range, the species seems to prefer oak woodland, from which it forages into nearby habitats such as low desert, chaparral, and ponderosa pine. In winter, the fringed myotis is found in the mountains of the northwest and southeast corners of the State. This species roosts in caves, mines, and buildings during the day and at night. It has been recorded in the vicinity of the Pinaleño Mountains (Hoffmeister 1986), more than 15 miles southwest of the project area.

Oak woodland habitats are not present within the project area, but the project area is within the summer range of this species in Arizona as shown by Hoffmeister (1986) and habitats appear suitable for foraging. Although not expected to utilize habitats for roosting or breeding, it is possible that the fringed myotis may occasionally visit the project area.

< **Loggerhead Shrike** (*Lanius ludovicianus*) is a BLM sensitive species but is not listed by the AGFD. The loggerhead shrike is an uncommon summer resident in a variety of open habitats, except brushless grassland, throughout the state (Tucson Audubon Society 1999, Monson and Philips 1981). It is a common transient and winter resident in open habitats, especially at lower elevations (Tucson Audubon Society 1999). This species has been observed in the project area, but nesting has not been confirmed.

< **Longfin Dace** (*Agosia chrysogaster*) is a BLM sensitive species but is not listed by the AGFD. No suitable habitat for longfin dace or any other fish occurs in the project area. The nearest locations where this species is known to occur are Bonita and Eagle creeks, 10-15 miles east/northeast of the project area and the Gila River.

< **Long-legged Myotis** (*Myotis volans*) is a BLM sensitive species but is not listed by the AGFD. In Arizona, this species is found in pinyon-juniper, oak, and coniferous forests throughout the northern, central, and southeastern portions of the State. The species has been observed at elevations ranging from 4,000 to over 9,000 feet. Long-legged myotis form summer maternity colonies in buildings, rock crevices, cliffs, and trees. This species does not use caves for roosting during the day, but has been observed using caves as roosts during the night. It has been recorded in the Pinaleño Mountains (Hoffmeister 1986), more than 15 miles southwest of the project area.

Oak woodland habitats and large stands of pinyon-juniper are not present within the project area, but the project area is within the summer range of this species in Arizona as shown by Hoffmeister (1986) and large areas of pinyon-juniper woodland are present north of the project area in the Gila Mountains. Although not expected to utilize habitats in the project area for roosting or breeding, it is possible that the long-legged myotis may occasionally visit the project area or the larger study area.

< **Lowland Leopard Frog** (*Rana yavapaiensis*) is designated BLM sensitive and is listed as a WSCA by the AGFD. This leopard frog occurs in south-central, central, west-central, and extreme northwestern Arizona, primarily below 3,000 feet elevation. Bonita Creek and the Gila River are the nearest locations to the project area where this species is known to occur. Leopard frogs in Eagle Creek were considered to be this species by Platz and Frost (1984), but a single leopard frog collected at 3,300 feet in Eagle Creek and present in the collections at Arizona State University (ASU # 16110), is labeled as Chiricahua leopard frog (see discussion above for Chiricahua leopard frog). No leopard frogs or tadpoles were observed at any of the springs in the study area. The few stock tanks in the study area are ephemeral and it appears highly unlikely that leopard frogs would be present in any of them.

< **Maricopa Tiger Beetle** (*Cicindela oregona maricopa*) is a BLM sensitive species. In Arizona, this beetle occurs along the banks of permanent streams throughout the Central Highlands below the Mogollon Rim. The species has been documented most often on sandy stream banks, but has also been found on gravelly and clay streambanks, and near seeps and reservoirs (AGFD 2001a). The distribution and abundance of the species is likely determined by substrate that is suitable for larval development; ideally the substrate would consist of sand or silt that is soft enough to allow larvae to burrow within and is also capable of holding together and retaining moisture levels that allow larval sustenance (McKown, cited in AGFD 2001a). No suitable habitat for this subspecies is present within the project area, however, it is possible that this species may inhabit portions of the Gila River or springs or drainages that surround the selected lands.

< **Mexican Garter Snake** (*Thamnophis eques*) is designated BLM sensitive and listed as WSCA by

the AGFD. This snake occurs primarily in permanent marshes and streams at middle elevations in central, south-central, and southeastern Arizona. No suitable habitat is present in the project area, but Mexican garter snake may be present along Bonita Creek, Eagle Creek, or portions of the Gila River.

< **Mexican Long-tongued Bat** (*Choeronycteris mexicana*) is a BLM sensitive species and is listed by the AGFD. The Mexican long-tongued bat is a migratory species that occurs in Arizona primarily from the Chiricahuas to the Santa Catalinas and Baboquivaris (AGFD 1996). It roosts in mine tunnels, caves, rock fissures, and rarely buildings, usually singly or in small groups, at elevations of 4,000 to 6,000 feet from the lower oak zone through the mixed pine-oak woodland to the pine-fir belt (Hoffmeister 1986, AGFD 1996). Most known roosts are in areas near water and riparian vegetation. This bat feeds on nectar, pollen, and probably some insects found in flowers. Paniculate agaves are a major food source. The Mexican long-tongued bat may forage in the project area, but roosting is considered unlikely.

< **Northern Goshawk** (*Accipiter gentilis*) is designated BLM sensitive and listed as WSCA by the AGFD. This hawk nests in coniferous woodlands at higher elevations in northeastern Arizona and in mountains of southeastern Arizona. It occurs at lower elevations in some winters. No suitable habitat for nesting is present in the project area. The nearest suitable nesting habitat for this species is in the Pinaleño Mountains more than 15 miles southwest of the project area. Goshawk may occur on rare occasions in the area during winter.

< **Northern Gray Hawk** (*Asturina nitida maxima*) is a BLM sensitive species and is listed by the AGFD. Gray hawk is an uncommon local summer resident along streams with tall cottonwood riparian woodland vegetation in southern Arizona (Tucson Audubon Society 1999). It is seen casually away from breeding areas during migration, and is considered accidental in winter (ibid.). Gray hawks feed primarily on reptiles (lizards and snakes), birds, and small mammals (Johnsgard 1990). This species may occur in the project area during migration.

< **Pima Indian Mallow** (*Abutilon parishii*) is a species listed as Salvage Restricted under the Arizona Native Plant Law. This plant occurs in canyons among rocks, on rocky hillsides, and in canyon bottoms at elevations ranging from 3,000 to 4,700 feet (USFWS 1992). Known locations in Arizona include the Santa Catalina Mountains, Tucson Mountains, and Ragged Top in Pima County, and near Bagdad in Yavapai County (USFWS 1992). A population of about 10 plants was located on BLM lands in the project area on November 17, 1994 (Figure 3-14) (SWCA 1997a). It is possible that this species may occur elsewhere within the project area. However, habitats suitable in the vicinity for this species are probably limited to the foothills of the Gila Mountains.

< **Pocketed Free-tailed Bat** (*Nyctinomops femorosacus*) is a BLM sensitive species but is not listed by the AGFD. The pocketed free-tailed bat reaches the northern limits of its range in central Arizona (AGFD 1996), from the Bill Williams River and Roosevelt Lake southward (Hoffmeister 1986). It appears to prefer caves and crevices along rocky cliffs in semi-arid deserts; however, it will also use buildings and other human-made shelters (ibid.). This bat may roost and/or forage in the project area.

< **Small-footed Myotis** (*Myotis ciliolabrum*) is a BLM sensitive species but is not listed by the AGFD. This species is distributed throughout most of Arizona (with the exception of the southwestern corner) where it is found in oak, juniper, chaparral, and riparian vegetation types. Habitat requirements for roost selection are poorly known, but in summer the small-footed myotis has been found in rock crevices, buildings, caves, mine tunnels, and even in loose tree bark. Maternity colonies appear to be small, containing up to 20 females with young, and have been found in buildings and tree cavities. This species has been found wintering in Arizona south of the Gila River. It has been recorded in the Pinaleño Mountains (ibid.), more than 15 miles southwest of the project area.

Though most of the project area does not support vegetation typical of areas where this species has been found regularly, the project area is within the summer range of this species in Arizona as shown by Hoffmeister (1986). It is therefore possible that this species may utilize mine shafts, mine adits, and natural roost sites for roosting or breeding. None were observed during investigations of 22 mine features on the project area (Figure 3-14).

< **Sonora Sucker** (*Catastomus insignis*) inhabits a variety of habitats from warm water rivers to trout streams from 369 to 2,663 feet. The species has an affinity for gravelly to rocky pools, or at least for relatively deep, quiet waters (Minckley 1973). In Arizona, it is widespread in the Gila and Bill Williams river basins and is known from Bonita Creek, but is rare to absent in the Salt River Canyon due to predation by exotic fish. (AGFD 2001b).

< **Speckled Dace** (*Rhinicthys osculus*) is a BLM sensitive species but is not listed by the AGFD. No suitable habitat for speckled dace or any other fish occurs in the project area. The nearest locations where this species is known to occur are Bonita and Eagle creeks, 10-15 miles east/northeast of the project area.

< **Three-nerved Scurfpea** (*Pediomelum trinervatum*) is a BLM sensitive species. In Arizona, the range for this species includes Cochise County west of the Chiricahua Mountains, and possibly portions of Graham County (AGFD 2001c). This plant inhabits sandy or gravelly loam soils in desert grasslands and creosote scrublands. The plant is generally found from 1,350 to 2,000 feet in elevation, but there is one Graham County collection from the San Simon area that was collected at 3,600 feet (Spellenberg 1999). Three-nerved scurfpea is not known to occur within the project area or surrounding lands, however, no intensive surveys for this plant have been conducted. It is possible this species occurs within the subject lands.

< **Western Burrowing Owl** (*Athene cunicularia hypugea*) is a BLM sensitive species but is not listed by the AGFD. The western burrowing owl is an uncommon and rather local resident in Sonoran grasslands and fallow or abandoned farmlands, except in farm areas around Phoenix and Yuma where it is considered common. It apparently also breeds in desert, sagebrush, and pinyon-juniper habitats, and in disturbed areas such as road cuts and airport landing strips. It depends on rodent burrows for nesting sites. There is an old summer record (date unknown) of this species from Safford, about 10 miles south of the project area (Phillips et al. 1964) and the species nested approximately 0.75 mile north of the Safford airport in 1994 (B. Robles, BLM, pers. comm. 1997). Though grassland habitat within the northernmost project area is similar to habitats known to be used by this species, soils in this area are relatively shallow and rocky and may be unsuitable for nesting sites due to a scarcity of burrowing rodents. Considering that burrowing owls have in the past been observed in the vicinity of Safford, it is possible that they occasionally may visit the project area, although they are not expected to occur regularly.

3.2.3.4 Biodiversity

Biodiversity is variously defined as the total number of kinds of organisms (usually species) in an area or some measure combining the number of kinds of organisms with some measure of their relative abundances. Measurements of biodiversity are typically based on only a partial list of organisms present in an area, generally the larger, more conspicuous organisms such as vertebrates. In many cases, biodiversity is inferred from the numbers and kinds of plant communities in an area, with the assumption that a greater number of plant communities supports a greater biodiversity. This simple index of biodiversity is practical because the cost of inventorying all species that occur in an area is usually prohibitive. More complete measures of biodiversity require a large team of specialists working over many seasons over many years. Though useful, the number of plant communities provides only a rough index to biodiversity since plant community classifications are subjective and can be made at many different scales. Furthermore, not all units of classification support the same numbers of species. Thus, any two scientists delineating plant communities in a given area can arrive at two very different, but equally valid, classifications.

Measurements of biodiversity are extremely scale-dependent. A well-known biological relationship is the species-area curve, which typically shows that the number of species increases with the size of the area surveyed. Most often, the number of species does not increase in direct proportion to area. The rate of additional species usually increases sharply with a small area and gradually tapers off with larger areas.

For conservation purposes, biodiversity is usually measured over relatively large areas. Federal and state lists of "endangered species" or "species of management concern" are typically developed from a global, national, or state perspective. The goals of such lists are typically to prevent the extinction of the listed taxa, not to maintain existing population levels of all species.

No total measure of biodiversity in the project area was made. Instead, two standard approaches were taken to evaluate potential impacts to biological resources: 1) a general plant community classification and 2) a thorough evaluation of special interest species. Because the project area consists primarily of creosotebush-dominated Sonoran Desertscrub and Semidesert Grassland habitat, and because most riparian habitats on the project area are poorly developed, overall biodiversity is expected to be low based on comparisons with other habitats in southeastern Arizona. Measurements of perennial plants confirmed that relatively few species are present in the project area (SWCA 1997g). Evaluations and surveys indicate that few special-interest species are expected to occur regularly in the project area. As with virtually any area, the geographic limits of some species are likely to occur within or near the boundary of the project area. Such limits are not typically considered in evaluations of the biology of an area precisely because they are typical of most areas.

3.2.4 Cultural Resources

3.2.4.1 Historic and Prehistoric Archaeological Resources

On the BLM-managed federal lands in the project area, historic and prehistoric archaeological resources are subject to provisions of the National Historic Preservation Act, as amended (NHPA) and other pertinent federal statutes. Indian burials on these lands are subject to provisions of the Native American Graves Protection and Repatriation Act (NAGPRA). On PD-owned and state lands in the project area, however, archaeological resources are not protected by federal law unless an action on these lands requires federal authorization of some kind (e.g., issuance of a permit under the Clean Water Act by the COE). Indian burials on non-federal lands are not protected by NAGPRA under any circumstances. Arizona state law does provide a measure of protection—not to archaeological resources *per se* on private land—but to all human remains and burial goods that might incidentally be associated with archaeological sites. Arizona Revised Statute 41-865 requires (with certain exemptions) private landowners to follow specific notification and treatment procedures when human remains have been encountered on their property.

Between 1992 and 1996, a 26,527-acre study area that includes federal, PD-owned, and state lands in the project area was surveyed for historic and prehistoric archaeological resources (SWCA 2003a). Surveys were conducted according to protocols specified by the BLM and Arizona State Museum (ASM). Total coverage was achieved by walking in parallel transects no more than 20 m (about 60 feet) apart. Terrain that was not traversable, such as vertical-sided ridgetops, was covered by irregularly spaced transects or by visual inspection with binoculars from a distance (SWCA 2003a).

Within the study area, 119 sites were recorded, including 59 prehistoric sites, 39 historic sites, 10 multicomponent sites, and 11 sites of unknown temporal association (SWCA 2003a). Four sites are now excluded from all proposed alternatives because they are located on land whose surface is controlled by the BLM, but whose mineral rights belong to the Melody Claim. Thus, there are a total of 115 archaeological sites in the project area. Of these 115 sites, 111 are recommended eligible for nomination to the National Register of Historic Places (National Register) for their scientific values. The remaining four sites are thought to be ineligible either because they are not archaeologically significant (three sites) or because they have already been subjected to archaeological data recovery (one site). Sites officially determined by the BLM and the Arizona State Historic Preservation Office to be eligible for the National

Register will be subject to mitigation requirements under NHPA prior to any federal action. Of the 111 sites, 57 are located partly or solely on federal property (the selected lands) and 54 are located partly or solely on PD property.[19] A list of the 119 sites, divided by land ownership and including a brief description, temporal affiliation, land management status, and potential National Register eligibility, is provided in three tables in Appendix D of this document.
The prehistoric sites and site components found in the project area[20] include rock features (41 sites), lithic scatters (20 sites), mixed artifact scatters (14 sites), petroglyphs (13 sites), lithic procurement localities (6 sites), rock shelters (2 sites), ceramic scatters (2 sites) and a water control feature (1 site). Each site or site component could be composed of just one of these elements or two or more of these elements. The historic sites and site components include evidence of mining activity (21 sites), water control features (13 sites), artifact scatters (11 sites), camps (11 sites), rock features (17 sites), corrals (2 sites), a water tank (1 site), habitations (2 site), and a road segment (1 site) (SWCA 2003a). The sites of indeterminate temporal classification ("unknown") all contain rock features (11 sites), but one is also a rock shelter.

For the most part, surveyors found sites to be in good to excellent condition, with their archaeological integrity apparently intact. Observed disturbances were generally minor and limited to only a few sites. Impacts resulting from human activity included disturbance by bull dozers or other earth moving equipment (sites AZ CC:2:153, 158, 166, 213, 251, and Field Site 999); construction and maintenance of a radio tower (AZ CC:2:214); and surface clearing and possible looter pits (AZ CC:2:154). Observed deterioration resulting from natural processes included minor and moderate surface erosion (AZ CC:2:186, 259); erosion of historic water control features (AZ CC:2:263, 275, 277); disturbance by plant growth (AZ CC:2:259); rock fracturing from freezing and thawing (AZ CC:2:152); and general weathering of surface artifacts, including, but not limited to, rusted and corroded metal objects, decomposing wooden and leather objects, and worn sherds (SWCA 2003a).

Most sites within the project area have the potential to contribute knowledge about both prehistoric and historic human activities in the Safford Valley. The most interesting and suggestive prehistoric site characteristics identified during the surveys include:

< a low occurrence of ceramic artifacts, which were found in limited numbers and at only ten sites;

< a relatively low occurrence of formal tools, including projectile points (only eight confirmed points and two possible point fragments);

< several lithic procurement sites (AZ CC:2:194, 199, 205, 210, 212, 213, 214); and

< the presence of artifacts identified as possibly dating from the Archaic period (7500 B.C.-A.D. 300) (AZ CC:2:155, 188, 203).

Potential exists for increasing our understanding of the chronology of prehistoric occupation in the region; patterns of settlement and movement; resource exploitation, including plant and lithic procurement and hunting; subsistence and diet; and lithic technology. Of particular interest is the possibility that one or more sites in the project area could shed light on occupation and activities during the Archaic period in the Safford Valley, of which little is known. Most of the previously studied sites in the region have been ascribed to the Formative period (A.D. 200-1450) of the Mogollon and/or Hohokam culture groups (SWCA 2003a). This pattern likely holds true for sites in the project area as well, although little diagnostic material was found during the surveys (SWCA 2003a).

Apachean people are known to have used the general area as winter camps since early historic times, and four sites in the project area (AZ CC:2:154, 159, 169, and 170) were identified as including features that may be Apachean. If so, these sites, and possibly others, offer the opportunity to examine a culture and time period rarely encountered in the archaeological record. Apache sites certainly exist, but they are

[19] The land on which AZ CC:2:176 [ASM] is located was purchased by PDSI from the Arizona State Lands Department.

[20] Excluding sites in the Melody Claim area.

difficult to find and identify. Traditional Apache lifeways left behind few material remains, and very little of that is diagnostically Apachean.

Later historic sites in the project area have potential for increasing our understanding of the mining technology used in the area; the relationships of local mining activity and regional socioeconomic and transportation systems; and the lifeways of early miners, including their living arrangements, material culture, and diet. Historic water control sites may contribute information about Civilian Conservation Corps (CCC) activities in the area during the Depression era, including construction methods used, the geographical extent and nature of CCC projects, and how those projects related to livestock grazing at the time of construction. Some water-control sites may also pre- or post-date the depression era and may inform on water resource management of other eras.

3.2.4.2 Traditional Cultural Properties Identified by Indian Tribes

For this Project, 11 Indian tribes were consulted regarding the presence or absence of known traditional cultural properties[21] in the project area per the requirements of NHPA (Table 3-19). The 11 tribes were also asked about places sacred to them that might warrant consideration under the American Indian Religious Freedom Act (AIRFA) and Executive Order 13007. Most of the tribes consulted consider the lands in the project area to be part of their historic aboriginal territory, or they claim ancestry to the prehistoric peoples who occupied these lands (SWCA 2000). Properties identified during consultation that are officially determined by the BLM and the Arizona State Historic Preservation Office to be eligible for inclusion in the National Register of Historic Places as Traditional Cultural Properties will be subject to mitigation requirements under the NHPA prior to any federal action. Sites identified during consultation as being sacred sites may warrant consideration by the BLM under AIRFA and Executive Order 13007.

The consultation process has included a review of published literature regarding Native American use of the Safford vicinity; correspondence and telecommunications with each of the 11 tribes requesting their concerns regarding places of traditional importance in the project area; and meetings with tribal personnel and visits to the project area as reported in Table 3-19. Each tribe was sent a copy of the archaeological inventory report [SWCA 1997b, revised to 2002a] and a videotape showing the project area and some of the identified archaeological sites. In June 1999, all tribes were also sent the preliminary Treatment Plan for review (SWCA 2003b). Copies of other archaeological reports related to the Project were made available to the tribes as well (SWCA 1998, 2003b).

Early in the consultation process, representatives of the Navajo Nation indicated that the Navajo had no knowledge of traditional cultural places in the project area; therefore, consultation with that tribe was considered complete at that point (SWCA 1998, 2000). Eight other tribes reported the presence of traditional cultural properties in the project area.[22] These 76 sites, which are all recorded prehistoric archaeological sites, are listed in Table 3-20. The Four Southern Tribes (the Tohono O'odham Nation, Ak-chin Indian Community, Gila River Indian Community, and Salt River Pima-Maricopa Indian Community) identified 14 archaeological sites as being traditional cultural properties, and would likely include the recently discovered field sites 998 and 999, bringing their TCPs to 16. The White Mountain Apache Tribe identified 3 sites as traditional cultural properties. The San Carlos Apache Tribe, the Hopi Tribe, and the Pueblo of Zuni each consider all prehistoric sites within the project area as traditional cultural properties, so they each have thus identified 76 sites as TCPs. Of the 76 sites, 43 are located on BLM-administered federal land and 33 are located on PD land.

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[21] National Register Bulletin 38 defines a traditional cultural property as a property that may be "eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community" (Parker and King 1989).

[22] As reported by SWCA (1998), some groups have reported that "all prehistoric sites" are to be considered TCPs. Because some additional sites have been located since that report was finalized, and because some of the eligibility recommendations have also been altered, there are now 76 TCP sites within the study area (excluding Melody Claims) whereas only 74 sites were reported in tribal correspondence prior to 1998.

Indian tribes have identified prehistoric archaeological sites in the project area as being places of traditional importance for three reasons: the site is considered ancestral, the site is considered sacred, and/or the site is thought to include a Native American grave. All tribes consulted indicated concern about the treatment of human remains and associated funerary objects that may be located within the project area. One possible Native American grave site has been identified in the project area and may warrant protection under the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990, as amended.

Three of the sites listed in Table 3-20 (AZ CC:2:200, 211, and 234) were identified by tribes as sacred sites and warrant consideration under Executive Order 13007, Indian Sacred Sites. These sites have been determined to be eligible for the National Register by the BLM. All three sites are considered sacred by the White Mountain Apache Tribe; AZ CC:2:200 and 211 are sacred to the Tohono O'odham Nation, Hopi Tribe, and the Ak-chin, Gila River, and Salt River Pima-Maricopa Indian Communities.

Table 3-19. Indian Tribes Consulted for the Proposed Dos Pobres/San Juan Project, Dates of Meetings, and Field Visits

Tribes	Meeting Dates	Field Visit Dates
Fort Sill Apache Tribe	-	-
Four Southern Tribes*	December 14, 1995 December 20, 1996**	September 20, 1995 March 16, 1996 May 19, 1997 December 16, 1999
Hopi Tribe	August 17, 1995	February 21, 1996
Mescalero Apache Tribe	-	-
Navajo Nation	-	-
Pueblo of Zuni	-	-
San Carlos Apache Tribe	September 20, 1994 December 7, 1994	June 9, 1997
White Mountain Apache Tribe	July 19, 1995 May 21, 1997	June 23, 1997

* The Four Southern Tribes are the Ak-chin Indian Community, Gila River Indian Community, Salt River Pima-Maricopa Indian Community, and Tohono O'odham Nation.

** Meetings were also held individually with the Gila River Indian Community on September 2, 1994; October 19, 1994; December 13, 1994, and November 16, 1999.

Source: SWCA 1998, 2000

Table 3-20. Places of Traditional Importance Identified by Tribes in the Project Area

ASM Site No. Prefix = AZ CC:2:	Site Type	Tribe: Ak-chin Indian Community Gila River Indian Community Salt River Pima-Maricopa Indian Community Tohono O'odham Nation	White Mountain Apache Tribe	San Carlos Apache Tribe	Hopi Tribe	Pueblo of Zuni
132	rock features	-	-	X	X	X
146	petroglyph	X	-	X	X	X
147	petroglyph, rock shelter, lithic scatter	X	-	X	X	X
148	rock feature	-	-	X	X	X
149	petroglyph	X	-	X	X	X
150	petroglyph	X	-	X	X	X
151	lithic scatter	-	-	X	X	X
152	petroglyph	X	-	X	X	X
153	sherd and lithic scatter	-	-	X	X	X
154	rock features	-	-	X	X	X
155	lithic scatter	-	-	X	X	X
156	petroglyph	X	-	X	X	X
157	petroglyph	X	-	X	X	X
159	rock features	-	-	X	X	X
158	petroglyph	X	-	X	X	X
160	rock features, lithic and groundstone scatter	-	-	X	X	X
164	rock feature, lithic and groundstone scatter	-	-	X	X	X
166	petroglyph, rock feature	X	-	X	X	X
168	lithic and groundstone scatter	-	-	X	X	X
169	rock features, sherd and lithic scatter	-	-	X	X	X
170	lithic and groundstone scatter	-	-	X	X	X
171	lithic scatter, quarry	-	-	X	X	X
186	sherd and lithic scatter	-	-	X	X	X
188	sherd and lithic scatter	-	-	X	X	X
191	lithic and groundstone scatter	-	-	X	X	X
192	lithic scatter	-	-	X	X	X
193	rock alignments, terraces	-	-	X	X	X
194	lithic procurement	-	-	X	X	X
195	lithic and groundstone scatter	-	-	X	X	X

Table 3-20, continued. Places of Traditional Importance Identified by Tribes in the Project Area

ASM Site No. Prefix = AZ CC:2:	Site Type	Tribe: Ak-chin Indian Community Gila River Indian Community Salt River Pima-Maricopa Indian Community Tohono O'odham Nation	White Mountain Apache Tribe	San Carlos Apache Tribe	Hopi Tribe	Pueblo of Zuni
196	sherd and lithic scatter	-	-	X	X	X
200	hill, rock rings	X	X	X	X	X
207	rock feature	-	-	X	X	X
208	rock feature	-	-	X	X	X
210	lithic procurement	-	-	X	X	X
211	rock ring	X	X	X	X	X
212	lithic procurement	-	-	X	X	X
213	lithic procurement	-	-	X	X	X
214	lithic procurement	-	-	X	X	X
215	lithic scatter, rock piles	-	-	X	X	X
217	lithic scatter	-	-	X	X	X
218	rock pile	-	-	X	X	X
219	lithic scatter	-	-	X	X	X
220	rock piles	-	-	X	X	X
221	lithic scatter	-	-	X	X	X
222	rock piles	-	-	X	X	X
223	rock features	-	-	X	X	X
225	rock piles	-	-	X	X	X
226	rock ring	X	-	X	X	X
227	rock pile	-	-	X	X	X
228	sherd and lithic scatter, habitation?	-	-	X	X	X
229	rock piles	-	-	X	X	X
231	rock piles, petroglyphs	X	-	X	X	X
233	rock piles	-	-	X	X	X
234	rock shelter, rock pile	-	X	X	X	X
241	petroglyph	X	-	X	X	X
245	rock feature	-	-	X	X	X
246	lithic scatter	-	-	X	X	X
249	rock features, lithic scatter	-	-	X	X	X
253	rock features, lithic scatter	-	-	X	X	X
254	rock features, lithic scatter	-	-	X	X	X
255	rock feature	-	-	X	X	X
257	rock features, sherd and lithic scatter	-	-	X	X	X
259	sherd scatter	-	-	X	X	X

Table 3-20, continued. Places of Traditional Importance Identified by Tribes in the Project Area

ASM Site No. Prefix = AZ CC:2:	Site Type	Tribe: Ak-chin Indian Community Gila River Indian Community Salt River Pima-Maricopa Indian Community Tohono O'odham Nation	White Mountain Apache Tribe	San Carlos Apache Tribe	Hopi Tribe	Pueblo of Zuni
261	rock feature	-	-	X	X	X
264	lithic scatter	-	-	X	X	X
266	rock features	-	-	X	X	X
267	rock features, lithic scatter	-	-	X	X	X
268	sherd scatter	-	-	X	X	X
269	rock features, lithic scatter	-	-	X	X	X
270	lithic scatter, rock ring	-	-	X	X	X
271	rock features, lithic scatter	-	-	X	X	X
272	rock features, lithic scatter	-	-	X	X	X
273	rock features, lithic scatter	-	-	X	X	X
274	rock feature, lithic scatter	-	-	X	X	X
FS 998	petroglyph	X	-	X	X	X
FS 999	petroglyph	X	-	X	X	X

3.2.5 Socioeconomic Resources

The information reported in this section was taken for the most part from a socioeconomic analysis prepared by ESI Corporation for the BLM (ESI 1997). Census data for 2000 were taken from the U.S. Census Bureau State and County Quickfacts Website (http://quickfacts.census.gov/qfd/). The source for Graham County employment data for 2000 was the Arizona Department of Economic Security (DES) website (http://www.de.state.az.us/links/economic/webpage/).

3.2.5.1 Population and Demographics

During the 2000 Census, 33,489 persons were counted in Graham County. With 7.2 persons per square mile, the county ranks 11th out of 15 counties in the State of Arizona for population density. About half of the residents live in the communities of Safford, Thatcher, and Pima in the Safford Valley. Neighboring Greenlee County, where PD's Morenci Mine is the principal employer and many residents of Graham County work, is also sparsely inhabited (14th out of 15 counties in the State) with a population of 8,547 in the year 2000.

The population of Graham County has grown by 138 percent over the last 40 years (Table 3-21). Growth has been continuous but at varying rates. Population increased by 18 percent between 1960 and 1970, by 37.9 percent between 1970 and 1980, by 16.1 percent between 1980 and 1990, and by 26.1 percent between 1990 and 2000.

By comparison, from 1960 to the present, the population of Greenlee County has decreased by 25.7 percent (Table 3-21). Between 1960 and 1970, the population dropped from 11,509 to 10,330, a decrease of 10.2 percent. In the following decade, the population rebounded to 11, 406, only to drop again between 1980 and 1990 to 8,008. Between 1990 and 2000, the population increased slightly to 8,547.

Table 3-21. Population Change in Graham County and Greenlee County, 1960-2000

Year	Population in Graham County	Population in Greenlee County
1960	14,045	11,509
1970	16,578	10,330
1980	22,862	11,406
1990	26,554	8,008
2000	33,489	8,547

Source: U.S. Census Bureau Website http://www.census.gov/population/cencounts/az190090.txt

3.2.5.1.1 Minority Groups and Low-Income Populations. Minority groups and low-income populations are specifically considered in this document as part of compliance with Executive Order 12898 regarding Environmental Justice.

According to the 2000 Census, approximately 67.1 percent of the population in Graham County identified themselves as White, 14.9 percent as Native American, 13.3 percent as Other, 1.9 percent as Black, and 0.6 percent as Asian. In answer to a separate question, 27 percent of individuals who had already identified themselves as belonging to one of the aforementioned groups further identified themselves as being of Hispanic origin. Between 1990 and 2000, while the overall population in the County increased by 26.1 percent, the Native American population increased by 26.3 percent, the Black population by 26.7 percent, and the Hispanic population by 35.3 percent.

Based on census data, the three Graham County census block groups[23] in which more than 100 Native American persons live coincide with the San Carlos Apache Reservation, with concentrations of Native Americans centered in the towns of Bylas and Peridot. Census block groups that include portions of Thatcher; portions of Safford; and the towns of Solomon, San Jose, and Sanchez contain the greatest concentrations (more than 300 persons) of persons identifying themselves as of Hispanic origin. The locations of these communities relative to the project area are depicted in Figure 3-15.

Low-income populations are defined for this analysis as census block groups in which the percentage of households with an annual income of less than $15,000 is equal to or greater than 40 percent. About half (17) of the 33 census block groups in Graham County fall into this category. They encompass most of the northern half and the southwestern quarter of the County, as well as about a third of the City of Safford and most of the Town of Pima. Census block groups with the highest proportion of low-income households are located within the San Carlos Apache Reservation (49, 59, and 82 percent); just outside the boundary of the Reservation (56 percent); and within pockets in the communities of Safford (52 and 55 percent), Thatcher (47 and 50 percent), and Pima (49 percent). The distribution of low-income populations relative to the project area is depicted in Figure 3-15. No developed residential areas are located within five miles of the proposed pits, leach pad, and development rock stockpiles.

3.2.5.2 Local and Regional Economy

The local economy in the Safford area, which includes the communities of Safford, Thatcher, and Pima (all within six miles of each other), is driven by agriculture, government employment, wholesale and retail trade, and tourism. Farming and ranching have been important in the area since the Upper Gila River Valley was first settled by Anglo Americans in the early 1870s. Some 40,000 irrigated acres are under cultivation, primarily with cotton. Safford has also long been the chief market for a widespread region that includes all of Graham and Greenlee Counties, part of northern Cochise County, and rural areas across the state border in western New Mexico. The copper-mining communities of Clifton and Morenci in Greenlee County are particularly important as a source of out-of-county consumers for Safford retail

[23] Census block groups by definition contain roughly 1,000 persons, although the 33 block groups in Graham County that were censussed in 1990 contained from 29 to 2,261 persons.

businesses. In turn, the Morenci Mine provides employment for many residents in the Safford area.

In recent decades, government employment has become increasingly important locally. This is principally attributable to two Arizona state prisons and one federal prison located near Safford. Safford is also the county seat of Graham County and the site of several federal offices serving the region. The newest industry to affect the area in a significant way is tourism, as increasing numbers of visitors discover the scenic beauty and recreational opportunities offered by the region's mountains and forests, the Gila River, and the upland desert terrain. This growing economic component fuels retail trade and lodging, restaurant, and other service sectors of the local economy. Commercial infrastructure for tourism (i.e., lodging, restaurants) is highly concentrated in Safford. Important tourist attractions within Graham County include but are not limited to:

< Mt. Graham and Riggs Lake in the Coronado National Forest Pinaleño Mountains
< San Carlos Lake
< Roper Lake State Park
< Hot Well Dunes Recreation Area
< Black Hills Rockhound Area
< Black Hills Back County Byway
< Discovery Park
< Gila Box RNCA, including Bonita Creek and its tributaries
< Aravaipa Canyon Wilderness
< hot springs

While none of these attractions by itself is important as either a generator of tourist traffic or as a source of regional income, together they provide a diversity of recreational opportunities that support potential future increases in the regional tourism industry.

3.2.5.2.1 Employment. According to the Arizona Department of Economic Security, the total civilian labor force in Graham County in 2000 averaged 10,300 individuals. Of these, 9,625 were employed and 675 were unemployed, for an unemployment rate of 6.5 percent. In the same year, neighboring Greenlee County had a civilian labor force of 4,075 and an unemployment rate of 5.6 percent. The highest unemployment rates in Graham County occurred on the San Carlos Apache Reservation. In 2000, Bylas, Arizona, the Reservation community closest to the project area, had an unemployment rate of 12.2 percent, while the Reservation as a whole had an unemployment rate closer to 20 percent.

In Graham County, at least half of employment is in two areas: agriculture and government. Trade and services account for another third. Of the 9,625 employed persons in Graham County in 2000, 73 percent were non-agricultural wage and salary employees, and a total of 27 percent either worked for wages in agriculture, were self-employed (often in agriculture), or worked outside the county (Table 3-22). Government jobs accounted for 27.2 percent of employed persons, reflecting the importance of the prisons as an industry in the area. Wholesale and retail trade accounted for 20.8 percent of jobs, and services accounted for another 15.8 percent. Graham County has a diversified economy when compared to Greenlee County, which has about 60 percent of its total labor force employment in the mining sector.

3.2.5.2.2 Income. Median household income is low in Graham County. In 1997, the county ranked 10th out of the 15 counties in Arizona, with a median household income of $27,564. This compares to the state median household income of $34,751. Also in 1997, Graham County had the sixth highest rate of persons in poverty (22.8 percent) of all counties in the State. An estimated 26.4 percent of children in Graham County were below the poverty line, compared to 23.2 percent for the state as a whole. The low-income figures, in part, reflect the influence of low-paying agricultural jobs, and contrast sharply with income figures for Greenlee County. In 1997, Greenlee County ranked first among the state's counties in median

household income ($43,696) and had the lowest rate of persons in poverty (10.3 percent). Greenlee County also had the lowest rate of children below the poverty line (12.6 percent). The high income figures can be attributed to relatively high-paying mining jobs.

Table 3-22. Employment Structure in Graham County, 2000

Employment Sector	No. of Persons	% of Total
Non-Agricultural Employment		
Government	2,625	27.2%
Trade	2,000	20.8%
Services & Misc.	1,525	15.8%
Construction	275	2.9%
Manufacturing	275	2.9%
Transportation, Communications, and Public Utilities	150	1.6%
Finance, Insurance, and Real Estate	175	1.8%
Subtotal of Non-Agricultural Employment	**7,025**	**73.0%**
Agriculture, Self-employment, Out-of-county Employment	**2,600**	**27.0%**
TOTAL	**9,625**	**100.0%**

Source: Arizona Department of Economic Security Website at http://www.de.state.az.us/links/economic/webpage/.

3.2.5.2.3 Taxes. Several sources of revenue for the county and municipal governments in Graham County would be affected by the alternative actions analyzed in this EIS. These sources include locally collected property and sales taxes; distributions from the State of Arizona to local governments of revenue produced by the Transaction Privilege, Use and Severance Tax and by state income taxes; and payments in lieu of taxes (PILT) paid by the federal government to local governments for federal lands which generate no county property taxes.

Private property taxes collected directly by county and by municipal governments are an important source of locally based revenues. These taxes are collected on assessed property values. The percent of total net assessed value by property class in Graham and Greenlee Counties is compared in Table 3-23. In Graham County, total net assessed value ($68,846,902) is only one-third that of Greenlee County ($228,467,780), even though Graham County is larger in area and population than Greenlee County. The difference is the relatively higher assessed value on patented mining property, which accounts for almost 87 percent ($198,579,797) of the property tax base in Greenlee County. In Graham County, the property tax base—principally residential, commercial, and agricultural property—is more diversified and of lower cash and assessed value.

Table 3-23. Percent of Net Assessed Property Values by Class in Graham and Greenlee Counties

Property Class Description*	GRAHAM COUNTY % of Total Net Assessed Value ($68,846,902)	GREENLEE COUNTY % of Total Net Assessed Value ($228,467,780)
Mines	0.2%	86.92%
Commercial	25.7%	1.6%
Agricultural	20.8%	0.85%
Residential	41.56%	3.32%
Other	11.67%	7.3%

*The property classes actually used for valuation have been grouped for purposes of this table.

The State of Arizona collects revenue from businesses in the State via a Transaction Privilege, Use and Severance Tax. Portions of this revenue are returned to each county by a formula based on both the total amount of collections in that county and the proportion of the state population represented by that county. Disbursements are also made to municipalities, but these payments are based solely on population. Table 3-24 lists the taxable activities and businesses, taxable income, and tax collections for Graham and Greenlee counties for fiscal year July 1, 1994 to June 30, 1995. The State also collects income taxes and distributes portions of this revenue to incorporated cities and towns as "revenue sharing."

The numbers presented in Table 3-24 illustrate some of the fundamental differences between the economies of Graham and Greenlee counties. In Graham County, retail services dominated tax collections with 59.3 percent. This reflects Safford's role as the retail shopping center for the region. In Greenlee County, the category "Other Taxable Activities," which includes mining, dominated with 79.8 percent. This percentage reflects the preeminent position of the Morenci Mine in the economic structure of the county, while the dollar amount ($14,442,571) demonstrates the mine's capacity to generate public revenue. In Greenlee County, this category alone produced almost 60 percent more Transaction Privilege, Use and Severance Tax revenue than all the categories combined in Graham County. The figures presented in Table 3-24 also illustrate the greater diversity in Graham County's economic base compared to that of Greenlee County.

Table 3-25 shows the distribution of Transaction Privilege, Use and Severance Tax revenue by the State to county governments in 1994-1995. Once again the figures illustrate economic differences between Graham and Greenlee counties, particularly the economic impact of taxes paid by PD's Morenci Mine on county revenues. Compared to Graham County, Greenlee County's disbursement is twice as high, even though Graham County's population is three and one-half times larger. This disparity means that the benefit from this tax source to each resident of Greenlee County is seven times greater than that to each resident of Graham County.

Another source of revenue for county governments that would potentially be affected by the Project is "payments in lieu of taxes" (PILT) made by the federal government to offset the limited property tax base that results from federal land ownership. These payments are established, and limited in the total amount payable to any one county, by a complex set of formulas involving the county's population, acreage of certain classes of federal lands, amounts of other federal payments to the county, and other variables. Population is a determining factor in setting limits (ceilings) for payments made to local governments. Currently, the BLM makes payments in lieu of taxes in the amount of approximately $11,365 to Graham County for the land surrounding the proposed Dos Pobres/San Juan Project on the basis of $0.69 per acre (J. Malys, BLM, pers. comm., 2000); the rate may change from year to year. In 1999, Graham County received $749,771 in total PILT (from BLM and Forest Service).

Table 3-24. Tax Collections from Taxable Activities by Business Classifications for Graham and Greenlee Counties, July 1, 1994-June 30, 1995

GRAHAM COUNTY	Net Taxable Income ($)	Collections ($)	% of Collections from County	% of Total Collections, Statewide

Communications	4,570,420	228,521	2.5%	
Restaurants/Bars	13,755,771	687,789	7.5%	
Commercial Leases	3,781,983	117,102	1.3%	
Rentals of Personal Property	5,168,130	258,407	2.8%	
Contracting (All)	22,882,300	1,144,115	12.4%	
Retail	109,138,042	5,456,902	59.3%	
Other Taxable Activities	26,102,843	1,315,075	14.3%	
TOTAL	**185,399,489**	**9,207,911**		**0.36%**
GREENLEE COUNTY				
Communications	$1,398,317	$69,916	0.4%	
Restaurants/Bars	3,742,304	187,115	1.0%	
Commercial Leases	408,357	12,673	0.1%	
Rentals of Personal Property	693,048	34,652	0.2%	
Contracting (All)	19,886,371	994,319	5.5%	
Retail	47,101,798	2,355,090	13.0%	
Other Taxable Activities	516,534,389	14,442,571	79.8%	
TOTAL	**589,764,584**	**18,096,336**		**0.71%**

3.2.5.3 Infrastructure

The rapid population growth (33 percent) in the Safford area over the past decade has put pressure on the existing infrastructure and those who staff it (ESI 1997). This growth has created a need for mid-priced housing; expanded and improved sewer facilities; a new source of electric power; new school facilities; and additional city, county, and school system staff. Additional health care professionals are needed as well.

3.2.5.3.1 Housing. The housing conditions in Graham County are somewhat atypical, compared to the rest of Arizona. Graham County ranks second in the percentage of owned and rented units built prior to 1980, indicating that the housing stock is fairly dated when compared to the rest of Arizona. According to the 1990
Census, Graham County had 5,976 (56 percent) individuals owning or renting housing units built prior to 1980 (ESI 1997, Appendix A-13). Median values for owner-occupied homes ($51,300) and rents paid ($221/month) in Graham County are among the state's lowest.

In the second half of 1996, 121 homes were sold on the new and resale markets in the Safford area. In January 1997, approximately 75 houses were on the resale market; about 45 percent of these were listed for less than $80,000. The supply of older, pre-owned, less expensive houses appears to meet the demand at the lower price range of the market. No new low-income housing or high-density housing is being planned. Few rental opportunities are available.

Four developers are currently building housing projects to meet a shortfall in the mid to upper ranges of the market. Approximately 263 new homes are planned in the $85,000 and above range; the average new home price is $102,000. The City of Safford's "tentative plan" for future new water hook-ups includes 350 housing units at one project, 400 at another, and several hundred more at other locations (ESI 1997).

3.2.5.3.2 Utilities. The City of Safford recruited a director for the city's utilities operation. Officials are now gathering data on staffing needs in that department to take care of deferred maintenance.

Table 3-25. Distribution of Transaction Privilege, Use and Severance Tax Revenue by the State of Arizona to Graham and Greenlee Counties in 1994-1995

Counties	Distribution Amounts	Per-capita, 1995	Population, 1995	% of All Distributions	% of Population
Graham	$1,868,969	$62	30,025	0.52%	0.71%
Greenlee	$3,756,460	$442	8,500	1.05%	0.20%
All Counties	$356,339,290	$84	4,228,900	100%	100%

< **Water.** The City of Safford provides domestic water for its own residents, for the nearby Town of Thatcher, and for smaller, unincorporated areas in the immediate vicinity. This water is drawn from Bonita Creek. Currently serving a peak demand of 4,000 gpm (ESI 1997), city officials are seeking to obtain new water supplies to augment their existing water right for 3,240,000 gallons per day (gpd) (3,584.5 ac-ft/yr) (H. West, Hydrologist, BLM, pers. comm.). In order to address water issues, particularly the ongoing adjudication of Gila River water rights, the city has retained a hydrogeologist. Determining Gila River water rights is a long-term undertaking affecting many central Arizona communities and Indian tribes. Domestic water for the Town of Pima and adjacent unincorporated areas is provided by Graham County Utilities, Inc. Domestic water for all other unincorporated areas in the county is provided by small, private water systems. Water for irrigation is supplied by the Gila Valley Irrigation District. The city is committed to providing water service to 425 new residential, commercial, and other sites by Fiscal Year 1997-1998.

< **Electric/Gas**. Currently, electrical power in Safford is provided by the city. All other areas of the eastern Gila Valley are serviced by one of two utility companies: Graham County Utilities, Inc. or Graham County Electric Cooperative, Inc. This electricity is generated at a coal-fired power plant near Willcox, Arizona. Natural gas service for the entire area is provided by Graham County Utilities, Inc. or Graham County Electric Cooperative, Inc. They distribute gas supplied by the El Paso Natural Gas Company.

< **Sewer.** City voters approved in May 1997 a bond sale to fund construction of a new wastewater treatment plant with a maximum capacity of 5 million gpd (3,472 gpm). The new facility is currently operational. The Town of Thatcher is presently upgrading its sewer system and expanding the system's capacity from 350,000 gpd to 1 million gpd.

< **Telephone.** Telephone service in the Safford Valley is provided by Qwest Communications.

< **Garbage.** Currently, the City of Safford owns three sideload trucks, two rearload trucks, and one open-bed truck. There are seven full-time employees in the sanitation department, and the city plans to hire one additional driver plus one truck within the next five years. The city uses the county landfill and pays a share of its maintenance cost (L. Lopez, Safford City Planner, pers. comm.). At this time, the landfill has capacity for about 20 to 25 more years of use at the current rate of use, but the county would like to purchase an additional 240 acres of adjacent BLM lands to provide another 60 to 80 years of use for future (J. Ward, Graham County Engineer, pers. comm.).

3.2.5.3.3 Schools. There are four school districts in the larger Safford area: Safford Unified School District Thatcher Unified School District, Pima Unified School District, and Solomon Unified School District, with the Safford and Thatcher districts having the largest numbers of students. The selected lands lie in the Safford and Solomon school districts. The Safford schools are near capacity, and either a new building or an addition on an existing building will be needed. As of October 1, 1996, the Safford Unified School District had five schools and a total enrollment of 3,043 students:

< 1 primary (pre-school through 2nd grade): 706 students
< 1 intermediate (grades 2-5): 661 students
< 1 middle school (grades 6-8): 685 students
< 2 high schools (grades 9-12): 918 students and 73 students

Thatcher area schools are also at capacity or in need of improvement. The District is building a new high school as of this writing in anticipation of a predicted increase in enrollment by one-third by the year 2000 (ESI 1997).

3.2.5.3.4 Emergency Response. The Safford Police Department employs twelve officers, and has been steadily increasing staff over the past few years to keep pace with the growth of the city. The city's fire department is staffed on a volunteer basis. This service is currently satisfying the needs of the city; expansion of this service is not seen as an immediate issue.

Safford serves as the primary medical hub for Graham and Greenlee counties. The area is currently suffering from a shortage of physicians and nurses. The Mt. Graham Community Hospital in Safford is expanding capacity in a number of areas, including construction of an intensive care unit. The hospital has built a new medical office building, a new intensive care unit, and additional operating rooms. The recent expansion should attract high-quality doctors to the area (ESI 1997).

3.2.5.4 Transportation

This section describes the current conditions of roads, intersections, bridges, and air traffic corridors in and near the project area.

3.2.5.4.1 Roads. The unpaved, ranch roads that provide access to the project area are described in Section 3.2.1.2. (see Figure 1-1). The roadways described here are paved segments that are most likely to be affected by the proposed mining activities being analyzed in this EIS. They include the roads and highways listed below; a few key intersections on those roads; and five bridges crossing the Gila River (Figure 3-16). The following roadway segments were studied by Curtis Lueck & Associates (1997) to determine current conditions and anticipated project impacts:

< US Highway 70 (US 70) from the town of Pima east to Sanchez Road
< US Highway 191 (US 191) from US 70 south to Interstate 10
< Safford-Bryce Road
< Airport Road - Eighth Avenue to Sanchez
< Reay Lane - US 70 to Safford Bryce Road
< Sanchez Road from Airport Road to US 70

US 70 is the main highway through the Safford area, paralleling the Gila River on the south side. It connects the communities of Safford, Thatcher, and Pima to each other; to Globe, Arizona, 73 miles west; and eventually to the metropolitan Phoenix area.

US 191, a state-designated scenic route, runs south from US 70 to Interstate 10, providing access to Mount Graham and Roper Lake State Park, both popular recreational areas. It also runs northeast, connecting US 70 to the communities of Clifton and Morenci and to the scenic White Mountains.

Safford-Bryce Road is a rural road that parallels the Gila River on the north side. It runs from Eighth Avenue (City of Safford) northwest to Eden Road (beyond Pima) and is connected to US 70 via Eighth Avenue over the Safford Bridge, Reay Lane over the Thatcher Bridge, Bryce-Eden Road over the Pima Bridge, and Eden Road over the Eden Bridge. The Phelps Dodge Mine Road from the Dos Pobres pit site terminates at Safford-Bryce Road (Figure 3-16). Four at-grade drainage crossings (dip-sections) carry stormwater across Safford-Bryce Road during runoff events. Such crossings can become impassable for short periods.

Airport Road continues the Safford-Bryce Road alignment from Eighth Avenue east to Sanchez Road. It connects to US 70 via Sanchez Road over Solomon Bridge (Figure 3-16). The San Juan Mine, Lone Star Mountain, and Solomon Pass Roads all terminate at Airport Road (see Figure 1-1).

Reay Lane over the Thatcher Bridge and Sanchez Road over Solomon Bridge are the crossings likely to receive the most traffic as a result of proposed mining activities.

Table 3-26 summarizes the condition of these roadway segments, including their operational characteristics, average daily traffic, and level of service (LOS). An LOS rating (LOS A through LOS F) is a qualitative description of how well a roadway operates under prevailing traffic conditions. A rating of LOS A indicates free-flowing traffic, whereas LOS F indicates forced flow and extreme congestion. In communities with a population below 50,000, LOS C is the level used as the planning and design goal. In the Safford transportation area, every roadway segment studied operated acceptably at LOS B or better, with most operating at LOS A (Parsons Brinckerhoff 1992). Most of the major roadways in the Safford area, including all but one of the segments listed above, are considered to be in adequate physical condition for passenger vehicles and commercial shipping (Curtis Lueck & Associates 1997). The exception is the Safford-Bryce Road. Although this road was given a “Fair” rating in a 1992 study (Parsons Brinckerhoff 1992, see Table 3-26), in 1997, portions were described as deteriorating, with pavement failing and edges raveled or poorly defined (Curtis Lueck & Associates 1997).

Table 3-26. Current Road Conditions in the Safford Area

Road Segment	Lanes (CLT = Center Left Turn)	Operational Characteristics*	Average Daily Traffic	Year of Count	Level of Service (LOS)
US 70, Main St. (Pima) - Reay Ln.	4+CLT	-	8,000	1995	-
US 70, Reay Ln. - Montieth Ln.	2	Fair	16,800	1995	B
US 70, Montieth Ln. - Sanchez Rd.	2	Good	5,400	1995	B
US 191, US 70 - Old Country Club	4+CLT	Good	7,000	1995	A
US 191, Old Country Club - I-10	2	Good	4,400	1995	A
Safford - Bryce Rd.	2	Fair	1,051	1996	A
Airport Rd.	2	Good	1,800	1996	A
Reay Ln.	2	Fair	600	1994	A
Sanchez Rd.	2	Fair/Good	372	1996	A

* Fair = sufficient sight distances, well-maintained pavement and striping, adequate shoulder, and the overall conditions give the user a sense of comfort and safety. Good = good operational characteristics overall, better than average pavement and striping.
Source: Curtis Lueck & Associates 1997, reporting operational characteristics and LOS data from Parsons Brinckerhoff (1992).

3.2.5.4.2 Intersections. The following six intersections are those most likely to be affected by proposed mining operations (Curtis Lueck & Associates 1997):

< US 70/Reay Lane (Thatcher): Unsignalized with stop-control on Reay Lane.
< US 70/Eighth Avenue (Safford): Signalized.
< US 70/US 191(Safford): Signalized.
< US 70/Sanchez Road: Unsignalized with stop-control on Sanchez Road.
< Safford-Bryce/Reay Road: Unsignalized “T” configuration with stop-control at Reay Road.
< Safford-Bryce/Eighth Avenue/Airport Road: Unsignalized “T” configuration with stop-control at Safford-Bryce/Eighth Avenue intersection.

The two signalized intersections, US 70/Eighth Avenue and US 70/US 191, were analyzed for level of use in a previous study (Parson Brinckerhoff 1992) and found to be operating well under capacity at that time. None of the unsignalized intersections listed above have been similarly analyzed in that study, but an unsignalized intersection on US 70 just east of Reay Lane (US 70/Stadium Drive) experienced peak-hour congestion in the mornings and afternoons (LOS ratings of E and D, respectively).

3.2.5.4.3 Bridges. Five, two-lane bridges crossing the Gila River provide access to Safford/Bryce and Airport Roads from the south: Eden, Pima, Thatcher, Safford, and Solomon bridges. None of the bridges carry posted weight restrictions. The Eden, Pima, and Thatcher bridges have a single, 12-foot-wide through lane in each direction and concrete “Jersey” barriers, with a two- to four-foot-wide shoulder area and no sidewalks. The Solomon Bridge is a new bridge built by the Arizona Department of Transportation and Graham County in 1996. This 810-foot-long bridge has two lanes, with a 30-foot-wide deck and is designed to convey the 25-year flood flow of about 67,000 cfs and to withstand scour during major floods. The Safford Bridge (Eighth Avenue) is an old bridge built during the 1930s. At only 23 feet wide, it is narrow and in a poor state of repair with apparent spalling of the concrete and exposed rebar.

3.2.5.4.4 Air Traffic Corridors. The Safford Municipal Airport adjoins the southern boundary of the

project area (Figure 1-2). Airspace restrictions associated with the airport require that air traffic not be obstructed by any object located within a three-dimensional space surrounding the airport. Such an object (e.g., a radio antenna or transmission line pole) would obstruct air traffic if its height were greater than the imaginary upper surfaces defining the three-dimensional space. This space is bounded on top by a roughly circular, flat, imaginary Horizontal Surface that acts as a "ceiling" 150 feet above the airport, and an imaginary Conical Surface that flares upward and outward from the circumference of the Horizontal Surface at a slope of 20H:1V (20 horizontal units to 1 vertical unit) in every direction. The circumferences of these two concentric "circles" are shown Figure 3-17, and more detailed definitions are presented in Figure 3-18. According to Federal Aviation Administration regulations, the radius of the flat Horizontal Surface must extend no less then 5,000 ft beyond each end of the airport's primary surface (runway), and the radius of the upward-sloping Conical Surface must extend another 4,000 ft beyond the circumference of the Horizontal Surface. At the Safford Municipal Airport, elevations of the Horizontal Surface range from 3,307 to 3,326 feet, paralleling the gentle slope of the primary runway. The Conical Surface on the north side of the airport, where a proposed power transmission line for the Project would be sited, ranges from 3,307 to 3,326 feet at the edge of the Horizontal Surface to 3,507 feet at the outer edge of the Conical Surface. These heights constrain any development within the outer "circle" shown in Figure 3-17 (SWCA 1997h).

3.2.6 Indian Trust Resources

All Department of the Interior bureaus and offices, including the BLM, have a responsibility to protect and maintain Indian Trust Resources (also known as Indian Trust Assets). Secretarial Order 3175 mandates that agencies, "when engaged in the planning of any proposed project or action, will ensure that any anticipated effects on Indian trust resources are explicitly addressed in the planning, decision, and operational documents...that are prepared for that project" (USDI 1993). As part of this responsibility, agencies are required to consult with the recognized tribal government with jurisdiction over the trust property that the proposal may affect, the appropriate office of the Bureau of Indian Affairs, and the Office of American Indian Trust if their evaluation reveals impacts to Indian Trust Resources.

Indian trust assets are "legal interests in property held in trust by the United States for Indian tribes or individuals" (BLM 1995b). Assets are further defined as "anything owned that has monetary value...[such as] real property, physical assets or intangible property rights" (ibid.). Examples of things which could be trust assets are lands, minerals, and water rights. Trust assets cannot be sold, leased, or otherwise alienated without the approval of the United States.

Indian trust assets in the general vicinity of the Project include water rights to the Gila River held by the San Carlos Apache Tribe and by the Gila River Indian Community. These tribes own 6,000 af/yr and 303,288 af/yr (L. Sibala, Hydrologist, BIA, telefax 1998) of water rights to the Gila River, respectively. In addition to these rights to surface flows in the Gila River, the San Carlos Apache Tribe holds another Indian Trust Asset in groundwater under the Reservation based upon Sections 4.0 and 4.3 of the San Carlos Apache Tribe Water Rights Settlement Agreement of March 30, 1999 (Settlement Agreement), to which the United States was a signatory. The Settlement Agreement states that such rights "are held by the United States in trust for the Tribe," and that the scope thereof is "...a permanent right to the on-Reservation diversion, use, and storage of all Groundwater beneath the Reservation, subject to a Groundwater management Plan to be developed by the Secretary." There are no Indian trust lands, minerals, or other Indian trust assets in or in the general vicinity of the project area, as identified in Figure 1-2.

3.3 OFFERED LANDS

This section provides descriptions of the offered lands proposed for exchange. The 11 properties are grouped as either base or optional properties. Organization follows the major resource categories for the selected lands except for Indian Trust Resources, as none of the 11 properties is Indian trust land, represents a legal interest held in trust by

the U.S. for an Indian tribe or individual, or is derived from rights reserved by or granted to an Indian tribe or individual by treaty, statute, or executive order.

3.3.1 Base Package

The base package of offered lands consists of five PD-owned properties: Amado, Curtis, Musnicki, Schock, and Feulner. The Amado and Curtis properties are located within and adjacent to the boundary of the BLM-administered Gila Box Riparian National Conservation Area (RNCA); the Musnicki property borders the BLM-administered Dos Cabezas Mountains Wilderness; and the Schock and Feulner properties lie within the boundary of the Sonoita Valley Acquisition District (District). The Schock property also borders the BLM-administered Las Cienegas National Conservation Area (NCA). The existing natural and human environment of these properties is described below.

3.3.1.1 Amado and Curtis Properties

The Amado and Curtis are separate properties, but because both are located in the Gila Box RNCA, Graham County, Arizona; both straddle Bonita Creek; and portions of the properties adjoin each other; they are described together. Both properties are characterized by undeveloped mountainous terrain paralleling segments of Bonita Creek. This perennial creek flows through a canyon, with small tributary canyons leading down to the heavily vegetated creek floodplain. Elevations range from a low of about 3,800 feet on both properties to about 4,300 feet on the Amado property and about 4,700 feet on the Curtis property (Zenitech 1998b).

3.3.1.1.1 Land Use. Owned by PD, the 180-acre Amado property and 675 acres of the 755-acre Curtis property (with a five-acre exclusion) are inholdings physically encompassed by, but not included in, the 21,767-acre, BLM-administered RNCA (SWCA 1996c), which is a Long-Term Management Area (LTMA) identified in the Safford District RMP.

Figure 2-27 shows the Amado and Curtis properties and surrounding land ownership. An approximately 80-acre portion of the Curtis property lies outside of the approved Gila Box RNCA boundary. The 855 acres of both properties within the Gila Box represent about 50 percent of existing private land in-holdings (1,720 acres) and about four percent of the total land (23,487 acres) within the RNCA perimeter. Other private in-holdings within the perimeter account for an additional three percent of the total, while BLM lands account for 93 percent. The outside boundary of the adjoined Amado and Curtis properties totals about 10.9 miles, of which 8.75 miles (or approximately 80 percent) abut BLM lands (ibid.).

These properties are physically accessible via four-wheel-drive roads and trails periodically maintained by the BLM. Four-wheel-drive legal access is possible from the west via Red Knolls Canyon Road (off Solomon Pass Road). Four-wheel-drive access is also available from the east via Hackberry Spring Road. Non-vehicular access is available from the west via Bushy Canyon Road, or visitors may take Solomon Pass Road to Lee Trail and walk approximately three river-miles up Bonita Creek to the Curtis property and another mile upstream to the Amado property. From the east, nonvehicular access is available via the Safford-Morenci Trail off East Bonita Rim Road, which is a four-wheel-drive road (SWCA 1996c).

Because the properties are private, no public access or public recreation is currently authorized, but PD has not prevented physical access to or public recreation on the properties. Recreational activities on adjacent Gila Box RNCA land, which has similar natural resource values, include, but are not limited to, camping, hiking, bird and wildlife watching, water play, photography, and archaeological site study (BLM 1991, 1994b). The Gila Box RNCA is a popular recreational spot for both local residents and visitors, drawing an estimated 25,000 people per year (S. Knox, BLM, pers. comm.). The reaches of Bonita Creek that cross the Amado and Curtis properties are included in an 8.1-mi-long segment that has been recommended by the BLM and the Department of the Interior for Wild and Scenic River designation (BLM 1994a). Resources determined to be "outstandingly remarkable" in this segment include fish and wildlife habitat, riparian, water quality, recreational, and cultural resource values.

PD has let grazing leases for both Amado and Curtis properties, which are located within the BLM's Bonita Creek and Johnny Creek Allotments, respectively (Phelps Dodge Corporation 1996). The properties are not encumbered by utilities easements, rights-of-way, or residential leases. Phelps Dodge owns the mineral estate on 220 acres, with the remaining acres under federal reserve minerals status (ibid.). Phelps Dodge also owns one surface water right of approximately 1.0 acre-foot per year (af/yr) from Bonita Creek for stock watering on the Amado property (SWCA 1996c).

The overall visual quality of the Amado and Curtis properties reflects the rugged terrain and the relative lack of human-caused disturbance in upper Bonita Creek. Landscape elements include flowing water, steep canyon walls, and diverse vegetative communities. An aerial inspection conducted in 1995 found that the dirt roads passing through the properties were overgrown with vegetation and appeared to be untraveled (Zenitech 1998b). Other evidence of human activity was limited to a corral on the Amado property that appeared to be in a state of disuse and an empty stocktank near the northern end of the Curtis property. No buildings, waste containers, illegal dumping, mining, or other indications of development were visible from the air (ibid.). The adjacent public lands in the RNCA are classified as VRM Class II (BLM 1991), a classification that would also apply to the Amado and Curtis properties if they were acquired. The management objective of Class II is to retain the existing character of the landscape. Management activities may be seen but they should not attract the attention of the casual observer. The level of change to the characteristic landscape should be low. Any changes must repeat the basic elements of form, line, color and texture found in the predominant natural features of the characteristic landscape (BLM 1991, 1994b).

The Amado and Curtis properties are not located within one mile of a federal hazardous materials National Priority List site or an Arizona Water Quality Assurance Revolving Fund (WQARF) site; a zipACIDS site; or a Resource Conservation and Recovery Act (RCRA) transport, storage, or disposal facility. No Emergency Response Notification System (ERNS) sites are located on the property or in the vicinity. No registered Underground Storage Tanks (UST) sites are located on the property or on adjacent properties. No Leaking Underground Storage Tanks (LUST) sites, or open or closed landfills, are located on or within 0.5 mile of the property (Zenitech 1998b).

3.3.1.1.2 Physical Resources. Review of physical resources on the offered lands for this document was limited to geology/mineral potential. No other physical resources, such as air quality or soils, were investigated. The discussion of the water resources of the offered lands is limited to water rights (see Land Use section of each property), and riparian and other biological resources related to water resources (see Biological Resources section of each property).

Erosion-resistant volcanic rocks make up the bluffs and cliffs along Bonita Creek. These rocks, Miocene to Oligocene in age, include silicic (rich in silica) to mafic (rich in iron and magnesium) flows and pyroclastic rocks, as well as some subvolcanic intrusions (Zenitech 1998b). The potential for the occurrence of six kinds of mineral resources on the Amado and Curtis properties was evaluated and is summarized below in Table 3-27.

3.3.1.1.3 Biological Resources. A well-developed riparian community exists along the segments of

Bonita Creek that flow through the two properties (SWCA 1996c). This community is characterized by an overstory of mature Fremont cottonwood, Goodding willow, sycamore, mesquite, and netleaf hackberry, with an understory of desert broom, seep-willow, coyote willow, burro brush, and an occasional tamarisk or tree tobacco. Wildrye and bermuda grass are present, along with native grasses such as threeawn and side-oats grama (C. Templin, BLM, pers. comm.). Continuous recruitment of trees is occurring, as indicated by stands and individuals of various ages throughout the canyon. Vegetation within the creek includes watercress and unidentified annual emergent vegetation, but because of frequent scouring, no well-developed community of emergent or aquatic vegetation grows along the stream. In the upstream portions of the properties where the canyon floor broadens, mesquite trees form bosques of several acres in extent. Most of the trees are young to middle-aged, but a few are large, older specimens. Upland vegetation on the canyon walls and ridges above the creek includes typical Sonoran Desertscrub plants such as prickly pear cactus, ocotillo, and catclaw acacia. Large patches of undisturbed native grasses are also present. Much of this upland is very steep and appears to be inaccessible to grazing cattle (SWCA 1996d).

Because perennial water is available in the canyon and little human activity takes place, wildlife is abundant. A large number of bird species were observed during field surveys in February 1995 (SWCA 1996d). The abundance and mix of species seen at that time suggest that Bonita Creek Canyon is important to wintering and migrating species, as well as to the expected summer resident species. Rocky Mountain bighorn sheep were seen during the surveys, and mammal sign observed included that of mule deer, black bear, raccoon, mountain lion, coyote, collared peccary, beaver, and white-throated woodrat. The canyon cliffs include numerous overhangs, small caves, and crevices that may provide roosts for several species of bats.

The special interest species identified by federal and state agencies that are known to occur, may occur, or are unlikely to occur on the Amado and Curtis properties, or for which the likelihood of occurrence is unknown, are listed in Table 3-28. Bonita Creek and its 100-year floodplain through both properties has been designated critical habitat for the spikedace and loach minnow and has been proposed as critical habitat for the Gila chub.

3.3.1.1.4 Cultural Resources. A review of archaeological site records at the Arizona State Museum and the BLM Safford Field Office indicated that some archaeological survey has been conducted along the reach of Bonita Creek that traverses the Curtis and Amado properties (SWCA 1996a). Sites recorded within the property boundaries include two sites dating from the prehistoric Formative period (A.D. 1250-1450) and a few sites dating from the Late Historical period (A.D. 1890-1930). The prehistoric sites are rock shelters (AZ W:14:1 and AZ W:14:4). The second of these, “Ceremonial Cave,” contained wooden artifacts thought to serve a ritual function. This site also was used during the Late Historical period, apparently as a homesite. Other recorded historical sites include a homesite containing ruins of a stone building (AZ W:19:9) and two sites with irrigation features (AZ W:14:8 and AZ W:14:11). During a recent field visit to the properties by an archaeologist, most of the recorded sites were recommended to be eligible for inclusion in the *National Register of Historic Places*, in part because they are likely to contain information about the settlement-subsistence systems of the canyon's prehistoric and historical inhabitants (SWCA 1996a).

3.3.1.1.5 Socioeconomic Resources. The Amado and Curtis properties, taxed as Vacant Land, generated $1968 and $397, respectively, in private property taxes for Graham County in 1999. Each property generates $105 in annual grazing fees for PD.

Table 3-27. Summary of Mineral Potential of the Amado and Curtis Properties

Mineral Resource	Potential	Level of Certainty
Coal, Oil & Gas, Sodium & Potassium	Low	C
Uranium & Thorium	Low	C

Geothermal Resources	Low	C
Locatable Metallic Minerals	Low	B
Non Metallic Minerals/Industrial Minerals	Low	C
Common Variety Minerals (Sand & Gravel)	Low	B

Source: D.E. Wahl 1997b, 1997c

3.3.1.2 Musnicki Property

The 640-acre Musnicki property is located in Cochise County on the western edge of the San Simon Valley, at the base of the Dos Cabezas Mountains. Most of the property appears relatively flat, but it slopes very gently uphill toward the south and west before rising abruptly into mountainous terrain along the southern and western borders (Zenitech 1998b). Elevation ranges between 4,000 and 4,400 feet. An ephemeral wash, Ninemile Creek, and a few tributary washes drain to the northeast. A small, apparently perennial pool is located amid boulders near the ranch site. Its source may be Ninemile Spring, located about 0.5 mile south of the property boundary (Zenitech 1998b). The property contains an old ranch house, the former headquarters of the Ninemile Ranch.

3.3.1.2.1 Land Use. The Musnicki property boundary totals 4.5 miles, of which 1.75 miles (or 39 percent) adjoin the 11,998-acre Dos Cabezas Mountains Wilderness (SWCA 1996c). The remaining 2.75 miles (or 61 percent) adjoin private lands or BLM-administered land not included in the Wilderness. The Dos Cabezas Mountains Wilderness is managed by the BLM to provide for the long-term protection and preservation of the area's wilderness character. Figure 2-28 shows the property in relation to surrounding land ownership.

The Musnicki property is physically accessible via an unnamed dirt road off Happy Camp Canyon Road. This unimproved road terminates at the Ninemile Ranch near the southern boundary of the property. No public access is currently authorized for this route although it is the only approach to the northeastern corner of the Dos Cabezas Mountains Wilderness from the north (ibid.). A road in Sheep Canyon to the east provides physical but not legal public access to the eastern end of the wilderness.

Table 3-28. Special Interest Species Potentially Occurring on the Amado and Curtis Properties, Graham County, Arizona

Species' Common Name	Scientific Name	Status*
Species That Are Known to Occur		
Common black-hawk	*Buteogallus anthracinus*	WSCA
Desert sucker	*Catostomus (Pantosteus) clarki*	SS
Gila chub	*Gila intermedia*	PE, WSCA
Longfin dace	*Agosia chrysogaster*	SS
Lowland leopard frog	*Rana yavapaiensis*	WSCA
Sonora sucker	*Catastomus insignis*	SS
Speckled dace	*Rhinichthys osculus*	SS
Spotted bat	*Euderma maculata*	SS, WSCA
Species That May Occur		
American peregrine falcon	*Falco peregrinus anatum*	WSCA
Aravaipa woodfern	*Thelypteris puberula var. sonorensis*	SS
Aravaipa sage	*Salvia amissa*	SS
Arizona giant sedge	*Carex spissa var. ultra*	SS
Bald eagle	*Haliaeetus leucocephalus*	T, WSCA
California leaf-nosed bat	*Macrotus californicus*	SS, WSCA
Canyon spotted whiptail	*Cnemidophorus burti*	SS
Cave myotis	*Myotis velifer*	SS
Fringed myotis	*Myotis thysanodes*	SS
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	E, WSCA
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	E, WSCA
Loggerhead shrike	*Lanius ludovicianus*	SS
Maricopa tiger beetle	*Cicindela oregona maricopa*	SS
Mexican long-tongued bat	*Choeronycteris mexicana*	SS, WSCA
Mexican garter snake	*Thamnophis eques*	WSCA
Northern gray hawk	*Asturina nitida maxima*	SS, WSCA
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	SS
Razorback sucker	*Xyrauchen texanus*	E, WSCA
Small-footed myotis	*Myotis ciliolabrum*	SS
Southwestern willow flycatcher	*Empidonax traillii extimus*	E, WSCA
Spikedace	*Meda fulgida*	T, WSCA
Three-nerved scurfpea	*Pediomelum trinervatum*	SS
Western burrowing owl	*Athene cunicularia hypugea*	SS
Western red bat	*Lasiuris blossevillii*	WSCA
White-faced ibis	*Plegadis chihi*	SS
Yellow-billed cuckoo	*Coccyzus americanus*	C, WSCA
Allen's (Mexican) big-eared bat	*Idionycteris phyllotis*	SS
Apache trout	*Onchorhynchus apache*	T, WSCA
Loach minnow	*Tiaroga cobitis*	T, WSCA

Table 3-28, continued. Special Interest Species Potentially Occurring on the Amado and Curtis Properties, Graham County, Arizona

Species' Common Name	Scientific Name	Status*
Species Unlikely to Occur		
Arizona cliffrose	*Purshia subintegra*	E, HS
Black-tailed prairie dog	*Cynomys ludovicianus*	C, WSCA
Brown pelican	*Pelacanus occidentalis*	E, WSCA
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum cactorum*	E, WSCA
Chiricahua leopard frog	*Rana chiricahuaensis*	T, WSCA
Chuckwalla	*Sauromalus obesus*	SS
Desert pupfish	*Cyprinodon macularius*	E, WSCA
Ferruginous hawk	*Buteo regalis*	WSCA
Fish Creek fleabane	*Erigeron piscaticus*	SS, SR
Goosefoot moonpod	*Ammocodon chenopodioides*	SS
Little Colorado sucker	*Catostomus sp.*	SS, WSCA
Long-legged myotis	*Myotis volans*	SS
Mexican spotted owl	*Strix occidentalis lucida*	T, WSCA
Mount Graham red squirrel	*Tamiasciurus hudsonicus grahamensis*	E, WSCA
Northern sagebrush lizard	*Sceloporus graciosus graciosus*	SS
Occult little brown bat	*Myostis lucifugus occultus*	SS
Peebles bluestar	*Amsonia peeblesii*	SS
Rosy boa	*Lichanura trivirgata*	SS
Sonoran desert tortoise	*Gopherus agassizii*	SS, WSCA
Western yellow bat	*Lasiuris xanthinus*	WSCA
Texas horned lizard	*Phrynosoma cornutum*	SS
Wet canyon talussnail	*Sonorella macrophallus*	CA
Big free-tailed bat	*Nyctinomops macrotis*	SS
Likelihood of Occurrence is Unknown		
Arizona giant sand treader cricket	*Daihinibaenetes arizonenesis*	SS
Chiricahua water scavenger beetle	*Cymbiodyta arizonica*	SS
Clifton rock daisy	*Perityle ambrosifolia*	SS
Navaho Jerusalem cricket	*Stenopelmatus navajo*	SS
Round-leaf broom	*Errazuria rotundata*	SS, SR
Texas globeberry	*Ibervilliea tenuisecta*	SS

* Status Key: E = Federal Endangered; T = Federal Threatened; PE = Federal Proposed Endangered; C = Federal Candidate; CA = Conservation Agreement; SS = BLM Sensitive Species; WSCA = Wildlife of Special Concern in Arizona (AGFD 1996); SR = Salvage Restricted under Arizona Native Plant Law.

Because this property is privately owned, no recreational uses by the public are authorized. However, potential recreational uses include, but are not limited to, hunting, hiking, camping, picnicking, photography, and bird and wildlife watching (ibid.).

This property is adjacent to the BLM's Ninemile grazing allotment, and PD has let a grazing lease for the property to the holder of the BLM allotment. In addition to the grazing lease, Valley Telephone Cooperative, Inc. has a buried telephone line on the property that provides service to the residential structure at Ninemile Ranch (S. George, scoping respondent, 1994). Phelps Dodge has let a month-to-month residential lease for the property. No other easements, rights-of-way, or other encumbrances are associated with this property. Phelps Dodge owns the mineral estate on 320 acres and the remaining acres are federal reserve minerals (Phelps Dodge Corporation 1996). Phelps Dodge also owns one surface water right of 15.0 af/yr from Ninemile Creek for agricultural, domestic, and stock watering use on this property (SWCA 1996c).

No formal visual quality analysis was completed for the Musnicki property; however, natural resource elements of the property that define its visual quality include moderate to heavy upland and riparian vegetation and gently sloping terrain that provides open vistas of the Dos Cabezas Mountains Wilderness and the San Simon Valley. The land to the extreme south and west is bouldery and rises steeply into the Dos Cabezas Mountains. A small area near the southern boundary of the property includes substantial human alterations to the natural environment, including the old Ninemile Ranch residence, storage sheds, a windmill and water tower, a corral, and various ranch and farming equipment (Zenitech 1998b). If acquired, the Musnicki property would be managed by BLM as VRM Class IV, for which the management objective is to provide for management activities that require major modification of the existing character of the landscape. The level of change can be high, but the visual impact of alterations should be minimized through careful location and minimal disturbance and by repeating the basic elements. The adjoining Dos Cabezas Mountains Wilderness is categorized as VRM Class I, for which the objective is to preserve the existing character of the landscape by allowing only very limited management activity. The level of change should be very low and must not attract attention (Safford District RMP; BLM 1991).

Aerial and ground inspection of the Musnicki property revealed no illegal dumping or evidence of underground storage tanks. Some surface staining, apparently from oil, was observed on the ranch road. Lead-acid batteries and containers of automotive cleaning agents and a cattle feed supplement were observed near the ranchhouse, but they were subsequently removed by the owner. The property is not located within one mile of a federal hazardous materials National Priority List site or an Arizona WQARF site; a zipACIDS site; or an RCRA transport, storage, or disposal facility. No ERNS sites are located on the property or in the vicinity. No registered UST sites are located on the property or on adjacent properties. No LUST sites, or open or closed landfills, are located on or within 0.5 mile of the property (Zenitech 1998b).

3.3.1.2.2 Physical Resources. The geology of the Musnicki property consists of early Miocene-to-Oligocene granitoid rocks, overlying much older Precambrian granitoid and metamorphic rocks. Surface geology includes fine-grained alluvial material derived from these parent rocks, with outcroppings of bedrock forming the transition from the San Simon Valley to the Dos Cabezas Mountains (Zenitech 1998b). The potential for occurrence of mineral resources on this property is summarized in Table 3-29.

3.3.1.2.3 Biological Resources. Upland slope vegetation includes mesquite, Palmer agave, wolfberry, desert hackberry, catclaw acacia, white-thorn acacia, prickly pear, turpentine bush, squawbush, ocotillo, beargrass, Coahuila juniper, Emory oak, and scrub oak. The majority of the property is vegetated by small mesquites, which increase in size along the dry washes, and other xeroriparian vegetation consisting of desert broom and desert willow (SWCA 1996d).

Wildlife species or sign observed during a site visit included black bear, gray fox, mule deer, coati, coyote, Harris' antelope squirrel, black-tailed jackrabbit, white-throated woodrat, common raven, cactus wren,

canyon wren, rock wren, canyon towhee, northern mockingbird, house finch, verdin, black-throated sparrow, Gambel's quail, phainopepla, greater roadrunner, red-tailed hawk, scrub jay, rattlesnake, and various lizards (SWCA 1996d). The AGFD classified this property as Resource Category IV habitat for wildlife.

Table 3-29. Summary of Mineral Potential of the Musnicki Property

Mineral Resource	Potential	Level of Certainty
Coal, Oil & Gas, Sodium & Potassium	Low	C
Uranium & Thorium	Low	C
Geothermal Resources	Low	C
Locatable Metallic Minerals	Low	C
Non-Metallic Minerals/Industrial Minerals	Low	C
Common Variety Minerals (Sand & Gravel)	Low	B

Source: D.E. Wahl 1997b, 1997c

The special interest species identified by federal and state agencies that may occur or are unlikely to occur on the Musnicki property, or for which the likelihood of occurrence is unknown, are listed in Table 3-30.

Table 3-30. Special Interest Species Potentially Occurring on the Musnicki Property, Cochise County, Arizona

Species' Common Name	Scientific Name	Status*
Species That May Occur		
American peregrine falcon	*Falco peregrinus anatum*	WSCA
Arizona giant sedge	*Carex spissa var. ultra*	SS
Big free-tailed bat	*Nyctinompos macrotis*	SS
California leaf-nosed bat	*Macrotus californicus*	SS, WSCA
Canyon spotted whiptail	*Cnemidophorus burti*	SS
Cave myotis	*Myotis velifer*	SS
Chiricahua leopard frog	*Rana chiricahuaensis*	T, WSCA
Fringed myotis	*Myotis thysanodes*	SS
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	E, WSCA
Loggerhead shrike	*Lanius ludovicianus*	SS
Longfin dace	*Agosia chrysogaster*	SS
Mexican long-tongued bat	*Choeronycteris mexicana*	SS, WSCA
Pinaleño hedgehog cactus	*Echinocereus ledingii*	SR
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	SS
Small-footed myotis	*Myotis ciliolabrum*	SS
Three-nerved scurfpea	*Pediomelum trinervatum*	SS
Western burrowing owl	*Athene cunicularia hypugea*	SS

Wilcox fishhook cactus	*Mammillaria wrightii wilcoxii*	SR
Species Unlikely to Occur		
Aravaipa woodfern	*Thelypteris puberula var. sonorensis*	SS
Aravaipa sage	*Salvia amissa*	SS
Bald eagle	*Haliaeetus leucocephalus*	T, WSCA
Beautiful shiner	*Cyprinella formosa*	T, WSCA

Table 3-30, continued. Special Interest Species Potentially Occurring on the Musnicki Property, Cochise County, Arizona

Species' Common Name	Scientific Name	Status*
Black-tailed prairie dog	*Cynomys ludovicianus*	C, WSCA
Brown pelican	*Pelacanus occidentalis*	E
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum*	E, WSCA
Canelo Hills ladies' tresses	*Spiranthes delitescens*	E, HS
Chuckwalla	*Sauromalus obesus*	SS
Cochise pincushion cactus	*Coryphantha robbinsorum*	T, HS
Desert sucker	*Catostomus (Pantosteus) clarki*	SS
Ferruginous hawk	*Buteo regalis*	WSCA
Fish Creek fleabane	*Erigeron piscaticus*	SS, SR
Allen's (Mexican) big-eared bat	*Idionycteris phyllotis*	SS
Gila chub	*Gila intermedia*	PE, WSCA
Huachuca water umbel	*Lillaeopsis schaffneriana ssp. recurva*	E, HS
Lemmon fleabane	*Erigeron lemmonii*	C
Little Colorado sucker	*Catostomus sp.*	SS, WSCA
Loach minnow	*Tiaroga cobitis*	T, WSCA
Long-legged myotis	*Myotis volans*	SS
Maricopa tiger beetle	*Cicindela oregona maricopa*	SS
Mexican gray wolf	*Canis lupus baileyi*	E, WSCA
Mexican spotted owl	*Strix occidentalis lucida*	T, WSCA
Mountain plover	*Charadrius montanus*	PT
New Mexican ridge-nosed rattlesnake	*Crotalus willardi obscurus*	T, WSCA
Northern sagebrush lizard	*Sceloporus graciosus graciosus*	SS
Northern aplomado falcon	*Falco femoralis*	E, WSCA
Northern gray hawk	*Asturina nitida maxima*	SS, WSCA
Occult little brown bat	*Myostis lucifugus occultus*	SS
Ocelot	*Leopardus (Felis) pardalis*	E, WSCA
Peebles bluestar	*Amsonia peeblesii*	SS
Ramsey Canyon leopard frog	*Rana subaquavocalis*	CA, WSCA
Rosy boa	*Lichanura trivirgata*	SS
Sonora sucker	*Catastomus insignis*	SS
Sonoran desert tortoise	*Gopherus agassizii*	SS, WSCA
Sonoran tiger salamander	*Ambystoma tigrinum stebbinsi*	E, WSCA
Southwestern willow flycatcher	*Empidonax traillii extimus*	E, WSCA
Speckled dace	*Rhinichthys osculus*	SS
Spikedace	*Meda fulgida*	T, WSCA
Spotted bat	*Euderma maculatum*	SS, WSCA
Texas horned lizard	*Phrynosoma cornutum*	SS
Yellow-billed cuckoo	*Coccyzus americanus occidentalis*	C, WSCA
White-faced ibis	*Plegadis chihi*	SS

Table 3-30, continued. Special Interest Species Potentially Occurring on the Musnicki Property, Cochise County, Arizona

Species' Common Name	Scientific Name	Status*
Whooping crane	*Grus americana*	E
Yaqui chub	*Gila purpurea*	E, WSCA
Yaqui catfish	*Ictalurus pricei*	T, WSCA
Yaqui topminnow	*Poeciliopsis occidentalis sonoriensis*	E, WSCA
Likelihood of Occurrence is Unknown		
Arizona giant sand treader cricket	*Daihinibaenetes arizonenesis*	SS
Chiricahua water scavenger beetle	*Cymbiodyta arizonica*	SS
Clifton rock daisy	*Perityle ambrosifolia*	SS
Goosefoot moonpod	*Ammocodon chenopodioides*	SS
Navaho Jerusalem cricket	*Stenopelmatus navajo*	SS
Round-leaf broom	*Errazuria rotundata*	SS, SR
Texas globeberry	*Ibervilliea tenuisecta*	SS

* Status Key: E = Federal Endangered; T = Federal Threatened; PE = Federal Proposed Endangered; PT = Federal Proposed Threatened; C = Federal Candidate; CA = Conservation Agreement; SS = BLM Sensitive Species; WSCA = Wildlife of Special Concern in Arizona (AGFD 1996); SR = Salvage Restricted under Arizona Native Plant Law; HS = Highly Safeguarded under Arizona Native Plant Law.

3.3.1.2.4 Cultural Resources. The property has not been systematically surveyed for cultural resources, although several sites have been recorded within a mile of it, and one site may have been recorded within it (SWCA 1996a). Recorded sites to the west and northwest of the property include five rock-shelter sites that, as a group, contain petroglyphs, bedrock mortars, roasting pits, potsherds, flaked-lithic artifacts, and pieces of shell. These sites are located at or near the base of the Dos Cabezas Mountains. Also present are one or two historic-to-recent trash scatters. Immediately northeast of the property is a probable habitation site with
surface structures, possible pit houses, and a variety of decorated pottery types that suggest an occupation date between A.D. 650 and 1150. A site recorded by Gila Pueblo as Ninemile Ruin may be located within the property. In addition, several unrecorded sites were observed during a visit to the property (SWCA 1996a). There may be additional sites yet unrecorded on the property.

3.3.1.2.5 Socioeconomic Resources. The Musnicki property is taxed as Agriculture/Ranch land, and PD paid Cochise County $1371 in private property taxes for this property in 1999. The grazing lease for this property generates approximately $100/lease-year to PD; a residential lease generates $240/year.

3.3.1.3 Schock Property

The 240-acre Schock property is located at the base of the Mustang Mountains, in the northeastern corner of Santa Cruz County, Arizona. Gently rolling hills rising to mountainous terrain along the eastern border dominate the topography. Elevation ranges from 5,000 to 5,600 feet. Two minor ephemeral washes drain the property (Zenitech 1998b).

3.3.1.3.1 Land Use. This property is a privately owned inholding within the Sonoita Valley Acquisition Planning District. Comprising about 100,800 acres of state, private, and BLM land, the Sonoita Valley Acquisition Planning District surrounds the 42,000-acre Las Cienegas NCA. Private and state land within the District has been identified as desirable for acquisition and addition to the Las Cienegas NCA per stipulations of the Las Cienegas National Conservation Area Establishment Act (HR 2941).

The Schock property has a total boundary of 3.0 miles, of which 0.5 abuts the Las Cienegas NCA and 0.5 abuts state lands. The remaining 2.0 miles border other private lands and BLM lands in the Sonoita Valley Acquisition Planning District (SWCA 1996c). Figure 2-29 shows the location of the Schock property in relation to surrounding land ownership.

This property, which is gated and fenced, is legally accessible to the public via a county-maintained paved road to Elgin, Arizona, off of State Highway 82. Because the property is privately owned, no public recreational uses are authorized. However, potential dispersed recreational uses of the property may include, but are not limited to, hiking and bird and wildlife watching (SWCA 1996c).

Other than a grazing lease, no other easements, rights-of-way, or residential leases are attached to the Schock property. Phelps Dodge owns the mineral estate on 160 acres, and the remaining 80 acres are federal reserve minerals (ibid.). No surface water rights have been filed for this property.

Some natural resource elements which define the property's visual resources include the rolling hills and open grasslands of the surrounding areas and a view of the monument-like volcanic core of Mount Bruce in the nearby Mustang Mountains. No buildings, mines, or other evidence of human development is visible on the property (ibid.). Visual resource management objectives for the neighboring Las Cienegas NCA, and BLM lands within the Sonoita Valley Acquisition Planning District, have been developed by the BLM's Tucson Field Office as part of an overall management plan for the NCA. Under the plan, most land in the planning area will be managed for the objectives of VRM Class II.

Aerial and ground inspection of the Schock property revealed no illegal dumping, surface staining, unusual odors, discarded waste containers, or indications of underground storage tanks or aboveground storage tanks. No federal hazardous materials National Priority List site; Arizona WQARF site; zipACIDS site; or RCRA transport, storage, or disposal facility is located within one mile of the Schock property. No LUST sites or open or closed landfills are located on or within 0.5 mile of the property. No registered UST sites are located on the property or on adjacent properties. No ERNS sites are located on the property or in the vicinity (Zenitech 1998b).

3.3.1.3.2 Physical Resources. The underlying geology of the Schock property consists of surficial deposits of Holocene to middle Pleistocene alluvium. Adjacent mountainous terrain is composed primarily of sedimentary rocks of Permian and Pennsylvanian age (Zenitech 1998b). The potential for occurrence of mineral resources on the Schock property was evaluated and is summarized below in Table 3-31.

Table 3-31. Summary of Mineral Potential of the Schock Property

Mineral Resource	Potential	Level of Certainty
Coal, Oil & Gas, Sodium & Potassium	Low	C
Uranium & Thorium	Low	C
Geothermal Resources	Low	C
Locatable Metallic Minerals	Low	B
Non-Metallic Minerals/Industrial Minerals	Low	C
Common Variety Minerals (Sand & Gravel)	Low	B

Source: D.E. Wahl 1997b

3.3.1.3.3 Biological Resources. Vegetation on the property is characteristic of the Semidesert Grassland community. The property appears to have been burned in the recent past, as evidenced by charred stumps of beargrass and has been heavily grazed by cattle and horses. Vegetative cover is dominated by both native and introduced grasses, including blue grama, black grama, side-oats grama, three awn, and lovegrass, interspersed with narrow-leafed yuccas, agaves, and beargrass. Shrubs occur in clumps or are widely spaced on the lower portions of the property, and increase in density uphill. Shrub and tree species observed include catclaw acacia, desert broom, sumac, ocotillo, mortonia, threadleaf groundsel, and fairy duster. Cactus and succulent species present include banana yucca, desert spoon, narrow-laved yucca, shindagger, prickly pear cactus, cane cholla, Arizona rainbow cactus, beargrass, Palmer agave, and Bisbee beehive cactus. A few mesquite trees are present in the lower portions of the property, and junipers are present at the higher elevations. Limestone outcrops upslope often had several species of ferns growing on them, as well as dense patches of shindaggers and some brilliantly colored patches of lichens (SWCA 1996d).

Wildlife observed during site visits included Gambel's quail, rock wren, chipping sparrow, rufous-winged sparrow, common raven, cactus wren, dark-eyed junco, rufous-sided towhee, canyon towhee, American pipit, horned lark, and mule deer. Although no pronghorn were observed, the AGFD documented them on the property during a 1992-1993 aerial survey (SWCA 1996d).

The special interest species identified by federal and state agencies that may occur or are unlikely to occur on the Schock property, or for which the likelihood of occurrence is unknown, are listed in Table 3-32.

3.3.1.3.4 Cultural Resources. The Schock property has not been surveyed for cultural resources, and no sites have been recorded in the vicinity. No cultural materials were observed during field reconnaissance. Archaeological sites—particularly flaked-lithic scatters—may occur on the property. The density of sites of this type, in the kind of setting represented by the Schock property, is anticipated to be relatively low. Nevertheless, the property may contain one or more archaeologically significant sites (SWCA 1996a).

3.3.1.3.5 Socioeconomic Resources. The Schock property, taxed as Agriculture/Ranch land, generated $1187 in property taxes for Santa Cruz County in 1999. Phelps Dodge currently receives $100/lease-year in grazing fees for the Schock property (Phelps Dodge Corporation 1996).

3.3.1.4 Feulner Property

The 320-acre Feulner property is located within Pima County, northwest of the Whetstone Mountains about 1.0 mile east of Cienega Creek. Topography in the area consists of sparsely vegetated hills cut by entrenching arroyos draining west into the creek. The property is bisected from the southeast to the northwest by an ephemeral wash. Elevation on the property ranges from 4,100 to 4,400 feet (Zenitech 1998b).

3.3.1.4.1 Land Use. This privately owned property lies within the perimeter of the Sonoita Valley Acquisition Planning District and 1.0 mile from the Las Cienegas NCA boundary. The property has a total boundary of 3.0 miles, all of which abuts state lands (SWCA 1996c). Figure 2-30 shows the property and surrounding land ownership.

The Feulner property is physically accessible via a maintained, gated but unlocked, gravel road off of Interstate 10 eastbound southeast of Tucson. The route crosses state and possibly private land, providing access for ranchers in the vicinity, and for Sierra Southwest Transco, Tucson Electric Power Company, and Southwest Gas Company to maintain a 115 kV powerline, a 138 kV powerline, and a natural gas

pipeline, respectively (SWCA 1996c). The road does not provide legal public access to the property. Application would have to be made to the Arizona State Land Department to authorize public use of the road, and permission would have to be obtained from any private landowner whose property is crossed.

Table 3-32. Special Interest Species Potentially Occurring on the Schock Property, Santa Cruz County, Arizona

Species' Common Name	Scientific Name	Status*
Species That May Occur		
Allen's (Mexican) big-eared bat	*Idionycteris phyllotis*	SS
Baird's sparrow	*Ammodramus bairdii*	WSCA
Bartram stonecrop	*Graptopetalum bartramii*	SS
Big free-tailed bat	*Nyctinomops macrotis*	SS
Button cactus	*Epithelantha micromeris*	SR
California leaf-nosed bat	*Macrotus californicus*	SS, WSCA
Canyon spotted whiptail	*Cnemidophorus burti*	SS
Cave myotis	*Myotis velifer*	SS
Fringed myotis	*Myotis thysanodes*	SS
Huachuca golden aster	*Heterotheca rutteri*	SS
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	E, WSCA
Loggerhead shrike	*Lanius ludovicianus*	SS
Mexican long-tongued bat	*Choeronycteris mexicana*	SS, WSCA
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	SS
Santa Cruz beehive cactus	*Coryphantha recurvata*	SS, HS
Small-footed myotis	*Myotis ciliolabrum*	SS
Sonoran desert tortoise	*Gopherus agassiz*	SS, WSCA
Sprague's pipit	*Anthus spragueii*	WSCA
Western burrowing owl	*Athene cunicularia hypugea*	SS
Species Unlikely to Occur		
American peregrine falcon	*Falco peregrinus anatum*	WSCA
Arizona giant sedge	*Carex spissa var. ultra*	SS
Bald eagle	*Haliaeetus leucocephalus*	T, WSCA
Brown pelican	*Pelacanus occidentalis*	E
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum*	E, WSCA
Canelo Hills ladies' tresses	*Spiranthes delitescens*	E, HS
Chiricahua leopard frog	*Rana chiricahuensis*	T, WSCA
Chuckwalla	*Sauromalus obesus*	SS
Desert sucker	*Catostomus (Pantosteus) clarki*	SS
Desert pupfish	*Cyprinodon macularius*	E, WSCA
Ferruginous hawk	*Buteo regalis*	WSCA
Gentry indigobush	*Dalea tentaculoides*	SS
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	E, WSCA
Huachuca milkvetch	*Astragalus hypoxylus*	SS
Huachuca spring snail	*Pyrgulopsis thompsoni*	C

Huachuca water umbel	*Lillaeopsis schaffneriana ssp. recurva*	E, HS

Table 3-32, continued. Special Interest Species Potentially Occurring on the Schock Property, Santa Cruz County, Arizona

Species' Common Name	Scientific Name	Status*
Long-legged myotis	*Myotis volans*	SS
Longfin dace	*Rhinicthys chrysogaster*	SS
Gila chub	*Gila intermedia*	PE, WSCA
Mexican gray wolf	*Canis lupus baileyi*	E, WSCA
Mexican spotted owl	*Strix occidentalis lucida*	T, WSCA
Northern gray hawk	*Asturina nitida maxima*	SS, WSCA
Northern aplomado falcon	*Falco femoralis*	E, WSCA
Occult little brown bat	*Myostis lucifugus occultus*	SS
Ocelot	*Leopardus (Felis) pardalis*	E, WSCA
Pima pineapple cactus	*Coryphantha scheerii robustispina*	E, HS
Rosy boa	*Lichanura trivirgata*	SS
Santa Cruz striped agave	*Agave parviflora ssp. parvilfora*	SS, HS
Sonora sucker	*Catastomus insignis*	SS
Sonora chub	*Gila ditaenia*	T, WSCA
Sonoran tiger salamander	*Ambystoma tigrinum stebbinsi*	E, WSCA
Southwestern willow flycatcher	*Empidonax traillii extimus*	E, WSCA
Speckled dace	*Rhinichthys osculus*	SS
Spotted bat	*Euderma maculatum*	SS, WSCA
Stephan's riffle beetle	*Heterelmis stephani*	C
Texas purple spike	*Hexalectris warnockii*	SS, HS
Texas horned lizard	*Phrynosoma cornutum*	SS
Tumamoc globeberry	*Tumamoca macdougalii*	SS, SR
Underwood's mastiff bat	*Eumops underwoodi*	SS
White-faced ibis	*Plegadis chihi*	SS
Yellow-billed cuckoo	*Coccyzus americanus occidentalis*	C, WSCA
Likelihood of Occurrence is Unknown		
Balloonvine	*Cardiospermum corindum*	SS
Chisos Mountain coralroot	*Hexalectris revoluta*	SS
Cocherell's striate disc	*Discus shemeki cockerelli*	SS
Dalhouse spleenwort	*Asplenium (Ceterach) dalhousiae*	SS
Santa Rita Mountains chlorochroan bug	*Chlorochroa rita*	SS

* Status Key: E = Federal Endangered; T = Federal Threatened; PE = Federal Proposed Endangered; C = Federal Candidate; SS = BLM Sensitive Species; WSCA = Wildlife of Special Concern in Arizona (AGFD 1996); SR = Salvage Restricted under Arizona Native Plant Law; HS = Highly Safeguarded under Arizona Native Plant Law.

Because the property is privately held, no public recreational uses are authorized. Potential recreational uses include, but are not limited to, hiking, camping, picnicking, hunting, and bird and wildlife watching. No eligible or recommended river segments occur on the property; however, the property is within the watershed of a portion of Cienega Creek recommended by the BLM and the Department of the Interior for Wild and Scenic River designation (ibid.).

Currently PD has let a grazing lease for the property, but no easements, rights-of-way, residential leases, or other encumbrances have been negotiated for this property. Minerals are reserved by the federal government. One surface water right belonging to Empirita Ranch Corporation for 3.0 af/yr from Upper Coyote Spring has been filed for stock watering use on the property (SWCA 1997i).

No formal visual quality analysis has been completed for the Feulner property; however, some natural resource elements of the area that define its visual quality include native grassland and woodland vegetation, and surrounding rolling hills (SWCA 1996c). No buildings, mines, or other indications of development are visible on the property (Zenitech 1998b). Visual resource management objectives for the nearby Las Cienegas NCA, and BLM lands within the Sonoita Valley Acquisition Planning District, have been developed by the BLM's Tucson Field Office as part of an overall management plan for the NCA. Under the plan, most land in the planning area will be managed for the objectives of VRM Class II.

An aerial inspection of the Feulner property revealed no buildings, waste containers, illegal dumping, mining, or other indications of development. No federal hazardous materials National Priority List site; Arizona WQARF site; zipACIDS site; or RCRA transport, storage, or disposal facility is located within one mile of the property. No LUST sites or open or closed landfills are located on or within 0.5 mile of the property. No registered UST sites are located on the property or on adjacent properties. No ERNS sites are located on the property or in the vicinity (Zenitech 1998b).

3.3.1.4.2 Physical Resources. The Feulner property consists of older surficial deposits of middle Pleistocene to late Pliocene alluvium. The subsurface geology consists of sedimentary rocks of Permian and Pennsylvanian age that has minimal surface exposure (Zenitech 1998b). The potential for occurrence of mineral resources on the Feulner property was evaluated and is summarized in Table 3-33.

Table 3-33. Summary of Mineral Potential of the Feulner Property

Mineral Resource	Potential	Level of Certainty
Coal, Oil & Gas, Sodium & Potassium	Low	C
Uranium & Thorium	Low	C
Geothermal Resources	Low	C
Locatable Metallic Minerals	Low	B
Non-Metallic Minerals/Industrial Minerals	Low	C
Common Variety Minerals (Sand & Gravel)	Low	B

Source: D.E. Wahl 1997b

3.3.1.4.3 Biological Resources. The Feulner property contains elements of both the Semidesert Grassland and the Arizona Upland Subdivision vegetative communities of the Sonoran Desertscrub biome. The wash's riparian vegetation is dominated by white-thorn acacia, mesquite, netleaf hackberry, desert broom, desert sumac, and rubber rabbitbrush. Common shrubs in the uplands include fairy-duster, white-thorn acacia, catclaw acacia, banana yucca, desert spoon, creosote bush, ocotillo, mortonia, Mexican crucillo, shindaggers, and Palmer agave. Cacti observed on the property include prickly pear, Fendler hedgehog cactus, Arizona rainbow cactus, needle-spined pineapple cactus, Bisbee beehive cactus, barrel cactus, cane cholla, and desert Christmas cactus. At least 10 needle-spined pineapple cacti, formerly a federal Category 2 candidate species, were observed on the property. Grasses commonly observed included Arizona cottontop, green sprangletop, spidergrass, three-awns, cane

beardgrass, side-oats grama, Lehman lovegrass, and slim tridens (SWCA 1996d).

Habitats on this property are considered by the AGFD to be Resource Category III (medium to high resource value for Arizona wildlife species and considered relatively abundant on a statewide basis). Wildlife is expected to be typical of the habitats represented on the property (SWCA 1996d).

The special interest species identified by federal and state agencies that may occur or are unlikely to occur on the Feulner property, or for which the likelihood of occurrence is unknown, are listed in Table 3-34.

3.3.1.4.4 Cultural Resources. The property has not been surveyed for cultural resources, and no sites have been recorded there. However, an unrecorded rock feature and several isolated flaked-lithic artifacts were noted during a reconnaissance of the property (SWCA 1996a). These included several cores and one flake observed on the benches and low hills that flank the primary drainage. The benches are covered by a dense growth of white-thorn acacia, making observation difficult, and it is likely that more artifacts are present than were seen during reconnaissance. The presence of the rock feature and artifacts suggests that additional, archaeologically significant sites are probably present on the Feulner property.

3.3.1.4.5 Socioeconomic Resources. The Feulner property is taxed as Agricultural/Ranch land and generated $103 in property taxes for Pima County in 1999. Phelps Dodge receives $150 annually in grazing fees for this property (Phelps Dodge Corporation 1996).

3.3.2 Optional Package

The optional package of offered lands consists of the following PD-owned properties: Tavasci Marsh, Freeland, Butler-Borg, Norton, Clyne I, and Clyne II. The Tavasci Marsh property borders the National Park Service-administered Tuzigoot National Monument in Yavapai County; the Freeland and Butler-Borg properties are clustered with the Musnicki property adjacent to the Dos Cabezas Mountains Wilderness in Cochise County; and the Clyne I and Clyne II properties, located in Pima County, lie within the Sonoita Valley Acquisition District, as do the Schock and Feulner properties. The Clyne I property also borders the BLM-administered Las Cienegas NCA.

3.3.2.1 Tavasci Marsh Property

This offered property is located approximately two miles east of the community of Clarkdale in Yavapai County, Arizona. The Verde River cuts across the southwestern corner of the 324-acre property, which is composed mostly of undeveloped, flat marshland and the overlooking bluffs. Elevation ranges from 3,300 to 3,800 feet (Zenitech 1998b).

Table 3-34. Special Interest Species Potentially Occurring on the Feulner Property, Pima County, Arizona

Species' Common Name	Scientific Name	Status*
Species That May Occur		
Allen's (Mexican) big-eared bat	*Idionycteris phyllotis*	SS
American peregrine falcon	*Falco peregrinus anatum*	WSCA
Big free-tailed bat	*Nyctinomops macrotis*	SS
California leaf-nosed bat	*Macrotus californicus*	SS, WSCA
Canyon spotted whiptail	*Cnemidophorus burti*	SS
Cave myotis	*Myotis velifer*	SS
Fringed myotis	*Myotis thysanodes*	SS
Huachuca golden aster	*Heterotheca rutteri*	SS
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	E, WSCA
Loggerhead shrike	*Lanius ludovicianus*	SS
Mexican long-tongued bat	*Choeronycteris mexicana*	SS, WSCA
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	SS
San Carlos wild-buckwheat	*Eriogonum capillare*	SR
Santa Cruz beehive cactus	*Coryphantha recurvata*	SS, HS
Small-footed myotis	*Myotis ciliolabrum*	SS
Sonoran desert tortoise	*Gopherus agassizii*	SS, WSCA
Western burrowing owl	*Athene cunicularia hypugea*	SS
Species Unlikely to Occur		
Acuna cactus	*Echinomastus erectrocentrus acunensis*	C, HS
Arizona giant sedge	*Carex spissa var. ultra*	SS
Bald eagle	*Haliaeetus leucocephalus*	T, WSCA
Bartram's stonecrop	*Graptopetalum bartramii*	SS, SR
Brown pelican	*Pelacanus occidentalis*	E,
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum cactorum*	E, WSCA
Chiricahua leopard frog	*Rana chiricahuaensis*	T, WSCA
Chuckwalla	*Sauromalus obesus*	SS
Desert sucker	*Catostomus (Pantosteus) clarki*	SS
Desert pupfish	*Cyprinodon macularius*	E, WSCA
Ferruginous hawk	*Buteo regalis*	WSCA
Gentry indigobush	*Dalea tentaculoides*	SS, HS
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	E, WSCA

Table 3-34, continued. Special Interest Species Potentially Occurring on the Feulner Property, Pima County, Arizona

Species' Common Name	Scientific Name	Status*
Gila chub	*Gila intermedia*	PE, WSCA

Table 3-34, continued. Special Interest Species Potentially Occurring on the Feulner Property, Pima County, Arizona

Species' Common Name	Scientific Name	Status*
Gooddings onion	*Allium gooddingii*	CA, HS
Huachuca milk vetch	*Astragalus hypoxylus*	SS
Huachuca water umbel	*Lillaeopsis schaffneriana ssp. recurva*	E, HS
Kearney's blue star	*Amsonia kearneyana*	E, HS
Loach minnow	*Tiaroga cobitis*	T, WSCA
Long-legged myotis	*Myotis volans*	SS
Longfin dace	*Agosia chrysogaster*	SS
Masked bobwhite	*Colinus virginianus*	E, WSCA
Mexican gray wolf	*Canis lupus baileyi*	E, WSCA
Mexican garter snake	*Thamnophis eques*	SS, WSCA
Mexican spotted owl	*Strix occidentalis lucida*	T, WSCA
Nichol's Turk's head cactus	*Echinocactus horizonthalonius* var. *nicholii*	E, HS
Northern gray hawk	*Asturina nitida maxima*	SS, WSCA
Occult little brown bat	*Myotis lucifugus occultus*	SS
Ocelot	*Leopardus (Felis) pardalis*	E, WSCA
Pima pineapple cactus	*Coryphantha scheerii robustispina*	E, HS
Rosy boa	*Lichanura trivirgata*	SS
San Xavier talussnail	*Sonorella macrophallus*	CA
Santa Cruz striped agave	*Agave parviflora ssp. parviflora*	SS, HS
Sonora sucker	*Catastomus insignis*	SS
Sonoran pronghorn	*Antilocarpa americana*	E, WSCA
Sonoyta mud turtle	*Kinosternon sonoriense longifemorale*	C
Southwestern willow flycatcher	*Empidonax traillii extimus*	E, WSCA
Speckled dace	*Rhinichthys osculus*	SS
Spikedace	*Meda fulgida*	T, WSCA
Spotted bat	*Euderma maculatum*	SS, WSCA
Texas purple spike	*Hexalectris warnockii*	SS, HS
Texas horned lizard	*Phrynosoma cornutum*	SS
Tumamoc globeberry	*Tumamoca macdougalii*	SS, SR
Underwood's mastiff bat	*Eumops underwoodi*	SS
White-faced ibis	*Plegadis chihi*	SS
Yellow-billed cuckoo	*Coccyzus americanus occidentalis*	C, WSCA
Likelihood of Occurrence is Unknown		
Balloonvine	*Cardiospermum corindum*	SS
Chisos Mountain coralroot	*Hexalectris revoluta*	SS
Cocherell's striate disc	*Discus shemeki cockerelli*	SS

Table 3-34, continued. Special Interest Species Potentially Occurring on the Feulner Property, Pima County, Arizona

Species' Common Name	Scientific Name	Status*
Dallhouse spleenwort	*Asplenium (Ceteracach) dalhousiae*	SS
Santa Rita Mountains chlorochroan bug	*Chlorochroa rita*	SS

* Status Key: E = Federal Endangered; T = Federal Threatened; PE = Federal Proposed Endangered; C = Federal Candidate; CA = Conservation Agreement; SS = BLM Sensitive Species; WSCA = Wildlife of Special Concern in Arizona (AGFD 1996); SR = Salvage Restricted under Arizona Native Plant Law; HS = Highly Safeguarded under Arizona Native Plant Law.

3.3.2.1.1 Land Use. The Tavasci Marsh property, which was acquired by PD's predecessors in interest in 1929, encompasses the Tavasci Marsh Habitat Restoration Project, a spring-fed, naturally occurring wetland currently managed by the AGFD per a cooperative agreement with PD. Tuzigoot National Monument, which is managed by the National Park Service, borders on the west,[24] as does privately-owned property. National forest lands managed by the U.S. Forest Service adjoin the property on the east and north. The Verde River Greenway, a six-mile reach of the Verde River managed by Arizona State Parks, and Dead Horse Ranch State Park adjoin the property on the south, in addition to a small section of privately owned property. Figure 2-31 generally shows the property in relation to surrounding land ownership.

AGFD's management objectives for the Tavasci Marsh Habitat Restoration Project are to restore and preserve wetland habitat for wildlife, including threatened and endangered species, and to provide educational and recreational opportunities in the marsh that are compatible with its sensitive nature (Phelps Dodge Development Corporation 1990). Improvements for habitat restoration include two water control structures. Recreational facilities include a hiking trail that leads through the marsh to an observation platform for wildlife and bird watching. Informational signs have been posted around the property. No camping or hunting is allowed on the property.

Tuzigoot National Monument was created to preserve Tuzigoot Ruin, the remnant of a prehistoric Sinaguan Indian pueblo. National Park Service management objectives for the Monument include making the site available to the public and providing interpretive information. The Verde River Greenway is managed to conserve natural resources, preserve cultural resources, and develop recreational opportunities. Tavasci Marsh is located within the 500-year floodplain of the Greenway.

The privately owned property to the west of Tavasci Marsh contains 98-acre Pecks Lake; a nine-hole golf course built in 1925; and the 120-acre, inactive Clarkdale tailing pile (Zenitech 1998b). Land use for several decades has been solely agricultural; however, the property may be developed as a residential community in the future.

The Tavasci Marsh property is accessible via four routes: 1) a gravel road between Pecks Lake and Dead Horse Ranch State Park; 2) a primitive hiking trail along the north bank of the Verde River; 3) a gravel road that approaches the property from the southeast; and 4) a gravel road from Tuzigoot National Monument. The first three routes provide legal public access. The fourth route is usable only by special

[24] The Tavasci Marsh property borders Tuzigoot National Monument but lies within a much larger area defined by the congressionally approved "boundary" of the monument. This boundary does not signify land ownership—it encompasses private and state lands as well as the monument itself—rather it defines an area that Congress believed should comprise an enlarged monument. The National Park Service is authorized to acquire available non-federal land within the approved boundary through purchase, donation, or exchange for inclusion in the monument.

permit from the National Park Service (SWCA 1996c). Wildlife and bird watching are important recreational activities on this property. Hiking opportunities are available as well.

A grazing lease excluding the Tavasci Marsh Habitat Restoration Project has been let for this property. No residential leases, rights-of-way, or other encumbrances are associated with the property. Telephone cables run through portions the property, both above and below ground. Phelps Dodge owns the mineral estate. Phelps Dodge also owns water rights for 806.5 af/yr from Shea Spring for stock watering, municipal, commercial, mining, and wildlife uses (SWCA 1997i). Shea Spring is the principal spring feeding Tavasci Marsh.

No formal visual quality analysis of the property was completed; however, some natural resource elements of the Tavasci Marsh property which define its visual quality include lush green marsh; riparian vegetation; open water; and limestone river terraces that form steep, whitish bluffs overlooking and contrasting with the marsh (SWCA 1996c). No other indications of development are evident on the property. The view to the north and east is dominated by red and gray mesas. Tuzigoot Ruin is visible atop a ridge on the southwestern side of the property, and the historic mining town of Jerome can be seen on a distant mountainside to the west. From certain vantage points on the property, the Verde Valley is visible at the base of the Mogollon Rim to the southeast.

A Phase I Environmental Assessment was performed for the Tavasci Marsh property (Aplomado 1999). Site inspection of the Tavasci Marsh property revealed no indications of dumping of hazardous waste, soil staining, chemical storage containers, or chemical odors. Two abandoned vehicle bodies were observed in the southeastern corner of the property, but no electrical transformers, USTs, ASTs, wells, drywells, potable water sources, or sewage/wastewater systems were indicated from interviews, site reconnaissances, or database reviews conducted for this property. No federal National Priority List site; Arizona WQARF site; or RCRA transport, storage, or disposal facility is located within one mile of this property. No LUST sites or open or closed landfills are located on or within 0.5 mile of the property. No registered UST sites are located on the property; a closed UST (ID No. AT 9340) is located on the historic dairy farm adjacent to the property. No ERNS sites are located on the property or in the vicinity (Aplomado 1999).

One zipACIDS site, the Phelps Dodge Verde Tailing site (Clarkdale tailing pile),[25] is located about 0.7 mile from the Tavasci Marsh property on the land being considered for future residential development. The majority of stormwater runoff from that land drains into Pecks Lake, which then discharges to Tavasci Marsh, and a smaller amount drains directly into the marsh. To determine if the Verde site's tailing pile was releasing metals into Tavasci Marsh, samples of surface water and sediment from several locations in the marsh were analyzed in 1993 and re-evaluated in 1997. While the test findings showed elevated levels of arsenic and chromium in some samples, elevated concentrations of arsenic found in surface waters and groundwaters throughout the Verde Valley have been attributed to natural leaching from the underlying Verde Formation (Baker et al. 1994).

At the request of the National Park Service, which would ultimately acquire the site from the BLM under the land exchange alternative, further testing was done at Tavasci Marsh to address the potential for ecological risk to aquatic organisms from elevated levels of metals in the marsh sediments. The 1999 report prepared by URS Greiner Woodward Clyde entitled "Tavasci Marsh Supplemental Sampling Report" showed that levels of metals in the sediment of Tavasci Marsh, with one exception, are below benchmarks that would indicate a risk to the organisms in the marsh. The one exception is in a single

[25] This site is listed in the Arizona CERCLA Information and Data System (zipACIDS) as zipACIDS No. 1053, EPA ID No. AZD983475773. Listing means the location is under investigation for possible contamination of soil, surface water, or groundwater.

sediment sample in which arsenic exceeds the benchmark. This exception is, in itself, not indicative of an unsuitable habitat. Tests for toxicity of the sediment and surface water further suggest that conditions in the marsh are not adversely affecting aquatic life.

3.3.2.1.2 Physical Resources. The Tavasci Marsh property is located in part of an abandoned oxbow of the Verde River on portions of the Verde River floodplain and alluvial terraces. The terrain is composed of recent Holocene sand and gravel fluvial deposits within the old riverbed, with Pliocene-to-middle Miocene sediments comprising the floodplain and terraces. These are capped in areas by Quaternary surficial deposits (Zenitech 1998b). The potential for the occurrence of six groups of mineral resources on the Tavasci Marsh property is summarized in Table 3-35. For an explanation of the Mineral Potential Classification System as used in this table see Section 3.2.2.3.2 of this document.

Table 3-35. Summary of Mineral Potential of the Tavasci Marsh Property

Mineral Resource	Potential	Level of Certainty
Coal, Oil & Gas, Sodium & Potassium	Low	C
Uranium & Thorium	Low	C
Geothermal Resources	Low	C
Locatable Metallic Minerals	Low	C
Non-Metallic Minerals/Industrial Minerals	Low	C
Common Variety Minerals (Sand & Gravel)	Moderate	B

Source: D.E. Wahl 1997b

3.3.2.1.3 Biological Resources. Vegetation on the site has been categorized as belonging to five different vegetation associations and one disturbed habitat, all of which intergrade with each other (SWCA 1996d). These vegetation associations are as follows:

- Sonoran Interior Marshland, *Typha domingensis* Association, with a variety of other wetland plants (bulrush, sedges, spikerushes, and willow) mixed in with the cattails and including areas of open water, with submergent and floating plants;
- Cottonwood-Willow Association (Fremont cottonwood-Goodding willow);
- Mesquite-Hackberry Association;
- Sonoran Riparian Woodland;
- Crucifixion Thorn-Juniper-Creosotebush Association on the limestone terrace above the marsh; and
- Disturbed areas impacted by drainage, grazing, or other human activities, but that are recovering to become marshland, mesquite or cottonwood-willow woodland.

Tavasci Marsh is a popular place for bird watching. More than 110 species of birds have been recorded from the marsh, including several species of marsh-dependent birds and riparian-obligate birds likely to nest or summer there. Species dependent upon the marsh and associated riparian woodland habitats that were observed during reconnaissance of the property in 1996 included yellow-billed cuckoo, great blue heron,

black-crowned night heron, northern harrier, white-faced ibis, yellow warbler, yellow-breasted chat, pied-billed grebe, mallard, green-winged teal, sora, common moorhen, American coot, common yellowthroat, red-winged blackbird, lesser goldfinch, and song sparrow (SWCA 1996d). Also seen were birds that frequent the adjacent upland communities or roost in trees at the edge of the marsh including red-tailed hawk, Cooper's hawk, barn owl, great horned owl, cactus wren, Bewick's wren, rock wren, northern rough-winged swallow, turkey vulture, Gambel's quail, mourning dove, white-winged dove, greater roadrunner, black-chinned hummingbird, Gila woodpecker, ladder-backed woodpecker, black phoebe, Say's phoebe, ash-throated flycatcher, western kingbird, vermillion flycatcher, verdin, northern mockingbird, Bell's vireo, summer tanager, western tanager, northern cardinal, blue grosbeak, canyon towhee, Abert's towhee, rufous-crowned sparrow, black-throated sparrow, great-tailed grackle, house finch, and brown-headed cowbird. The endangered Yuma clapper rail has been reported from Tavasci Marsh, and the endangered southwestern willow flycatcher has been known to nest there and along the Verde River near the property. Bald eagles and peregrine falcons are known to forage in the vicinity. AGFD rates this property as Resource Category I habitat. Habitats in this category are of the highest value to Arizona wildlife species and are unique and/or irreplaceable on a statewide or regional basis. The National Audubon Society designated Tavasci Marsh and neighboring riparian habitat as the first "Important Bird Area" in the State of Arizona.

The special interest species identified by federal and state agencies that are known to occur, may occur, or are unlikely to occur on the Tavasci Marsh property, or for which the likelihood of occurrence is unknown, are listed in Table 3-36. The portion of the Verde River and its 100-year floodplain on the property is designated critical habitat for the razorback sucker, spikedace, and loach minnow. Areas of the Verde River from Sob Canyon to its inflow into Horseshoe Reservoir, including Tavasci Marsh and Ister Flat, are designated critical habitat for the southwestern willow flycatcher.

Table 3-36. Special Interest Species Potentially Occurring on the Tavasci Marsh Property, Yavapai County, Arizona

Species' Common Name	Scientific Name	Status*
Species That Are Known to Occur		
Osprey	*Pandion haliaetus*	WSCA
Southwestern willow flycatcher	*Empidonax traillii extimus*	E, WSCA
Yellow-billed cuckoo	*Coccyzus americanus*	C, WSCA
Yuma clapper rail	*Rallus longirostris yumanensis*	E, WSCA
Species That May Occur		
Allen's (Mexican) big-eared bat	*Idionycteris phyllotis*	SS
American bittern	*Botaurus lentiginosus*	WSCA
American peregrine falcon	*Falco peregrinus anatum*	WSCA
Arizona cliff rose	*Purshia subintegra*	E, HS
Arizona giant sedge	*Carex spissa var. ultra*	SS
Bald eagle	*Haliaeetus leucocephalus*	T, WSCA
Big free-tailed bat	*Nyctinompos macrotis*	SS
Brown pelican	*Pelacanus occidentalis*	E, WSCA
Cave myotis	*Myotis velifer*	SS
Chiricahua leopard frog	*Rana chiricahuaensis*	T, WSCA
Ferruginous hawk	*Buteo regalis*	WSCA

Fringed myotis	*Myotis thysanodes*	SS

Table 3-36, continued. Special Interest Species Potentially Occurring on the Tavasci Marsh Property, Yavapai County, Arizona

Species' Common Name	Scientific Name	Status*
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	E, WSCA
Gila chub	*Gila intermedia*	PE, WSCA
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	E, WSCA
Loggerhead shrike	*Lanius ludovicianus*	SS
Long-legged myotis	*Myotis volans*	SS
Lowland leopard frog	*Rana yavapaiensis*	WSCA
Maricopa tiger beetle	*Cicindela oregona maricopa*	SS
Mexican garter snake	*Thamnophis eques*	WSCA
Page springsnail	*Pyrgulopsis morrisoni*	C, WSCA
Razorback sucker	*Xyrauchen texanus*	E, WSCA
Ripley wild-buckwheat	*Eriogonum ripleyi*	SR
Small-footed myotis	*Myotis ciliolabrum*	SS
Spikedace	*Meda fulgida*	T, WSCA
Spotted bat	*Euderma maculatum*	SS, WSCA
Verde Valley sage	*Salvia dorrii mearnsii*	SR
Roundtail chub	*Gila robusta*	WSCA
Western red bat	*Lasiuris blossevillii*	WSCA
White-faced ibis	*Plegadis chihi*	SS
Species That Are Unlikely to Occur		
Arizona agave	*Agave arizonica*	E, HS
California leaf-nosed bat	*Macrotus californicus*	SS, WSCA
Chuckwalla	*Sauromalus obesus*	SS
Colorado pikeminnow	*Ptchocheilus lucius*	E, WSCA
Desert pupfish	*Cyprinodon macularius*	E, WSCA
Desert sucker	*Catostomus (Pantosteus) clarki*	SS
Kofa Mountain barberry	*Berberis harrisoniana*	SS
Loach minnow	*Tiaroga cobitis*	T, WSCA
Longfin dace	*Agosia chrysogaster*	SS
Mexican spotted owl	*Strix occidentalis lucida*	T, WSCA
Mexican long-tongued bat	*Choeronycteris mexicana*	SS, WSCA
Murphey agave	*Agave murpheyi*	SS
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	SS
Rosy boa	*Lichanura trivirgata*	SS
Sonora sucker	*Catastomus insignis*	SS

Table 3-36, continued. Special Interest Species Potentially Occurring on the Tavasci Marsh Property, Yavapai County, Arizona

Species' Common Name	Scientific Name	Status*
Sonoran desert tortoise	*Gopherus agassizii*	SS
Speckled dace	*Rhinichthys osculus*	SS
Tumamoc globeberry	*Tumamoca macdougalii*	SS, SR
Species for Which Likelihood of Occurrence is Unknown		
Arizona skink	*Eumeces gilberti arizonensis*	SS, WSCA
Arizona Sonoran rosewood	*Vauguelinia californica ssp. sonorensis*	SS
California flannelbush	*Fremontodendron californica*	SS, SR
MacNeil sooty wing skipper	*Hesperopsis gracielae*	SS
Schott wire-lettuce	*Stephanomeria schottii*	SS

* Status Key: E = Federal Endangered; T = Federal Threatened; PE = Federal Proposed Endangered; C = Federal Candidate; SS = BLM Sensitive Species; WSCA = Wildlife of Special Concern in Arizona (AGFD 1996); SR = Salvage Restricted under Arizona Native Plant Law; HS = Highly Safeguarded under Arizona Native Plant Law.

3.3.2.1.4 Cultural Resources. The Tavasci Marsh property contains multiple archaeological sites, both prehistoric and historic, that are eligible to the *National Register of Historic Places*. Although the property was surveyed in 1986, a recent visit suggests that additional archaeological sites can be located and characterized (SWCA 1996a).

The cultural history of the Tavasci Marsh area is fairly well known because of research at Tuzigoot National Monument. Hohokam farmers colonized the valley by A.D. 800, but by A.D. 1125 were displaced by the Sinagua. Tuzigoot Pueblo was started just before A.D. 1000 and was occupied until about A.D. 1425. By the time the Spanish first explored the Verde Valley, the Yavapai and the Tonto Apache had settled in the area. By the 1860s, Euroamericans began settling the valley, and within a decade the Native American population had been pushed out. In the 1880s, the copper boom at Jerome heralded the start of the intensive settlement of the valley (SWCA 1996a).

3.3.2.1.5 Socioeconomic Resources. In 1999, this property, taxed as Vacant Land, generated property taxes of $2,629 for Yavapai County. The existing grazing lease associated with portions of this property generates $300 per month for PD (Phelps Dodge Corporation 1996).

3.3.2.2 Freeland Property

This property consists of three physically separate parcels (identified as the West, North, and East parcels in Figure 2-32) totaling 140 acres in the eastern foothills of the Dos Cabezas Mountains in Cochise County, Arizona. The West parcel is located in the mouth of Happy Camp Canyon roughly 1.5 to 1.75 miles west of the other two parcels. Elevations on this parcel range from 4,480 to 4,640 feet. The East and North parcels, about 0.6 mile apart, lie outside the mouth of the Canyon on the alluvial fan that forms the upper slope of the San Simon Valley. Elevations on the East parcel, which includes a rocky ridge, range from less than 4,100 to about 4,240 feet. Elevations on the gently sloping North parcel range only from 4,100 to 4,180 feet. Happy Camp Wash, which runs through the West parcel, is the major drainage in the area. The three parcels are sufficiently similar in most characteristics to be discussed as one property, except when a specific resource occurs on only one or two of the parcels. In such cases, the

parcels on which the resources occur are identified individually.

3.3.2.2.1 Land Use. All three Freeland parcels are located within the Dos Cabezas LTMA in the Safford Field Office (BLM 1991). The West Parcel is nearly surrounded by the Dos Cabezas Mountains Wilderness but does not adjoin the Wilderness at any point. Other privately owned properties, including the Butler-Borg property and lands offered for exchange in other proposed actions, intervene. The East and North parcels are within 0.25 and 0.5 mile of the Wilderness, respectively. The Dos Cabezas Mountains Wilderness is managed to provide for the long-term protection and preservation of the area's wilderness character. Within that context, the BLM manages a variety of resource values, including wildlife habitat, vegetation, visual resources, cultural resources, dispersed recreation, and livestock grazing (SWCA 1996c). Figure 2-32 shows the parcels in relation to surrounding land ownership.

Primary access to the three parcels is via Happy Camp Canyon Road off Apache Pass Road leading south out of the community of Bowie. This dirt road, a two-wheel-drive road as far as the Indian Bread Rocks Picnic Area and a four-wheel-drive road beyond, follows alongside Happy Camp Wash through East and West parcels. It provides one of two access points to the northern and central portions of the Dos Cabezas Mountains Wilderness. Short spur roads lead toward the North parcel, but public access is not currently authorized for these roads. No other roads or trails are evident (SWCA 1996c).

Because these parcels are privately owned, no public recreational uses are authorized. As these parcels provide access to the central portion of the Dos Cabezas Mountains Wilderness, potential recreational uses of the parcels include, but are not limited to, hunting, hiking, camping, picnicking, and bird and wildlife watching (ibid.). Vehicle use would be permitted on the property but restricted to existing roads and trails.
The Freeland property is adjacent to or part of the BLM's Happy Camp grazing allotment. Currently PD has let a grazing lease and associated road easement to this land (Phelps Dodge Corporation 1996). The property is partially fenced for livestock control, and water is available for livestock. No utilities easements, residential leases, rights-of-way, or other legal agreements encumber these parcels. Phelps Dodge owns the mineral estate on 60 acres, and the remaining acres are federal reserve minerals (ibid.). No surface water rights have been filed for this property.

No formal visual quality analysis was completed for the Freeland property; however, some natural resource elements of the parcels that define visual quality include distinct upland and xeroriparian vegetation, rock outcrops, the large arroyo of Happy Camp Wash, and silhouettes of the surrounding rolling hills. North Parcel affords a long view of the San Simon Valley and Peloncillo Mountains (SWCA 1996c). Human modifications are limited to a functioning windmill and adjacent large, rusted, metal water tank in the West parcel (Zenitech 1998b). If acquired by the BLM, the North and East Parcels would fall within VRM Class IV, and the West Parcel would fall within VRM Class III. The management objective of Class IV is to provide for management activities that require major modification of the existing character of the landscape. The level of change can be high, but the visual impact of alterations should be minimized through careful location and minimal disturbance and by repeating the basic elements. The objective of Class III is to *partially retain* the existing character of the landscape. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape. The nearby Dos Cabezas Mountains Wilderness is categorized as VRM Class I, in which the objective is to preserve the existing character of the landscape by allowing only very limited management activity. The level of change should be very low and it must not attract attention.

No federal hazardous materials National Priority List site; Arizona WQARF site; zipACIDS site; or RCRA transport, storage, or disposal facility is located within one mile of the Freeland property. No LUST sites or

open or closed landfills are located on or within 0.5 mile of the property. No registered UST sites are located on the property or on adjacent properties. No ERNS sites are located on the property or in the vicinity (Zenitech 1998b).

3.3.2.2.2 Physical Resources. The underlying surficial geology of the Freeland property consists of early Miocene to Oligocene granitoid rocks, overlying middle Proterozoic granitoid and metamorphic rocks (Zenitech 1998b). Relatively fine-grained colluvial and alluvial material derived from these parent rocks form the alluvial fan. The potential for occurrence of mineral resources on this property is summarized in Table 3-37.

Table 3-37. Summary of Mineral Potential of the Freeland Property

Mineral Resource	Potential	Level of Certainty
Coal, Oil & Gas, Sodium & Potassium	Low	C
Uranium & Thorium	Low	C
Geothermal Resources	Low	C
Metallic Minerals	Low	C
Non Metallic Minerals/Industrial Minerals	Low	C
Common Variety Minerals (Sand & Gravel)	Moderate	B

Source: D.E. Wahl 1997b

3.3.2.2.3 Biological Resources. Vegetation on the flatter terrain of the West and East parcels includes mesquite, catclaw acacia, and burro brush, which combine to form a sparse xeroriparian association. Other prominent species include velvet ash, netleaf hackberry, Emory oak, and gray oak trees and mesquite, catclaw acacia, wolfberry, seep-willow, and burro brush shrubs. Vegetation in the upland portions of the West parcels is intermediate between Interior Chaparral and Sonoran Desertscrub, and includes mesquite, prickly pear, Palmer agave, catclaw acacia, turpentine-bush, fairyduster, sotol, and juniper. The rocky ridge extending onto the East parcel has vegetation intermediate between Interior Chaparral and Sonoran Desertscrub, including sotol, Palmer agave, ferns of several species, scrub oak, squaw bush, side-oats grama grass, and bullgrass. Vegetation on the open North parcel is a relatively homogeneous mixture of shrubby mesquite, catclaw acacia, snakeweed, and various grasses (SWCA 1996d).

Wildlife species observed on the Freeland property include mule deer, canyon towhee, Scott's oriole, house finch, cactus wren, black-throated sparrow, desert cottontail, black-tailed rattlesnake, eastern fence lizard, desert spiny lizard, ladder-backed woodpecker, greater roadrunner, cactus wren, northern cardinal, and Gambel's quail. On the West parcel, the windmill provides water for wildlife as well as livestock, and numerous large rocks with crevices and overhangs provide shelter (SWCA 1996d).

The special interest species identified by federal and state agencies that may occur or are unlikely to occur on the Freeland property, or for which the likelihood of occurrence is unknown, are listed in Table 3-38.

Table 3-38. Special Interest Species Potentially Occurring on the Freeland Property, Cochise County, Arizona

Species' Common Name	Scientific Name	Status*

Species That May Occur

American peregrine falcon	*Falco peregrinus anatum*	WSCA
Arizona giant sedge	*Carex spissa var. ultra*	SS
Big free-tailed bat	*Nyctinompos macrotis*	SS
California leaf-nosed bat	*Macrotus californicus*	SS, WSCA
Canyon spotted whiptail	*Cnemidophorus burti*	SS

Table 3-38, continued. Special Interest Species Potentially Occurring on the Freeland Property, Cochise County, Arizona

Species' Common Name	Scientific Name	Status*
Cave myotis	*Myotis velifer*	SS
Chiricahua leopard frog	*Rana chiricahuaensis*	T, WSCA
Fringed myotis	*Myotis thysanodes*	SS
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	E, WSCA
Loggerhead shrike	*Lanius ludovicianus*	SS
Mexican long-tongued bat	*Choeronycteris mexicana*	SS, WSCA
Pinaleño hedgehog cactus	*Echinocereus ledingii*	SR
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	SS
Small-footed myotis	*Myotis ciliolabrum*	SS
Three-nerved scurfpea	*Pediomelum trinervatum*	SS
Wilcox fishhook cactus	*Mammillaria wrightii wilcoxii*	SR
Species Unlikely to Occur		
Allen's (Mexican) big-eared bat	*Idionycteris phyllotis*	SS
Aravaipa sage	*Salvia amissa*	SS
Bald eagle	*Haliaeetus leucocephalus*	T, WSCA
Beautiful shiner	*Cyprinella formosa*	T, WSCA
Black-tailed prairie dog	*Cynomys ludovicianus*	C, WSCA
Brown pelican	*Pelacanus occidentalis*	E, WSCA
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum*	E, WSCA
Aravaipa woodfern	*Thelypteris puberula var. sonorensis*	SS
Western burrowing owl	*Athene cunicularia hypugea*	SS
Little Colorado sucker	*Catostomus sp.*	SS, WSCA
Loach minnow	*Tiaroga cobitis*	T, WSCA
Longfin dace	*Agosia chrysogaster*	SS
Long-legged myotis	*Myotis volans*	SS
Maricopa tiger beetle	*Cicindela oregona maricopa*	SS
Mexican gray wolf	*Canis lupus baileyi*	E, WSCA
Mexican spotted owl	*Strix occidentalis lucida*	T, WSCA
Mountain plover	*Charadrius montanus*	PT
New Mexican ridge-nosed rattlesnake	*Crotalus willardi obscurus*	T, WSCA
Northern sagebrush lizard	*Sceloporus graciosus graciosus*	SS
Northern gray hawk	*Asturina nitida maxima*	SS, WSCA
Northern aplomado falcon	*Falco femoralis*	E, WSCA
Occult little brown bat	*Myostis lucifugus occultus*	SS
Ocelot	*Leopardus (Felis) pardalis*	E, WSCA
Peebles bluestar	*Amsonia peeblesii*	SS
Ramsey Canyon leopard frog	*Rana subaquavocalis*	CA, WSCA

Table 3-38, continued. Special Interest Species Potentially Occurring on the Freeland Property, Cochise County, Arizona

Species' Common Name	Scientific Name	Status*
Rosy boa	*Lichanura trivirgata*	SS
Sonora sucker	*Catastomus insignis*	SS
Sonoran tiger salamander	*Ambystoma tigrinum stebbinsi*	E, WSCA
Southwestern willow flycatcher	*Empidonax traillii extimus*	E, WSCA
Speckled dace	*Rhinichthys osculus*	SS
Spikedace	*Meda fulgida*	T, WSCA
Spotted bat	*Euderma maculatum*	SS, WSCA
Texas horned lizard	*Phrynosoma cornutum*	SS
White-faced ibis	*Plegadis chihi*	SS
Whooping crane	*Grus americana*	E
Yaqui catfish	*Ictalurus pricei*	T, WSCA
Yaqui topminnow	*Poeciliopsis occidentalis sonoriensis*	E, WSCA
Yaqui chub	*Gila purpurea*	E, WSCA
Yellow-billed cuckoo	*Coccyzus americanus occidentalis*	C, WSCA
Likelihood of Occurrence is Unknown		
Arizona giant sand treader cricket	*Daihinibaenetes arizonenesis*	SS
Chiricahua water scavenger beetle	*Cymbiodyta arizonica*	SS
Clifton rock daisy	*Perityle ambrosifolia*	SS
Goosefoot moonpod	*Ammocodon chenopodioides*	SS
Navaho Jerusalem cricket	*Stenopelmatus navajo*	SS
Round-leaf broom	*Errazuria rotundata*	SS, SR
Texas globeberry	*Ibervilliea tenuisecta*	SS

* Status Key: E = Federal Endangered; T = Federal Threatened; PE = Federal Proposed Endangered; PT = Federal Proposed Threatened; C = Federal Candidate; CA = Conservation Agreement; SS = BLM Sensitive Species; WSCA = Wildlife of Special Concern in Arizona (AGFD 1996); SR = Salvage Restricted under Arizona Native Plant Law; HS = Highly Safeguarded under Arizona Native Plant Law.

3.3.2.2.4 Cultural Resources.

< **West Parcel.** Based on a check of ASM files, no systematic surveys have been done on or within one mile of the West parcel, but two sites have been recorded within one mile of the parcel boundary. AZ CC:14:18 (ASM) consists of petroglyphs and pictographs on five panels in the local granite outcrops. Also present are bedrock mortars, metate fragments, and flaked stone. The second site, AZ CC:14:21 (ASM), is a rock shelter with a spring, pictographs, two bedrock mortars, a mano fragment, and flaked stone. The age and affiliation of the sites could not be determined. Both site cards indicate that additional small sites are in the area; however, a recent, brief inspection of the parcel failed to locate any archaeological sites (SWCA 1996a).

< **East and North Parcels.** Two systematic surveys have been completed within one mile of these parcels: one in 1982 (Powers Elevation 1982) and the other in 1981 and 1994 (Bromley 1981;

Woodall 1994). Between these two surveys and miscellaneous studies, nine prehistoric sites and one historical site have been recorded within one mile of the parcels. The prehistoric sites include the two rock art sites described above; two additional rock art sites; two lithic scatters (each comprising several hundred artifacts); two sites containing lithic artifacts, sherds, and rock alignments; and one containing a roasting pit, rock shelters, bedrock mortars, rock alignments, lithic artifacts, sherds, and Euroamerican trash dating from the early 1900s. Salado polychrome sherds found at two of the sites suggest that those locations were occupied between A.D. 1300 and 1450. The historical site consisted of traces of a wooden building and Euroamerican trash dating from the early 1900s. Woodall (1994, p.3) remarks that "Several historic roads, which include the Fort Grant-Fort Bowie Road and the Pueblo Viejo-Fort Bowie Road" are present in this area, but that survey was unable to locate the roads on the ground; such long-abandoned roads may need to be documented with the help of remote sensing imagery (SWCA 1996a).

During a recent field visit, three isolated lithic artifacts were found on the North parcel and three historical sites and a hand-dug well were found on the East parcel. The historical remains are probably parts of a single large ranch complex that appears to be eligible for the *National Register of Historic Places*. The archaeological potential of the East parcel appears to be high, and the other two parcels are likely to include additional sites as well (SWCA 1996a).

3.3.2.2.5 Socioeconomic Resources. The Freeland property is taxed as Vacant Land and generated $579 in property taxes for Cochise County in 1999. The current grazing lease generates about $100/lease-year for PD (Phelps Dodge Corporation 1996).

3.3.2.3 Butler-Borg Property

This property consists of 308 acres in lower Happy Camp Canyon at the eastern edge of the Dos Cabezas Mountains in Cochise County, Arizona. It lies about a tenth of a mile west of the Freeland West parcel. Straddling Happy Camp Wash, the Butler-Borg property covers the canyon bottom and portions of the rocky, granite slopes on either side. Elevation ranges from 4,500 to 5,400 feet. Curtis Spring is located just east of the property.

3.3.2.3.1 Land Use. The Butler-Borg property borders the 11,998-acre Dos Cabezas Mountains Wilderness, which lies to the north, south, and west. It is also within the perimeter of a designated LTMA in the Safford Field Office (BLM 1991). The boundary of the property totals three miles, of which two miles (67 percent) adjoins the Wilderness. The remaining one mile (or 33 percent) adjoins other private lands that are proposed for BLM acquisition in another land exchange (SWCA 1996c). Figure 2-32 shows the property in relation to surrounding land ownership.

This property is accessible via the Happy Camp Canyon Road, a partly two-wheel-drive, partly four-wheel-drive dirt road off Apache Pass Road leading south out of the town of Bowie, Cochise County, Arizona. This road, which parallels Happy Camp Wash through the property, provides one of two access routes to the northern and central portions of the Dos Cabezas Mountains Wilderness. The road is washed out by Happy Camp Wash immediately east of the property, but continues as a passable dirt road/trail after the washout (SWCA 1996c).

Because the property is privately owned, no public recreational uses are authorized. As this property provides access to the central portions of the Dos Cabezas Mountains Wilderness, potential recreational uses of the property include, but are not limited to, hunting, hiking, camping, picnicking, and bird and wildlife watching. Vehicular use would be permitted but restricted to roads and trails. The property does not include, affect, or lie in the watershed of any river segments proposed for Wild and Scenic River

designation (ibid.).

The Butler-Borg property is adjacent to the BLM's Happy Camp grazing allotment. Currently PD leases the property for grazing purposes only; the lessee is not permitted to encumber the lease without PD's consent (Phelps Dodge Corporation 1996). The property is at least partially fenced for livestock control, and water is available for livestock. No utilities easements, residential leases, rights-of-way, or other encumbrances are associated with this property. Minerals are reserved by the federal government. No surface water rights have been filed for this property.

No formal visual quality analysis was completed for this property; however, natural resource elements that define its visual quality include distinct upland and xeroriparian vegetation, rock outcrops, the large arroyo of Happy Camp Wash, and silhouettes of the surrounding rolling hills (SWCA 1996c). According to the Safford District RMP (BLM 1991), public lands in the area (other than the Dos Cabezas Mountains Wilderness) have been categorized as VRM Class III. If acquired by the BLM, the Butler-Borg property would fall within this classification as well. The objective of Class III is to *partially retain* the existing character of the landscape. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape. The adjoining Wilderness is categorized as VRM Class I, in which the objective is to preserve the existing character of the landscape by allowing only very limited management activity. The level of change should be very low and it must not attract attention.

No federal hazardous materials National Priority List site; Arizona WQARF site; zipACIDS site; or RCRA transport, storage, or disposal facility is located within one mile of the Butler-Borg property. No LUST sites or open or closed landfills are located on or within 0.5 mile of the property. No registered UST sites are located on the property or on adjacent properties. No ERNS sites are located on the property or in the vicinity (Zenitech 1998b).

3.3.2.3.2 Physical Resources. The underlying surficial geology of the Butler-Borg tract consists of early Miocene to Oligocene granitoid rocks, overlying middle Proterozoic granitoid and metamorphic rocks (Zenitech 1998b). The potential for occurrence of mineral resources on this property is summarized in Table 3-39.

Table 3-39. Summary of Mineral Potential of the Butler-Borg Property

Mineral Resource	Potential	Level of Certainty
Coal, Oil & Gas, Sodium & Potassium	Low	C
Uranium & Thorium	Low	C
Geothermal Resources	Low	C
Metallic Minerals	Low	B
Non Metallic Minerals/Industrial Minerals	Low	C
Common Variety Minerals (Sand & Gravel)	Moderate	B

Source: D.E. Wahl 1997b

3.3.2.3.3 Biological Resources. Vegetation on the Butler-Borg property is clearly divided into distinctive xeroriparian and upland communities, with most of the property being upland. Xeroriparian vegetation includes sycamore, Arizona walnut, netleaf hackberry, Arizona cottontop, canyon grape, desert willow,

desert broom, velvet ash, mesquite, and catclaw acacia. Upland vegetation is intermediate between the Sonoran Desertscrub community and the Interior Chaparral plant community, containing species characteristic of both. These species include mesquite, catclaw acacia, beargrass, ocotillo, manzanita, sotol, fairyduster, lovegrass, snakeweed, barrel cactus, prickly pear, hedgehog cactus, cane cholla, Palmer agave, wolfberry, banana yucca, squaw bush, Lehmann lovegrass, sumac, scrub oak, Emory oak, and juniper. Juniper becomes abundant toward the top of the north-facing slope, which may be considered a *Juniperus coahuilensis* Association. The most abundant species in both associations, and the dominant plant on the property, is mesquite, which appears there in the form of a shrub generally less than six feet tall (SWCA 1996d).

Wildlife species or sign observed during a recent site visit included mule deer, coyote, Harris' antelope squirrel, desert cottontail, pocket gopher, white-throated woodrat, cactus wren, turkey vulture, rock wren, canyon towhee, northern mockingbird, house finch, black-throated sparrow, Gambel's quail, and Scott's oriole, and diamondback rattlesnake (SWCA 1996d).

The special interest species identified by federal and state agencies that may occur or are unlikely to occur on the Butler-Borg property, or for which the likelihood of occurrence is unknown, are listed in Table 3-40.

3.3.2.3.4 Cultural Resources. Based on a check of ASM files check, no systematic surveys are known to have been conducted on or within one mile of the Butler-Borg property. The one site recorded within one mile of the parcel, AZ CC:14:18 (ASM), is a rock art site previously described in the section on the Freeland property. Based on a limited field reconnaissance of the Butler-Borg property (SWCA 1996a), at least one archaeological site (a historical ranching site) occurs there. This site appears to be eligible for the *National Register of Historic Places*. The presence of AZ CC:14:18 (ASM) near the parcel, in a physical setting that characterizes much of the property suggests that Native American rock art may be present on the property as well. The location of the property in a major canyon of the Dos Cabezas Mountains, within a short distance of a spring, further increases the likelihood of important archaeological sites on this property (SWCA 1996a).

Table 3-40. Special Interest Species Potentially Occurring on the Butler-Borg Property, Cochise County, Arizona

Species' Common Name	Scientific Name	Status*
Species That May Occur		
American peregrine falcon	*Falco peregrinus anatum*	WSCA
Arizona giant sedge	*Carex spissa var. ultra*	SS
Big free-tailed bat	*Nyctinompos macrotis*	SS
California leaf-nosed bat	*Macrotus californicus*	SS, WSCA
Canyon spotted whiptail	*Cnemidophorus burti*	SS
Cave myotis	*Myotis velifer*	SS
Chiricahua leopard frog	*Rana chiricahuaensis*	T, WSCA
Fringed myotis	*Myotis thysanodes*	SS
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	E, WSCA
Loggerhead shrike	*Lanius ludovicianus*	SS
Mexican long-tongued bat	*Choeronycteris mexicana*	SS, WSCA
Pinaleño hedgehog cactus	*Echinocereus ledingii*	SR

Pocketed free-tailed bat	*Nyctinomops femorosaccus*	SS
Small-footed myotis	*Myotis ciliolabrum*	SS
Three-nerved scurfpea	*Pediomelum trinervatum*	SS

Table 3-40, continued. Special Interest Species Potentially Occurring on the Butler-Borg Property, Cochise County, Arizona

Species' Common Name	Scientific Name	Status*
Wilcox fishhook cactus	*Mammillaria wrightii wilcoxii*	SR
Species Unlikely to Occur		
Allen's (Mexican) big-eared bat	*Idionycteris phyllotis*	SS
Aravaipa woodfern	*Thelypteris puberula var. sonorensis*	SS
Aravaipa sage	*Salvia amissa*	SS
Bald eagle	*Haliaeetus leucocephalus*	T, WSCA
Beautiful shiner	*Cyprinella formosa*	T, WSCA
Black-tailed prairie dog	*Cynomys ludovicianus*	C, WSCA
Brown pelican	*Pelacanus occidentalis*	E
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum*	E, WSCA
Canelo Hills ladies' tresses	*Spiranthes delitescens*	E, HS
Chuckwalla	*Sauromalus obesus*	SS
Cochise pincushion cactus	*Coryphantha robbinsorum*	T, HS
Desert sucker	*Catostomus (Pantosteus) clarki*	SS
Ferruginous hawk	*Buteo regalis*	SS, WSCA
Fish Creek fleabane	*Erigeron piscaticus*	SS, SR
Gila chub	*Gila intermedia*	PE, WSCA
Huachuca spring snail	*Pyrgulopsis thompsoni*	C
Huachuca water umbel	*Lillaeopsis schaffneriana ssp. recurva*	E, HS
Lemmon fleabane	*Erigeron lemmonii*	C, HS
Little Colorado sucker	*Catostomus sp.*	SS, WSCA
Loach minnow	*Tiaroga cobitis*	T, WSCA
Western burrowing owl	*Athene cunicularia hypugea*	SS
Long-legged myotis	*Myotis volans*	SS
Longfin dace	*Agosia chrysogaster*	SS
Maricopa tiger beetle	*Cicindela oregona maricopa*	SS
Mexican spotted owl	*Strix occidentalis lucida*	T, WSCA
Mexican gray wolf	*Canis lupus baileyi*	E, WSCA
Mountain plover	*Charadrius montanus*	PT
New Mexican ridge-nosed rattlesnake	*Crotalus willardi obscurus*	T
Northern aplomado falcon	*Falco femoralis*	E, WSCA
Northern gray hawk	*Asturina nitida maxima*	SS, WSCA
Northern sagebrush lizard	*Sceloporus graciosus graciosus*	SS
Occult little brown bat	*Myostis lucifugus occultus*	SS
Ocelot	*Leopardus (Felis) pardalis*	E, WSCA
Peebles bluestar	*Amsonia peeblesii*	SS
Ramsey Canyon leopard frog	*Rana subaquavocalis*	CA, WSCA
Rosy boa	*Lichanura trivirgata*	SS
Sonora sucker	*Catastomus insignis*	SS

Table 3-40, continued. Special Interest Species Potentially Occurring on the Butler-Borg Property, Cochise County, Arizona

Species' Common Name	Scientific Name	Status*
Sonoran tiger salamander	*Ambystoma tigrinum stebbinsi*	E, WSCA
Southwestern willow flycatcher	*Empidonax traillii extimus*	E, WSCA
Speckled dace	*Rhinichthys osculus*	SS
Spikedace	*Meda fulgida*	T, WSCA
Spotted bat	*Euderma maculatum*	SS, WSCA
Texas horned lizard	*Phrynosoma cornutum*	SS
White-faced ibis	*Plegadis chihi*	SS
Whooping crane	*Grus americana*	E
Yaqui catfish	*Ictalurus pricei*	T, WSCA
Yaqui topminnow	*Poeciliopsis occidentalis sonoriensis*	E, WSCA
Yaqui chub	*Gila purpurea*	E, WSCA
Yellow-billed cuckoo	*Coccyzus americanus occidentalis*	C, WSCA
Likelihood of Occurrence is Unknown		
Arizona giant sand treader cricket	*Daihinibaenetes arizonenesis*	SS
Chiricahua water scavenger beetle	*Cymbiodyta arizonica*	SS
Clifton rock daisy	*Perityle ambrosifolia*	SS
Goosefoot moonpod	*Ammocodon chenopodioides*	SS
Navaho Jerusalem cricket	*Stenopelmatus navajo*	SS
Round-leaf broom	*Errazuria rotundata*	SS, SR
Texas globeberry	*Ibervilliea tenuisecta*	SS

* Status Key: E = Federal Endangered; T = Federal Threatened; PE = Federal Proposed Endangered; PT = Federal Proposed Threatened; C = Federal Candidate; CA = Conservation Agreement; SS = BLM Sensitive Species; WSCA = Wildlife of Special Concern in Arizona (AGFD 1996); SR = Salvage Restricted under Arizona Native Plant Law; HS = Highly Safeguarded under Arizona Native Plant Law.

3.3.2.3.5 Socioeconomic Resources. The Butler-Borg property, taxed as Vacant Land, generated $658 in property taxes for Cochise County in 1999. Currently, the grazing lease on this property generates $100/lease-year for PD (Phelps Dodge Corporation 1996).

3.3.2.4 Norton Property

Totaling 400 acres, the Norton property consists of two separate parcels located less than 0.75 mile from each other on Black Rock Wash in Graham County, Arizona. Elevations on the property, which encompasses portions of the wash and its sparsely vegetated floodplain, range from 3,000 to 3,100 feet. Black Rock Wash is an ephemeral tributary of the Gila River, draining eastward from the Santa Teresa Mountains.

3.3.2.4.1 Land Use. This property, which has a total boundary of about five miles, is surrounded entirely by public lands administered by the BLM. The western-most property boundary lies about 0.25 mile east of the San Carlos Apache Reservation. Figure 2-33 shows the location of the Norton property in relation to surrounding land ownership.

The property is physically and legally accessible from the east via an unpaved portion of the Black Rock Wash Road off of Highway 70. Access from the west is by unimproved roads leading from the San Carlos Apache Reservation. Visitors must contact the Tribe to obtain the necessary permits required to cross the reservation. The Norton property is privately owned and no recreational activities are authorized; however, evidence of off-highway vehicle use is apparent. Potential dispersed recreational uses of the property include, but are not limited to, hiking, picnicking, quail hunting, backcountry driving, and bird and wildlife watching. This property is located within the BLM's Southwest Gila Valley LTMA. It does not include or adjoin any river segments determined by the BLM and the Department of the Interior to be eligible or suitable for Wild and Scenic Rivers designation (BLM 1994a).

Phelps Dodge has let a month-to-month grazing lease to the Norton property, which was once part of the Norton family ranch. Other than the grazing lease, no other encumbrances are associated with this property. Phelps Dodge owns the mineral estate (Phelps Dodge Corporation 1996). The Arizona State Land Department has filed one surface water right for 0.3 af/yr from Black Rock Wash for stock watering and wildlife use on this property.

Landscape on the Norton property consists of a dry, shallow, sandy watercourse of Black Rock Wash; its broad, relatively level floodplain; and low hills and bluffs south of the floodplain. Stands of mesquite, desert willow, Arizona black walnut, and other riparian and xeroriparian trees and shrubs growing along the wash provide the property's dominant visual interest (SWCA 1996c). Corrals, a stock tank, and a windmill are present, but no buildings or other evidence of development can be seen (Zenitech 1998b). A formal visual quality analysis has not been completed for the Norton property; however, adjacent public lands within this area have been designated as VRM Class IV (BLM 1991). The management objective of Class IV is to provide for management activities that require major modification of the existing character of the landscape. Such activities may dominate the view and be the major focus of viewer attention. The level of change can be high, but the visual impact of the change should be minimized through careful location and minimal disturbance and by repeating the basic elements.

No federal hazardous materials National Priority List site; Arizona WQARF site; zipACIDS site; or RCRA transport, storage, or disposal facility is located within one mile of the Norton property. No LUST sites or open or closed landfills are located on or within 0.5 mile of the property. No registered UST sites are located on the property or on adjacent properties. No ERNS sites are located on the property or in the vicinity (Zenitech 1998b).

3.3.2.4.2 Physical Resources. The Norton property is composed primarily of fluvial sediments overlying Pliocene to middle Miocene sedimentary rocks. The sedimentary rocks consist of pans of the Bidahochi Formation and the Bouse Formation with patches of Quaternary surficial deposits acting as caprock (Zenitech 1998b). The potential for occurrence of mineral resources on this property is summarized in Table 3-41.

3.3.2.4.3 Biological Resources. The dominant plant on the Norton property is mesquite, many of which are very large, mature specimens growing along Black Rock Wash. Other species present include narrow-leaved yucca, rabbitbrush, catclaw acacia, creosote, desert broom, and prickly pear cacti. Trees of note on the property include mature individuals of sycamore, Arizona ash, black walnut, and desert willow. Although a riparian zone is not clearly defined, almost the entire property lies on the wash floodplain and has vegetation characteristic of an old, somewhat degraded mesquite bosque. Most larger mesquite trees have been partially harvested for wood at some time in the past, but they continue to grow well, with some exceeding 30 feet in height. The property has potential for recovery to a classic mesquite bosque (SWCA 1996d).

Table 3-41. Summary of Mineral Potential of the Norton Property

Mineral Resource	Potential	Level of Certainty
Coal, Oil & Gas, Sodium & Potassium	Low	C
Uranium & Thorium	Low	C
Geothermal Resources	Moderate	B
Locatable Metallic Minerals	Low	C
Non-Metallic Minerals/Industrial Minerals	Low	C
Common Variety Minerals (Sand & Gravel)	Low	C

Source: D.E. Wahl 1997b

Wildlife or sign of wildlife observed during a recent field visit by biologists included collared peccary, coyote, mule deer, Harris' antelope squirrel, white-throated woodrat, desert cottontail, black-tailed jackrabbit, dark-eyed junco, black-throated sparrow, white-crowned sparrow, common raven, phainopepla, Gambel's quail, red-tailed hawk, verdin, golden eagle, Harris' hawk, northern oriole, Cooper's hawk, crissal thrasher, Bewick's wren, ladder-backed woodpecker, house finch, Abert's towhee, Gila woodpecker, and pyrrhuloxia (SWCA 1996d). Overall, the wildlife present on the property is expected to be typical of the habitats present. The USFWS and AGFD have reported that no federal or state listed or proposed threatened or endangered species were found in their databases for this area (SWCA 1996d). The special interest species identified by federal and state agencies that may occur or are unlikely to occur on the Norton property, or for which the likelihood of occurrence is unknown, are listed in Table 3-42.

3.3.2.4.4 Cultural Resources. The Norton property has not been systematically surveyed for cultural resources. The ranching facilities mentioned above were noted during a recent archaeological reconnaissance of the property, but no evidence was seen to suggest that they are historic in age (SWCA 1996a). No Prehistoric period sites were observed during the reconnaissance, which focused on the bluffs in the southern part of the property.

3.3.2.4.5 Socioeconomic Resources. This property, taxed as Agriculture/Ranch land, generated $24 in private property taxes for Graham County in 1999. Phelps Dodge has leased the property back to the Norton family for grazing for $18/lease-year (Phelps Dodge Corporation 1996).

3.3.2.5 Clyne I Property

This 160-acre property is located on the western flank of the Whetstone mountains about 14 miles northeast of the community of Sonoita in Pima County, Arizona. It is the remaining portion of a 240-acre property originally included as offered lands in the proposed Morenci Land Exchange between the BLM and PD. For that project, only an 80-acre portion of the original property was approved for exchange as part of the Preferred Action Alternative. The Clyne I property considered for this exchange encompasses portions of Bear Spring Canyon and the ridge between that canyon and Shellenberger Canyon to the north. Elevations range between 4,720 and about 5,000 feet. Drainage is to the northwest via a wash in Bear Spring Canyon, then in Mattie Canyon to Cienega Creek (SWCA 1996c).

Table 3-42. Special Interest Species Potentially Occurring on the Norton Property, Graham County, Arizona

Species' Common Name	Scientific Name	Status*
Species That May Occur		
Allen's (Mexican) big-eared bat	*Idionycteris phyllotis*	SS
Bald eagle	*Haliaeetus leucocephalus*	T, WSCA
Big free-tailed bat	*Nyctinomops macrotis*	SS, WSCA
California leaf-nosed bat	*Macrotus californicus*	SS, WSCA
Canyon spotted whiptail	*Cnemidophorus burti*	SS
Cave myotis	*Myotis velifer*	SS
Fringed myotis	*Myotis thysanodes*	SS
Loggerhead shrike	*Lanius ludovicianus*	SS
Long-legged myotis	*Myotis volans*	SS
Mexican long-tongued bat	*Choeronycteris mexicana*	SS, WSCA
Northern gray hawk	*Asturina nitida maxima*	SS, WSCA
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	SS
Small-footed myotis	*Myotis ciliolabrum*	SS
Three-nerved scurfpea	*Pediomelum trinervatum*	SS
Western burrowing owl	*Athene cunicularia hypugea*	SS
Yellow-billed cuckoo	*Coccyzus americanus*	C, WSCA
Species Unlikely to Occur		
American peregrine falcon	*Falco peregrinus anatum*	WSCA
Apache trout	*Onchorhynchus apache*	T, WSCA
Aravaipa woodfern	*Thelypteris puberula var. sonorensis*	SS
Aravaipa sage	*Salvia amissa*	SS
Arizona giant sedge	*Carex spissa var. ultra*	SS
Arizona cliffrose	*Purshia subintegra*	E, HS
Black-tailed prairie dog	*Cynomys ludovicianus*	C, WSCA
Brown pelican	*Pelacanus occidentalis*	E
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum cactorum*	E, WSCA
Chiricahua leopard frog	*Rana chiricahuaensis*	T, WSCA
Chuckwalla	*Sauromalus obesus*	SS
Desert pupfish	*Cyprinodon macularius*	E, WSCA
Fish Creek fleabane	*Erigeron piscaticus*	SS, SR
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	E, WSCA
Gila chub	*Gila Intermedia*	PE, WSCA
Goosefoot moonpod	*Ammocodon chenopodioides*	SS
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	E, WSCA
Sonoran desert tortoise	*Gopherus agassizii*	SS

Table 3-42, continued. Special Interest Species Potentially Occurring on the Norton Property, Graham County, Arizona

Species' Common Name	Scientific Name	Status*
Little Colorado sucker	*Catostomus sp.*	SS, WSCA
Loach minnow	*Tiaroga cobitis*	T, WSCA
Longfin dace	*Agosia chrysogaster*	SS
Maricopa tiger beetle	*Cicindela oregona maricopa*	SS
Mexican spotted owl	*Strix occidentalis lucida*	T, WSCA
Mount Graham red squirrel	*Tamiasciurus hudsonicus grahamensis*	E, WSCA
Northern sagebrush lizard	*Sceloporus graciosus graciosus*	SS
Occult little brown bat	*Myostis lucifugus occultus*	SS
Peebles bluestar	*Amsonia peeblesii*	SS
Razorback sucker	*Xyrauchen texanus*	E, WSCA
Rosy boa	*Lichanura trivirgata*	SS
Sonora sucker	*Catostomus insignis*	SS
Southwestern willow flycatcher	*Empidonax traillii extimus*	E, WSCA
Speckled dace	*Rhinicthys osculus*	SS
Spikedace	*Meda fulgida*	T, WSCA
Spotted bat	*Euderma maculata*	SS, WSCA
Texas horned lizard	*Phrynosoma cornutum*	SS
Wet canyon talussnail	*Sonorella macrophallus*	CA
White-faced ibis	*Plegadis chihi*	SS
Likelihood of Occurrence is Unknown		
Arizona giant sand treader cricket	*Daihinibaenetes arizonenesis*	SS
Chiricahua water scavenger beetle	*Cymbiodyta arizonica*	SS
Clifton rock daisy	*Perityle ambrosifolia*	SS
Navaho Jerusalem cricket	*Stenopelmatus navajo*	SS
Round-leaf broom	*Errazuria rotundata*	SS, SR
Texas globeberry	*Ibervilliea tenuisecta*	SS

* Status Key: E = Federal Endangered; T = Federal Threatened; PE = Federal Proposed Endangered; C = Federal Candidate; CA = Conservation Agreement; SS = BLM Sensitive Species; WSCA = Wildlife of Special Concern in Arizona (AGFD 1996); SR = Salvage Restricted under Arizona Native Plant Law; HS = Highly Safeguarded under Arizona Native Plant Law.

3.3.2.5.1 Land Use. The Clyne I property is located in what was formerly known as the Empirita Ranch. It is adjacent to private and BLM lands and within the perimeter of the 100,800-acre Sonoita Valley Acquisition Planning District (consisting of state, private, and BLM land). One mile of the property's four miles of boundary abuts the Las Cienegas NCA. Figure 2-34 shows the location of the property in relation to surrounding land ownership.

The property is physically accessible via a four-wheel-drive, gravel road off Highway 82, east of Sonoita.

Visitors to the property must travel approximately seven miles north of Highway 82 across private, state, USFS, and BLM lands. Public access is currently authorized across USFS and BLM lands but not across state and private land. Application would have to be made to the Arizona State Land Department to authorize public use of the road, and permission would have to be obtained from any private landowner whose property is crossed. Because the property is privately owned, no recreational uses are authorized. Potential dispersed recreational uses of the property may include, but are not limited to, hunting, hiking, camping, picnicking, backcountry driving on selected roads and routes, and bird and wildlife watching. The property is within the watershed of a segment of Cienega Creek that the BLM and the Department of the Interior have recommended for Wild and Scenic Rivers designation (ibid.).

PD has let a grazing lease to the Clyne I property, but no utilities easements, rights-of-way, or residential leases otherwise encumber the land. Minerals are reserved by the federal government. Phelps Dodge owns one surface water right for 2.0 af/yr from Bear Spring Canyon for stock watering.

No formal visual quality analysis was completed for this property; however, some natural resource elements that define its visual quality include an ephemeral wash, a northwest-to-southeast-trending ridge (or hogback) formed in a sequence of limestone beds that dip steeply to the south, rock outcrops, and distinct upland and xeroriparian vegetation. Rolling hills surround the property. No human-made structures or other indications of development are present (SWCA 1996c). Visual resource management objectives for the neighboring Las Cienegas NCA, and BLM lands within the Sonoita Valley Acquisition Planning District, have been developed by the BLM's Tucson Field Office as part of an overall management plan for the NCA. Under the plan, most public land in the planning area will be managed for the objectives of VRM Class II.

No federal hazardous materials National Priority List site; Arizona WQARF site; zipACIDS site; or RCRA transport, storage, or disposal facility is located within one mile of the Clyne I property. No LUST sites or open or closed landfills are located on or within 0.5 mile of the property. No registered UST sites are located on the property or on adjacent properties. No ERNS sites are located on the property or in the vicinity (Zenitech 1998b).

3.3.2.5.2 Physical Resources. The geology underlying the Clyne I property consists of Paleozoic and Mesozoic (Cretaceous) sedimentary rocks and some Cretaceous volcanic rocks in steeply tilted, overlapping layers. The potential for occurrence of mineral resources on this property is summarized below in Table 3-43.

3.3.2.5.3 Biological Resources. The grassland of the Las Cienegas NCA and surrounding area is "one of the finest examples of Plains grassland in the Southwest" (Pima County Department of Transportation and Flood Control District 1992). AGFD noted during their visit to this area that uplands were "in good condition [and] supported a variety of native grasses" (AGFD 1994). In addition to these native grasses, upland vegetation observed during a recent field reconnaissance by biologists included numerous shrubs and small trees, such as mesquite, fairyduster, ocotillo, Palmer agave, shindaggers, catclaw acacia, wait-a-minute bush, desert spoon, beargrass, buckwheat, silktassel, Emory oak, Mexican cliffrose, juniper, desert sumac, and numerous species of cacti. Several small dense stands of mortonia, an uncommon species reaching its western-most limits in southeastern Arizona, were seen as well (SWCA 1996c).

Vegetation along Bear Spring Canyon Wash is representative of xeroriparian drainages in southeastern Arizona, in which species composition is similar to that of the uplands, except with general greater density and volume of vegetation. No acreage estimate was made of xeroriparian plants (SWCA 1996c).

Wildlife or sign observed on the property during site reconnaissance included mule deer, desert cottontail, blacktailed jackrabbit, coyote, woodrat, javelina, several species of lizard, whitewinged dove, black-throated sparrow, Gambel's quail, eastern meadowlark, and others (SWCA 1996c). Small caves,

crevices, and rock outcrops on the property provide numerous shelter sites for wildlife, including bats and carnivores. Grassland portions of the Las Cienegas NCA are known to support small herds of pronghorn (BLM 1991). AGFD categorized habitats on the property as Resource Category III, "of high to medium value for Arizona wildlife species and are relatively abundant on a statewide basis" (AGFD 1994).

Table 3-43. Summary of Mineral Potential of the Clyne I Property

Mineral Resource	Potential	Level of Certainty
Coal, Oil & Gas, Sodium & Potassium	Low	C
Uranium & Thorium	Low	C
Geothermal Resources	Low	C
Locatable Metallic Minerals	Low	B
Non-Metallic Minerals/Industrial Minerals	Low	C
Common Variety Minerals (Sand & Gravel)	Low	C

Source: D.E. Wahl 1997b

The special interest species identified by federal and state agencies that may occur or are unlikely to occur on the Clyne I property, or for which the likelihood of occurrence is unknown, are listed in Table 3-44.

3.3.2.5.4 Cultural Resources. The property has not been surveyed for cultural resources, and no sites had been recorded there before archaeologists conducted a reconnaissance in 1995 (SWCA 1996a). During that visit, one or perhaps more sites were identified. Flaked-lithic artifacts were noted at several points over a distance of several hundred feet along the central ridge. These Prehistoric artifact scatters represent the flaking of a dark raw material found on the ridge. A more thorough examination will be required to determine whether the scatters should be recorded as one or a sequence of sites. A rock-pile feature was also noted south of the ridge; this feature may warrant site status.

Considering the presence within the property of an extensive, archaeologically significant flaked lithic scatter and a diverse plant community that might have been attractive to prehistoric and historic gatherers, it appears likely that additional significant sites are present in the area (SWCA 1996a).

3.3.2.5.5 Socioeconomic Resources. This property, taxed as Vacant Land, generated $97 in private property taxes for Pima County in 1999. A current grazing lease generates $100/lease-year for PD (Phelps Dodge Corporation 1996).

3.3.2.6 Clyne II Property

This 400-acre property is located at the base of the Whetstone Mountains in Pima County, approximately 0.75 mile south of the Clyne I property. Elevations range from 4,900 to 5,200 feet. Mud Spring Canyon bisects the property. Groundwater surfaces at places in the canyon to produce ponds, at least one of which appears to be perennial (SWCA 1996d). Both Mud Spring Canyon and Spring Water Canyon, which cut diagonally through the center and northwestern corner of the property, respectively, drain into Cienega Creek.

Table 3-44. Special Interest Species Potentially Occurring on the Clyne I Property, Pima County, Arizona

Species' Common Name	Scientific Name	Status*
Species That May Occur		
Allen's (Mexican) big-eared bat	*Idionycteris phyllotis*	SS
American peregrine falcon	*Falco peregrinus anatum*	WSCA
Big free-tailed bat	*Nyctinomops macrotis*	SS, WSCA
California leaf-nosed bat	*Macrotus californicus*	SS, WSCA
Canyon spotted whiptail	*Cnemidophorus burti*	SS
Cave myotis	*Myotis velifer*	SS
Fringed myotis	*Myotis thysanodes*	SS
Huachuca golden aster	*Heterotheca rutteri*	SS
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	E, WSCA
Loggerhead shrike	*Lanius ludovicianus*	SS
Mexican long-tongued bat	*Choeronycteris mexicana*	SS, WSCA
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	SS
San Carlos wild-buckwheat	*Eriogonum capillare*	SR
Santa Cruz beehive cactus	*Coryphantha recurvata*	SS, HS
Small-footed myotis	*Myotis ciliolabrum*	SS
Sonoran desert tortoise	*Gopherus agassiz*	SS, WSCA
Species Unlikely to Occur		
Acuna cactus	*Echinomastus erectrocentrus acunensis*	C, HS
Arizona giant sedge	*Carex spissa var. ultra*	SS
Bald eagle	*Haliaeetus leucocephalus*	T, WSCA
Bartram's stonecrop	*Graptopetalum bartramii*	SS, SR
Brown pelican	*Pelacanus occidentalis*	E
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum cactorum*	E, WSCA
Chiricahua leopard frog	*Rana chiricahuaensis*	T, WSCA
Chuckwalla	*Sauromalus obesus*	SS
Desert pupfish	*Cyprinodon macularius*	E, WSCA
Desert sucker	*Catostomus (Pantosteus) clarki*	SS
Ferruginous hawk	*Buteo regalis*	WSCA
Gentry indigobush	*Dalea tentaculoides*	SS, HS
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	E, WSCA
Gila chub	*Gila intermedia*	PE, WSCA
Gooddings onion	*Allium gooddingii*	CA, HS
Huachuca water umbel	*Lillaeopsis schaffneriana ssp. recurva*	E, HS
Huachuca milk vetch	*Astragalus hypoxylus*	SS, SR
Kearney's blue star	*Amsonia kearneyana*	E, HS

Loach minnow	*Tiaroga cobitis*	T, WSCA
Long-legged myotis	*Myotis volans*	SS
Longfin dace	*Agosia chrysogaster*	SS
Masked bobwhite	*Colinus virginianus*	E, WSCA

Table 3-44, continued. Special Interest Species Potentially Occurring on the Clyne I Property, Pima County, Arizona

Species' Common Name	Scientific Name	Status*
Mexican spotted owl	*Strix occidentalis lucida*	T, WSCA
Mexican gray wolf	*Canis lupus baileyi*	E, WSCA
Mexican garter snake	*Thamnophis eques*	WSCA
Western burrowing owl	*Athene cunicularia hypugea*	SS
Mountain plover	*Charadrius montanus*	PT
Nichol's Turk's head cactus	*Echinocactus horizonthalonius* var. *nicholii*	E, HS
Northern gray hawk	*Asturina nitida maxima*	SS, WSCA
Occult little brown bat	*Myotis lucifugus occultus*	SS
Ocelot	*Leopardus (Felis) pardalis*	E, WSCA
Pima pineapple cactus	*Coryphantha scheerii robustispina*	E, HS
Rosy boa	*Lichanura trivirgata*	SS
San Xavier talussnail	*Sonorella macrophallus*	CA
Santa Cruz striped agave	*Agave parviflora ssp. parviflora*	SS, HS
Sonora sucker	*Catastomus insignis*	SS
Sonoran pronghorn	*Antilocarpa americana*	E, WSCA
Sonoyta mud turtle	*Kinosternon sonoriense longifemorale*	C
Southwestern willow flycatcher	*Empidonax traillii extimus*	E, WSCA
Speckled dace	*Rhinichthys osculus*	SS
Spikedace	*Meda fulgida*	T, WSCA
Spotted bat	*Euderma maculatum*	SS, WSCA
Texas purple spike	*Hexalectris warnockii*	SS, HS
Texas horned lizard	*Phrynosoma cornutum*	SS
Tumamoc globeberry	*Tumamoca macdougalii*	SS, SR
Underwood's mastiff bat	*Eumops underwoodi*	SS
White-faced ibis	*Plegadis chihi*	SS
Yellow-billed cuckoo	*Coccyzus americanus occidentalis*	C, WSCA
Likelihood of Occurrence is Unknown		
Balloonvine	*Cardiospermum corindum*	SS
Chisos Mountain coralroot	*Hexalectris revoluta*	SS
Cockerell's striate disc	*Discus shemeki cockerelli*	SS
Dalhouse spleenwort	*Asplenium (Ceteracach) dalhousiae*	SS
Santa Rita Mountains chlorochroan bug	*Chlorochroa rita*	SS

* Status Key: E = Federal Endangered; T = Federal Threatened; PE = Federal Proposed Endangered; PT = Federal Proposed Threatened; C = Federal Candidate; CA = Conservation Agreement; SS = BLM Sensitive Species; WSCA = Wildlife of Special Concern in Arizona (AGFD 1996); SR = Salvage Restricted under Arizona Native Plant Law; HS = Highly Safeguarded under Arizona Native Plant Law.

3.3.2.6.1 Land Use. The property lies within the boundary of the Las Cienegas NCA. Addition of this

property would represent a 0.8 percent increase in total area of this NCA. The property has a total perimeter

of 3.5 miles, of which 2.0 miles (57 percent) to the west and east are adjacent to state land. The remaining 1.5 miles (or 43 percent) of the property's border abuts private land (SWCA 1996c). Figure 2-34 shows the location of the property in relation to surrounding land ownership.

The property is not directly accessible by vehicle, but the eastern boundary can be reached by taking a four-wheel-drive, gravel road off Highway 82, east of Sonoita; driving north approximately six miles across private, state, USFS, and BLM lands; parking at the nearest point to the property in Section 23 and walking about 0.5 mile across state land. Public access is currently authorized across USFS and BLM lands but not across state and private land. Application would have to be made to the Arizona State Land Department to authorize public use of the road and state land, and permission would have to be obtained from any private landowner whose property is crossed.

No public recreational uses are authorized on this privately owned property. Potential dispersed recreational uses of the property may include, but are not limited to, hunting, hiking, mountain biking, camping, picnicking, and bird and wildlife watching. The property has not been surveyed for caves, but is in an area of known caves and has the appropriate geological conditions for cave formation. If any caves are found on the property, then recreational caving could be available. The property lies within the watershed of a segment of Cienega Creek that the BLM and the Department of the Interior have recommended for Wild and Scenic Rivers designation as "Scenic" (SWCA 1996c).

PD has let a grazing lease to this property and easements were given to the former owner for a road and water pipeline. Evidence of a rudimentary, unpassable, two-track roadway was noted during a site investigation, but the water line was not found and may not exist (SWCA 1996c). No other utilities easements, rights-of-way, or residential leases encumber this property. Phelps Dodge owns the mineral estate on 240 acres and the remaining 160 acres are federal reserve minerals. Phelps Dodge owns one surface water right for 2.0 af/yr from Mud Spring Canyon for stock watering.

No formal visual quality analysis was completed for the Clyne II property; however, some natural resource elements that define its visual quality include a low-relief canyon (Mud Spring Canyon); rock outcrops; perennial pond(s); and distinct upland, xeroriparian, and hydroriparian vegetation. Rolling hills can be seen for many miles in every direction (SWCA 1996c). No human-made structures or other indications of development exist on the property (Zenitech 1998b). Visual resource management objectives for the nearby Las Cienegas NCA, and BLM lands within the Sonoita Valley Acquisition Planning District, have been developed by the BLM's Tucson Field Office as part of an overall management plan for the NCA. Under the plan, most public land in the planning area will be managed for the objectives of VRM Class II.

No federal hazardous materials National Priority List site; Arizona WQARF site; zipACIDS site; or RCRA transport, storage, or disposal facility is located within one mile of the Clyne II property. No LUST sites or open or closed landfills are located on or within 0.5 mile of the property. No registered UST sites are located on the property or on adjacent properties. No ERNS sites are located on the property or in the vicinity (Zenitech 1998b).

3.3.2.6.2 Physical Resources. The underlying geology of the Clyne II property consists of Holocene-to-middle Pleistocene surficial deposits in the canyon floor, bounded above by sedimentary rocks, primarily of Cretaceous age, with local volcanic units (Zenitech 1998b). The potential for occurrence of mineral resources on the Clyne II property is summarized below in Table 3-45.

Table 3-45. Summary of Mineral Potential of the Clyne II Property

Mineral Resource	Potential	Level of Certainty
Coal, Oil & Gas, Sodium & Potassium	Low	C
Uranium & Thorium	Low	C
Geothermal Resources	Low	C
Locatable Metallic Minerals	Low	B
Non-Metallic Minerals/Industrial Minerals	Low	C
Common Variety Minerals (Sand & Gravel)	Low	C

Source: D.E. Wahl 1997b

3.3.2.6.3 Biological Resources. Upland vegetation on the Clyne II property is characteristic of plains grassland in southeastern Arizona as it makes a transition to Semidesert Grassland. Most of the ground is covered with a variety of native grasses. Shrubs and succulents are widely scattered or occasionally form clusters or patches. Grass species present include blue grama, black grama, side-oats grama, tanglehead, bullgrass, bush muhly, plains bristlegrass, three-awn, and Lehmann lovegrass. Other upland species include catclaw acacia, white-thorn acacia, beargrass, mesquite, fairyduster, ocotillo, narrow-leaved yucca, Palmer agave, wait-a-minute bush, sotol, buckwheat, silk tassel, Emory oak, Mexican cliffrose, Coahuila juniper, alligator juniper, desert sumac, scrub oak, and several species of cacti including flat cream pincushion, Bisbee beehive cactus, Fendler needle hedgehog, Arizona rainbow cactus, prickly pears of two species (*Opuntia phaeacantha* and *O. macrorhiza*) and cane cholla. Mortonia, an uncommon species reaching its western-most limits in southeastern Arizona, is present in several patches on the property, and is the dominant species on the slopes above the largest pond. Drainages have a distinct xeroriparian community of mixed oaks, including Emory oak, net-leaf oak, and scrub oak, with squaw bush, sugar sumac, both juniper species, beargrass, bullgrass, and other species. Along the upper part of Mud Spring Canyon, a small hydroriparian community includes a few young Fremont cottonwoods, Goodding willows, seep-willows, and an understory of grasses and spikerushes (SWCA 1996d).

Wildlife or wildlife sign observed during a field reconnaissance included pronghorn, mule deer, blacktailed jackrabbit, coyote, raccoon, javelina, mountain lion, rock squirrel, mourning dove, canyon towhee, Chihuahuan raven, dark-eyed junco, horned lark, Gambel's quail, song sparrow, lesser goldfinch, house finch, verdin, mountain bluebird, black phoebe, eastern meadowlark, and canyon treefrog. No leopard frogs were seen, but habitat appeared suitable for leopard frogs. Small caves, crevices, and rock outcrops provide numerous shelter sites for wildlife including bats and carnivores. The Whetstone Mountains contain several caves, including Kartschner Caverns State Park on the east side and Red Cave, an important archeological site, on the west side. This property has not been adequately explored for caves, but has geological characteristics that suggest a possibility of cave formation (SWCA 1996d).

The special interest species identified by federal and state agencies that may occur or are unlikely to occur on the Clyne II property, or for which the likelihood of occurrence is unknown, are listed in Table 3-46.

3.3.2.6.4 Cultural Resources. The Clyne II property has not been surveyed for cultural resources, and no sites have been formally recorded in the study area. During a recent reconnaissance by archaeologists, one site (and possibly more) was identified (SWCA 1996a). Flaked-lithic artifacts were widely dispersed throughout the study area. Small caves, crevices, and rock outcrops, particularly in the northern-most reaches of the property, may be conducive for use as shelter by prehistoric peoples. Over most of the property, the limestone is overlain with poorly sorted colluvium containing a variety of rock types. Many of the lithic artifacts

Table 3-46. Special Interest Species Potentially Occurring on the Clyne II Property, Pima County, Arizona

Species' Common Name	Scientific Name	Status*
Species That May Occur		
Allen's (Mexican) big-eared bat	*Idionycteris phyllotis*	SS
American peregrine falcon	*Falco peregrinus anatum*	WSCA
Arizona giant sedge	*Carex spissa var. ultra*	SS
Baird's sparrow	*Ammodrammus bairdii*	WSCA
Bartram's stonecrop	*Graptopetalum bartramii*	SS, SR
Big free-tailed bat	*Nyctinomops macrotis*	SS, WSCA
California leaf-nosed bat	*Macrotus californicus*	SS, WSCA
Canyon spotted whiptail	*Cnemidophorus burti*	SS
Cave myotis	*Myotis velifer*	SS
Chiricahua leopard frog	*Rana chiricahuaensis*	T, WSCA
Desert pupfish	*Cyprinodon macularius*	E, WSCA
Ferruginous hawk	*Buteo regalis*	WSCA
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	E, WSCA
Huachuca water umbel	*Lillaeopsis schaffneriana ssp. recurva*	E, HS
Huachuca golden aster	*Heterotheca rutteri*	SS
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	E, WSCA
Loach minnow	*Tiaroga cobitis*	T, WSCA
Loggerhead shrike	*Lanius ludovicianus*	SS
Long-legged myotis	*Myotis volans*	SS
Longfin dace	*Agosia chrysogaster*	SS
Mexican long-tongued bat	*Choeronycteris mexicana*	SS, WSCA
Mexican garter snake	*Thamnophis eques*	WSCA
Northern gray hawk	*Asturina nitida maxima*	SS, WSCA
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	SS
San Carlos wild-buckwheat	*Eriogonum capillare*	SR
Santa Cruz beehive cactus	*Coryphantha recurvata*	SS, HS
Small-footed myotis	*Myotis ciliolabrum*	SS
Small-footed myotis	*Myotis ciliolabrum*	SS
Sonoran desert tortoise	*Gopherus agassiz*	SS, WSCA
Townsend's big-eared bat	*Plecotus townsendii pallescens*	WSCA
Western burrowing owl	*Athene cunicularia hypugea*	SS
Wilcox fishhook cactus	*Mammillaria wrightii wilcoxii*	SR
Fringed myotis	*Myotis thysanodes*	SS

Table 3-46, continued. Special Interest Species Potentially Occurring on the Clyne II Property, Pima County, Arizona

Species' Common Name	Scientific Name	Status*
Species Unlikely to Occur		
Acuna cactus	*Echinomastus erectrocentrus acunensis*	C, HS
Bald eagle	*Haliaeetus leucocephalus*	T, WSCA
Brown pelican	*Pelacanus occidentalis*	E
Bunchgrass lizard	*Sceloprous scalaris*	WSCA
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum cactorum*	E, WSCA
Chuckwalla	*Sauromalus obesus*	SS
Desert sucker	*Catostomus (Pantosteus) clarki*	SS
Gentry indigobush	*Dalea tentaculoides*	SS, HS
Gila chub	*Gila intermedia*	PE, WSCA
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	E, WSCA
Gooddings onion	*Allium gooddingii*	CA, HS
Huachuca milk vetch	*Astragalus hypoxylus*	SS
Kearney's blue star	*Amsonia kearneyana*	E, HS
Long-legged myotis	*Myotis volans*	SS
Masked bobwhite	*Colinus virginianus*	E, WSCA
Mexican gray wolf	*Canis lupus baileyi*	E, WSCA
Mexican spotted owl	*Strix occidentalis lucida*	T, WSCA
Mountain plover	*Charadrius montanus*	PT
Nichol's Turk's head cactus	*Echinocactus horizonthalonius* var. *nicholii*	E, HS
Occult little brown bat	*Myotis lucifugus occultus*	SS
Ocelot	*Leopardus (Felis) pardalis*	E, WSCA
Pima pineapple cactus	*Coryphantha scheerii robustispina*	E, HS
Rosy boa	*Lichanura trivirgata*	SS
San Xavier talussnail	*Sonorella macrophallus*	CA
Santa Cruz striped agave	*Agave parviflora ssp. parviflora*	SS, HS
Sonora sucker	*Catastomus insignis*	SS
Sonoran pronghorn	*Antilocarpa americana*	E, WSCA
Sonoyta mud turtle	*Kinosternon sonoriense longifemorale*	C
Southwestern willow flycatcher	*Empidonax traillii extimus*	E, SS, WSCA
Speckled dace	*Rhinichthys osculus*	SS
Spikedace	*Meda fulgida*	T, WSCA
Spotted bat	*Euderma maculatum*	SS, WSCA
Texas purple spike	*Hexalectris warnockii*	SS, HS
Texas horned lizard	*Phrynosoma cornutum*	SS
Tumamoc globeberry	*Tumamoca macdougalii*	SS, SR
Underwood's mastiff bat	*Eumops underwoodi*	SS
White-faced ibis	*Plegadis chihi*	SS
Yellow-billed cuckoo	*Coccyzus americanus occidentalis*	C, WSCA

Table 3-46, continued. Special Interest Species Potentially Occurring on the Clyne II Property, Pima County, Arizona

Species' Common Name	Scientific Name	Status*
Likelihood of Occurrence is Unknown		
Balloonvine	*Cardiospermum corindum*	SS
Chisos Mountain coralroot	*Hexalectris revoluta*	SS
Cockerell's striate disc	*Discus shemeki cockerelli*	SS
Dalhouse spleenwort	*Asplenium (Ceteracach) dalhousiae*	SS
Santa Rita Mountains chlorochroan bug	*Chlorochroa rita*	SS

* Status Key: E = Federal Endangered; T = Federal Threatened; PE = Federal Proposed Endangered; PT = Federal Proposed Threatened; C = Federal Candidate; CA = Conservation Agreement; SS = BLM Sensitive Species; WSCA = Wildlife of Special Concern in Arizona (AGFD 1996); SR = Salvage Restricted under Arizona Native Plant Law; HS = Highly Safeguarded under Arizona Native Plant Law.

observed in the study area appear to represent "testing" colluvial cobbles for material types (chert, quartzite, etc.) in an effort to find stone suitable for manufacture of stone tools (SWCA 1996a).

Considering the presence within the Clyne II property of an extensive, archaeologically significant flaked-lithic scatter, perennial water, natural rock shelters, and a wide diversity of plant and animal communities that might have been attractive to prehistoric and historic gatherers, it appears very likely that additional significant sites are present in the area (SWCA 1996a).

3.3.2.6.5 Socioeconomic Resources. This property, taxed as Agriculture/Ranch land, generated $161 in private property taxes for Pima County in 1999. Currently, a grazing lease for the property generates approximately $100/lease-year for PD (Phelps Dodge Corporation 1996).

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION AND CHAPTER ORGANIZATION

This chapter presents the direct, indirect, and cumulative impacts of the Proposed Action and its alternatives. The analyses of impacts discussed here are the basis for the comparative summary of alternatives provided in Table 2-14 in Chapter 2. These analyses, which are organized initially by the two alternatives sets, then internally within those sets by major category as presented in Chapter 3, incorporate certain assumptions.

4.2 IMPACT ANALYSIS ASSUMPTIONS

The following assumptions were made in analyzing the direct and indirect environmental impacts of the alternatives considered in this EIS.

< Direct impacts are those that are caused by the action being analyzed and occur at the same place and time as the action; indirect impacts are those that are caused by the action but are removed in distance and/or occur later in time within the reasonably foreseeable future.

< Because federal and other agency permits are still required in order to implement mining activities on the selected lands if the land exchange is allowed, the land exchange alternative does not cause the foreseeable mining uses of the selected lands. Furthermore, because denial of a mine plan by BLM is highly unlikely (because BLM typically works with an applicant to develop an acceptable mine plan), mining could proceed on the selected lands when all necessary permits are secured whether or not the land exchange is authorized. Therefore, impacts associated with the foreseeable mining uses are not directly or indirectly caused by the land exchange.

< Short-term or temporary impacts are those which occur during or as a result of activities within the 15-month long Project construction period or those that endure for a specific or predicted length of time but that may extend beyond the construction period. Long-term impacts are those that are expected to occur during or as a result of activities proposed for the 16-year mining operations and reclamation and beyond.

< Mitigation measures for a direct impact may preclude other direct impacts from occurring. For example, mitigation for physical impacts to surface flows of the Gila River would result in no net impact on surface flows, thereby avoiding potential impacts to other resources associated with surface flows, e.g., listed species and Indian surface water rights. Similarly, mitigation for impacts resulting from the exchange may preclude impacts of foreseeable mining uses (e.g., archaeological sites).

< For the land exchange alternative, the foreseeable uses of the selected lands include those actions described under the Proposed Action alternative (the Dos Pobres/San Juan Project) as well as the foreseeable uses anticipated to occur later if PDSI develops the Dos Pobres sulfide and Lone Star orebodies as described in Section 2.2.2.1.2.

< Implementation of the foreseeable uses of the selected lands would require PDSI to obtain all applicable federal, state, and local permits and comply with all applicable environmental laws and regulations, regardless of land ownership.

< In the absence of site-specific design criteria, the surface disturbance impacts of the foreseeable uses of the selected lands for the possible Dos Pobres sulfide and Lone Star projects are assumed to be the maximum of the range anticipated, as defined below:

- Production Operations and Support Use Areas: 100 percent surface disturbance
- Transition Use Areas: 25 percent surface disturbance
- Intermittent Use Areas: 5 percent surface disturbance

< Impacts to the human environment of the No Land Exchange alternative are expected to be the same as those described for the Proposed Action or Partial Backfill alternatives. This assumption is based on the fact that PDSI has submitted a Mining Plan of Operations to the BLM for consideration (the Proposed Action) and that BLM authorizes any mining plan that includes adequate provisions to prevent unnecessary and undue degradation of the environment; includes measures to provide for reclamation of disturbed land; and complies with other applicable federal and state laws and regulations. The COE is also evaluating the proposed mining operations under its authority for Clean Water Act (CWA) compliance and it is reasonable to assume that either of the action alternatives in the Mine Plan Alternatives Set or some modification of these will fulfill these three requirements. Therefore, it has been assumed for the purposes of this analysis that proposed mining activities would proceed on portions of the selected land whether the land exchange is approved or not.

< The total acreage figure in this document for the selected lands was produced by cadastral survey. Other acreages are based on title documents or on data calculated using Computer-Assisted Drafting (CAD) software and are approximate but correct in magnitude.

< The selection of the Proposed Action alternative is not likely to cause or promote the introduction or spread of invasive species and has been addressed in the MPO and reclamation plan. Furthermore, the BLM has determined that there are no invasive, nonnative plant species known to occur on the offered lands that are not present on adjacent public lands. Offered lands would be subject to BLM policies regarding invasive, nonnative plant species if acquired under the Land Exchange alternative.

4.3 MINE PLAN ALTERNATIVES IMPACT ANALYSIS

4.3.1 Land Use

4.3.1.1 Public Lands Management

4.3.1.1.1 Proposed Action Alternative. Under this alternative, the approximately 1,931 acres of BLM-administered lands proposed for use in the MPO would be developed by PDSI, with federal oversight by BLM under 43 CFR 3809 and 3715 and by COE under Section 404 of the CWA. BLM's short- and long-term management responsibilities for these lands would increase as part of the BLM's review and oversight of the MPO and reclamation activities on public lands. These responsibilities include ensuring compliance with federal and state laws and regulations, including those pertaining to surface occupancy of public lands under

43 CFR 3715; environmental analysis of any proposed major modifications in the MPO; securing adequate bonding; oversight of mitigation and monitoring measures other than those specifically under the jurisdiction of other agencies; and oversight of reclamation activities and post-mining land uses (PMLUs).

No special management areas, such as wildernesses, ACECs, wild and scenic rivers (including recommended segments), or NCAs, would be directly impacted by this alternative. The Gila Box RNCA is not expected to be affected by the Project because the Bonita Creek portion of the RNCA occupies a separate watershed (surface water and groundwater), and the Gila River portion of the RNCA lies upstream of project area drainage. Potential access impacts to these public recreational areas is discussed under Section 4.3.1.2.1.

Visitors' recreational use of special management areas in the Safford Field Office would likely increase by an unquantified amount as an indirect impact of the Proposed Action alternative due to the slight increase in Graham County's population as a result of additional employment from the Project; this would also indirectly increase BLM's management responsibilities for public lands within the Safford Field Office by some small, but undetermined amount.

This alternative is consistent with Graham County's Land Use and Resource Policy Plan and Implementation Plan (LURPP), which "encourages mining efforts on public and private lands" (Graham County, Comment Letter No. 74).

4.3.1.1.2 Partial Backfill Alternative. The mining activities proposed under this alternative would result in impacts to management of public lands, including special management areas, identical from those described for the Proposed Action alternative. BLM's increased management responsibilities for mining oversight and administrative requirements would be identical to those needed to oversee the Proposed Action alternative.

4.3.1.1.3 No Action Alternative. The No Action alternative would result in no changes to the existing management of public lands, including special management areas, by the BLM Safford Field Office. Although no mining activities would be permitted by either the BLM or COE, BLM, as part of its public lands management responsibilities, would continue to work with PDSI to modify the rejected MPO and develop an acceptable mine plan under 43 CFR 3809. PDSI would then have to resubmit modified Section 404 and Section 402 (AZPDES) permit applications to COE and ADEQ, respectively, for environmental review.

4.3.1.2 Access and Recreation

4.3.1.2.1 Proposed Action Alternative. Approval of the Dos Pobres/San Juan Project would result in the closure of public access on the upper part of San Juan Mine Road, which the public currently uses to reach recreation areas in the Gila Mountains. However, public use of the lower three to four miles of San Juan Mine Road would still be authorized, allowing the public to access public lands south of the project area. Legal public access to the Gila Box RNCA, Bonita Creek, Johnny Creek, the Safford-Morenci Trailhead, and the north side of the Gila Mountains would still be available via the Solomon Pass Road. Currently, using Solomon Pass and West Ranch Road to get to Johnny Creek and the Safford-Morenci Trailhead requires a somewhat longer travel time (about 30-40 minutes more) than using the San Juan Mine Road (S. Knox, BLM, pers. comm.). Loss of public access on upper San Juan Mine Road would affect an estimated maximum of 2,800 to 3,100 backcountry drivers who use this area each year for recreational driving; the majority of these recreationists would likely continue to access the Gila Mountains and Gila Box via the alternate route on Solomon Pass Road. Mitigation for the impact to San Juan Mine Road is described in Table 4-45 (see also Section 4.4.1.2.1).

This alternative would also remove the approximately 1,931 acres of public lands proposed for mining from public use for dispersed recreation. Since the majority of recreational use of the these lands is for access to

other public recreational areas or for hunting in AGFD Hunt Unit 28, this alternative is not expected to cause a drop in visitor use in the general area. The approximately 240 hunters per year would have to hunt in other locations in the Unit. The BLM commercial special recreation permit holders would not be able to use the selected lands if their permits are renewed (although outfitters probably only use the public lands in question for access to other public lands) (S. Knox, BLM, pers. comm.). Horseback riders and mountain bikers would also be similarly impacted by loss of public access in the project area. In particular, the annual Safford Johnny Creek Endurance Ride may have to be rerouted under this alternative because the current horseback riding event route passes through public lands in the proposed MPO area.

This alternative also creates recreational opportunities in the form of post-mining land uses involving education and tourism. Education and tourism objectives would be achieved by constructing and providing public access to a lookout point in the hills above the project area where interpretive signs would describe the mine pits and other facilities visible from that vantage point. The possibility of offering mine tours would be evaluated in the future (J. Korolsky, PDSI, pers. comm.).

4.3.1.2.2 Partial Backfill Alternative. This alternative would result in direct and indirect impacts to access and recreation in the project area that are identical to those described for the Proposed Action alternative.

4.3.1.2.3 No Action Alternative. As no mining activities would be permitted under this alternative, no changes to existing public access or recreational uses of the project area would be expected. The San Juan Mine Road and PD Mine Road would remain open to public access. Dispersed recreational use would continue to occur on the public lands in project area, including hunting in AGFD Hunt Unit 28, recreational driving, horseback riding, and mountain biking. Subject to an annual BLM special use permit and PD authorization, the Safford Johnny Creek Endurance Ride could continue to use the current route over both public and PD private lands. No post-mining tourism or educational land uses would be provided.

4.3.1.3 Encumbrances

4.3.1.3.1 Proposed Action Alternative. This alternative would directly affect the seven existing rights-of-way (ROWs) on public lands in the project area. Four of these are for electric power transmission and distribution lines; two are for telephone and telegraph lines; and one is for a radio communication site and access road; all were authorized by BLM originally to provide these services to either PDSI or the former mining operator(s). Based on the MPO, PDSI would relocate portions of the four power and two telephone lines as necessary to develop the Project and BLM would reissue the ROWs. The ROW for the radio communications site and access road would also be relocated to the south in Section 10 atop a hill on which PDSI proposes to construct a telecommunications repeater tower. PDSI would apply to the BLM for a ROW grant for that portion of the new 230 kV powerline that crosses public lands. The 230 kV line must also be approved by the Arizona Power Plant and Transmission Line Siting Committee.

4.3.1.3.2 Partial Backfill Alternative. This alternative would result in impacts to ROWs and easements identical to those described for the Proposed Action alternative.

4.3.1.3.3 No Action Alternative. There would be no change in the existing legal ROWs or easement agreements that the BLM has made for the project area.

4.3.1.4 Agriculture/Grazing

4.3.1.4.1 Proposed Action Alternative. No unique or prime farmlands are located in the project area and no direct or indirect impacts to such lands are expected.

Four grazing allotments administered by the Safford Field Office would be directly impacted by this alternative. These are the Bryce, Talley Wash, Lone Star, and Johnny Creek allotments. Portions of these allotments would be fenced off and unavailable for continued grazing (as depicted in Figure 4-1) due to safety and site security reasons. Table 4-1 summarizes the approximate acreage of public and PD-owned lands that would be removed from each allotment by the fencing and the corresponding reduction in each allotment's stocking capacity measured in Animal Unit Months (AUMs), as a result of the Proposed Action alternative. Of the 5,169 acres removed by fencing for the Project, 3,238 acres would be returned to the allotment after mine closure, and 1,931 acres would be permanently lost due to mining activity.

The Safford Field Office's annual grazing receipts would be reduced by approximately $144 ($1.35/AUM) as a result of the 107 AUMs removed by this alternative. Eight BLM-registered range improvements, or portions thereof, including the Bryce-Talley Wash, Stewart-Golding, and Golding-West fences, three dirt tanks, the 4612/4613 boundary fence, and the Peterson Wash pipeline, would be affected by this alternative. These improvements are located within the proposed fenced area surrounding the Project; allottees would be compensated for the loss of use or access to these facilities if this alternative is selected.

4.3.1.4.2 Partial Backfill Alternative. This alternative would result in impacts that are identical to those described under the Proposed Action.

4.3.1.4.3 No Action Alternative. The No Action alternative would not affect the current grazing use of the BLM lands in the project area. The six allotments in the project area would continue to be grazed at their current stocking rates, and allottees would continue to have access to and use of registered range improvements in their allotments. BLM would continue to receive grazing income for the current stocking capacity of the allotments.

Table 4-1. Acreage of Public and PD-Owned Lands Removed from Each Allotment as a Result of the Proposed Action Alternative, and Corresponding Reduction in the Allotment's Stocking Capacity

ALLOTMENT (Operator)	Total Allotment (acres)	Acreage Removed from Allotment Due to Project		Reduction in Stocking Capacity	
		Public Lands	PD Lands	Public Lands AUMs (%)	PD Lands AUMs (%)
Bryce Allotment (G. Bryce)	54,000	455	770	12	18
Talley Wash Allotment (Page Land & Cattle Co.)	9,703	3,766	2,310	49	30
Rest Haven Allotment (B. Smith & B. Bell)	2,317	0	0	0	0
Lone Star Allotment (Phelps Dodge Corporation)	31,829	615	179	20	6
Johnny Creek Allotment (J. Menges)	23,291	333	365	26	28
Bonita Creek Allotment (C. Amado)	25,171	0	0	0	0
TOTAL	**146,311**	**5,169**	**3,624**	**107**	**82**

4.3.1.5 Mineral Rights

4.3.1.5.1 Proposed Action Alternative. No direct or indirect impacts on federal mineral rights would occur as a result of this alternative because PD owns all federal mining claims appurtenant to the public lands proposed for mining. The State of Arizona's subsurface mineral rights in Sections 16 and 32 would not be impacted by development of the Project.

4.3.1.5.2 Partial Backfill Alternative. Like the Proposed Action, this alternative would have no impact on PD's or other parties' federal or state mineral rights, i.e., the legal right to develop a mining claim. However, this alternative could preclude future mining of low-grade copper ore and/or result in extra costs associated with possible future extraction of such ore from the San Juan mine.

4.3.1.5.3 No Action Alternative. Selection of this alternative by the BLM or COE would not affect PD's or other parties' mineral rights to the project area. Development of minerals on public lands is authorized by the General Mining Law of 1872 (under which PD has filed 844 mining claims on the project area); 43 CFR 3809 regulations (under which PDSI submitted both the 1996 and the 2001 revised Dos Pobres/San Juan Plan of Operations); the Mining and Mineral Policy Act of 1970; and the National Materials and Minerals Policy, Research, and Development Act of 1980. However, such development is subject to approval of a plan of operations that meets the requirements of applicable environmental laws and regulations.

BLM must reject a mining plan that would result in unnecessary or undue degradation of the environment. According to regulations at 43 CFR 3809.5, failure to comply with applicable performance standards, terms and conditions of plan approval, and other federal and state environmental and cultural resource laws will constitute unnecessary or undue degradation. To determine whether a proposed MPO would cause such degradation, the BLM oversees an analysis of environmental impacts as required by provisions of the National Environmental Policy Act (NEPA). The BLM also relies on analyses conducted by permitting agencies—such as the COE, EPA, and ADEQ—whose permitting jurisdictions arise from federal environmental statutes such as the Clean Air Act and the CWA or state environmental laws. The implementing regulations of these statutes provide quantitative and qualitative criteria for demonstrating environmental compliance. In the case considered by this EIS, the No Action alternative would only be selected if both the Proposed Action and the Partial Backfill alternatives failed to meet the criteria stipulated for the required permit(s). If that were to happen, the COE could not issue their 404 permit; the BLM could not authorize either the Proposed Action or the Partial Backfill mining plans; and the project proponent (PDSI) could not mine under either plan. PD's ability to mine their claims under a *permittable* mine plan, however, would remain unchanged.

4.3.1.6 Surface Water Rights

4.3.1.6.1 Proposed Action Alternative. Although ownership of surface water rights in the project area would not be impacted by the Proposed Action alternative, the proposed security/grazing fence around the mine site would physically preclude access to and use of surface water rights within the fenced boundary. Fifteen surface water rights totaling 3.9 af/yr located on BLM lands and four surface water rights totaling 75.97 af/yr located on PD lands would be directly impacted. Holders of these rights, as listed in Tables 4-2 and 4-3, respectively, would be compensated for their losses. Additionally, stormwater management facilities would reduce the watershed area contributing tributary runoff to the Gila River (see Table 4-4).

4.3.1.6.2 Partial Backfill Alternative. This alternative would result in impacts to surface water rights that are identical to those described for the Proposed Action alternative.

4.3.1.6.3 No Action Alternative. As no mining activities or surface disturbance would be authorized, this alternative would not affect existing surface water rights on the public lands in the project area.

4.3.1.7 Blasting Noise and Vibrations

4.3.1.7.1 Proposed Action Alternative. Blasting at the Project, while scheduled to occur daily, would be of relatively low magnitude and extremely short duration. Noise and vibrations caused by blasting are not expected to adversely affect either the residents or structures in the Safford area or the telescope operations on Mt. Graham approximately 20 air miles away.

Air blasts (sound pressure, measured in decibels [dB]) and ground motion (vibrations, measured in peak particle velocity in in/sec) are common effects of pit blasting. The severity of these effects depends upon the instantaneous charge per delay, distance from the source, and a variety of other geophysical and atmospheric factors. To determine the likely nature of the air blasts and ground motions that would result from mine blasting at Dos Pobres and San Juan, a study was undertaken using standard formulas developed by Ladegaard-Pederson and Dally (1975) for estimating sound pressure and by U.S. Bureau of Mines and others for estimating ground motion (Physical Resources Engineering 1997). To conservatively estimate sound pressure of proposed blasting, 10 percent of the value for the upper limit of the curve for an unconfined blast was used, given that the design of the blast is substantially confined within the drilled rock (ibid.).

Table 4-2. Potential Impacts to Surface Water Rights on BLM Lands Under the Proposed Action and Partial Backfill Alternatives

Registry No.	Holder	Impact	Volume (af/yr)
36-0072391	Page Land & Cattle Co. (PL&C)	Under leach pad	0.20
36-0072392	PL&C	Near ore surge pile and road	0.15
36-0072393	PL&C	Under temporary laydown area	0.20
36-0072394	PL&C	Under leach pad	0.15
36-0072395	PL&C	Under aggregate borrow source area	0.10
38-0019207	BLM	Near road to SJ truck shop complex	0.10
38-0019208	BLM	Under leach pad	0.10
38-0019209	BLM	No direct impact; within fence	0.10
38-0019287	BLM	Near South diversion channel	1.30
38-0024941	P D	Under San Juan pit	0.70
38-0072385	PL&C	Near leach pad area	0.20
38-0072386	PL&C	Under soil stockpile area	0.10
38-0072387	PL&C	Near leach pad area	0.15
38-0072388	PL&C	Under temporary laydown area	0.20
38-0072389	PL&C	Near ore surge pile	0.15
		TOTAL	**3.9**

Table 4-3. Impacts to Surface Water Rights on PD's Private Lands under the Proposed Action and Partial Backfill Alternatives

Registry No.	Holder	Impact	Volume (af/yr)
36-0060073.1	G.A. Bryce	Under West development rock stockpile area	1.61
36-0072390	Page Land & Cattle	Near Dos Pobres setback and powerline	0.30
4A-0002478	G.A. Golding	Within fenced area	1.68
4A-0001418	PL&C	Within Dos Pobres Mine setback	72.38
		TOTAL	**75.97**

Table 4-4. Potential Change in Watershed Area Resulting from the Proposed Action

	Watershed Area (ac)		
Wash	***Baseline Condition***	***Post-Project Condition***	**Net Change (ac)**
Coyote/Butler	12,822	14,066	1,244
Watson	6,222	3,707	(2,515)
Talley	5,220	4,651	(569)
Cottonwood/Peterson	11,961	11,643	(318)
Wilson	4,301	4,301	0
Lone Star	6,815	6,815	0
TOTAL	**43,040**	**40,882**	**(2,158)**

Source: Dames & Moore 1998, Table 1

Under this alternative, blasting at the mine sites is expected to occur during daylight hours, once or possibly twice a day at each pit, seven days per week. Proposed blasting techniques are described in Chapter 2. Based on the anticipated maximum charge load of 6,000 lbs, and the distances from the pit areas to the nearest residential area and the Mt. Graham observatories (approximately 7 and 20 miles, respectively), expected sound pressure and ground motion were calculated for these sites. Table 4-5 provides these data, and Figure 4-2 shows sound pressure and ground motion levels at 2-, 7-, and 10-mile radii from the mine pits.

To put these data into context, refer to Figure 4-3 and Table 4-6. Figure 4-3 shows the human and structural response to sound pressure levels and the range of sound pressure levels expected from air blasts from explosions. The expected sound pressure at Safford (96 dB) and Mt. Graham (89 dB) from blasting in the project area falls well below the "complaint" level and well within the scaled distance requirements recommended by researchers (Physical Resource Engineering 1997). For residential areas near Safford, the expected sound pressure level of the blasts would be similar to that of a riveter, but for extremely short durations. At the Mt. Graham Observatories, roughly 15 miles southwest of the project area, the expected sound pressure from blasting would be more similar to the noise generated by the pulse of a kitchen blender.

Table 4-5. Estimated Sound Pressures and Peak Particle Velocities for Safford and the Mt. Graham Observatories from Mine Blasting

Location	Distance (ft)	Sound Pressure (dB)	Peak Particle Velocity (in/sec)	
			low estimate	high estimate
Safford	36,960	96	0.0013	0.0134
Mt. Graham	104,016	89	0.0003	0.0026

Source: Physical Resources Engineering, Inc. 1997

Table 4-6 presents data comparing vibrations generated by six kinds of human activities in a test fatigue structure. Compared to these data, the estimated vibration levels from blasting at the Project that would affect structures in the Safford area (0.0013 to 0.0134 in/sec) would fall well below vibrations caused by someone walking through the structure (0.056 to 0.286 in/sec). At the Mt. Graham Observatories, vibrations would be almost imperceptible (0.0003 to 0.0026 in/sec) and of extremely short duration. It is anticipated that they would not interfere with telescope operations.

Table 4-6. Comparison of Vibrations in a Test Fatigue Structure from Six Human Activities

Location of Receptor in Test Fatigue Structure	Maximum Structure Vibrations (in/sec)					
	Jumps	Heel Drops	Entrance Door Slams	Sliding Glass Door Slams	Nail Hammering	Walking
NW corner	0.190	0.055	0.220	0.110	0.100	0.056
SE corner	0.310	0.139	0.182	0.164	0.508	0.157
S wall	1.44	0.783	1.29	0.136	0.241	0.225
W wall	1.00	0.486	1.05	0.124	0.365	0.086
Mid-floor	10.1	5.84	0.453	0.272	0.067	0.286

Source: Physical Resources Engineering, Inc. 1997, Table 5

4.3.1.7.2 Partial Backfill Alternative. The noise and vibrations associated with blasting would be identical as those described for the Proposed Action alternative.

4.3.1.7.3 No Action Alternative. This alternative would result in no mining activities, including blasting; therefore, no noise or vibrational impacts associated blasting would be expected.

4.3.1.8 Visual Resources

4.3.1.8.1 Proposed Action Alternative. The Project would result in permanent modifications to the existing character of the landscape. Construction of the pits, leach pad, development rock and soil stockpiles, aggregate and compactible soil borrow pits and overburden stockpiles, access and haul roads, stormwater management facilities, shops, communications facilities, tanks and storage buildings, and other facilities would become a major focus of viewers' attention from viewpoints in the Safford Valley looking in the direction of the Gila Mountains. A computer-generated photographic visual simulation of the Project depicting the anticipated

view at full build-out from a central point in Safford near Highway 70 and 20th Avenue is provided as Figure 4-4. Based on this simulation and those from two other viewpoints (Dames & Moore 1997b), BLM prepared a visual contrast rating describing and evaluating the proposed changes in the character of the existing landscape (Knox 1997). The following analysis describes the anticipated changes in the scene as depicted in Figure 4-4.

By the end of the 16-year Project, two development rock stockpiles, the leach pad, and the upper part of the back wall of the San Juan pit would be visible on the terrace above the Gila River as part of a background view from the valley (ibid.). At about 400- to 450-feet tall, the West Development Rock Stockpile would appear mesa-like, with the front half being visible and the remainder being hidden behind the leach pad. The East Development Rock Stockpile, while much smaller, would only partially be hidden by one of the foothills. The leach pad would also be mesa-like in appearance and fully visible. The ultimate Dos Pobres pit would not be visible from the center of Safford as the leach pad lies in front of it and only the upper back wall of the ultimate San Juan pit would be visible (ibid.). Together, these facilities span a distance of about four miles across the base of the Gila Mountains. None of these facilities would rise above the silhouette of the Gila Mountains.

Horizontal lines created by the tops of the mesa-like pad, development rock stockpiles, and the stormwater diversions and the diagonal lines created by the side slopes of the pad and rock stockpiles would be apparent to viewers and would contrast with the ragged horizon of the Gila Mountains (ibid.). To some degree, the mesa-like forms would blend with other physiographic features in the Gila Valley, such as the terraces along and parallel to the Gila River and Frye Mesa at the base of Mt. Graham.

The rock stockpiles and leach pad would probably be greyish, with a blue-to-purplish tint or brownish-reddish tint depending on the lighting, time of day, distance, etc. The visual cuts made by the stormwater diversions and the upper backwall of the San Juan pit may be slightly lighter in color than the stockpiles, but all the mining features would appear relatively smooth-textured from most in-town views.

As the project area becomes revegetated, the color and lines of the pad, rock stockpiles, pits, and roads would soften slightly, but would still be noticeable (ibid.). Blocky and angular human-made structures in the form of buildings, shops, and telecommunications facilities would have little-to-no contrast with the form and line of existing structures on site, and a weak to moderate contrast with the form and line of the existing landscape. The structures would be painted compatible with the surrounding landscape, creating a little-to-no contrast with the landscape. Given the distance between Safford and the project area, there would be no contrast between the texture of the proposed and existing structures and the proposed structures and the surrounding landscape.

The Project's nighttime operations would require a certain amount of lighting for safety purposes, but such lighting would be in compliance with the Graham County Lighting Ordinance, which requires shielding of outdoor lights, down-turned lights, and sodium lighting. Many of the lights used for nighttime operations at the Project would be visible from Safford and other view points within the Safford Valley, but are not expected to affect astronomical observations at Mt. Graham, Discovery Park, or Eastern Arizona College. Sources of night lighting that would be visible from locations within the valley include the truck shop, haul trucks driving to and from the pits and various stockpiles, the SX/EW plant, the ore crushing/agglomeration and coneying system, other buildings/offices, security gates, and portable light-plants placed on stockpiles during night operations involving occasional truck haulage, for safety reasons. The degree to which each of these lighted facilities would be visible varies with the viewer's location. The East development rock stockpile and leach pad (as they grow over time) and natural topography such as river terraces and foothills would likely block views of the truck shop, the ore crushing/agglomeration and conveying system, and Site No. 2 from viewpoints in the western part of the valley. For viewers on the eastern part of the valley, the leach pad (as it grows over time) would likely block views of Site No. 1. The visibility of haul truck head lights would vary much during the

course of operations, depending upon the route and the location of active dump areas on each stockpile. The planned use of conveyors for placement of agglomerated ore is expected to further reduce nighttime lighting since portable light-plants (generators with pole-mounted spot lights that are used so that haul trucks can back up safely on the stockpiles) would be unnecessary except on occasion.

The distance from viewpoints in the valley (between six to nine miles) to different parts of the project area will lessen the impact of nighttime lights to some degree. The combined effect of all lights may produce some glow on the nighttime sky, but dust abatement measures would minimize the potential for reflected glow at night.

4.3.1.8.2 Partial Backfill Alternative. Anticipated impacts to visual resources distinguish this alternative from the Proposed Action alternative. In general, this alternative would result in all of the same direct visual resource impacts to the form, line, texture, and color or the existing landscape as the Proposed Action, with the following exceptions. While this alternative would still be considered a major modification of the existing character of the landscape, it would slightly reduce the Project's overall visual impact by slightly reducing the height of both the West and East development rock stockpiles by about 50 feet (one lift) as compared to the Proposed Action. This height reduction is achieved by backfilling about 21 percent (80 million tons) of the total development rock (about 365 million tons) into a portion of the mined-out San Juan pit. The form of the stockpiles, however, would still be mesa-like or terrace-like to the viewer and would still be below the horizon created by the crest of the Gila Mountains. With somewhat reduced heights, the visual mass of the stockpiles would be slightly decreased compared to those of the Proposed Action alternative.

Visual quality impacts from the Project's nighttime lighting would be identical to those of the Proposed Action alternative from Years 0 through 9; in Year 10 and following, however, when backfilling starts, nighttime lighting impacts would be slightly increased by the use of light-plants needed on active dump areas for the backfill stockpile (via haul trucks, no conveyor is planned). However, as the light-plants would be located below the line of sight within the San Juan pit, this increase is expected to be minor.

4.3.1.8.3 No Action Alternative. Under this alternative, visual resources in the project area would remain unchanged because no mining would occur. BLM would continue to manage their lands per the applicable visual resource management objectives.

4.3.1.9 Hazardous Materials

4.3.1.9.1 Proposed Action Alternative. This alternative would not affect any listed federal "Superfund" or state WQARF sites, RCRA sites, ERNS sites, UST sites, LUST sites,[44] or open or closed landfills. One zipACIDS[45] site, the San Juan Mine site, lies primarily on PD's private lands and would be directly affected by the Project. Since this site lies within the proposed San Juan pit, the zipACIDS site would be eliminated as mining commences. The pit lake water that now exists at the San Juan pit would be routed into the process make-up waters for mining operations once mining commences at San Juan.

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[44] "Superfund" sites are on the National Priority List for remediation under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); state hazmat sites are also called Arizona Water Quality Assurance Revolving Fund (WQARF) sites; RCRA = Resource Conservation and Recovery Act; ERNS = Emergency Response Notification System; UST = Underground Storage Tanks; LUST = Leaking Underground Storage Tanks.

[45] ZipACIDS sites are locations in Arizona, sorted by zip code, subject to investigation under the State WQARF program and the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for possible contamination of surface water or groundwater; listing as a zipACIDS site does not mean that the location is contaminated, is causing contamination, or is in violation of state or federal statutes or regulations.

As required by the Mine Safety and Health Administration (MSHA), PDSI must comply with all required safety measures regarding the transport, use, and storage of hazardous materials. All hazardous materials would be transported, handled, and disposed of per the requirements of the Resource Conservation and Recovery Act of 1976 and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended. To meet these requirements, PDSI has incorporated numerous safety features into the mine plan, such as double containment systems for the storage and use of sulfuric acid solutions, reagents, diluent, fuel, and other petroleum products (see Section 2.1.2.3.5 for details). The shipping company selected by PDSI to transport sulfuric acid to and from the mine would be required to comply with the applicable federal and state regulations governing the transport of cargo, including hazardous materials. The internal controls for transporting sulfuric acid used by one potential contractor are listed in Section 2.1.2.2.6. Upon closure of the mines, PDSI would be required to properly remove and dispose of hazardous materials from the mine sites per the Aquifer Protection Permit (APP) Program and reclamation requirements.

The transport, use, and storage of hazardous materials for the Project would increase the potential risk for adverse impacts associated with a spill or discharge of hazardous materials. The environmental effects of a release would depend on the substance, quantity, timing, and location of the release and could range from a minor spill of fuel on-site to a severe spill of sulfuric acid or fuel on public roads or bridges during transport to the mine site. PDSI would develop a Spill Prevention Control and Countermeasures (SPCC) Plan to address requirements for preventing accidental spills and developing procedures to be followed in the event of a spill. PDSI would also be required to meet the toxic releases inventory report requirements of Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) and Section 6607 of the Pollution Prevention Act of 1990. These laws require PDSI to annually report toxic releases (including amounts) should any statutory thresholds be exceeded (T. Crawford, EPA, pers. comm.).

As described in Section 3.2.1.9, PDSI initiated and completed voluntary clean-up and stormwater management activities at the existing San Juan pit. These activities included general cleanup of debris, as well as construction of a stormwater diversion and installation of a stormwater evaporation pond. ADEQ has determined that these improvements at San Juan would be subject to the APP review process and would be treated as a new facility.

4.3.1.9.2 Partial Backfill Alternative. Impacts of this alternative would be identical to those of the Proposed Action.

4.3.1.9.3 No Action Alternative. This alternative would not affect or result in the use of hazardous materials on public lands.

4.3.2 Physical Resources, Including Waters of the U.S.

4.3.2.1 Climate

4.3.2.1.1 Proposed Action Alternative. This alternative would not affect climate on a regional scale but could alter local wind patterns on the mining site. Prevailing weather patterns for the Safford Valley are governed by larger regional and global geographic factors beyond those potentially affected by the Project and would not be affected by development of the Proposed Action in any measurable way. Winds generally follow local topography and flow parallel to major valleys (Class One Technical Services 1997). On a very localized (or microclimatic) scale, wind patterns in and around the mine property would respond directly to changes in local topography caused by development of the open pit mines, stockpiles, leach pad, and other facilities. These microclimatic changes, however, are not expected to be noticeable in the natural and human environment beyond the project area.

4.3.2.1.2 Partial Backfill Alternative. As under the Proposed Action, winds in and around the mine property at a very localized scale would respond directly to changes in local topography that would result from development of open pit mine operations and partial backfill of the San Juan Pit. While the reduced height of the development rock stockpiles would be expected to result in different microclimatic effects, these extremely localized changes would not likely be discernible or noticeable on the human or natural environment.

4.3.2.1.3 No Action Alternative. This alternative would have no impact on the existing climate in the region containing the project region.

4.3.2.2 Air Quality

4.3.2.2.1 Proposed Action Alternative. The Project is not expected to emit air pollutants in excess of state or national standards. Arizona's State Implementation Plan (SIP) sets forth the measures to be used to attain the National Ambient Air Quality Standards (NAAQS) in designated non-attainment areas for six criteria air pollutants: particulate matter (PM_{10}), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), ozone (O_3), and lead (Pb). Because the project area lies in an attainment area for all six pollutants, no existing non-attainment SIP requirements are applicable to the Project (J. Gibbs, ADEQ, personal communication).

Potential impacts to air quality from the Proposed Action alternative were assessed by modeling the emissions levels of the four criteria pollutants, PM_{10}, NO_x[46], SO_2, and CO, that would reasonably be expected to emanate from the mining activity (AEC 2003b). Sulfuric acid (H_2SO_4) mist from the electrowinning process and speciated volatile organic compounds (VOCs) from fuel burning equipment, which appear on the Arizona Ambient Air Quality Guideline (AAAQG) list but are not criteria pollutants, were also modeled. The modeling indicated that, while this alternative would result in an increase in the ambient concentrations of criteria pollutants and the modeled AAAQG compounds, no standards would be exceeded. Modeling for air quality impacts was based on the revised MPO (PDSI 2001).

The emissions sources associated with proposed mining and mining-related activities in the project area would consist of point, area, volume, and open pit sources (AEC 2003b). Point sources include stacks and vents; area sources include wind-blown fugitives from ore piles; volume sources include vehicular traffic on roads; and open pit sources are those associated with operations in the pits, such as drilling and blasting.

Emissions are expected to be primarily fugitive emissions, those that cannot reasonably be directed through a stack, vent, or functionally equivalent opening. Such emissions include PM_{10} (dust) from mobile equipment traffic on dirt roads, drilling, blasting, truck loading and unloading, crushing and materials handling, and wind erosion of exposed and disturbed soil. The MPO provides for dust control at the primary, secondary, and tertiary crusher plants; conveyors; coarse ore surge pile; and fine ore surge pile. Atomized water spray systems with fog nozzles and water-wetting systems would be used at these facilities to suppress dust, and pulse-type baghouse dust collection systems would be used to filter dust-laden air. Throughout construction and operations, water trucks would systematically suppress dust on haul roads and unpaved primary access roads. Commercial dust suppressants would be used in certain areas.

Sulfuric acid mist would be emitted from electrowinning operations at the SX/EW tankhouse. VOCs would originate from the generators, boiler, and other sources. Acid mist control methods being evaluated by PDSI

[46] Only NO_2 has an NAAQS; however, predicting NO_x concentration provides a very conservative method for adhering to the NAAQS because NO_x emissions are primarily NO (nitrous oxide), which gradually converts to NO_2 over time.

include heat retention beads and balls, surfactants, water foggers, and cell wipers. Essentially, these methods either retard the release of acid mist from electrolyte within the electrowinning cell or work to contain acid mist above the cell. Emissions of VOCs during the solution extraction process would be minimized through engineering design and diluent selection for low vapor pressure. Boiler combustion gasses would be minimized through use of clean-burning fuels, such as propane and/or natural gas.

To predict concentrations of the four criteria pollutants, PM_{10}, NO_x, SO_2, and CO, Applied Environmental Consultants, Inc. (2003) used the EPA-approved Industrial Source Complex 3 (ISC3) model. Within the model, one set of receptors traced the process area boundary and a second set formed a coarse grid extending outward from the process boundary to 10 kilometers (about 6 miles) (see Figure 3-4). In addition, six special receptors at each of the following locations (downtown Safford, the Safford Municipal Airport, the nearest residence, the San Carlos Apache Reservation boundary, the Galiuro Wilderness west of the project area, and the Gila Wilderness in New Mexico) were modeled. Both wildernesses are Class I air sheds that lie within 100 kilometers (about 62 miles) of the project area. The modeling results for the process boundary and grid receptors are summarized in Table 4-7; the modeling results at the six special receptor sites are summarized in Table 4-8a. Modeling results showed that none of the assessed pollutants would exceed the applicable NAAQS at or beyond the process boundary (AEC 2003b).

Table 4-7. Maximum Ambient Impacts Due to Emissions from the Proposed Project Compared to Applicable NAAQS.

Pollutant	Averaging period	Modeled concentration (: g/m^3)	Highest background concentration (: g/m^3) [1]	Maximum ambient concentration (: g/m^3)	NAAQS (: g/m^3)
PM_{10}	24-hour	26.0 [2,3]	27.7	53.7	150
PM_{10}	Annual	3.8 [3]	12.3	16.1	50
SO_2	3-hour	219 [2]	94.0	313	1,300
SO_2	24-hour	26.6 [2]	22.0	48.6	365
SO_2	Annual	3.4	1.0	4.4	80
NO_x	Annual	17.4	1.9	19.3	100
CO	1-hour	7,568[2]	3,200	10,768	40,000
CO	8-hour	405 [2]	1,219	1,615	10,000

[1] See Section 3.2.2.2.1 for information on background concentrations.
[2] Highest 2nd high concentration.
[3] Calculated with plume depletion.
Source: AEC 2003b, Table 6.1

Concentrations of H_2SO_4 and 12 VOCs were also modeled. The highest predicted 1-hour and 24-hour H_2SO_4 concentrations were 16.5 : g/m^3 and 0.7 : g/m^3, which are less than the applicable AAAQG concentrations of 22.5 : g/m^3 and 7.5 : g/m^3, respectively. None of the predicted VOC concentrations were above the applicable AAAQGs.

Table 4-8a. Summary of Air Quality Model Results at Six Special Receptor Sites

		Maximum Annual and High Second High Short-Term Concentrations (: g/m^3)					
Pollutant	**Averaging period***	**Downtown Safford**	**Safford Airport**	**Nearest Residence**	**San Carlos Apache Reservation**	**Galiuro Wilderness**	**Gila Wilderness**
PM_{10}	24-hour (28, 150)	2	2	4	6	0.3	0.1
PM_{10}	Annual (12, 50)	0.1	0.2	0.1	0.3	0.01	0.01
SO_2	3-hour (94, 1,300)	9	17	9	99	9	6
SO_2	24-hour (22, 365)	1	2	1	9	1	1
SO_2	Annual (1, 80)	0.02	0.09	0.02	0.38	0.03	0.01
NO_x	Annual (2, 100)	0.1	0.4	0.1	1.9	0.1	0.1
CO	1-hour (3,200, 40,000)	248	587	266	3,729	272	155
CO	8-hour (1,219, 10,000)	11	39	20	110	20	7

* Values in parentheses represent the maximum background concentration and the applicable NAAQS. The background concentrations would have to be added to the above concentrations for comparison to the NAAQS.

Source: AEC 2003b, Table 6.4

As stated earlier, the Project will be classified as a minor source for all pollutants and therefore, will not be subject to PSD permitting. For the purposes of the EIS, however, emissions from the Project are assumed to consume PSD increment. Consequently, an increment analysis was performed by Applied Environmental Consultants as described below.

As defined in the EPA New Source Review Workshop Manual (Workshop Manual),the impact area for purposes of PSD increment analysis is a circular area with a radius extending from the source to: (1) the most distant point where modeling predicts a significant impact, or (2) a modeling receptor distance of 50 kilometers (about 30 miles), whichever is less. For the purposes of this analysis, the impact area was assumed to be 50 kilometers (about 30 miles). The amount of PSD increment that has been consumed (or expanded) in a PSD area for any given pollutant is determined from the emission increases and decreases that have occurred from sources in the area since the applicable minor source baseline date. The PM_{10}, SO_2 and NO_2 minor source baseline date for the Southeast Arizona Intrastate AQCR, where the Project is located, was triggered

on April 5,2002 by ADEQ's completeness determination for the Bowie Power Station application. As recommended in the Workshop Manual, the increment inventory should include all increment consuming sources within the impact area and 50 kilometers (about 30 miles) beyond. A review of the ADEQ emission source data base extending 100 kilometers (about 80 miles) from the Project location identified only the proposed Bowie Power Station as a PM_{10}, SO_2 and NO_2 increment consuming source. The Bowie Power Station will be located approximately 61 kilometers from the Dos Pobres/San Juan Project, and it is in the process of obtaining a PSD permit from ADEQ.

A further review of the impact area and 50 kilometers (about 30 miles) beyond showed that other potential locations for increment consuming sources are the rural towns of Safford (12 kilometers from Project), Bowie (59 kilometers from Project) and Wilcox (70 kilometers from Project), along with several other smaller towns. Some of these rural towns like Safford support agriculture, but none have any major industrial facilities. Moreover, there has been no new development (including new farming or new unpaved roads) or modifications to existing minor sources in these rural towns since the minor source baseline date of April 5, 2002. Thus, for purposes of this analysis, the only increment consuming sources that could potentially contribute to ambient PM_{10}, SO_2 and NO_2 concentrations in the impact area are the Project and the Bowie Power Station.

The most conservative increment consumption analysis is one in which the maximum impacts from each source within that portion of the impact area nearest to the source being permitted are summed for comparison to the applicable increment. This approach was used for the analysis conducted for the EIS. The PM_{10}, SO_2 and NO_2 emissions data for the proposed Bowie Power Station were modeled using the Project receptor grid. The results of the modeling are summarized in Table 4-8b. The results show that the sum of the maximum impacts from both the Project and the Bowie Power Station are below the applicable PSD increments. Therefore there is no need or requirement for offsets or mitigation measures.

Table 4-8b. Maximum Ambient Concentrations Due to Emissions from the Proposed DP/SJ Project and the Bowie Power Station Project With Comparison to Applicable PSD Increments

Pollutant	Averaging Period	Maximum Modeled Concentration From DP/SJ Project (: g/m^3)	Maximum Modeled Concentration From Bowie Project (: g/m^3)	Total Ambient Concentration (: g/m^3)	Class II PSD Increment (: g/m^3)
PM_{10}	24-hour	26.0 [a, b]	0.23 [a]	26.23	30
	Annual	3.8 [b]	0.01	3.81	17
SO_2	3-hour	219 [a]	0.59 [a]	219.59	512
	24-hour	26.6 [a]	0.08 [a]	26.68	91
	Annual	3.4	0.01	3.41	20
NO_x	Annual	17.4	0.01	17.41	25

[a] *Highest 2nd high concentration.*

[b] *Calculated with plume depletion.*

Since the PSD minor source baseline date has been triggered by the proposed Bowie Power Station, future emission sources in the area may be required to analyze PSD increment consumption. The amount of increment available to accommodate future growth or future projects elsewhere increases dramatically with distance from the Project. The Project's maximum predicted increment consumption of 26.0 : g/m^3 is at only one location, and that location is a point at the Project's boundary. The new analysis demonstrates that the Project's predicted impacts decrease rapidly with increasing distance from the Project. This is usually the tendency with particulate matter plumes because of the dispersion of emissions and because they lose mass as the plume travels downwind. The amount of increment available for future emissions increases in Safford (12 kilometers from Project), Bowie (59 kilometers from Project), and Wilcox (70 kilometers from Project), along with several other smaller towns is thus quite large for the areas likely to be impacted by such emissions.

Any new PM_{10} emissions in Safford and other communities also will have maximum impacts near the source that decrease outward (i.e., decrease toward the Project). Consequently, it is unlikely that the combined increment consumption of the Project and any future increment-consuming sources in Safford or other communities would exceed the available PSD increment.

The Proposed Action alternative is not expected to have a significant adverse effect on the air quality or visibility of the two Class I airsheds within 100 kilometers (about 60 miles) of the process boundary of the project area. These Class I airsheds are the Galiuro Wilderness southwest of the project area and the Gila Wilderness east of the project area in New Mexico (see Figure 3-5). To assess potential effects of emissions plumes associated with the proposed mining and mining-related activities on visibility in these wilderness areas, a visibility impact analysis was conducted using the EPA VISCREEN model (AEC 2003b). The VISCREEN model is based on anticipated emissions, which for the Project, primarily consist of fugitive dust and vehicle tailpipe emissions. Visual impacts of plumes are a function of atmospheric turbulence (wind speed and direction); local terrain; and the location, buoyancy, particle size, and frequency of emissions. The analysis is influenced and complicated by several factors, such as the influence on plume transport meteorology of intervening terrain between the Project and the area being assessed for visibility impacts.

Two levels of screening analysis were performed for each wilderness area: Level 1 screening, which is designed to provide a conservative estimate of worst-day visual impacts assuming worst-case meteorological conditions, and Level 2 screening, which must be performed if screening criteria at Level 1 are exceeded (AEC 2003b). Level 2 screening is a more complete analysis, allowing for more realistic meteorological and plume composition inputs. The Level 2 screening completed for this EIS used the 2002 revised PM_{10} emissions inventory and more conservative modeling assumptions recommended by the U.S. Forest Service (AEC 2003b). Results of the screening indicated that visibility in the wilderness areas would not be affected by the Proposed Action.

Title III of the 1990 Clean Air Act Amendments lists 189 compounds and compound classes as hazardous air pollutants (HAPs), also referred to as “air toxics”. The listed compounds include various chemicals such as benzene and toluene, minerals such as asbestos, as well as metals such as mercury and arsenic.

Air emissions from the Project will include a very small percentage of constituents classified as HAPs. Total potential emissions of HAPs from the Project are estimated to be 3.2 tons per year (tpy) (AEC 2003c). Most of this amount (approximately 2.8 tpy) is attributable to naturally occurring manganese present in the soils, ore, and development rock in the Project area. Manganese compounds, which are listed HAPs, are expected to be present in the form of manganese oxide minerals as a small percentage of total particulate emissions generated from mining, mineral handling, and truck haulage operations. Other HAPs metals, such as lead and cadmium, may also be present in particulate emissions, but in trace amounts. Trace amounts of organic chemicals listed as HAPs (e.g., benzene, formaldehyde, etc.) are also expected to be present in VOC emissions associated with the SX/EW process and fuel handling/storage, as well as in combustion gases. The methods and systems described in Section 2.1.2.3.9 for controlling air emissions will also serve to control the HAPs component of those emissions.

4.3.2.2.2 Partial Backfill Alternative. The primary difference between this alternative and the Proposed Action is the backfilling of 60 to 80 million tons of development rock into the San Juan pit. Permanent sources of emissions, such as conveyors and some processing facilities would be identical to the Proposed Action. Mobile emissions sources, such as haul trucks and support vehicles would follow slightly different haulage routes after Year 10 of the Project for the proposed backfilling of the San Juan pit. Truck loading and unloading associated with backfilling development rock in the San Juan pit would be a source of PM_{10}. While the PM_{10} and tailpipe emissions would be generated from slightly different *locations* than those of the Proposed Action, the total *quantity* of emissions (tons per year) would not be measurably different. Therefore, emissions of criteria pollutants affecting air quality are not expected to exceed standards or guidelines within any 1-hour, 8-hour, 24-hour, or annual period at or beyond the process boundary, including the City of Safford, San Carlos Apache Reservation boundary, and the Galiuro and Gila Wildernesses, based on modeling results (AEC 2003b).

For Class I airsheds within 100 kilometers of the Project, factors affecting plume visual impacts such as atmospheric turbulence (wind speed and direction); local terrain; and the location, buoyancy, particle size, and frequency of emissions are expected to be identical to the Proposed Action alternative. Therefore, the results of visibility analysis described under the Proposed Action for the Galiuro and Gila Wildernesses would be identical for this alternative.

4.3.2.2.3 No Action Alternative. The No Action alternative would not change existing conditions for air quality, criteria pollutants, or visibility in Class I airsheds.

4.3.2.3 Geology

4.3.2.3.1 Proposed Action Alternative. This alternative would impact some of the locatable and salable mineral resources, the geological resources of primary concern, within the 16,297 acres of public lands in the project area. As part of baseline data collection, a BLM-approved contractor evaluated locatable and salable mineral resources and found that high mineral potential for copper or related mineralization occurs on only about 265 acres, or 1.6 percent of the total, specifically on parts of parcels H, P, Q, I1, and O (see Figure 3-8). These are areas that would be impacted by development of the San Juan pit under the Proposed Action alternative (ibid.). The remaining public lands, approximately 16,032 acres, or 98.4 percent, have low or moderate mineral potential or high potential but at a lower level of certainty, for either open-pit or underground deposits and are not proposed for mining development. None of the lands contain 1) moderate or high mineral potential for all other metallic minerals, including placer gold; 2) known commercial quantities of non-metallic

and industrial mineral resources; 3) prospectively valuable coal, oil, gas, sodium, or potassium resources; or 4) moderate or high potential for accumulation of uranium or thorium (ibid.). Neither the known sulfide orebody underlying the Dos Pobres pit on PD's private lands, nor future access needed to develop that orebody, would be impacted by the Project because of the planned 1,300-foot setback around the pit.

For salable minerals, the Watson Wash aggregate borrow area (roughly 1/3 lies on public lands) and the existing aggregate source (entirely on public lands) located immediately downstream of the proposed leach pad would be used to provide riprap, sand, and gravels necessary for construction of stormwater channel protection, haul roads, roadbeds, and other facilities. These direct impacts to salable materials on the public lands would be long term.

4.3.2.3.2 Partial Backfill Alternative. The proposed backfilling of development rock in the San Juan pit would not preclude access to any currently known, economically viable reserves of metallic or non-metallic resources because such reserves would have been removed from the western portion of San Juan pit before backfilling begins in Year 10 of the Project. However, this alternative permanently removes the potential to access any ore deposits in the backfilled portion of the San Juan pit that are not currently considered economically viable but may otherwise become so due to future changes in technology or the price of copper. As under the Proposed Action, the Dos Pobres setback under this alternative has been designed to accommodate potential future development of the geological mineral resources of the Dos Pobres sulfide orebody.

4.3.2.3.3 No Action Alternative. This alternative would not affect existing mineral resources in the project area.

4.3.2.4 Soils

4.3.2.4.1 Proposed Action Alternative. Based upon SCS mapping of the project area (SCS 1981), direct impacts are expected to the soil complexes associated with the upper alluvial fan terraces, ephemeral washbeds and floodplains, and rocky upper slopes. All these soil complexes are generally characterized as poor, low-productivity soils. To the extent possible, soils would be stockpiled for reclamation along with other growth medium (PDSI 1997). Implementation of stormwater control measures and revegetation programs outlined in the MPO would limit off-site erosion potential. On-site erosion would be controlled in a manner consistent with safety and operational requirements. During construction and operations, dust suppression by watering would help control soil loss by wind erosion. Stormwater management programs, closure plans under the APP, and BLM reclamation regulations would provide protection for downstream aquatic resources in the Gila River from the effects of long-term soil erosion. Losses of soil productivity, however poor that productivity might be before project initiation, would occur in areas not subject to active reclamation programs, such as the pit sites, building pads, ponds, and support infrastructures such as roads and powerlines. These long-term losses would continue until natural successional processes resulted in the re-establishment of vegetation and productive soil profiles.

4.3.2.4.2 Partial Backfill Alternative. This alternative would result in direct and indirect impacts to soils that are identical to those described for the Proposed Action alternative.

4.3.2.4.3 No Action Alternative. As no mining or surface disturbing activities would occur under this alternative, soils or sediment yield of the project area would not be impacted by this alternative.

4.3.2.5 Groundwater

4.3.2.5.1 Groundwater Quantity

< **Proposed Action Alternative.** Groundwater pumping at the Dos Pobres/San Juan Project would impact groundwater elevations in the area for an extended period (over 3,000 years). The magnitude and areal extent of this impact were predicted using hydrological modeling. Development of that model and the resulting predictions are presented below.

C **Groundwater Model Development.** In conjunction with BLM hydrologists, Dames & Moore (now URS Corporation) prepared a groundwater model to evaluate the potential impact of the proposed Dos Pobres/San Juan Project on the groundwater and surface water regimes near Safford (URS 2002a). The purpose of the model was to predict what impact, if any, on regional groundwater flow might result from development of the proposed open pit mines and groundwater production wells. Of particular interest was the potential impact on surface flows in the Gila River approximately eight miles south of the proposed production well field (see Section 4.3.2.6.1, Surface Water Quantity) and the potential impact on groundwater under the San Carlos Apache Reservation, which is located within three miles of the project area at the closest point (see Section 4.3.6.1, Indian Trust Resources).

The analysis of potential mine-induced groundwater impacts was accomplished through the use of a computer simulation (model) of the regional groundwater system. In the computer model, the analyst inputs numeric information that describes the regional hydrologic characteristics within the model domain. The model then simulates regional movement and storage of groundwater. Once a model of the system has been calibrated (i.e., conforms to observation data and adequately describes known behaviors of the system), the model is then used to predict the response of the groundwater system that is likely to result from development of mine pits and groundwater pumping to support mine operations.

The model represents hydrogeologists' current understanding of the regional groundwater system and is but one of many unique solutions that may match computed and observed values with equal precision. The model integrates various elements of a complex hydrogeologic system and is the best method available to describe and predict the behavior of the system under the Proposed Action. However, since the model is not the "real world," monitoring the actual system response, comparing that response to the model's predictions, and adjusting mitigation accordingly are integral components of the 3M Program. This "model, monitor, and mitigate" (3M) approach is described in greater detail in Appendix F. The modeling effort and model predictions are described below.

The three-dimensional model was developed with a total of 226,304 calculation cells, covering approximately 500 square miles extending from north of the Gila Mountains to south of the Gila River and from about the confluence of the Gila River and Bonita Creek in the east to Eden in the west, with the project area lying approximately in the center (see Figure 4-7). A total of 17 layers simulated the vertical distance from the top of the Gila Mountains (5,248 feet) to a depth of about 3,280 feet below mean sea level. The groundwater model computer

programs MODFLOW (USGS 1983, 1996), ZONE BUDGET (Harbaugh 1990), and Visual Modflow (Waterloo Hydrologic Software 1995) were used in this analysis (see URS 2002a).

The model domain incorporates a complex hydrogeologic setting in thickly bedded sedimentary deposits in the Safford Valley and faulted and fractured andesitic and basaltic volcanic rocks at the mine property and in the Gila Mountains. Subsurface data developed by PDSI and other mining companies, and published data and interpretations from USGS reports, were used to define the hydrogeologic system. The hydrogeologic system is depicted in Figure 3-9 in Chapter 3. Both Bonita Creek and the Gila River flows were simulated in conformance with published stream flow data for the Gila River at Calva and for Bonita Creek near Morenci. Recharge to volcanic rocks and to the Lower Basin Fill was simulated as mountain-front recharge and as areal recharge over the Gila Mountains. Recharge rates and area distribution were developed in cooperation with BLM hydrologists.

Initially, the model was run in three stages: 1) a steady-state model simulating pre-mining conditions; 2) 16 consecutive transient simulations of each year of proposed mining; and 3) one 500-year transient simulation of recovery beginning at the end of Year 16. To achieve an acceptable steady-state calibration, most recharge to the model was applied as mountain-front recharge in areas adjacent to the mountains. A much smaller amount of areal recharge was also applied over the Gila Mountains. Groundwater from the San Simon basin and from the Pinaleño and Peloncillo Mountains entered the model along the model boundaries. The amounts of flow from these areas were derived from published USGS estimates and input from BLM. Irrigation pumping was simulated by an average withdrawal of water from irrigated areas of the model; pumping from individual irrigation production wells was not simulated. The rate of irrigation withdrawal was estimated as the difference between the consumptive use by crops, estimated by BLM to be 153,000 af/yr, and total diversions from the Gila River, estimated by BLM to be 100,000 af/yr (H. West, BLM, pers. comm.). Groundwater discharge from the model domain was applied at its western end near Eden to achieve an appropriate balance between inflow and outflow to the model comparable to published USGS estimates of flow through the Safford Valley near Calva (Freethey and Anderson 1986). These estimated outflows were developed in cooperation with BLM hydrologists.

The steady-state model simulated the current groundwater flow pattern throughout the model domain. It was calibrated by comparing predicted and measured well water levels, using water levels measured in wells in the model domain for which current and historical data were available. The water balance for the model is shown on Figure 4-5. A scatter plot of observed versus simulated water levels is shown on Figure 4-6. The correlation coefficient for all data is 0.98, where 1.00 is a perfect correlation (URS 2002a). A total of about 500 observations of water levels was used to calibrate the model. In addition, the model was calibrated using BLM estimates of baseflow in Bonita Creek and USGS estimates of river base flow at Calva considered to represent extreme drought conditions.[47] The predicted steady-state water levels are shown on Figure 4-7.

[47] A low base flow value will allow for easier detection of the influence of mine pumping on the Gila River.

When the calibration statistics of the steady-state model reached acceptable limits, a transient model was developed to simulate large-scale pumping tests conducted at the project site in 1996. The model's simulated drawdown from the pumping wells and nearby monitor wells was compared to observed drawdown from the same wells. When the results were found to match within acceptable limits, as defined by BLM, the transient model was considered calibrated. The calibrated transient model was then used to simulate groundwater withdrawal from production wells in the vicinity of the proposed mine and groundwater withdrawn from open pits. Production of groundwater was simulated to increase to a maximum of 4,095 gpm, or 6,605 af/yr.

Results of the initial model run (1998 model) were reported in the Draft EIS. Since then, the model has been rerun twice to correct an over-prediction of drawdown attributable, in part, to what is called the "dry cell problem" (URS 2002a). In the 1998 model, a cell was considered "dry" and became inactive for the remainder of the simulation once the water level in that cell dropped below the bottom of the cell. As a result, the model could not accurately simulate recovery of groundwater after pumping ceased. To correct this problem and better predict realistic changes in the water table through time, the model was rerun with a "rewetting" package. The 2002 model also differed from the 1998 model in that it:

- reduced the modeled peak pumping rate from 5,000 gpm (8,065 af/yr) to 4,095 gpm (6,605 af/yr) to reflect the reduction in predicted water demand per the revised MPO;
- included more realistic pit bottom areas and mine depths;
- contained one transient simulation stage rather than two (the 16-year mining period was combined with the post-mining period);
- simulated a 3,000-year period rather than a 516-year period;
- used time steps of shorter duration; and
- improved model accuracy by reducing the closure criteria for the solution of model finite-difference calculations.

- **Model Sensitivity Analysis.** Because the 2002 ground water model is based on sparse data, except in the vicinity of the mine and south of the Gila River where data are abundant or widely distributed respectively, a sensitivity analysis was performed. Nine hydrologic parameters in the model were increased and decreased, resulting in 18 different model projections of steady-state conditions that could be compared to the 2002 model projection of steady-state (pre-mining) conditions.

The mine pumping is of primary concern because of its potential impact on the waters of the Gila River and the San Carlos Apache Reservation, and the sensitivity analysis enables a comparison of the effects of varying parameters whose true values are not known with great certainty. Appendix G lists the parameters varied, the 2002 model value for that parameter, the higher and lower values used for each parameter, and the resulting effects on the Gila

River, ground water outflow to the northwest in Safford valley, and Bonita Creek (which is a measure of impacts on the water resources of the San Carlos Apache Reservation).

The information gained by this kind of sensitivity analysis is useful in identifying model parameters which have great influence on model predictions and thus should be given priority in model refinement. Although useful in prioritizing parameter data needs, it also serves as an indication of uncertainties in the current model projections. While all the sensitivity projections showed some deviations in the predicted flows of Bonita Creek and the Gila River from the 2002 model, which is well constrained by data from the USGS stream gages on those streams, and all projections showed changes in water level elevations in various parts of the model, no other parameters were varied to bring the model projection back into calibration with observed streamflows and groundwater levels. Had such adjustments been made, the predicted impacts would have been reduced from those reported in this EIS.

The transient 2002 model was used to evaluate the sensitivity of the model projections to the storage characteristics of the volcanic aquifers underlying the San Carlos Apache Reservation north of the Butte fault. The amount of reduction of the storage parameters was related to depth, with the deeper layers having the greatest reductions. The average reduction was about one order of magnitude, and while the projection showed a negligible change in the flow of the Gila River, the predicted impact on Bonita Creek increased slightly from 0.1 acre feet per year to 0.3 acre feet per year, and the temporary drawdown in the southern corner of the Reservation in the higher parts of the Gila Mountains increased from less than a foot in the 2002 model to 1 to 3 feet, reaching a maximum northern extent at year 450. While not as exhaustive a sensitivity analysis as the one that will be performed on the final calibration of the model at the end of mining, this analysis indicates that:

- 109 af/yr is an upper bound on predicted impacts to the flow of the Gila River;
- 9 af/yr is an upper bound on predicted impacts to Gila River flows at the model domain's western boundary;
- 0.3 af/yr is an upper bound on impacts to the flow of Bonita Creek.

It is noteworthy that the proposed Alternate Year Fallowing Program exceeds by a factor of three any predicted impact to the Gila River, either directly from groundwater discharge and surface water diversion, or indirectly by contributions from Bonita Creek or augmentation by the western boundary flow between the western boundary and the San Carlos Reservoir.

- **Groundwater Surface Elevations.** To predict the impact of the development of open pits and groundwater pumping on the groundwater surface elevation in the model domain, the drawdown cone was simulated for a period of 3,000 years. Drawdown resulting from the mining operation is predicted to expand over time away from the immediate vicinity of pumping, reaching a maximum depth around 16 years after pumping begins and a maximum extent after about 200 years (URS 2002a). This expansion is predicted to be asymmetrical, expanding first southward, then northward. The drawdown cone as defined by the one-foot contour line does not reach the Gila River, Bonita Creek, or the boundary of the San Carlos

Apache Reservation. In the model, groundwater levels recover slowly, with the depth of drawdown decreasing after Year 16, and the total extent of drawdown decreasing after Year 200. By the end of the simulated 3,000-year model period, about 80% of the 88,528 af pumped is restored and the extent of the cone of depression has greatly contracted. In a test simulation, about 97% of the pumped volume is restored after 8,000 years, so residual effects are long lasting but minor and localized. Figure 4-8 shows the maximum predicted depth of drawdown (800 feet centered at the San Juan pit at Year 16); the maximum *southern* extent of the drawdown cone as defined by the one-foot contour line (occurs at Year 100); the maximum *northern* extent of the drawdown cone (occurs at Year 800-1200); and the drawdown cone as predicted in Year 3000.

- **San Carlos Apache Reservation.** The model estimates that about 268 af/yr of groundwater currently flows across the boundary of the San Carlos Apache Reservation to the south toward the Gila River (URS 2002a). The predicted impact of the Project would be a very slight increase in this flow, peaking at 0.2 af/yr, or about 0.07 percent of estimated current flow, in Year 50. Figure 4-9 graphically depicts the scale of this predicted impact by comparing the modeled peak impact to the modeled pre-mining flow over the 3,000-year simulation period. Decline of water table elevations beneath the San Carlos Apache Reservation are predicted to be nearly zero (URS 2002a). Potential impact in the area of the Reservation is likely to be extremely small so as to be unmeasurable because:

  The Butte Fault, whose low permeability is indicated by the precipitous change in water levels that occurs across the fault, limits groundwater flow from north to south. The effect of this fault is understated in the model; therefore, the potential impacts in the area of the Reservation are likely overstated.

  - The rocks of the Gila Mountains have small hydraulic conductivity; therefore, the mountain block imposes an extensive barrier to any potential impacts north of the site.

  A predicted but unmeasurable Impact on groundwater under the San Carlos Apache Reservation would not conflict with the Secretary of the Interior's fiduciary obligation to protect Indian trust assets. The effects of pumping would be monitored as part of the Mitigation and Monitoring Plan (Appendix F) submitted for this Project, and the data collected from groundwater wells located between the Project and the San Carlos Apache Reservation boundary and Bonita Creek would be analyzed to determine if the groundwater surface elevation is responding to groundwater pumping in the manner predicted by the model. No mitigation is warranted or proposed.

- **Area Springs.** Only DP Seep would be directly impacted by proposed mining operations as it lies within the footprint of the Dos Pobres open pit on PD land. Bryce, Hackberry, Cottonwood, and Walnut Springs, all upgradient (north) of the mine pits, and separated from the pits and the area of project pumping by the Butte Fault, are not expected to be impacted by the Project's predicted drawdown of groundwater (R. Mac Nish, University of Arizona, pers. comm. 1998). Isotope sampling of springs will be done prior to project start-up to

provide further evidence as to whether the springs in the area are part of a local or regional flow system.

- **Watson Wash Artesian Well.** The groundwater model predicts that the Watson Wash artesian well, located southwest of the project area, could be impacted by Project operations (Sinton 2002). A maximum drawdown in wellhead pressure of 0.72 foot is anticipated by Year 1200 of the model run. Potential impacts to this artesian well would be monitored at the wellhead and between the well and the Project well field. Mitigation, if predicted impacts occur, would be achieved by lowering the height of the well discharge pipe by the amount of drawdown in measured wellhead pressure. If impacts of greater magnitude were observed in the "early warning" wells located between the well field and the Watson Wash artesian well, alternative mitigation would be developed and implemented before actual impact at the well. No impacts are therefore expected to existing recreational uses or wildlife habitat at Watson Wash artesian well.

- **Monitoring and Recalibration.** The effects predicted by the model are an estimate based upon the best available information. Calibration of the model was accomplished by trial and error adjustment of aquifer parameters within the limits of values reported in the literature for these and/or similar units. In addition, the boundary fluxes in the model were also constrained by data from USGS streamflow gages or from published estimates of subsurface flows both into and out of the model domain. While the model calibration resulted in acceptable matches of computed and observed water levels in wells, the present model is but one of many unique solutions that might match computed and observed values with equal precision. Implementation of the Model, Monitor, and Mitigate (3M) Program outlined in Appendix F will provide ongoing evaluation of the model's predicted effects. If the changes in water levels in monitoring wells deviate in excess of established criteria from the model's predicted changes, the model will be recalibrated to bring the projected levels and gradients within those bounds. After recalibration, the model would be rerun to determine if the revised projected river flow impacts from mining warrant changes in the acreage of land fallowed in the Alternate Year Fallowing Program.

< **Partial Backfill Alternative.** The impacts to groundwater quantity in the region resulting from implementation of the Partial Backfill alternative are expected to be identical to those described for the Proposed Action as the water demand and supply are identical for this alternative.

< **No Action Alternative.** This alternative would not affect existing groundwater quantity since no mining, hence no pumping, would be authorized.

4.3.2.5.2 Groundwater Quality

< **Proposed Action Alternative.** Prior to the onset of mining, water quality sampling will be undertaken to better characterize water quality in the vicinity of the mine and to improve the understanding of the flow system; this sampling will be done in addition to sampling that will be required by PD's APP permit. Because of groundwater protection measures designed to Best Available Demonstrated Control Technology (BADCT) standards—such as the liner systems for the leach pad, PLS excess process solution pond, and stormwater impoundment—the Proposed Action

alternative is not expected to result in exceedances of numeric aquifer water quality standards at or beyond the proposed points of compliance identified in PDSI's APP application. APP closure requirements include permanent strategies to control run-on, runoff, and infiltration; therefore, post-Project groundwater quality is expected to continue to meet state aquifer water quality standards.

Under Arizona's Environmental Quality Act of 1986, PDSI must obtain an APP to implement mining activities. PDSI submitted an application for the APP to the ADEQ in October 1998. The APP would cover all potentially discharging facilities, such as the leach pad, stormwater impoundment, PLS excess process solution pond, and the existing evaporation pond at San Juan. The APP process provides opportunities for public review and requires PDSI to demonstrate compliance with BADCT design standards for potentially discharging facilities. Arizona's APP requirements stipulate that at applicable points of compliance, groundwater quality must meet state numeric aquifer water quality standards, which are reuired to be equal to or more stringent than federal maximum contaminant levels (mcl) for drinking water standards set by EPA. The points of compliance must be located so as to ensure the protection of all current and reasonably foreseeable future uses of the aquifer by the permittee.

< **Partial Backfill Alternative.** Under this alternative, the APP requirements and potentially discharging facilities are identical to those identified for the Proposed Action alternative; therefore, post-Project groundwater quality is expected to continue to meet state aquifer water quality standards.

< **No Action Alternative.** As there would be no mining activities or potentially discharging facilities permitted under this alternative, no impacts would occur to existing groundwater quality.

4.3.2.6 Surface Water

4.3.2.6.1 Surface Water Quantity

< **Proposed Action Alternative.** The focus of surface water quantity analysis is the Gila River, Bonita Creek (as the City of Safford's primary drinking water source), the ephemeral drainages within the project area, and the artesian well at Watson Wash. Long-term, direct, potential impacts to surface flows in the Gila River could result from two sources: 1) predicted drawdown in the regional groundwater flow system (see Section 4.3.2.5.1) as a result of Project groundwater pumping; and 2) reduced volume of surface water discharged from drainages tributary to the Gila River as a result of surface diversions and other environmental protection measures for surface water quality.

C **Gila River.** The model was also used to predict any potential impact of groundwater pumping and the mine pits on Gila River surface flow by calculating changes in groundwater flow to/from the river as a function of time. Over a 3,000-year simulation time, the model projected the maximum reduction in groundwater flow to the Gila River attributable to the Project to be approximately 34 af/yr at Year 450 (URS 2002a). When adjusted for the predicted effect of the pit lakes on groundwater flow (21 af/yr), the maximum reduction in groundwater flow to the Gila River is projected to be 55 af/yr at Year 450. After the maximum reduction in surface flow in Year 450, the impact of pumping on the river is predicted to decrease as shown in Figure 4-10.

Storm water management for the Project is also expected to reduce surface water flows of the Gila River. As a result of the Project's upstream diversions and other storm water management measures designed to meet PDSI's non-discharge facility Section 402 (AZPDES) permit requirements, annual storm water runoff to the Gila River is expected to be reduced by approximately 94 af/yr (see Table 4-9). This amount includes a reduction both in channel flows and in incidental sheet flow before it collects in channels.

Thus, the predicted annual total maximum impact to surface flows in the Gila River as a result of groundwater pumping and stormwater management is 149 af/yr, which is less than 0.01 percent of the historic median annual flow rate of 342,200 af/yr and less than 0.05 percent of the estimated long-term average base flow (Figure 4-11). This impact is miniscule and unmeasurable relative to the river's average annual flows. The amount of mine pumping is, at its peak, less than two percent of the average annual flow of the Gila River at the head of the valley. In addition, the location of the pumping is about seven miles from the river, so the effects of the 16 years of pumping will be spread out over centuries at the river (B. MacNish, pers. comm., 2002).

Table 4-9. Estimated Change in Average Annual Runoff to the Gila River as a Result of the Proposed Action Alternative

Wash	Existing Runoff (af/yr)	Estimated Runoff under Proposed Action Alternative (af/yr)	Net Change (af/yr)	Percent change
Coyote/Butler Wash	264	289	25	9.5%
Watson Wash	137	68	(69)	(50.4%)
Talley Wash	119	85	(34)	(28.6%)
Cottonwood/Peterson Wash	252	238	(14)	(5.6%)
Wilson Wash	80	80	0	0%
Lone Star	130	128	(2)	(1.5%)
TOTAL	**982**	**888**	**(94)**	**(10.4%)**

Source: Dames & Moore 1998

Despite these impacts being unmeasurable, PDSI proposes to fallow decreed farmland that it owns in the Safford Valley to offset predicted physical impacts to surface water flows in the Gila River. The net effect of this mitigation program (called the Alternate Year Fallowing Program, see Appendix F) would be to reduce consumptive use of river water that otherwise would be diverted for irrigation. The program calls for fallowing 200 acres each year in an alternating pattern to preserve the integrity of the decreed water right for agriculture. Based on recent per-acre consumptive use in the Safford Valley (2.4 af), fallowing 200 acres would result in reduced consumption of 480 af/yr of water from the Gila River. Because 480 af/yr is more than three times the maximum total predicted impact on Gila River flows of 149 af/yr

(Figure 4-12), it is expected that the fallowing program as currently configured would be adequate even if the monitoring program and future model recalibration predict a higher impact. Should revised impact estimates exceed 480 af/yr, additional decreed farmland is available for fallowing to make up the difference. This fallowing program would be implemented in perpetuity and protected by placing deed restrictions on farmlands incorporated into the program. In light of overall effects to Gila River flows, no adverse impacts to holders of surface water rights, including Indian tribes, to the Gila River are expected.

C **Bonita Creek.** The groundwater model predicts that Bonita Creek flows are also not measurably impacted by groundwater pumping (less than 0.1 af/yr). Figure 4-10 shows the predicted changes in surface flow in Bonita Creek over a 3,000-year simulation period. The capacity of the City of Safford's current drinking water system, which is currently operating near maximum (H. West, BLM, pers. comm.), would not be affected.

< **Partial Backfill Alternative.** This alternative is expected to result in impacts to surface water quantity that are identical to those described under the Proposed Action alternative.

< **No Action Alternative.** With no mining permitted under this alternative, no effects to existing surface water quantity of the Gila River, Bonita Creek, Watson Wash artesian well, or drainages on the project area are expected.

4.3.2.6.2 Surface Water Quality

< **Proposed Action Alternative.** Surface water quality off the mine site is not expected to be adversely affected under the Proposed Action alternative because on-site and off-site surface water quality would be regulated by Sections 401 (State Water Quality Certification), 402 (AZPDES), and 404 of the CWA. Off-site drainage would be diverted around the Project by a series of stormwater diversion channels, thereby preventing stormwater from contacting mine facilities. As part of Section 402 compliance, stormwater that falls onto mine facilities and the project site would be retained on the mine site and not discharged. Stormwater facilities have been designed to retain the 100-year, 24-hour storm event, including a PLS draindown during a 24-hour power outage, a criterion that exceeds BADCT standards. Stormwater retained on-site would be routed into the process make-up water system.

PDSI is required to develop a spill and pollution prevention plan to minimize the probability of releasing process solutions in the environment during operations and to provide for the rapid detection and control of process solution seepage or accidental spill. The potential for a surface release of process solutions or hazardous materials does exist (however unlikely given the conservative design of the stormwater impoundment), and such a release could possibly affect surface water quality of the ephemeral drainages if such a release occurred during a storm event. The alkaline nature of the soils in the area would likely neutralize a release of PLS or sulfuric acid, and, given the approximately five-mile distance to perennial water (Gila River), it is unlikely that a such release would cause a water quality exceedance in the river.

Potential impacts to surface water quality from the Proposed Action include changes in sediment transport characteristics of some drainages as a result of the Project's stormwater management program. These impacts result from increased scour associated with diversions and detention of sediment in detention/retention basins. A sediment transport model (HEC-6) was constructed for drainages in which there was a potential for measurable increased channel scour as a result of the post-mine conditions (Dames & Moore 1999b). The model was used to estimate the extent of downstream scour as a result of increased flow velocities and shear forces in drainages with increased flows: E Wash, an unnamed tributary of Coyote Wash; Q Wash, an unnamed tributary of Peterson Wash; and Cottonwood Wash (see Figure 2-1). The model results for these three drainages show that equilibrium for sediment transport is re-established downstream at distances of about 1.0 mile for E Wash, 1.7 miles for Cottonwood Wash, and, 0.2 mile for Q Wash from their respective diversion outfalls (see Figure 4-13). All these equilibrium points are located within the mine site boundary; therefore, the effects of scouring are not expected to extend off-site (i.e., no scour effects on private or state lands south of the project area or at the Gila River) (Dames & Moore 1999b).

To estimate the impacts to sediment yield from the five largest washes in the project area, Dames & Moore (1996a) used the Pacific Southwest Inter-Agency Committee (PSIAC) method. Input parameters in this model include geology, soils, climate, runoff, topography, ground cover, land use, upland erosion, and channel erosion and transport. Based on the results of the model, the proposed stormwater management activities under the Proposed Action alternative are estimated to reduce the average annual sediment yield in some drainages by approximately nine percent (Table 4-10) of the existing yield, which could increase the potential for channel erosion (scour) during high flow events.

Table 4-10. Impacts to Average Annual Sediment Yield for Five Washes in the Project Area as a Result of the Proposed Action Alternative

Wash	Existing Sediment Yield (af/yr)	Estimated Sediment Yield for the Proposed Action* (af/yr)	Net Change (af/yr)	Percent Change
Coyote/Butler Wash	0.9	0.9	0.0	0%
Watson Wash	2.9	2.7	(0.2)	-7%
Talley Wash	1.3	0.9	(0.4)	-31%
Cottonwood/Peterson Wash	1.5	0.9	(0.6)	-40%
Wilson Wash	3.0	3.3	0.3	10%
TOTAL	**9.6**	**8.7**	**(0.9)**	**-9%**

* Dames & Moore (1996a) evaluated average annual sediment yield under "post-project alternatives" A, B, C, and D. Alternative B was used as a proxy for the Proposed Action. Alternative C was assumed to be the Partial Backfill Alternative.

No impacts are expected to the quality of water in the Gila River from groundwater pollution because actions required to comply with APP regulations for development of the Proposed Action are expected to result in no exceedances of numeric aquifer water quality standards at or beyond those points (see Section 4.3.2.5.2) (the river is beyond the proposed points of compliance identified in PDSI's APP application).

< **Partial Backfill Alternative.** Surface water quality off the mine site is not expected to be affected under the Partial Backfill alternative as on-site and off-site surface water quality would be regulated by Sections 401 (State Water Quality Certification), 402 (AZPDES), and 404 of the CWA. Under the Partial Backfill alternative, the diversion of flows into E Wash, Cottonwood Wash, and Q Wash would result in impacts to potential bed sediment erosion identical to those described under the Proposed Action alternative. Like the Proposed Action, the impacts of scour are not likely to be discernible off the mine site or at the Gila River (Dames & Moore 1999b).

To estimate the impacts to sediment yield from the five largest washes in the project area, Dames and Moore (1996a) used the Pacific Southwest Inter-Agency Committee (PSIAC) method. Input parameters in this model include geology, soils, climate, runoff, topography, ground cover, land use, upland erosion, and channel erosion and transport. Based on the results of the model, the drainage modifications under the Partial Backfill alternative are identical to those proposed for the Proposed Action and are also estimated to reduce average annual sediment yield by approximately nine percent (Table 4-10).

< **No Action Alternative.** This alternative would not affect existing surface water quality of the project area because no surface disturbance activities would be permitted under this alternative.

4.3.2.6.3 Pit Lakes

< **Proposed Action Alternative.** During mining operations, precipitation, pit wall runoff, and groundwater entering the pits would be pumped out for use in the leaching process. Once mining is completed and the pits are no longer dewatered, a lake is expected to form in each pit. Mining the San Juan deposit would eliminate the existing pit lake, a positive impact because the pit lake that would form in the new San Juan pit at the close of operations would likely have much better water quality than the current pit lake (Water Management Consultants 1997).

After closure, the Project's stormwater diversion structures would continue to divert surface flows from entering the San Juan and Dos Pobres pits. Proposed structures that would affect the water quality of future pit lakes and their purposes are summarized below (Dames & Moore 1999b):

- **West Diversion Channel to E Wash** (see Figures 2-11 and 2-12). This diversion is designed to reduce surface flow into the Dos Pobres pit and ponding against the West development rock stockpile.

- **South Diversion Channel to Q Wash** (see Figure 2-13). This diversion is designed to reduce local flows into the San Juan pit.

- **Peterson Wash Diversion Channel to Cottonwood Wash** (Figure 2-14). This diversion is designed to prevent Peterson Wash flows from entering the San Juan pit.

Water Management Consultants, Inc. (1997, 1998, 2002) evaluated the expected conditions in the San Juan and Dos Pobres ultimate pit lakes under the Proposed Action alternative. This evaluation is based upon 1) an estimate of the acid-generating potential of the wall rocks in the pits based on

acid-base accounting data, 2) an estimate of the leachate chemistry derived from interaction of simulated rain and rocks expected to occur in the pit walls based upon the results of EPA1312 testing, and 3) predictive modeling of the chemical load of the runoff from the high walls and influent groundwater chemistry (based on the results of the groundwater monitoring program) mixed in proportions defined by the water balance model (Water Management Consultants 2002). The following discussion of predicted pit lake evolution and water quality is from the report entitled "Updated Screening Level Pit Lake Evaluation at the Dos Pobres/San Juan Project" (Water Management Consultants 2002).

Mass balances for water and chemical constituents were conducted for each of the pits. Elements of the water balance for each pit were determined by application of physically realistic models using statistically represenative weather records, surface runoff estimates calculated on an event-by-event basis, and numerical analysis of groundwater flow including unsaturated zone processes. Elements of the chemical mass balance for each pit were determined by associating constituent concentrations measured or estimated by laboratory testing with water volumes identified by the water balance calculations. Reactions between the constituents in the pit lakes were then simulated, and the process was repeated until a steady-state condition was reached. The steady-state condition represents the long-term physical and chemical characteristics of the pit lakes.

Results of the updated screen level pit lake evaluation for the Project indicate that both the Dos Pobres and San Juan mine pits will develop lakes after mine dewatering ceases (Figure 4-14). Water levels in the lakes are expected to stabilize at levels below the regional water table in the area, and therefore, the lakes will act as groundwater sinks with zero discharge to regional groundwater. Total groundwater inflow to the two pits at steady-state will be under 6 gpm. Under long-term conditions, runoff to the pits from pit highwalls and direct precipitation combined were found to contribute 92% and 98% of total inflow to the Dos Pobres and San Juan pits, respectively. The only outflow is expected to be pit lake evaporation. Accordingly, long-term chemistry of the lakes will be dominated by the quality of the inflowing waters as they reach kinetic equilibrium under the influence of evapoconcentration and precipitation.

The pit lake evaluation indicates that over the long-term, water quality of both pit lakes will meet both Aquifer Water Quality Standards (AWQS) and BLM standards for all regulated constituents, with the exception of thallium (see Table 4-11 and Figure 4-15). Modeling results for thallium concentrations are, however, deemed inconclusive since this constituent was below the detection limit of the analytical procedure (but the detection limit was higher than the standard). The low sulfide concentrations of the wall rocks of both the proposed pits and the abundance of carbonate minerals within the Safford Volcanics, and quartz monzonite prophyry, and the Gila Mountain Volcanics are expected to keep the pH of the water filling the pits at neutral. The results of the ABA and EPA 1312 tests and the screening level modeling results based upon these data support the conclusions that the predicted lake water for the two pits should be near neutral with a metals load within both BLM benchmark concentrations and AWQS.

- **San Juan Pit Lake.** At steady-state, the ultimate pit lake at San Juan is expected to be 150 ft deep, which corresponds to an elevation of 3,300 ft above mean sea level. The volume of groundwater intercepted by the pit at steady-state conditions is 0.64 af/yr, with groundwater inflow originating from the Safford Volcanics bedrock.

- **Dos Pobres Pit Lake.** At steady-state, the ultimate pit lake at Dos Pobres is expected to be 200 ft deep, which corresponds to an elevation of 2,800 ft above mean sea level. The volume of groundwater intercepted by the pit at steady-state conditions is 7.8 af/yr, with groundwater flow originating from the Safford Volcanics and the Gila Mountain Volcanics bedrock reservoirs.

Table 4-11. PHREEQC Average Concentration 0-100 years Projected for the San Juan and Dos Pobres Pit Lakes Compared to Applicable Standards (all concentrations in mg/l, except pH, pe, and ionic strength)

Chemical	San Juan	Dos Pobres	AWQS	BLM Benchmark
Alkalinity	11.29	43.87		
Aluminum	0.00381	0.0106	--	21
Antimony	0.00253	0.00225	0.006	0.17
Arsenic	0.000397	0.0000216	0.05	0.94
Barium	0.71	0.55	2	--
Beryllium	0.000491	0.0000402	0.004	--
Cadmium	0.000653	0.000588	0.005	0.23
Calcium	12.3	22.93	--	--
Chloride	1.42	8.81	--	--
Chromium	0.0122	0.0066	0.10	--
Copper	0.015	0.00793	--	1.1
Fluoride	0.26	0.66	4	5.3
Iron	0.00111	0.000439	--	--
Lead	0.0000469	0.0000372	0.05	--
Magnesium	1.75	7.57	--	--
Manganese	0.023	0.0495	--	0.78
Mercury	0.000133	0.000143	0.002	0.002
Nickel	0.018	0.0232	0.10	--
pH	7.05	7.65	--	--
Potassium	13.91	10.39	--	--
Selenium	0.0121	0.00556	0.05	0.57
Silver	0.000735	0.00105	--	14
Sodium	30.96	41.19	--	--
Sulfate	106.75	128.83	--	--
Thallium	0.00332	0.00357	0.002	0.002
Zinc	0.0189	0.0272	--	0.834

Source: Water Management Consultants 2002

< **Partial Backfill Alternative.** Under this alternative, the existing San Juan pit lake would also be eliminated, and the planned pit would be partially backfilled with 60-80 million tons of development rock, reducing the ultimate pit size to approximately 215 acres. Placement of development rock would occur in the western portion of the pit, at elevations of 3,650 feet above msl or higher. The pit lake is expected to ultimately stabilize at 3,300 feet above msl, 350 feet below the toe of the backfill development rock stockpile. Backfilling would therefore have no impact on the projected pit lake water quality or quantity as described above. Under the Proposed Action alternative, the predicted lake water is expected to be neutral (pH 7.05) and is not expected to be a threat to wildlife or the environment. The water quality and quantity of the anticipated pit lake at Dos Pobres is expected to be identical to that described under the Proposed Action alternative.

< **No Action Alternative**. Under this alternative, the existing pit lake at San Juan would remain, and no pit lake would be expected to form at Dos Pobres since no further development of that orebody would occur. Over the long-term, the pit lake water at San Juan would likely remain of poor quality due to runoff from the historic process areas. In the very long-term, evapoconcentration of some chemical constituents of the pit lake may also occur, should the rate of evaporation exceed the rate of precipitation and groundwater inflow entering the San Juan pit.

4.3.2.6.4 100-year Floodplains

< **Proposed Action Alternative.** Under the Proposed Action, the hydrologic regime of several washes would be altered by the proposed construction of a series of retention, detention, and diversion structures designed to reduce run-on into the San Juan and Dos Pobres pits, leach pad, and development rock stockpiles; to reduce ponding against stockpiles; and to prevent release into surface waters of flows potentially impacted by leaching or mining operations. As summarized in Table 4-12, these structures would result in reduced peak flows in washes from which flows are diverted (F, G, Watson, Talley, Peterson) and increased peak flows in washes which receive diverted flows (E, E1, Q, and Cottonwood).

The FEMA 100-year floodplain delineation for the Gila River in the region of the project area is not expected to change as a result of the Proposed Action. For the washes with increased peak flows, the extent of scour was estimated by comparing pre- and post-mine flow velocities and shear forces. Conservative estimates of the extent of scour for E, Cottonwood, and Q Washes are distances of approximately 1.0 mile, 1.7 miles, and 0.2 mile, respectively. The Graham County landfill, located near the confluence of Peterson and Cottonwood Washes, is roughly 10 miles (52,800 feet) downstream of the West Diversion Outfall at Cottonwood Wash. This landfill, primarily used by the communities of Safford, Thatcher, and Pima, is not expected to be impacted by increased flows in Cottonwood Wash (Dames & Moore 1999b), as the estimated extent of increased scour is not expected to reach beyond approximately 1.7 miles below the diversion outfall (ibid.).

< **Partial Backfill Alternative.** As the Partial Backfill alternative proposes identical retention, detention, and diversion structures, this alternative would result in direct and indirect impacts to 100-year floodplains that are identical to those described for the Proposed Action alternative.

Table 4-12. Estimated Range of Increases in Surface Water Flow in Nine Washes from the Proposed Action Alternative

Wash	Percent of Pre-Mine Peak Flow
F	26-73
G1	24-77
Watson	33-69
Talley	27-84
Peterson	25-73
E1	134
E	103-135
Cottonwood	137-151
Q	122-180

Source: Dames & Moore 1997c, 1998c.

< **No Action Alternative.** This alternative would not affect 100-year floodplains within the project area as no activities would be permitted that impact drainages and their flows.

4.3.2.6.5 Waters of the U.S.

< **Proposed Action Alternative.** Within an approximately 16,625-acre study area that included the public and private lands proposed for mining use, 113.92 acres of waters of the U.S. and 0.03 acres of wetlands (at Cottonwood and Bryce Springs) have been delineated (SWCA 1997e) and approved by the COE as jurisdictional. Under this alternative, about 21.4 acres of jurisdictional waters within this study area would be directly impacted by mining and mining-related activities (Table 4-13). In addition, about 93.2 acres of jurisdictional waters, some within and some outside the study area, would be indirectly impacted. No impacts on the jurisdictional wetlands are expected. DP Seep, which lies within the project footprint and would be removed during mine elevation, does not meet the criteria to be considered a jurisdictional wetland.

Direct impacts to waters of the U.S. would result from excavation and fill activity in washes during construction of the stormwater diversion system and development of the mines. Functions of waters of the U.S., such as wildlife habitat and stormwater conveyance, are assumed to be completely lost in the 21.4 acres directly affected. Indirect impacts would result from downstream dewatering in washes losing diverted stormwater flow; from scour effects and some xeroriparian vegetation enhancement in washes receiving diverted flows; and from a reduction in overall watershed area due to mine development. Functions in these areas would not be reduced below values found in adjacent uplands (SWCA 1997g); therefore, maximum impact to the 93.2 acres indirectly affected is assumed to be 50 percent. Based on these assumptions, impacts to a total of 68 acres of jurisdictional water of the U.S. would have to be mitigated under Section 404 of the CWA. The proposed mitigation—creation of 30 acres of riparian habitat, enhancement of 18 acres of riparian and wetland

habitat, and preservation of 160 acres of riparian habitats along the Gila River—is presented in Appendix F.

< **Partial Backfill Alternative.** The backfilling into the San Juan pit with nearly 27 percent of the development rock generated by the Project results in reduced height of the development rock stockpiles rather than reduced footprints. Therefore, this alternative is expected have direct and indirect impacts on waters of the U.S. to the same degree as the Proposed Action alternative.

< **No Action Alternative.** This alternative proposes no activities that would result in direct or indirect impacts to waters of the U.S.

Table 4-13. Impacts to Waters of the United States Resulting from the Proposed Action

Activity	Impacted Acreage
Direct Impacts	
Fill	16.5
Excavation	4.9
Indirect Impacts	
Scour	3.0
Upstream Diversions [1]	4.1
Downstream Diversions [2]	82.9
Other Impacts	3.2
TOTAL	**114.6**

[1] Upstream diversions refer to waters impacted by the upstream diversion ditch and occur between the mine facilities and upstream diversion ditches.

[2] Downstream diversions refer to jurisdictional arroyos on the downstream side of the mine that are dewatered at the downstream extent of direct impact acres.

4.3.3 Biological Resources

4.3.3.1 Vegetation

4.3.3.1.1 Proposed Action Alternative. The Proposed Action alternative is expected to result in direct impacts to three of the four upland vegetation communities on public lands in the project area: 1) Sonoran Desertscrub, 2) Sonoran Desertscrub/Semidesert Grassland ecotone, and 3) Disturbed Land. The fourth upland community, Semidesert Grassland, grows at elevations above the planned mining activities and would probably not be affected. Upland vegetation on the mining site would be cleared or grubbed to construct pits, stockpiles, leach pad, haul and access roads, shops, stormwater diversions, and other facilities. Some native cacti, primarily barrel cactus, may be salvaged for revegetation/reclamation purposes. Some (unquantified amount) Xeroriparian Mixed Scrub growing along washes would be disturbed by the stormwater diversions,

both by construction activities and the dewatering of some drainages. Riparian vegetation associated with perennial springs is not expected to be directly or indirectly impacted by the Project.

Table 4-14 summarizes the direct impacts of the Proposed Action alternative on the six habitat types occurring in the project area. These values (in acres) are based on the impact calculations provided in Chapter 2 for the various mine facilities proposed under this alternative. Approximately 60 percent of the affected vegetation grows on BLM-administered public lands; 40 percent on PD property.

Table 4-14. Acres of Vegetation Communities Expected to Be Impacted by the Proposed Action Alternative

	Sonoran Desertscrub	Semidesert Grassland	Sonoran Desertscrub-Semidesert Grassland	Disturbed	Xeroriparian Mixed Scrub	Riparian at Springs	TOTAL
BLM Land	527	0	1,220	184	unquantified	0*	1,931
PD Land	290	0	1,026	113	unquantified	0*	1,429
TOTAL	**817**	**0**	**2,246**	**297**	**unquantified**	**0***	**3,360**

* No direct or indirect impacts are expected.

While loss of vegetation under the stockpiles and leach pad would be permanent, other areas, such as the side slopes and tops of the development rock stockpiles and the leach pad, would be reclaimed and revegetated to provide invasive, nonnative plant species control, erosion control, and slope stability (see Section 2.1.2.4 in Chapter 2). PDSI would evaluate, as part of project development activities, opportunities for salvaging native cacti to be used for on-site revegetation.

4.3.3.1.2 Partial Backfill Alternative. This alternative would result in direct and indirect impacts identical to those described under the Proposed Action alternative.

4.3.3.1.3 No Action Alternative. Under the No Action alternative, no mine-related impacts to vegetation resources on the project area would occur.

4.3.3.2 Wildlife Resources

4.3.3.2.1 Proposed Action Alternative. Due to the loss of habitats (i.e., vegetation communities) in the project area resulting from construction of mine facilities, the Proposed Action alternative is expected to indirectly affect some wildlife, including nongame birds, smaller mammals, herptiles, and invertebrates, as well as game species such as mule deer, collared peccary (javelina), mountain lion, doves, and quail. Animals affected by loss of habitat are expected to move to suitable habitat in the vicinity of the project area. Table 4-15 gives the estimated number of mule deer and javelina that could be impacted under this alternative based on density estimates provided by the Arizona Game and Fish Department (AGFD) for the project area. Impact

to big game species on public lands would, in turn, affect recreational hunting use of this portion of AGFD Hunt Unit 28.

Table 4-15. Estimated Number of Mule Deer and Javelina in the Project Area Impacted as a Result of the Proposed Action Alternative (based on AGFD density estimates)

	Mule Deer (4 to 7/sq mi)	**Javelina (1.5 to 3/sq mi)**
BLM Land	12 to 21	5 to 9
PD Land	8 to 14	3 to 6
TOTAL	**20 to 35**	**8 to 15**

Wildlife may be disturbed by human activity (e.g., noise, vibration, traffic, nighttime light, etc.) on the project site, causing animals to move away from the area. Some animals, especially small burrowing animals, may be injured or killed by construction and mining activities. Increased traffic on roads may also result in injury or death of wildlife.

Creation of pit lakes is not expected to significantly affect wildlife. Larger terrestrial species would be prevented from gaining access to the pit lakes by fencing proposed to meet safety objectives and provide site security. Some birds could occasionally use the pit lakes for resting, and bats could forage over them for insects and drink from them. Such activity is not expected to adversely impact these animals because "long-term simulation of the pit water quality indicates that given the neutralizing capacity of the exposed rocks [in the Dos Pobres pit], and the slightly alkaline groundwater inflow, the pit lake water would most likely remain neutral. No adverse effect to...avian species is anticipated" (Water Management Consultants 1997). For the San Juan pit lake, "the predicted lake water is not considered a threat to wildlife or the environment in the long term" (ibid.).

The excess process solution impoundment at the downgradient toe of the leach pad would also be located within the fenced active mine site. However, the surface of the impoundment would be exposed and accessible to birds and bats. PLS is acidic (generally with a pH below 2.0) and toxic, typically containing high concentrations of total dissolved solids, heavy metals, and sulfates (see Table 4-16 for chemical composition of PLS for the Project as compared to BLM benchmark standards for wildlife). Unlike cyanide ponds at gold mines that have been associated with adverse impacts on wildlife, PLS impoundments are brightly colored and have an acidic/acrid odor. Anecdotal information from wildlife agency personnel and mine personnel suggests that there is little in or around active PLS ponds adjacent to SX/EW facilities to attract birds or bats to rest in, drink from, or forage over the ponds and indicates that wildlife impacts from exposure to active PLS ponds at other copper mines in Arizona have not been documented (T. Hughes, BLM, pers. comm.; L. Thrasher, BLM, pers. comm.; R. Haughey, AGFD, pers. comm.; K. King, USFWS, pers. comm.; J. Korolsky, PDSI, pers. comm.). However, PDSI will monitor potential wildlife use of the excess process solution impoundment and implement appropriate mitigation measures if warranted. PDSI is currently evaluating engineering designs for potential mitigation.

After major storm events, the stormwater impoundment would likely contain runoff, including diluted PLS, from the areas upgradient of it. Because this is expected to occur infrequently, and on these occasions the

impoundment would be drained as soon as practicable, the stormwater impoundment is expected to rarely attract wildlife.

Table 4-16. Data on Chemical Composition of Pregnant Leach Solution (PLS) from Ongoing Column Leach Tests for Dos Pobres/San Juan Project Compared to BLM Benchmark Standards

	Units	PLS Characteristics	BLM Benchmark Standards for Wildlife
General Parameters			
pH	-	1.52-2.70	-
Total Dissolved Solids	mg/L	44000-57000	-
Fluoride	mg/L	<1.0	5.3
Sulfate	mg/L	34000-41000	-
Trace Metals, Total Dissolved			
Aluminum	mg/L	3400-4000	21
Antimony	mg/L	<1.0	0.17
Arsenic	mg/L	<1.0	0.94
Barium	mg/L	<0.1-0.55	-
Beryllium	mg/L	<0.50	-
Cadmium	mg/L	6.7-7.8	0.23
Chromium	mg/L	0.98-2.6	-
Copper	mg/L	1100-2800	1.1
Iron	mg/L	150-3100	-
Lead	mg/L	<1.0	-
Manganese	mg/L	240-300	0.78
Mercury	mg/L	<0.002	0.002
Nickel	mg/L	2.7-4.8	-
Selenium	mg/L	<1.0	0.57
Silver	mg/L	<0.50	14
Thallium	mg/L	<2.0	0.002
Zinc	mg/L	470	0.834

Source of PLS Data: J. Korolsky, PDSI, pers. comm.

< Number = Below detection limit

4.3.3.2.2 Partial Backfill Alternative. This alternative would result in impacts to wildlife that are identical to those of the Proposed Action alternative.

4.3.3.2.3 No Action Alternative. This alternative would have no direct or indirect effects on wildlife or wildlife habitats.

4.3.3.3 Special Interest Species

4.3.3.3.1 Threatened and Endangered Plants

< **Proposed Action Alternative.** No known listed, proposed, or candidate threatened or endangered plant species are likely to be directly or indirectly impacted under this alternative. The BLM undertook a Section7 consultation with the USFWS for the Arizona hedgehog cactus after a morphologically similar cactus was found in the project area. Consultation was concluded on June 11, 2002, with the issuance of a biological opinion that the Project would not affect the Arizona hedgehog cactus because the hedgehog cacti within the action area are not the listed entity (USFWS 2002).

< **Partial Backfill Alternative.** The effects of this alternative on threatened and endangered plants would be identical to those described under the Proposed Action alternative.

< **No Action Alternative.** This alternative would not impact threatened or endangered plant species.

4.3.3.3.2 Threatened and Endangered Animals

< **Proposed Action Alternative.** No threatened or endangered animal species are likely to be directly or indirectly impacted by the Proposed Action alternative. The project area does not provide suitable habitat for any listed, proposed, or candidate animal species, nor have any individuals of such species been recorded from the site (Table 4-17).

Suitable habitat for the species listed in Table 4-17 exists along the Gila River south of the project area, and/or along Bonita Creek, east of the project area. Southwestern willow flycatchers inhabit riparian vegetation bordering the Gila River, and yellow-billed cuckoos and Gila chub are known from Bonita Creek. Bald eagles are expected to occur infrequently in both areas. Razorback sucker, spikedace, loach minnow, and cactus ferruginous pygmy-owl are unlikely to occur, even though reintroduction of the razorback sucker into Gila River was attempted in the 1980s. None of these species or suitable habitat for these species is expected to be affected by the Project because the potential for reduction in flow in the Gila River as a result of the Project would be mitigated by the Alternate Year Fallowing Program described in the Mitigation and Monitoring Plan (Appendix F), and model-predicted project impacts on flow in Bonita Creek are nearly zero.

Gila topminnow has been documented in the outflow area from an artesian well in Watson Wash southwest of the project area but has not been found in the last two annual surveys (B. Robles, BLM, pers. comm. 2002). This species may be extirpated from the site, possibly because of competition from mosquito fish, a non-native species first observed at the well in 1999 (ibid.). Groundwater modeling has predicted that groundwater pumping at the Project could reduce wellhead pressure at the Watson Wash well by 0.72 foot at 1200 years after Project initiation (Sinton 2002). Mitigation plans consist of regularly monitoring wellhead pressure and, if a reduction in water flow is observed in “early warning” monitoring wells, reducing the height of the well’s discharge pipe to maintain flow pressure. Suitable habitat would be preserved to support the Gila topminnow.

Table 4-17. Summary of Anticipated Impacts of the Proposed Action Alternative on Threatened or Endangered Animal Species Potentially Occurring Near the Project Area

Species	Status*	Direct and Indirect Impacts
Bald eagle	T	No direct or indirect impacts expected
Cactus ferruginous pygmy-owl	E	No direct or indirect impacts expected
Gila chub	PE	No direct or indirect impacts expected
Gila topminnow	E	No direct or indirect impacts expected
Loach minnow	T	No direct or indirect impacts expected
Razorback sucker	E	No direct or indirect impacts expected
Southwestern willow flycatcher	E	No direct or indirect impacts expected
Spikedace	T	No direct or indirect impacts expected
Yellow-billed cuckoo	C	No direct or indirect impacts expected

* E = endangered; T = threatened

In its biological opinion, the USFWS concurred with the BLM determination that the Project may affect but is not likely to adversely affect the Gila topminnow, razorback sucker, spikedace, and loach minnow. Regarding the southwestern willow flycatcher, the USFWS rendered the opinion that the Project, as proposed, is not likely to jeopardize the continued existence of the species (USFWS 2002).

< **Partial Backfill Alternative.** The effects of this alternative on threatened or endangered animals would be identical to those described under the Proposed Action alternative.

< **No Action Alternative.** This alternative would result in no direct or indirect impacts to threatened or endangered animal species.

4.3.3.3.3 Critical Habitat. No proposed or designated critical habitat for any listed or proposed threatened or endangered species occurs in the project area.

< **Proposed Action Alternative.** No designated critical habitat for listed species would be directly impacted by the Project. It is unlikely that critical habitat for the razorback sucker in the Gila River south of the project area, or critical habitat for the loach minnow and spikedace in the Gila River and Bonita Creek east of the project area, would be indirectly impacted by predicted reductions in flows resulting from groundwater pumping and stormwater diversions at the Project. Effects on Bonita Creek flows are predicted to be nearly zero, and the potential for an indirect impact on the Gila River would be mitigated by implementation of the Alternate Year Fallowing Program described in the Mitigation and Monitoring Plan (Appendix F). In its biological opinion, the USFWS determined that the Project may affect but is not likely to adversely affect designated habitat for the razorback sucker, spikedace, and loach minnow (USFWS 2002).

< **Partial Backfill Alternative.** The effects of this alternative on critical habitat would be identical to those described under the Proposed Action alternative.

< **No Action Alternative.** No designated critical habitat would be affected by this alternative.

4.3.3.3.4 BLM Sensitive Species. One BLM sensitive plant species (Pima Indian mallow) and four BLM sensitive animal species (California leaf-nosed bat, Townsend's big-eared bat, cave myotis, and Gila monster) are known or likely to occur regularly in the project area. Eleven additional BLM sensitive species (northern goshawk, ferruginous hawk, common black-hawk, yellow-billed cuckoo, burrowing owl, small-footed myotis, long-legged myotis, fringed myotis, Yuma myotis, Allen's big-eared bat, and greater western mastiff bat) may occasionally visit the project area. One other BLM sensitive species, Gila chub, is known to occur nearby.

< **Proposed Action Alternative.** The known population of Pima Indian mallow grows outside areas that would be impacted by the proposed Project. Most of these areas do not appear to contain suitable habitat for the plant, although a comprehensive survey for Pima Indian mallow was not conducted (SWCA 1997a). No direct or indirect impacts to this species are anticipated; nor are impacts expected to California leaf-nosed bat, Townsend's big-eared bat, or cave myotis. All existing mine features known to be used by these bats (sites 3, 5, 6, 13, 20, and 21) or that appear to be potential roosting habitat for them (sites 1, 9, 10, 11, and 19) lie outside areas of potential disturbance (see Figure 3-13), and bats are unlikely to be attracted to or use solution ponds for drinking or foraging. Suitable habitat for the Gila monster is present on both BLM and PD lands in areas that would be affected by mining-related activities. It is likely that an undetermined number of individuals of this species would be lost under this alternative; however, the impact is not likely to lead to loss of population viability or extirpation of the Gila monster from the general area. The 11 species that occasionally may visit the project area are likely to appear irregularly, if at all; therefore impacts to these species are not expected. Chiricahua leopard frog is known to occur along the Gila River but is not expected to be impacted for the reasons given in Section 4.3.3.3.2. Gila chub is known to occur in Bonita Creek, where no significant impacts to surface water flows are expected.

< **Partial Backfill Alternative.** The effects of this alternative on BLM sensitive species would be identical to those described under the Proposed Action alternative.

< **No Action Alternative.** This alternative would result in no direct or indirect impacts to BLM sensitive species.

4.3.3.4 Biodiversity

4.3.3.4.1 Proposed Action Alternative. As measurements of biodiversity are scale-dependent, so too would be the Project's impacts on biodiversity. Although there is no question that biodiversity of land directly impacted by the Project, such as mining pit sites, would be significantly reduced, the overall biodiversity of the region, even of public lands in the project area, would not be affected. The population viability of species of plants and animals in the area would not likely be affected in either the short or long term by the Project; therefore, this alternative is not expected to adversely affect biodiversity.

4.3.3.4.2 Partial Backfill Alternative. Impacts to biodiversity of the region from this alternative would be identical to those described under the Proposed Action alternative.

4.3.3.4.3 No Action Alternative. This alternative would maintain the *status quo* of the subject lands and would have no direct or indirect impacts on the biodiversity of the project area or of the surrounding region.

4.3.4 Cultural Resources

4.3.4.1 Historic and Prehistoric Archaeological Resources

4.3.4.1.1 Proposed Action Alternative. The Proposed Action would destroy or damage 37 of the 115 archaeological sites located in the project study area (see mitigation described in Table 4-45 at the end of this chapter). Of the affected sites, 13 are located on BLM-administered federal lands and 24 are on PD-owned land. For their scientific value, 36 of these sites are recommended to be eligible for nomination to the National Register of Historic Places (National Register). Of these 36 sites, 18 are prehistoric, 10 are historic, 4 are multicomponent, and 4 are sites of unknown temporal association. Table 4-18 lists the site numbers of both the eligible and ineligible sites.

Table 4-18. Archaeological Sites that Would be Directly Impacted by the Proposed Action Alternative

Federal Lands		PD Lands			
Sites Recommended as Eligible for the National Register for Their Scientific Values					
AZ CC:2:148	AZ CC:2:193	AZ CC:2:150	AZ CC:2:162	AZ CC:2:168	AZ CC:2:257
AZ CC:2:149	AZ CC:2:197	AZ CC:2:156	AZ CC:2:163	AZ CC:2:169	AZ CC:2:258
AZ CC:2:151	AZ CC:2:204	AZ CC:2:157	AZ CC:2:164	AZ CC:2:241	AZ CC:2:259
AZ CC:2:152	AZ CC:2:213	AZ CC:2:158	AZ CC:2:165	AZ CC:2:242	AZ CC:2:269
AZ CC:2:191	AZ CC:2:215	AZ CC:2:159	AZ CC:2:166	AZ CC:2:245	AZ CC:2:274
AZ CC:2:192	AZ CC:2:225	AZ CC:2:160	AZ CC:2:167	AZ CC:2:252	AZ CC:2:277
Sites Recommended as Ineligible for the National Register for Their Scientific Values					
AZ CC:2:206					

Project components that would damage or destroy archaeological sites include the Dos Pobres and San Juan pits, West and East development rock stockpiles, leach pad, crusher facility, aggregate source pit, San Juan soil stockpile, West Diversion Channel, Peterson Wash Diversion, four transmission lines, two roads, and activity in the Site #1 area. Many of the 37 sites could be avoided by judiciously positioning transmission line components, realigning roads, and repositioning the soil stockpile.

4.3.4.1.2 Partial Backfill Alternative. This alternative would result in impacts to archaeological sites that are identical to those described under the Proposed Action.

4.3.4.1.3 No Action Alternative. The No Action alternative would not affect historic and prehistoric archaeological resources in the project area. No mining would be authorized; therefore, none of the 115 sites in the project area would be physically impacted by mining. Other federal management actions may apply.

4.3.4.2 Traditional Cultural Properties Identified by Indian Tribes

4.3.4.2.1 Proposed Action Alternative. Indian tribes consulted for this project generally opposed the proposed undertakings and consider 76 of the 115 archaeological sites in the project area to be places of traditional importance (see Table 3-20). The BLM and Arizona State Historic Preservation Office have yet to determine whether these properties are eligible for the National Register for their traditional values (i.e., as Traditional Cultural Properties) as well as their scientific values. The Proposed Action would damage or destroy 26 of these properties, 10 on federal lands and 16 on PD lands (Table 4-19). Eight of these sites are composed of petroglyph and cupule boulders. At the request of the Four Southern Tribes, all eight petroglyphs/cupule boulders will be relocated as a part of mitigation after full recording of the sites (SWCA 2000, 2003b).

Three sites (AZ CC:2:200, 211, and 234) are considered sacred: AZ CC:2:200, 211, and 234 are considered sacred by two by the White Mountain Apache Tribe and AZ CC:2:200 and 211 are considered sacred by the Tohono O'odham Nation, Hopi Tribe, and the Ak-chin, Gila River, and Salt River Pima-Maricopa Indian Communities. These sites are located on federal land and treatment must be consistent with Executive Order 13007 "Indian Sacred Sites," May 24, 1996. This order requires federal agencies to "to the extent practicable and not clearly inconsistent with essential agency functions, accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and avoid adversely affecting the physical integrity of such sacred sites."

Table 4-19. Sites Identified by Indian Tribes as Being Places of Traditional Importance That Would Be Directly Impacted by the Proposed Action Alternative

Federal Lands		PD Lands		
AZ CC:2:148	AZ CC:2:192	AZ CC:2:150	AZ CC:2:164	AZ CC:2:257
AZ CC:2:149	AZ CC:2:193	AZ CC:2:156	AZ CC:2:166	AZ CC:2:259
AZ CC:2:151	AZ CC:2:213	AZ CC:2:157	AZ CC:2:168	AZ CC:2:269
AZ CC:2:152	AZ CC:2:215	AZ CC:2:158	AZ CC:2:169	AZ CC:2:274
AZ CC:2:191	AZ CC:2:225	AZ CC:2:159	AZ CC:2:241	
		AZ CC:2:160	AZ CC:2:45	

The three sacred sites, AZ CC:2:200, 211, and 234, will be avoided. To further protect AZ CC:2:200, PDSI revised its site development plan to provide a protective buffer zone around the site to exclude mining operations and will construct a fence around AZ CC:2:211 to protect the site from mining operations. Furthermore, PDSI will also provide access to the sites for representatives from appropriate Indian tribes for ceremonial purposes; therefore, sites AZ CC:2:200, 211, and 234 are not likely to be adversely affected by the Proposed Action.

4.3.4.2.2 Partial Backfill Alternative. Impacts to traditional cultural properties under this alternative would be identical to those described under the Proposed Action.

4.3.4.2.3 No Action Alternative. Under this alternative, mining would not be authorized; therefore, none of the sites in the project area identified as being traditional cultural properties and/or sacred sites by Indian tribes would be physically affected by mining.

4.3.5 Socioeconomic Resources

Impacts of the mine plan alternatives set on the socioeconomic resources of the region are expected to be concentrated in the Safford/Thatcher/Pima corridor (referred to here as the Safford area) of Graham County, primarily in the City of Safford itself. The nature, timing, and magnitude of these impacts would reflect the Dos Pobres/San Juan Project's two major phases: the initial 15-month construction phase and the long-term, 16-year production phase (ESI 1997).

4.3.5.1 Population and Demographics

4.3.5.1.1 Proposed Action Alternative. The Proposed Action is expected to result in 145 new households, or 448 additional people, in Graham County. Of these new households, an estimated 108 would be associated with direct employment at the Project during its operational phase. The remaining 37 would result from indirect employment opportunities generated by the Project (see Section 4.3.5.2.1, Employment) (ESI 1997). Table 4-20 gives the percent growth represented by these figures for three areas: Graham County; the Safford area (Incorporated Safford, Thatcher, and Pima combined); and the City of Safford alone. An estimated 67 percent of all growth is expected to occur within the Safford city limits (see Section 4.6.1.3.1, Housing). Growth information is provided in Table 4-20 for both households and population. The year 1995 was chosen as the base year for this analysis because a special census was conducted in that year.

Table 4-20. Estimated Percent Increase in the Number of Households and Population of Graham County, the Safford Area, and the City of Safford Attributable to the Proposed Action

Area	No. Of Households (1995)	Percent Growth in No. of Households	Population (1995)	Percent Growth in population
Graham County	9,937	1.5%	29,772	1.5%
Safford Area	5,455	2.7%	14,580	3.1%
City of Safford	3,468	4.2%	8,773	5.1%

This table shows that the Proposed Action alternative would result in an estimated growth in the population of the Safford area of about 3.1 percent. Safford itself is likely to see an increase closer to 5.1 percent (assuming that Safford sees two-thirds of the growth). Graham County, having the largest base population, would be impacted the least, with an estimated increase of only 1.5 percent.

The State of Arizona Department of Economic Security has projected the overall population growth in Graham County for the years 1995-2005. They expect the county to grow by 2,466 households, or 8,553 individuals, a robust increase of 24.8 percent and 28.7 percent, respectively. The Dos Pobres/San Juan Project's

estimated contribution of 145 new households and 448 individuals (ESI 1997) represents only about 5.9 percent and 5.2 percent, respectively, of this projected growth.

< **Minority Groups and Low-Income Populations.** Like the general population, minority groups in the Safford area are expected to benefit from the Proposed Action, which would provide additional opportunities for short-term jobs during the project construction phase and long-term jobs during the production phase. The Project would generate, either directly or indirectly, an estimated total of 644 new jobs in the Safford area by Year 16 of the Project (see Section 4.3.5.2.1, Employment). It is expected that this employment would reflect the demographic profile of the Safford area, including representative numbers from minority and low-income populations (ESI 1997). PDSI itself is expected to hire approximately 80 percent of its projected 250-person labor force locally, paying an average salary of approximately $36,000 (1997 dollars). Approximately 80 percent of these relatively high-paying jobs are classified as "laborer," a category that does not necessarily require specialized skills or extensive formal education—prerequisites that often function as barriers to employment for members of disadvantaged groups. Indirect employment from the Project is expected to be concentrated in the retail and service sectors, where jobs tend to be low-paying but require relatively low levels of formal education. These jobs may be filled disproportionately by individuals from minority or low-income populations.

Most of the increased employment opportunities under the Proposed Action would be located in the Safford area, which includes relatively high proportions of Hispanic and low-income households (see Section 3.2.5.1.1, Minority Groups and Low-Income Populations). Safford is close (within 10 miles) to the communities of Solomon, San Jose, and Sanchez, which are heavily Hispanic. However, Safford is relatively far (about 30 and 50 miles, respectively) from Bylas and Periodot, the major Native American population centers in the county.

4.3.5.1.2 Partial Backfill Alternative. Impacts of this alternative would be identical to those of the Proposed Action.

4.3.5.1.3 No Action Alternative. The No Action alternative would not cause any change in the population size and demographics of Graham County. Population would continue to grow in the Safford area as a result of factors other than mining (e.g., increased tourist-based business, influx of retirees, etc.).

4.3.5.2 Local and Regional Economy

4.3.5.2.1 Employment

< **Proposed Action Alternative.** The Proposed Action is expected to result in a more diversified local economy by adding mining-related jobs to the mix, increasing non-agricultural wage and salary employment by an estimated 9.0 percent over 1996 levels.

C **Direct Employment.** Under the Proposed Action alternative, employment during the construction phase of the Project is expected to range from 150 full-time jobs in the first month to a peak of 980 full-time jobs in the eighth month, declining to 50 jobs in the last (fifteenth) month. The average construction employment for the Project would be

approximately 470 workers (PDSI 1996). Potential construction firms have indicated that the Safford/Thatcher and Clifton/Morenci areas could possibly supply up to 40 percent of the needed construction workers (ESI 1997). Given these estimates, an estimated 390 temporary jobs could be filled by the local labor force. The availability of construction jobs would likely reduce the unemployment figure in the Safford area, which currently stands at 7.1 percent (about 240 individuals), but by an undeterminable number that depends in part on the suitability of unemployed individuals at the time of recruitment.

The operational phase of the Project is anticipated to begin in the twelfth month of the 15-month construction schedule (ESI 1997). Once fully operational, the Project as described in the Proposed Action alternative is expected to provide approximately 250 direct, full-time, salaried jobs. This figure may be higher at periods of maximum production. The three general categories of jobs that would be filled and the number of jobs they comprise are shown in Table 4-21.

Table 4-21. Breakout of Types of Employee Positions under the Proposed Action Alternative

Employee Category	Number of Positions	Percent of Total
Administrative (supervisory, clerical, and support staff)	29	12%
Technical (engineering)	20	8%
Labor (craftsmen, operators, skilled and general laborers)	201	80%

Source: ESI 1997, Table II-13

PDSI expects about 80 percent of the workforce to be local hires from Graham and Greenlee counties, including the communities of Bylas, Fort Thomas, Pima, Central, Thatcher, Safford, Solomon, San Jose, York, Clifton, Morenci, and Duncan. The other 20 percent are expected to come from outside the region. Workers drawn from the outside would most likely bring needed technical, journeyman-level skills in specific mining-related trades (ESI 1997).

The majority of new local employment would likely come from the Safford area, the region's largest population center. These employees would include entry-level workers, individuals currently numbered among the County's unemployed, and individuals currently holding other jobs who would prefer higher-paying mining jobs (ESI 1997). It is unknown what proportion of new local hires would come from each of these sources; therefore, the magnitude of the Proposed Action's impact on the area's unemployment figure or on the distribution of labor among economic sectors is also unknown. Most new local hires would fall into the PDSI "labor" category, many requiring little if any mining experience.

It is expected that an undetermined number of experienced mine workers would transfer to the Project from PD's Morenci (PDMI) operation. A portion of such workers currently living in the Clifton/Morenci area may elect to stay there and commute to their new jobs, thus

lessening the impact of their employment on the Safford area's economy. It is likely, however, that some transfers from PDMI to PDSI would come from the approximately 32 percent of PDMI workers who already live in the Safford area and now commute to Morenci. Vacancies in the Morenci operation would likely be filled from the approximately 3,000 active applications normally on file with PDMI. Other than this shift in personnel, the socioeconomic conditions in Greenlee County should remain unaffected by the Proposed Action (ESI 1997).

In addition to the salaried workforce, PDSI estimates that local contractors would employ 100 workers to provide certain maintenance and fabrication services over the life of the Project. The four types of jobs that would be filled by contracted labor is shown in Table 4-22. PDSI also plans to hire an average of 15 college students for 10-12 weeks each year in a 40-hour-per-week summer internship program (ESI 1997).

Table 4-22. Breakout and Estimated Hourly Wages of Anticipated Contract Workers for the Project under the Proposed Action Alternative

Worker Category	Estimated Percentage of Total	Estimated Hourly Wage
Supervisor	10%	$20-22
Craftsman	25%	$12-13
Helper	25%	$8-9
Laborer	40%	$6-7

Source: ESI 1997

- **Indirect employment.** Direct employees, both salaried PDSI employees and contract workers, would generate a demand for goods and services that would lead to additional, or indirect, employment across all sectors of the region's economy. Local expenditures by PDSI for goods and services to support project operations would also result in a certain amount of indirect employment. PDSI is expected to spend approximately $103,000,000 in local expenditures over the life of the project (ESI 1997, Table II-18a).

  Because Safford is already the region's service center, and because most of the new PDSI employees would probably live in the Safford area, that community is expected to be the locus for the increased demand. The multiplier effect of the direct employment in this case is expected to be fairly high, from 1.74 to 1.84 (ESI 1997). Consequently, the direct employment of 350 workers (250 salaried PDSI employees plus 100 contract workers) is expected to generate a total employment of 623 by Year 7 of the Project; 634 by Year 12; and 644 by Year 16. Currently, wage and salary employment in Graham County as a whole totals 7,100. The largest share of the new indirect employment (294 by Year 16) would likely occur in Safford's retail and service sectors. The most pronounced consequences of the overall increased employment would be a proportional increase in demands on housing, schools, and utilities in the Safford area (ESI 1997).

< **Partial Backfill Alternative.** Impacts of this alternative would be identical to those of the Proposed Action.

< **No Action Alternative.** The No Action alternative would not cause any change in employment figures in the Safford area or in Graham County as a whole.

4.3.5.2.2 Income

< **Proposed Action Alternative.** This alternative would result in increased income for the workers who shift from low-paying jobs (which are typical in the Safford area) to higher-paying construction- and mine-related work. The overall income from the increased direct and indirect employment generated by the Dos Pobres/San Juan Project would inject relatively large amounts of money into the local economy.

The construction payroll over the 15 months needed to reach full project build-out is estimated to total $25,285,000 (1997 dollars). Once the mines are operational, the PDSI payroll for salaried workers is estimated to average $9.0 million per year, totaling $144 million over the 16-year production life of the Project. The payroll for contract workers is estimated at $2.5 to $3.0 million per year, for a total of $44 million over the life of the Project. The internship payroll would range from $60,000 to $72,000 each year, for a total of $0.96 million to $1.15 million. Consequently, from the beginning of the construction phase to the end of the projected life of mining operations, PDSI would pay its direct and contracted employees well over $214 million in wages (ESI 1997).

The average annual direct (unfringed) income of a PDSI salaried worker is expected to be $36,000 (1997 dollars) (ESI 1997). This would be a high-paying job for a member of the Graham County labor force. Assuming one PDSI employee per household, and no other source of income in the household (a conservative assumption), an annual income of $36,000 compares very favorably to the current median household income in Graham County of $18,455.

The hourly wages for the estimated 100 contract workers are reported in Table 4-22. According to this estimate, 65 percent of these workers would be paid between $6 and $9 per hour, which, if annualized based on a full-time, 40-hour-week, would come to between $12,480 and $18,720 per year. The highest-paid 10 percent of the workers would earn between $41,600 and $45,760 per year (ESI 1997).

Indirect employment resulting from the Proposed Action most likely would be concentrated in the lower-end retail and services sector of the local economy, which already accounts for a large percentage of jobs in the Safford area and which often pays too little to support a family. Higher-paid jobs—for example in construction, teaching, or the medical field—would also be generated but would be in the minority (ESI 1997).

< **Partial Backfill Alternative.** Impacts of this alternative would be identical to those of the Proposed Action.

< **No Action Alternative.** The No Action alternative would not change income characteristics in the Safford area or in Graham County as a whole.

4.3.5.2.3 Taxes

< **Proposed Action Alternative**. The estimated total state and local taxes that would be generated by the Proposed Action over the life of the Project is estimated at $150,875,700. This revenue would come from two sources: taxes paid by PDSI and taxes paid by workers as a result of direct and indirect employment (Table 4-23). State and local taxes paid by PDSI are estimated to total about $137.7 million. In addition, PDSI would pay an estimated $282.54 million in federal income and payroll taxes over the life of the Project, bringing their total estimated tax contribution to over $420 million (ESI 1997). Direct and indirect employment resulting from the Proposed Action would contribute an estimated $13,175,700 in the state and local tax revenue. A breakdown of these tax payments is presented in Table 4-24.

Table 4-23. Estimated Total State and Local Tax Revenues That Would Be Generated by the Proposed Action Over the 16-year Life of Project

Tax Payer	Property (local)	Sales (state & local)	Income (state)	Severance (state)	Construction (state & local)	TOTAL
PDSI	$52,000,000	$5,400,000*	$43,000,000	$31,000,000	$6,300,000	**$137,700,000**
Employees (Direct & Indirect)	$2,229,000	$562,700	$10,384,000	-	**-**	**$13,175,700**
TOTAL	**$54,229,000**	**$5,962,700**	**$53,384,000**	**$31,000,000**	**$6,300,000**	**$150,875,700**
Average Annual	**$3,389,313**	**$372,669**	**$3,336,500**	**$1,937,500**	**$393,750**	**$9,429,732**

Sources: ESI 1997, Tables II-17 & II-18; J. Korolsky, PDSI, pers. comm.

* Includes state sales taxes paid for purchases made outside the local area. An estimated $654,284 would be paid in Graham County (Based on ESI 1997, Table II-18b).

The impact of the Proposed Action on tax revenues available to Graham County and the communities of Safford, Thatcher, and Pima would be major. Graham County collects the property tax, which represents the bulk of increased local tax revenues, and a 0.05 percent sales taxes. The communities of Safford, Thatcher, and Pima each collect a 1.0 percent sales tax. The county and each of these communities also receive a percentage of the sales, severance, and income taxes collected by the state through Arizona's revenue-sharing program. Distributions of state sales and severance taxes to each county in the state are based on both the total amount of collections in a given county and the proportion of the state population represented by that county. Disbursements sales and severance tax revenue to municipalities are based solely on population. Distribution of state income tax to counties and municipalities is based on population.

Table 4-25 provides the percentages of total state sales, severance, and income tax collections that were returned to Graham County and the communities of Safford, Thatcher, and Pima in 1994 (ESI 1997). Based on these percentages and the estimated revenue totals shown in Table 4-23, the

Proposed Action could contribute an estimated total of $57.6 million, or an estimated annual average of $3.6 million, to local coffers over the life of the Project.

< **Partial Backfill Alternative**. Impacts of this alternative would be identical to those of the Proposed Action.

< **No Action Alternative.** The No Action alternative would not cause any change in tax revenues in the Safford area or in Graham County as a whole.

Table 4-24. Estimated State and Local Taxes That Would Be Paid by Workers under the Proposed Action

Property taxes generated from new home sales	$139,306 annually for a rounded total of $2,229,000
Sales tax generated as a result of consumption by construction workers	$24,700 over the 15-mo build-out
Sales tax generated as a result of consumption by new households	$33,612 annually for a rounded total of $538,000
State income taxes construction workers would pay	$575,750 over the 15-mo build-out*
State income taxes direct employees would pay	$343,000 annually for a total of $5,488,000**
State income taxes indirect employees would pay	Between $252,000 in Year 1 and $288,000 in Year 16*** for a total approximating $4,320,000

Source: ESI 1997

* Assuming each of the 470 construction workers(the average employment) would pay the Arizona 1995 statewide average of $980 per filer, averaged over 15 months.

** Assuming each of the 350 direct employees would pay the Arizona 1995 statewide average of $980 per filer.

*** Depending on the production scenario and ignoring inflationary effects.

Table 4-25. Distribution of State Revenue-Sharing Funds in Graham County (1994 data)

Recipient	Percent of Total State Sales and Severance Tax Collections	Percent of Total State Income Tax Collections
Graham County	0.52%	0.45%
Safford	0.26%	0.26%
Thatcher	0.13%	0.13%
Pima	0.06%	0.06%
TOTAL	**0.97%**	**0.90%**

Source: ESI 1997

4.3.5.3 Infrastructure

4.3.5.3.1 Housing

< **Proposed Action Alternative.** The impacts of the construction phase of the Proposed Action on housing would focus on short-term rental accommodations and motels. Currently, few rental opportunities are available in the Safford area to meet this demand (ESI 1997). The production phase of the Proposed Action is expected to affect long-term housing, generating 108 new housing units over the life of the Project (Table 4-26).

Table 4-26. New Households as a Result of Direct Employment Housing

Employment Housing Demand	Estimated Employees (Total)	Percent needing new housing	New Households
Newcomers/PDSI	250	20 %	50
Newcomers/Contract	100	15 %	15
Local/PDSI	200	15 %	30
Local/Contract	85	15 %	13
TOTAL	**635**	**17%**	**108**

Source: ESI 1997

The demand for new housing would likely be concentrated in the Safford area due to that community's proximity to 1) the project site, 2) employment opportunities for other household members, 3) available housing, and 4) goods and services. An estimated 67 percent of the new households generated by the Project would be located in the City of Safford, while the remaining 33 percent would be distributed throughout nearby Thatcher and Pima, and in the more rural areas (ESI 1997). The following assumptions were adopted to determine local housing demand related to employment at the Dos Pobres/San Juan Project:

- 80 percent of direct PDSI jobs would be filled within the local Graham/Greenlee area, 15 percent of which would require new housing;
- 20 percent of direct Dos Pobres/San Juan Project jobs would be filled by newcomers, 100 percent of which would require new housing;
- Of the 85 percent contract jobs filled by locals, 15 percent would demand new housing; and
- 15 percent of new contract jobs would be filled by newcomers demanding new housing.

< **Partial Backfill Alternative.** Impacts of this alternative would be identical to those of the Proposed Action.

< **No Action Alternative.** The No Action alternative would not cause any change in the housing situation in the Safford area or in Graham County as a whole.

4.3.5.3.2 Utilities (Water, Electric/Gas, Sewer, Telephone, Garbage)

< **Proposed Action Alternative.** Under this alternative, the estimated additional 145 households expected to result from the Dos Pobres/San Juan Project could burden the existing water system for the City of Safford and the communities Safford supplies (the Town of Thatcher and smaller, unincorporated areas in the immediate vicinity). Even though the estimated percent of growth in households in the area is small (less than 4.0 percent), Safford's water system has water rights to only 2,250 gallons per minute (gpm) (3,632 af/yr) from Bonita Creek, and they are currently pumping an average of 2,140 gpm (,3,454 af/yr) with a peak demand of about 4,000 gpm (6,456 af/yr). While the City is pursuing additional sources of water, their supply has yet to be augmented (H. West, BLM, pers. comm.).

The estimated increase in households resulting from the Project is not expected to place an appreciable increased demand on sewer facilities, sources of electrical power, solid waste collection and disposal systems, or on public utility personnel and equipment in the Safford area. The city built a new wastewater treatment plant with a maximum capacity of two million gallons/day; operations began in 2002 and currently this plant processes 875,000 gal/day (D. Gordon, Gila Resources, pers. comm.). The capacity of the plant could be increased to four millions gal/day with very little need for expanded infrastructure (ibid.).

The Proposed Action is expected to impact utilities and public services in a positive way by generating substantially increased property, sales, and construction tax revenues for the City of Safford and Graham County by which to pay for infrastructure needs that are expected as a result of the Project (see Section 4.3.5.2.3 and Table 4-23).

< **Partial Backfill Alternative.** Impacts of this alternative would be identical to those of the Proposed Action.

< **No Action Alternative.** This alternative would result in no changes to utilities serving the Safford area.

4.3.5.3.3 Schools

< **Proposed Action Alternative.** Safford area schools can expect increased enrollment as new families move into the Safford area to work at the Dos Pobres/San Juan Project or local businesses related to the Project and its employees. In the first year of production, an estimated 91 new school-age children are expected as a result of the Proposed Action. Over the life of the mine, an annual average of 95 new school-age children is expected (ESI 1997). Of these students, the Safford School District would receive 64; the Thatcher School District would receive 30. Both districts could anticipate an enrollment increase of 2.0 percent in the first one or two years of the Project. The two smaller school districts in the area, the Pima Unified School District and the Solomon School District,

may receive some of these students as well, but not in large numbers. Safford schools are near capacity, and all Thatcher schools are at capacity or in need of replacement. The estimated 2.0 percent increase in students attributable to the Proposed Action would not contribute appreciably to an existing and growing need for additional school facilities and staff in the Safford School District, but even this small increase spread over 12 grades might be noticeable in Thatcher.

The Proposed Action would also benefit local school districts by generating increased property tax revenues. PDSI would pay approximately 95 percent of the expected $54 million increase in total property taxes resulting from the Proposed Action.

< **Partial Backfill Alternative.** Impacts of this alternative would be identical to those of the Proposed Action.

< **No Action Alternative.** This alternative would result in no changes to schools in the Safford area.

4.3.5.3.4 Emergency Response

< **Proposed Action Alternative.** This alternative would not result in appreciable increased demands on the law enforcement and fire-fighting organizations in the Safford area. Nor would it seriously exacerbate the current shortage of physicians and nurses. The Proposed Action would result in additional local tax revenues to help support law enforcement departments and purchase fire-fighting equipment. PDSI has already contributed to the local hospital in anticipation of any increased demands made by the Project on that facility.

< **Partial Backfill Alternative.** Impacts of this alternative would be identical to those of the Proposed Action.

< **No Action Alternative.** This alternative would result in no changes to emergency response capabilities in the Safford area.

4.3.5.4 Transportation

4.3.5.4.1 Proposed Action Alternative

< **Roads.** Under the Proposed Action alternative, traffic in the Safford area is expected to increase as a result of employees and commercial trucks traveling to and from the mine site, although the anticipated increase would not exceed the capacity of any road in the study area. The roads and intersections would continue to operate at an acceptable level of performance (LOS “C” or better), even with the mine in full operation. The increase in traffic would be noticeable on the lowest-volume roads (i.e., the Safford-Bryce and Airport Roads) (Curtis Lueck & Associates1997).

During the construction phase of the Project, the expected distribution of daily traffic at major intersections in the Safford area is based on a peak of 980 employees with an average vehicle occupancy rate of 1.3 (or 754 employee round trips). An additional 100 round trips per day would be

added for construction materials and miscellaneous travel, resulting in a maximum total of 854 vehicle round trips per day (Curtis Lueck & Associates 1997). Travel by employees is not expected to restrict any of the bridges. Trucks transporting materials from the east and south to the mine would use the Solomon Bridge to Airport Road, and trucks arriving from the west would use the Thatcher Bridge to Safford-Bryce Road, thus avoiding the narrow Safford Bridge (Eighth Avenue Bridge) and the more heavily traveled areas of Safford.

During the operational phase, average daily traffic is forecasted at 325 employee round trips and approximately 70 truck round trips (Figure 2-7). Employee trips, which are likely to use any of the four bridges crossing the Gila River, are not expected to cause travel to be restricted at any of these bridges. Additional traffic from material transport is expected to average 100 commercial trucks per day, which includes sulfuric acid tank trucks and other trucks carrying processing materials. Tanker trucks would avoid using the Safford Bridge so as not to impede traffic at that point (Curtis Lueck & Associates 1997).

It is not expected that any roads in the study area would need to be widened as a result of the Proposed Action. The increase in heavy truck traffic on the Safford-Bryce Road could degrade the pavement of that road in places where the structural integrity is questionable. The safety of increased truck traffic on Safford-Bryce and Airport Roads could be compromised by the existence of at least five curves with advisory speeds of 25 miles per hour (mph) or less on roads posted for 55 mph. The Proposed Project would result in substantial payments by PDSI in state and local taxes that fund road repair.

< **Air Traffic.** The Proposed Action alternative would not impact air traffic around the Safford Municipal Airport. The proposed 230 kV powerline that would transmit power to the Project from the existing Hackberry 230 kV powerline southeast of the project site does cross through the protected area around the airport (see Section 3.2.5.4.4, Air Traffic, and Figure 3-16). However, the pole structures supporting the line would not rise above the constraining Horizontal or Conical Surfaces. Figures 4-16 and 4-17 depict the pole structures in relation to the imaginary surfaces at three points located along Cross Sections AA', BB', and CC', respectively (see Figure 3-17 for the positions of these cross sections). According to an initial transmission line design, the pole shown on Cross Section BB' would exceed the height limit by five feet; however, the design has been modified so that no poles along the line would pierce the Conical Surface (SWCA 1997h).

4.3.5.4.2 Partial Backfill Alternative. Impacts of this alternative would be identical to those of the Proposed Action.

4.3.5.4.3 No Action Alternative. This alternative would cause no change in transportation in the Safford area.

4.3.6 Indian Trust Resources

4.3.6.1 Proposed Action Alternative

Water rights to the Gila River held by the Gila River Indian Community and the San Carlos Apache Tribe have been identified as Indian trust assets. The predicted impacts on surface flows in the Gila River as described in Sections 4.3.2.5.1 and 4.3.2.6.1 would be mitigated by implementing an Alternate Year Fallowing Program that leaves water in the Gila River that would otherwise be used for crops (see Appendix F for details of this mitigation). Through the Alternate Year Fallowing Program, the current ability of downstream users, including the Gila River Indian Community and the San Carlos Apache Tribe, to divert water will not be affected. In the absence of actual negative physical impacts to Gila River flows, there would be no adverse impacts to the surface water rights of downstream users resulting from the Project.

In addition to these rights to surface flows in the Gila River, the San Carlos Apache Tribe holds an Indian trust asset in all groundwater under the San Carlos Apache Reservation based upon Sections 4.0 and 4.3 of the San Carlos Apache Tribe Water Rights Settlement Agreement of March 30, 1999, to which the United States was a signatory. This agreement states that such rights "are held by the United State in trust for the Tribe," and that the scope thereof is "...a permanent right to the on-Reservation diversion, use, and storage of all Groundwater beneath the Reservation...." The 2002 groundwater model predicts that the cone of depression (as measured by the one-foot contour line) resulting from project pumping would not reach the southern boundary of the San Carlos Apache Reservation (see Figure 4-8, 100 years). The model does predict a very slight increase in the current rate of groundwater flow from the Reservation southward toward the mining area (maximum peak rate increase of 0.2 af/yr, or 0.07 percent of the current predicted flow), and a nearly zero decline in the groundwater table on the Reservation. Once the Project begins pumping, effects on groundwater would be monitored in accordance with the Mitigation and Monitoring Plan for water resources (Appendix F). Data from groundwater wells located between the Project and the San Carlos Apache Reservation boundary and Bonita Creek would be collected and analyzed to determine if the groundwater surface elevation is responding to groundwater pumping in the manner predicted by the model.

The predicted nearly zero impact to groundwater under the Reservation is unmeasurable and not significant. The Tribe's ability to access and use groundwater, identified as a trust resource under the San Carlos Apache Tribe Water Rights Settlement Agreement, for the purposes of the Reservation remains unaffected by the Project. No mitigation is proposed for this nearly zero impact. Considering the overall effects to water resources in the Gila River basin as a result of the Project, no significant adverse effects on Indian trust assets held by the Gila River Indian Community or the San Carlos Apache Tribe are expected to result from the Project.

4.3.6.2 Partial Backfill Alternative

Potential impacts of the Partial Backfill alternative on Indian trust resources would be identical to those of the Proposed Action alternative.

4.3.6.3 No Action Alternative

The No Action alternative would not impact Indian trust resources.

4.4 LAND EXCHANGE ALTERNATIVES IMPACT ANALYSIS

4.4.1 Land Use

4.4.1.1 Public Lands Management

4.4.1.1.1 Land Exchange Alternative

< **Selected Lands.** The direct impacts of the exchange on the selected lands include transfer of ownership of 16,297 acres of public land administered by the BLM to Phelps Dodge. With the exchange of ownership of the land go all the rights, privileges, and obligations appurtenant to those lands. The BLM's Safford Field Office would relinquish federal jurisdiction and management responsibilities for these lands, including oversight of the mining operations and reclamation activities proposed as the Dos Pobres/San Juan Project. Exchange of the selected lands would not affect any special management areas administered by the BLM such as ACECs, wildernesses, wild and scenic rivers, or National Conservation Areas (NCA), including Riparian NCAs.

Other direct impacts of the exchange alternatives on the selected lands include consolidation of federal land and PD's private land holdings in the Safford Mining District, disposal of the Sanchez building, and reduction in the number of corners of land parcels shared by BLM with PD from 116 to 27. This nearly 77 percent reduction in shared boundary corners represents a mutually improved ability of both BLM and PD to manage their respective lands surrounding and within the project area.

The foreseeable mining uses of the selected lands, including long-range potential uses of the Dos Pobres sulfide orebody and the Lone Star area, would occur without management and oversight by BLM, although federal oversight would still be provided by the COE through their CWA Section 404 permit. Based on the conceptual foreseeable uses for these areas as described in Section 2.2.2.1.2, the potential mine development activities that would be involved in developing the Dos Pobres sulfide orebody and the Lone Star deposit would be subject to the requirements of the Clean Air Act, and the CWA as administered by the COE, thereby providing the federal "trigger" for compliance with other federal environmental laws such as the Endangered Species Act, National Historic Preservation Act, and the National Environmental Policy Act. Therefore, the net effect of the exchange on public lands management is the loss of BLM jurisdiction in particular, and not federal oversight in general, for mining and mining-related support activities on private lands.

Under this alternative, the State Mine Inspector's Office would have jurisdiction over mining reclamation on private lands. State reclamation requirements are similar to federal requirements; Table 4-27 provides a comparative summary of the federal versus State of Arizona reclamation requirements. One difference is that State regulations allow use of a corporate guarantee as a financial assurance for reclamation whereas BLM regulations do not. The State regulations require successful demonstration and certification of a corporate financial test in support of a corporate guarantee, however a corporate guarantee generally represents a higher risk financial assurance mechanism than does cash or a surety bond.

This alternative is consistent with Graham County's Land Use and Resource Policy Plan and Implementation Plan (LURPP), which "encourages mining efforts on public and private lands" (Graham County, Comment Letter No. 74).

< **Offered Lands.** The exchange alternative would result in federal acquisition of about 3,867 acres of offered lands consisting of eleven properties in five Arizona counties in exchange for 16,297 acres of public lands in the BLM's Safford Field Office acquired by PD. Net change is a loss of 12,430 acres of public lands in Arizona. The Safford Field Office would have a net loss of 13,874 acres; the BLM's Tucson Field Office would enjoy a net gain of 1,120 acres; and the National Park Service would enjoy a net gain of 324 acres. Acquisition of the offered lands would result in the following effects to public lands management:

- Increase the BLM-administered lands within the Gila Box RNCA by 855 acres. This would reduce the acreage of private inholdings in the Gila Box RNCA nearly 50 percent, from 1,720 to 865 acres and from 15 to 13 private inholdings. This alternative also would put under BLM management an approximately 2.0-mile portion of an 8.1-mile segment of Bonita Creek that has been recommended for Wild and Scenic River designation.

- Increase BLM-administered lands in the Las Cienegas National Conservation Area (NCA) by 400 acres (Schock and Clyne I properties) and in the Sonoita Valley Acquisition Planning District by 720 acres (Feulner and Clyne II properties). Four private inholdings totaling 1,120 acres would be removed from the Sonoita Valley Acquisition Planning District.

- Increase public lands in the Tuzigoot National Monument near Cottonwood, Arizona, by 324 acres.

- Increase BLM-administered lands in the Dos Cabezas Long-Term Management Area (LTMA) by 1,088 acres and remove three private inholdings. Public access to the Dos Cabezas Mountains Wilderness would be improved through BLM control over lands through which the Happy Camp Canyon Road passes.

- Consolidate BLM-administered lands in the Southwest Gila Valley LTMA with the acquisition of the 400-acre Norton property; and

- Consolidate BLM-administered lands adjacent to the Gila Box RNCA with the acquisition of the 80-acre portion of the Curtis property that lies outside the RNCA boundary, but within the LTMA.

The public land consolidation that would be achieved by this alternative is consistent with and meets the objectives of the Safford RMP, as amended; the Final Gila Box Plan (BLM 1998); and the Tuzigoot Statement for Management (NPS 1995).

Table 4-27. Comparison of Federal and Arizona State Mined Land Reclamation Standards

	Federal Reclamation Standards	State Reclamation Standards
Applies to:	Federal lands	Private lands in Arizona
Compliance Officer:	Authorized Officer (AO) at BLM	Arizona State Mine Inspector
Acreage criterion:	Requires reclamation plan for disturbances over five acres	Requires reclamation plan for disturbances over five acres
Acreage exemptions:	Requires reclamation for disturbances under five acres	Does not apply to disturbances under five acres
Grandfather clause date:	Applies to mining operations constructed on or after January 1, 1981	Applies to mining operations constructed on or after January 1, 1995
Post-closure reclamation objective:	Requires reclamation plan to be suitable for conditions consistent with BLM land use plans and RMPs	Requires reclamation plan to meet post-mining land use objectives approved by State Mine Inspector
Applicable start-date for reclamation:	Requires reclamation to occur concurrently with mining activity when economically and technically feasible, or else to begin at the earliest feasible time	Requires reclamation to occur concurrently with mining activity when possible, or else to begin within two years of cessation of mining activity
Bonding/ Insurance:	Requires a financial assurance mechanism, such as a surety bond or cash, to cover reclamation costs	Requires a financial assurance mechanism for reclamation costs
Reclamation standards:	Includes reclamation standards for waste management, site stability, subsurface stabilization, water management, soil management, erosion prevention, revegetation, wildlife habitat, site protection, and post-closure maintenance	Includes reclamation standards for waste management, subsurface stabilization (case by case determination), site stability, soil management, erosion prevention, revegetation, site protection, and site-specific standards. Water management standards are covered under the state APP Program.
Compliance review:	Allows the AO to inspect operations periodically to determine compliance	Allows the State Mine Inspector to inspect operations periodically to determine compliance; requires annual reclamation status report
Public review/ notification:	Provides for public disclosure of the mining plan through the NEPA analysis	Requires public notification prior to approval or major modification of an approved plan

4.4.1.1.2 No Land Exchange Alternative. The No Land Exchange alternative would result in no changes to the existing federal ownership status of public lands by the BLM Safford Field Office. BLM Safford Field Office would continue to manage a complex boundary in the project area created by multiple private inholdings, and additional long-term federal oversight would be required for the mining and reclamation that is expected to occur under the MPO (Proposed Action). The offered lands would remain under PD ownership and management and there would be no public lands consolidation or improved public access in the Gila Box

RNCA, the Dos Cabezas LTMA, and Southwest Gila Valley LTMA in the BLM Safford Field Office; in the Las Cienegas NCA and the Sonoita Valley Acquisition Planning District in the BLM Tucson Field Office; or at the National Park Service's Tuzigoot National Monument.

4.4.1.2 Access and Recreation

4.4.1.2.1 Land Exchange Alternative

< **Selected Lands.** Under this alternative, PD, as landowner of the selected lands, would have the right to restrict public access on roads entering their private property. The BLM would retain an easement for segments of Solomon Pass Road, West Ranch Road, and Salt Trap Tank Road that pass through the selected lands for public and physical access to the Gila Box RNCA and the Gila Mountains.

Physical access on PD Mine Road would continue to be restricted to authorized persons at the proposed new security gate. San Juan Mine Road would be closed to the public at the new PD property line; however, the BLM would retain an easement or right-of-access on this road to allow the owners of the Melody Claims and allottees to access their mine claims and portions of their allotments, respectively. The BLM would also retain an easement for the spur road leading to the patented Horseshoe Claims from Solomon Pass Road, so that the landowner(s) could continue to access theirland under this alternative. No changes to existing physical and public access on the Lone Star Mountain Road are expected.

Recreational opportunities would be reduced in the project vicinity as a result of the land exchange, but these reductions are not expected to significantly affect recreational use of the area. People driving recreationally in the Gila Mountains or heading to Johnny Creek or the Safford-Morenci Trailhead could no longer use San Juan Mine Road. Public and physical access to these destinations, however, would still be available via Solomon Pass, West Ranch, and Johnny Creek Loop roads. Using these roads instead of San Juan Mine Road would 30-40 minutes to the drive in some cases, depending on the travel route (S. Knox, BLM, pers. comm.). Closure of San Juan Mine Road may cause some recreationists to go elsewhere, but given the attractiveness of the destinations most affected (Johnny Creek Loop, Johnny Creek, and the Safford-Morenci Trailhead) and the availability of an alternate route to those destinations (Solomon Pass Road), any decrease in recreational use of the area resulting from the road closure is expected to be small. Use of Bonita Creek and the Gila Box RNCA, which are currently accessed via Solomon Pass Road, is not expected to be affected. Overall, if the land exchange alternative is selected, the number of backcountry drivers per year using backroads in the vicinity of the project area is expected to continue in the range of 2,800 to 3,100. The numbers of horseback riders and mountain bike riders using these roads are expected to remain at approximately 75 and 30, respectively (S. Knox, BLM, pers. comm.). To mitigate for loss of access to the Gila Mountains via San Juan Mine Road, PDSI has proposed to upgrade (widen, grade, improve drainage) portions of the existing Solomon Pass Road to accommodate fair-weather travel of 2-wheel-drive passenger vehicles.

Under the land exchange alternative, the selected lands would become private property and would no longer be available to hunters on AGFD Hunt Unit 28 or to the four current holders of commercial special recreation permits from the BLM. This restriction in land use is not expected to affect the number of hunters using the general area, nor is it expected to affect the number of commercial special recreation permit holders in the BLM Safford Field Office. The estimated 100 individuals each

year who now hunt deer and javelina on federal and state lands in the project area would likely shift their activity to the deer and javelina habitat available on public lands in the Gila Mountains north of the project area and use Solomon Pass Road to get there. Similarly, the estimated 140 individuals who annually hunt quail and dove, mostly along San Juan Mine Road, would likely shift their hunting to the Solomon Pass area and nearby regions in the Gila Mountains. The four outfitters holding commercial special recreation permits from the BLM Safford Field Office could continue to hold those permits, but would have to move any activities now conducted on the selected lands to other public lands in the region. Portions of the route for the annual Safford Johnny Creek Endurance Ride would now cross property that would be acquired by PD through this alternative; the event promoter could negotiate with PD for permission to cross their property, but any routing decision would be governed by PD's safety and security concerns. Participation in the ride is expected to remain in the vicinity of 85-90 riders and 30-40 spectators (S. Knox, BLM, pers. comm.).

The foreseeable uses at the potential Dos Pobres sulfide and Lone Star projects would not affect public and physical access or recreational uses of selected lands beyond those impacts described above.

< **Offered Lands.** Acquisition of the offered properties would improve public access to public lands. In the Gila Box RNCA, acquisition of the Amado and Curtis properties would assure public pedestrian access through about a two-mile reach of Bonita Creek that was formerly private land; acquisition of the Musnicki, Freeland, and Butler-Borg properties improves and further assures public access along the Happy Camp Canyon Road to the north-central part of the Dos Cabezas Mountains Wilderness; acquisition of the Norton property improves public access along Black Rock Wash Road to the San Carlos Apache Reservation; and acquisition of the Schock, Feulner, Clyne I, and Clyne II properties improves general public access in the Las Cienegas NCA and the Sonoita Valley Acquisition Planning District.

All the offered properties offer dispersed recreational opportunities, including such activities as hiking, mountain biking, backcountry driving, and wildlife/bird watching, among others. The Amado, Curtis, Clyne II, and Tavasci Marsh also offer recreational opportunities associated with perennial water habitats. Developed recreational facilities associated with the Tavasci Marsh Restoration Project (a wildlife/bird watching platform, trails, and signage) would continue to be available at the Tavasci Marsh property. As public lands, the following ten offered properties totaling 3,534 acres would be included in existing AGFD Hunt Units and available for hunting use: Amado, Curtis, Musnicki, Schock, Feulner, Freeland, Butler-Borg, Norton, Clyne I, and Clyne II. Hunting is not allowed in the Tuzigoot National Monument (where the Tavasci Marsh property lies).

4.4.1.2.2 No Land Exchange Alternative. This alternative would not, in itself, cause changes to existing public access or recreational uses of the project area. However, as selection of this alternative would result in BLM authorizing mining on portions of the selected lands per the regulations at 43 CFR § 3809, the impacts described under the Proposed Action would also be expected under this alternative.

Under this alternative, the offered lands would remain privately owned and public access to offered lands or to public lands adjacent to these properties, such as to the north-central portion of the Dos Cabezas Mountains Wilderness via Happy Camp Canyon, would not be improved. Furthermore, no developed or dispersed recreational opportunities associated with the offered lands would be available to the public. The

Tavasci Marsh property would continue to be managed by AGFD under their cooperative management agreement with PD.

4.4.1.3 Encumbrances

4.4.1.3.1 Land Exchange Alternative

< **Selected Lands.** PD's acquisition of the selected lands would not affect the seven existing right-of-way agreements, as the exchange would be subject to the conditions of those prior existing encumbrances. However, the foreseeable uses of the selected lands would require rerouting and/or construction of some portions of the electric power lines, telephone/telegraph lines, and radio station site per the approved mine plan. These new or revised rights-of-way would be negotiated directly by PDSI with the existing grantees.

< **Offered Lands.** Public acquisition of the offered lands would be subject to existing rights-of-way, easements, and other encumbrances on titles to the properties. The Clyne II property includes an easement to the grazing leaseholder for a livestock water pipeline and associated roadway; the month-to-month residential lease agreement for the Musnicki property would be terminated if the exchange was authorized. No other encumbrances are known for the offered lands.

4.4.1.3.2 No Land Exchange Alternative. Although this alternative, in itself, would not change the legal rights-of-way or easement agreements that the BLM has made for the selected lands, the mining activities anticipated under this alternative would require modifications to these encumbrances as described under the Proposed Action alternative to accommodate the mine plan. The agreements made between PD and others on the offered lands would not be impacted under this alternative.

4.4.1.4 Agriculture/Grazing

4.4.1.4.1 Land Exchange Alternative

< **Selected Lands.** No prime or unique farmlands would be impacted by this alternative or by the foreseeable uses of the selected lands. Six BLM grazing allotments would be affected by the exchange. Those portions of selected lands and 24 registered range improvements within the Bryce, Talley Wash, Rest Haven, Bonita, Lone Star, and Johnny Creek allotments would be transferred to PD ownership, with a reduction in BLM grazing receipts corresponding the reduced stocking capacity associated with the public lands (Table 4-28).

< **Offered Lands.** No existing farmlands would be acquired under BLM management through the exchange. Grazing on the offered lands would be allowed per the applicable management plans. The Tavasci Marsh property would be closed to grazing. Within the Gila Box, those portions of the Amado and Curtis properties in the riparian areas would not be open to livestock grazing, per the proposed management action selected in the Final Gila Box Management Plan (BLM 1998). The Musnicki, Schock, Feulner, Freeland, Butler-Borg, Norton, Clyne I, and Clyne II properties, and portions of the Amado and Curtis properties outside the riparian areas would be open to grazing.

For site security and safety reasons and to keep cattle away from operations, PDSI plans to fence a portion of the selected lands around the Project as needed (Figure 4-1). PDSI has indicated that it would lease the selected lands and range improvements outside the security fence to the current allottees for continued grazing use as long as the property is not needed for development of the Dos Pobres sulfide and at Lone Star deposits. Because only a portion of the selected lands would be removed from grazing use by the Project, impacts on grazing are not commensurate with the reduction in BLM-administered land in each allotment. Impacts to BLM grazing income, however, are commensurate with the amount of BLM land removed from each allotment, because revenues generated by grazing leases for those lands would now be paid to PD rather than to BLM.

Table 4-28. Impacts to Six BLM Grazing Allotments as a Result of the Land Exchange Alternative

Allotment	BLM Land in Allotment Exchanged to PD (acres)	Corresponding reduction in BLM AUMs	Corresponding Reduction in BLM grazing receipts at $1.35/AUM ($/yr)
Bryce	1,723	45	$61
Talley Wash	4,338	57	$77
Rest Haven	232	0	$0
Lone Star	5,720	189	$255
Johnny Creek	4,229	325	$439
Bonita Creek	124	16	$22
TOTAL	**16,366**	**632**	**$854**

Data source: C. Templin, BLM, Safford Field Office

Impacts to grazing as a result of the foreseeable uses include the impacts described under the Proposed Action alternative in the Mine Plan Alternatives Set, as well as anticipated reductions in the Bryce, Talley Wash, Johnny Creek, Lone Star, and possibly Bonita Creek allotments from future possible mining at the Dos Pobres sulfide and Lone Star projects as summarized in Table 4-29. The data in this table are based on the acreage of each allotment within the three foreseeable use categories and do not consider the security fence that PDSI plans to install around the Project. No adjustment has been made to the acreage for percent disturbance associated with each foreseeable use category.

Table 4-29. Impacts from Foreseeable Uses for the Potential Dos Pobres Sulfide (DPS) and Lone Star (LS) Projects on Six Grazing Allotments in the Safford Field Office

	Production Operations & Support Use Areas (ac)		Transitional Use Areas (ac)			
Allotment	*DPS*	*LS*	*DPS*	*LS*	Intermittent Use Area (ac)	TOTAL (ac)
Bryce	1,975	0	331	0	4,710	7,016
Talley Wash	1,363	0	227	0	5,580	7,170
Rest Haven	0	0	0	0	232	232
Lone Star	0	3,817	0	325	10,408	14,550

Johnny Creek	118	2,014	63	198	4,452	6,845
Bonita Creek	0	0	0	0	124	124
TOTAL	**3,456**	**5,831**	**621**	**523**	**25,506**	**35,937**

4.4.1.4.2 No Land Exchange Alternative. While this alternative would not, in itself, affect the current use of the project area or the offered lands for grazing. The six allotments in the project area would continue to be grazed at their current stocking rates; PD would likely continue to lease all the offered lands, except Tavasci Marsh, for grazing use. The Amado and Curtis properties, continuing as private inholdings in the Gila Box RNCA, would not be subject to the grazing limitations in the Final Gila Box Plan (BLM 1998); however, vehicle access to these properties for continued grazing use may be reduced as a result of other BLM management actions (ibid.).

4.4.1.5 Mineral Rights

4.4.1.5.1 Land Exchange Alternative

< **Selected Lands.** As a result of this alternative, PD would own the selected lands and the mineral rights to those lands. No impact to third-party mineral rights is expected to result from the exchange, which is subject to the existing mineral claims on the selected lands per the Agreement to Initiate (ATI) a Land Exchange (BLM 1994b).

No impacts to mineral rights are expected as a result of the potential foreseeable mining uses of the Dos Pobres sulfide and Lone Star area as those areas contain no third-party mining claims.

< **Offered Lands.** Under this alternative, the following properties totaling 2,299 acres would be closed to mineral entry: all but 80 acres of Curtis and all of Amado, Schock, Feulner, Tavasci Marsh, Clyne I, and Clyne II. A total of 1,568 acres composed of the 80-acre portion of Curtis and all of Musnicki, Freeland, Butler-Borg, and Norton properties would be open to mineral entry per the Safford District RMP. It should be noted that the metallic mineral potential of the offered lands is low, except for sand and gravel and/or geothermal on some properties (see Tables 3-27, 3-29, 3-31, 3-33, 3-35, 3-37, 3-39, 3-41, 3-42, 3-44).

4.4.1.5.2 No Land Exchange Alternative. This alternative would not affect PD's or third-party mineral rights on the selected lands or on the offered lands. PDSI would retain the ability to develop its existing mineral claims on the selected lands through a BLM-approved mining plan of operations, assuming all other environmental permits were secured. Thus, the selection of this alternative, in light of the submitted MPO as the Proposed Action, would result in BLM-authorization of the proposed mining of the project area if all permitting requirements are met.

4.4.1.6 Surface Water Rights

4.4.1.6.1 Land Exchange Alternative

< **Selected Lands.** Under this alternative, the surface water rights would remain appurtenant to the selected lands and would pass to PD unless reserved, severed, and transferred elsewhere by BLM or other holders. For surface water rights registered to BLM or PD, however, BLM and PD have agreed to mutually swap these rights associated with the selected and offered lands under this alternative. BLM would relinquish to PD 11 surface water rights totaling 9.06 af/yr that it has registered with ADWR for the selected lands (refer to Table 3-6), including water rights whose place of use lies within the footprints of the foreseeable uses at the potential Dos Pobres sulfide and Lone Star projects. Although the exchange as a whole represents a significant net gain in BLM water rights (see below), BLM would sustain a net loss of about 8 af/yr of BLM-owned water rights within the Gila River watershed itself (BLM acquires 1 af/yr on the Amado property and loses 9.06 af/yr on the selected lands). However, no real impact to Gila River flows is expected as a result of the net loss in water rights as the exchange affects only ownership of the right and not its current designated use.

However, the foreseeable mining uses associated with the Dos Pobres/San Juan Project would physically impact 21 surface water rights that lie within the Project boundary fence; these impacts have been accounted for in the calculation of impacts to surface water quantity expected as a result of the Proposed Action alternative. Foreseeable mining uses within Production Operations and Support areas and Transitional Use areas identified for potential mining at Dos Pobres sulfide and Lone Star would impact four surface water rights totaling 5.75 af/yr on the selected lands.

< **Offered Lands.** Under this alternative, BLM would acquire eight surface water rights appurtenant to the offered parcels totaling 830.17 af/yr, as identified in Table 4-30. This would represent a net gain for BLM of 821.11 af/yr, or roughly 90 times the surface water rights exchanged to PD on the selected lands. The vast majority of the surface water provided to BLM under these water rights (806.5 af/yr or about 97 percent of the total) is appurtenant to Shea Spring, the primary water source for Tavasci Marsh.

4.4.1.6.2 No Land Exchange Alternative. This alternative would not affect surface water rights, either physically or legally. All current holders of registered water rights to the project area and to the Gila River or to the offered lands would continue to hold and exercise their surface water rights. However, as mining in the project area would likely be implemented as a result of PD submitting their MPO (Proposed Action) to BLM, impacts to surface water rights identical to those described under the Proposed Action alternative would be expected to occur.

4.4.1.7 Blasting Noise and Vibrations

4.4.1.7.1 Land Exchange Alternative

< **Selected Lands.** While the exchange itself does not propose blasting and therefore would have no impacts from noise and vibrations associated with blasting, the foreseeable uses of the selected lands associated with the Dos Pobres San Juan Project would result in noise and vibrational impacts identical to those described in Section 4.3.1.7.1 for the Proposed Action alternative. Although no specific blasting activities have been proposed for the potential foreseeable mining uses of the Dos Pobres sulfide or the Lone Star area, it is expected that the noise and vibrations associated with future blasting that could be heard or felt at Mt. Graham or in Safford would be similar in magnitude to those of the Proposed Action alternative. These would probably occur during the latter period of the Dos Pobres/San Juan Project, when blasting at the Dos Pobres Mine has stopped. Therefore,

depending on the timing of these projects, the total number of daily blasts on the selected lands could increase or decrease slightly.

Table 4-30. Surface Water Rights on the Offered Lands That Would Be Acquired by BLM

Offered Property	Registration Number	Place of Use	Holder	Water Source	Specified Use[1]	Quantity[2]
Base Package						
Amado	4A-0004782 0001	T5S R27E Sec 10 SW NE	PD Corporation	Bonita Creek	S	1.00 af/yr
		T5S R27E Sec 3 NE SW				
Musnicki	36-0065222	T14S R28E Sec 9 SE SE[3]	PD Corporation	Ninemile Creek	I, D, S	15.00 af/yr
Feulner	36-0064893	T18S R18W Sec 5 NW SE	PD Corporation	Upper Coyote Spring	S	3.00 af/yr
Optional Package						
Tavasci Marsh	36-0025460	T16N R3E Sec 15 NE SW[4]	PD Corporation	Shea Spring	I, W	806.50 af/yr
Norton	36-0002041	T5S R23E Sec 30 NE NE	PD Corporation	Black Rock Wash	S, W	0.30 af/yr
Clyne I	36-0019771 0001	T19S R18E Sec 10 NE SW	PD Corporation	Bear Spring Canyon	S	2.00 af/yr
Clyne II	33-0030167 0001	T19S R18E Sec 21 SW NE SE	PD Corporation	Mud Spring	W	0.37 af/yr
	36-0029484 0001	T19S R18E Sec 22 NE NW	PD Corporation	Mud Springs Canyon	S	2.00 af/yr
					TOTAL	**830.17 af/yr**

[1] Specified Use: A=Irrigation, C=Commercial, D=Domestic, I=Industrial, M=Municipal, S= Stock, W= Wildlife, X=Mining.

[2] af/yr = acre-feet per year. 1 acre-foot = 325,851 gallons.

[3] The legal description of this surface water right is not specific enough to ensure that this right is actually on the Tavasci Marsh property.

[4] Point of diversion (place of use not available). While surface water rights are attached to place of use, and therefore the point of diversion has no effect on water rights, the place of use and point of diversion are often the same, especially for “36-” water rights (ADWR 1995, 1996).

< **Offered Lands.** No blasting noise and vibrational impacts would affect the offered lands under this alternative.

4.4.1.7.2 No Land Exchange Alternative. This alternative does not, in itself, propose any activities that would result in noise or vibrational impacts to either the selected or offered lands. However, as mining is expected to occur under this alternative, noise and vibrational impacts identical to those described for the Proposed Action alternative would be anticipated.

4.4.1.8 Visual Resources

4.4.1.8.1 Land Exchange Alternative

< **Selected Lands**. Under this alternative, BLM's VRM class objectives would not apply to mining activities on private lands. The exchange itself would not impact visual resources of the selected lands; however, the foreseeable uses of the selected lands would modify the landscape to a considerable extent. The uses associated with the Dos Pobres/San Juan Project would result in impacts identical to those described under the Proposed Action alternative, and potential development of the Dos Pobres sulfide and Lone Star projects would amplify and extend those impacts. Developing the Dos Pobres sulfide orebody would mean continuing traditional open pit mining, continuing to process ore with the SX/EW method, and expanding the mine-for-leach pit at Dos Pobres. Conventional concentrating processes would be used as well. These processes require a primary crusher, a semi-autogenous (SAG) mill (composed of ball mills and flotation trains), and storage of concentrate, and they create tailings. Mining the Lone Star oxide orebody would likely involve the same SX/EW process as the proposed for the Dos Pobres/San Juan Project, including creation of a leach pad and development rock stockpiles.

These foreseeable mining uses would alter the landscape of the Gila Mountains and its southern flank, affecting the silhouette of Lone Star Mountain. Contrasting light colors from the tailings and unnaturally regular horizontal and diagonal lines associated with a tailings impoundment and processing facilities are likely to be visible from many points in the Safford Valley. The massing effect of the three mines across the base of the Gila Mountains would create a zone below the horizon of large-scale, mesa-like or terrace-like forms, with various structures, roads, and contrasting colors visible.

< **Offered Lands.** The visual resources of the offered lands would become a resource managed by the BLM (or by NPS for Tavasci Marsh) under the land exchange alternative. The visual resources of the Tavasci Marsh, Amado, and all but 80 acres of the Curtis property would be managed to preserve the existing character of the landscape. The visual resources of the 80-acre portion of Curtis, Musnicki, Schock, Feulner, West Freeland, Butler-Borg, Clyne I, and Clyne II properties would be managed to partially retain the existing landscape character; the visual resources of the Norton, North Freeland, and East Freeland properties would be managed to provide for major modification of the existing character of the landscape.

4.4.1.8.2 No Land Exchange Alternative. This alternative, in and of itself, would not affect visual resources management in the project area. BLM would continue to manage public lands in the project area per the applicable visual resource management objectives. However, in light of the Proposed Action alternative and BLM's requirements under 43 CFR § 3809, the mining that is expected to occur under this alternative would likely result in visual resource impacts identical to those described under the Proposed Action alternative. Visual resources on the offered lands would be subject to management by PD; VRM classifications of adjacent or nearby public lands would not apply.

4.4.1.9 Hazardous Materials

4.4.1.9.1 Land Exchange Alternative

< **Selected Lands.** Per the Resource Conservation and Recovery Act of 1976 and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, BLM required a Phase I Environmental Assessment of the selected lands and offered lands. Under this alternative, an unquantified portion of the San Juan zipACIDS site which lies on BLM selected lands would be exchanged to PD (Zenitech 1998a). PD is aware of this disclosure, would accept the liability associated with acquiring this portion of the selected lands, and has already initiated clean-up activities at the San Juan zipACIDS site, including the portion that lies on the selected lands. The foreseeable mining uses of the selected lands would eliminate the San Juan site as the mine is developed. As discussed under Section 4.3.1.9.1, the potential risk for impacts from a release of hazardous materials would be increased due to the transport, use, and storage of such materials on the mine site; however, PDSI's Spill Containment and Pollution Prevention Plan and use of BADCT design standards should minimize that potential. Prior to the land exchange (if it is authorized), information about use of the selected lands will be updated to ensure that no hazardous materials have been introduced since the original assessment.

< **Offered Lands.** There are no known hazardous materials sites on the offered lands, and acquisition of the eleven offered properties would bring no known hazardous materials sites into public ownership (Zenitech 1998b). Prior to the land exchange (if it is authorized), information about land use of the offered properties will be updated to ensure that no hazardous materials have been introduced since the original assessment.

4.4.1.9.2 No Land Exchange Alternative. This alternative, in and of itself, would not affect hazardous materials and neither increase nor decrease the BLM's liabilities for hazardous materials sites on public lands. However, given that mining would likely occur on portions of the selected lands, impacts identical to those described under the Proposed Action for hazardous materials are anticipated. This alternative would have no effect on the offered lands.

4.4.2 Physical Resources, Including Waters of the U.S.

4.4.2.1 Climate

4.4.2.1.1 Land Exchange Alternative

< **Selected Lands.** The land exchange alternative itself would not physically affect climate, either directly or indirectly. Potential impacts to climate, if any, would result solely from foreseeable mining uses of the selected lands, as described in Section 4.3.2.1.1 in the Mine Plan Alternatives Set. Based on the conceptual foreseeable uses described for the potential Lone Star and Dos Pobres sulfide projects, on-site wind patterns on the selected lands would likely change as a result of large-scale changes in topography from construction of mine facilities such as open pits or cuts, leach pads, and development rock stockpiles. These impacts, if they occur, would likely be long term but localized.

< **Offered Lands.** Neither the exchange itself nor the foreseeable uses of the offered lands is expected to affect local or regional climate.

4.4.2.1.2 No Land Exchange Alternative. This alternative would have no impact to existing climate of either the selected or offered lands. The anticipated mining activities that would likely occur on portions of the selected lands would result in impacts to local wind patterns identical to those described under the Proposed Action alternative.

4.4.2.2 Air Quality (Criteria Air Pollutants and Class I Airsheds)

4.4.2.2.1 Land Exchange Alternative

< **Selected Lands.** The land exchange *per se* would not generate any criteria air pollutants or affect Class I airsheds within 100 kilometers of the selected lands. However, the proposed foreseeable uses of the selected lands include mining construction and operational activities that would generate emissions subject to Clean Air Act requirements.

The potential impacts to criteria pollutants and to Class I airsheds for the specific foreseeable uses proposed at the Dos Pobres/San Juan Project are described in Section 4.3.2.2.1. Although only conceptual plans are known at this time for the foreseeable uses at the Dos Pobres sulfide project, the anticipated activities that involve traditional ore concentrating methods (i.e., tailings, concentrator) may result in emissions of criteria pollutants that would classify the project as a major new source, thereby requiring compliance with a Class I air quality permit, regardless of private land status. Compliance would mandate no exceedances of air quality standards; however, an increase in ambient concentrations of criteria pollutants such as PM_{10} would likely result. The potential foreseeable uses at the Lone Star project, however, would probably be similar in types of emissions to the Dos Pobres/San Juan Project, which has been classified as a minor source requiring a Class II air quality permit (Class One Technical Services 1997). ADEQ's source determination for these potential projects, if implemented, would be based on the level of point source emissions for all regulated pollutants, as defined by ADEQ. For major sources only, ADEQ requires an air quality impact analysis on Class I airsheds located within 100 kilometers of the process boundary (ibid.).

< **Offered Lands.** Neither the land exchange nor the foreseeable uses of the offered lands would generate criteria air pollutants subject to Clean Air Act requirements. No impacts on Class I airsheds are expected from the federal acquisition or foreseeable uses of the offered lands.

4.4.2.2.2 No Land Exchange Alternative. This alternative, in and of itself, would not change existing conditions for air quality, criteria pollutants, or Class I airsheds on either the selected or offered lands. However, as mining would likely occur, the impacts to air quality, criteria pollutants, and Class I airsheds as described under the Proposed Action would be expected.

4.4.2.3 Geology

4.4.2.3.1 Land Exchange Alternative. The primary geological resource of concern to this analysis is the economic mineral potential of the exchange lands.

< **Selected Lands.** The mineral potential of the selected lands has been included in the appraised value of the selected lands. While the economic mineral potential would not be directly or indirectly affected by the exchange itself, the foreseeable uses of the selected lands involve mining of the metallic mineral deposits (copper) found therein as well as on-site use of common variety minerals such as sand, gravel, decomposed granite, aggregate, and rock suitable for riprap. Thus, the metallic and common-variety mineral potential of portions of the selected lands would be largely reduced as the foreseeable uses are implemented as described in Section 4.3.2.3.1. The long-range foreseeable uses at the potential Dos Pobres sulfide and Lone Star projects would likely include use of common variety minerals that may occur within Intermittent Use areas of the selected lands as part of construction and mine development activities for those projects; the sulfide and oxide orebodies associated with these potential projects are located on existing PD private lands.

< **Offered Lands.** If acquired into public ownership, five of the offered properties, or portions thereof, would be open to mineral entry under this alternative. The properties that would be open to mineral entry are Musnicki, Freeland, Butler-Borg, Norton, and 80 acres of Curtis that lie outside of the Gila Box RNCA boundary. Of these properties, all have low mineral potential for coal, oil, gas, sodium, potassium, uranium, thorium, geothermal resources, metallic minerals, non-metallic and industrial minerals, and common variety minerals, with the following exceptions: Freeland and Butler-Borg were classified as having moderate mineral potential for common variety minerals and Norton was evaluated as having moderate mineral potential for geothermal resources. For the six properties with low economic mineral potential, it is unlikely that mining claims would be filed for their mineral resources; the mineral resources of the Freeland, Butler-Borg, and Norton properties could become encumbered under the General Mining Law of 1872, FLPMA, and other public lands mineral regulations. The Tavasci Marsh, Amado, Schock, Feulner, Clyne I, and Clyne II properties and all but 80 acres of the Curtis property would be closed to mineral entry.

4.4.2.3.2 No Land Exchange Alternative. This alternative would not affect existing mineral resources in the selected lands or on the offered lands. The mineral resources on the selected lands would still be controlled by PD through their mining claims, and through submittal of their MPO (the Proposed Action), are expected to be developed as described under the Proposed Action alternative. As private lands, the offered lands mineral resources could be developed without federal oversight to the degree that such activities are allowed without a federal permit.

4.4.2.4 Soils

4.4.2.4.1 Land Exchange Alternative

< **Selected Lands.** The land exchange itself would not affect soils; however, the foreseeable mining uses of the selected lands would. These effects for the Dos Pobres/San Juan Project are described in Section 4.3.2.4.1. For the selected lands identified for Production Operations and Support and Transitional Uses for the potential Dos Pobres sulfide and Lone Star projects, the area's low productivity soils would be similarly disturbed by expansion of the Dos Pobres pit and mining of the Lone Star pit, construction of new or expanded leach pad areas, and construction of new mining support facilities like a tailings impoundment, a concentrator, and new roads and stormwater management facilities. Some stockpiling of soils for reclamation uses would be anticipated and on-site erosion would be controlled in a manner consistent with safety and operational requirements.

< **Offered Lands.** This alternative is not expected to directly affect the soil resources of the offered lands. BLM erosion control practices may be implemented on an as-needed basis for properties or portions thereof in which soil erosion may be affecting public access, public safety, or other natural resources.

4.4.2.4.2 No Land Exchange Alternative. The soils of the selected lands and of the offered lands would not be impacted by this alternative, in and of itself. However, soils impacts as described by the Proposed Action would be expected as a result of BLM's subsequent authorization of a mine plan.

4.4.2.5 Groundwater

4.4.2.5.1 Groundwater Quantity

< **Land Exchange Alternative**

C **Selected Lands.** The land exchange itself would not impact groundwater quantity. Based on the hydrogeologic model prepared for the Project, the foreseeable uses of the selected lands as described by the Proposed Action would result in impacts to groundwater quantity as discussed in Section 4.3.2.5.1. As BLM oversight for mining would be removed under this alternative, federal oversight to ensure mitigation for these impacts as described in Appendix F would be included in the COE's 404 permit. Anticipated impacts include creation of a cone of depression emanating outward from the production well field and from the Dos Pobres and San Juan pits that reflects a long-term reduction of the volcanic aquifer's groundwater surface elevation. Although PD does not yet know the water source for these possible future projects, it is assumed for the purposes of this analysis that the same aquifer for the Dos Pobres/San Juan Project would also be used to supply process and make-up water for the potential Production Operations and Support uses at the Dos Pobres sulfide and Lone Star projects; the pumpage necessary for these potential projects, however, has not been quantified. Continued pumping of the volcanic aquifer would extend and increase the long-term impacts to groundwater quantity beyond those predicted for the Dos Pobres/ San Juan Project, but at this time, it is not possible to quantify the amount or temporal extent of the additional anticipated impacts. As implementation of these foreseeable uses on private lands in the future would still require compliance with Section 404 permit requirements, the extent of these impacts to the regional groundwater system would be evaluated by the COE under a separate NEPA analysis at that time.

C **Offered Lands.** The Land Exchange alternative is not anticipated to impact regional groundwater systems of the offered lands.

< **No Land Exchange Alternative.** Retaining the selected lands in public ownership would not affect the existing regional groundwater system. However, groundwater impacts from mining as described in the Proposed Action are expected with BLM's subsequent authorization of a mine plan alternative. Groundwater quantity on the offered lands would also remain the same as the existing conditions

4.4.2.5.2 Groundwater Quality

< **Land Exchange Alternative**

C **Selected Lands.** The land exchange is not expected to impact groundwater quality either directly or indirectly. The foreseeable uses, however, involve mining activities and production facilities that are subject to regulation under the State of Arizona's APP Program administered by ADEQ. Based on APP requirements, mining activities under the Dos Pobres/San Juan Project (Proposed Action alternative) are not expected to cause an exceedance of numeric aquifer water quality standards at or beyond the proposed points of compliance that are identified in PDSI's APP application. Use of liner systems for the leach pad, excess process solution impoundment, and stormwater impoundment; stormwater impoundment sized for the 100-year/24-hour storm event and 24-hour power outage; double containment systems for the SX/EW tankhouse facilities; and other environmental protection measures are applications of best available demonstrated control technologies (BADCT) used in the Project to maximize protection of groundwater quality.

The potential future foreseeable uses at the Dos Pobres sulfide and Lone Star projects would also be subject to APP requirements for groundwater protection; therefore, no exceedances of state numeric aquifer water quality standards at or beyond the proposed points of compliance would be expected.

C **Offered Lands.** The land exchange is not anticipated to affect the regional groundwater quality of the offered lands.

< **No Land Exchange Alternative.** The No Land Exchange alternative, in and of itself, would not impact existing groundwater quality of either the selected or the offered lands. However, impacts to groundwater quality identical to those described for the Proposed Action are expected as a result of the subsequent authorization of a mine plan alternative.

4.4.2.6 Surface Water

4.4.2.6.1 Surface Water Quantity

< **Land Exchange Alternative**

C **Selected Lands.** The land exchange would not impact surface water quantity of the selected lands either directly or indirectly. The foreseeable mining uses of the selected lands are predicted to result in the surface water quantity impacts discussed under the Proposed Action alternative in Section 4.3.2.6.1 in the Mine Plan Alternatives Set. These long-term impacts include a maximum predicted impact to Gila River flows of about 149 af/yr at Year 450 as a result of the effects of groundwater pumping, the pit lake effect, and the permanent retention of surface waters (for stormwater management) that are tributary to the Gila River (URS 2002a). Predicted impacts would be mitigated as described in Section 4.3.2.6.1.

For the foreseeable uses at Dos Pobres sulfide and Lone Star, it is anticipated that surface water flows in Production Operations and Support Areas would be retained on-site as part of a stormwater management program yet to be developed. Surface flows in the Gila River may also be captured as a result of the effects of continued groundwater pumping for the two potential projects. No quantification has been made of these potential, long-term impacts to surface flows to the Gila River and its tributaries.

For the foreseeable uses at the Dos Pobres/San Juan Project, the groundwater model predicts impacts to flows in Bonita Creek to be nearly zero (URS 2002a). However, as these future potential projects would be subject to federal permitting under Section 404 of the CWA by COE, such impacts would be quantified and evaluated under a separate NEPA analysis prepared if and when those projects are proposed.

C **Offered Lands.** The surface flows of drainages on the offered lands would not be impacted by the land exchange.

< **No Land Exchange Alternative.** This alternative, in and of itself, would not affect existing surface water quantity on either the selected or the offered lands. However, surface water quantity impacts resulting from the subsequent authorization of a mine plan would be expected and would be identical to those described for the Proposed Action alternative.

4.4.2.6.2 Surface Water Quality

< **Land Exchange Alternative**

C **Selected Lands.** The land exchange itself would not impact surface water quality of the selected lands. Implementation of the foreseeable uses for the Dos Pobres/San Juan Project includes measures in compliance with Sections, 401, 402, and 404 of the CWA to protect surface water quality. Stormwater that comes into contact with mine facilities is not expected to leave the mine site and facilities have been designed to entrain stormwater that falls on-site within the mines' process and make-up water systems. Foreseeable Production Operations and Support Uses at the potential Dos Pobres sulfide and Lone Star projects would also be subject to Sections 401 (State Water Quality Certificaiton), 402 (AZPDES), and 404 (Dredge and Fill) permit requirements that would assist in protecting quality of surface waters off the mine site.

The sediment transport characteristics of drainages in the Dos Pobres/San Juan Project altered for stormwater management would change as described in Section 4.3.2.6.2. For the Dos Pobres sulfide and Lone Star projects, foreseeable uses in Production Operations and Support Areas and in Transitional Areas, it is anticipated that additional drainages within the selected lands would be altered as part of stormwater management activities for those future potential projects. Therefore, sediment transport characteristics would also be expected in diverted and recipient drainages, although the extent of those impacts cannot be quantified at this time.

- **Offered Lands.** No impacts to the surface water quality of the offered lands are anticipated as result of the land exchange. Public management of the Tavasci Marsh property and the Curtis and Amado properties on Bonita Creek would continue to maintain the existing water quality of the aquatic habitats on those lands.

< **No Land Exchange Alternative.** This alternative, in itself, would not affect existing surface water quality of either the project area or of the offered lands. However, the subsequent mining that would occur resulting from BLM's selection of a mine plan alternative would result in impacts identical to those described for the Proposed Action alternative.

4.4.2.6.3 Pit Lakes

< **Land Exchange Alternative**

- **Selected Lands.** The land exchange itself would not directly or indirectly result in creation of pit lakes. The foreseeable mining at the Dos Pobres/San Juan Project would result in formation of permanent pit lakes at the Dos Pobres and San Juan pits as described in Section 4.3.2.6.3. Implementation of the foreseeable uses at the possible Lone Star project would also create a pit lake whose water chemistry and ultimate size/depth cannot be determined at this time. If the foreseeable uses at the Dos Pobres sulfide project are implemented, the Dos Pobres pit would be expanded to mine the sulfide ores. The Dos Pobres pit lake under this alternative would be expected to form sometime after completion of the potential Dos Pobres sulfide project. No projections have been made as to the water chemistry and ultimate size/depth of pit lake formed after the Dos Pobres sulfide project; however, because the foreseeable uses at the Dos Pobres sulfide and Lone Star projects would be subject to CWA Sections 401, 402, and 404 permitting in the future, the potential pit lake impacts would be characterized, quantified, and evaluated at that time.

- **Offered Lands.** None of the foreseeable uses of the offered lands would result in creation of a pit lake.

< **No Land Exchange Alternative.** Under this alternative, the existing water quality of the San Juan pit lake would not change and no pit lake would be expected at Dos Pobres since no further development of that orebody would occur. However, in selecting this alternative, BLM would have to make a subsequent decision regarding one of the mine plan alternatives, therefore, the pit lake impacts described under the Proposed Action alternative would be expected to occur.

4.4.2.6.4 100-year Floodplains

< **Land Exchange Alternative**

- **Selected Lands.** Under this alternative, PD would manage some lands within the FEMA-designated 100-yr floodplain of the Gila River. No other direct or indirect impacts to 100-yr floodplains in the vicinity of the project area are expected. The anticipated changes in the hydrologic regimes of several washes on the portions of the selected lands affected by the

foreseeable uses at the Dos Pobres/San Juan Project are also not expected to impact 100-yr floodplains (see Section 4.3.2.6.4). Implementation of foreseeable uses at the potential Dos Pobres sulfide and Lone Star projects would also be expected to change the hydrologic regimes of washes directly or indirectly affected by stormwater management operations. At this time, however, no specific facilities have been designed and it is not possible to evaluate the extent of these impacts, if any, on 100-yr floodplains in the project vicinity. Given the distance of these potential impacts from the Gila River and the Graham County landfill, it is likely that washes with increased flows would recover from the increased effects of scour some distance upstream of the 100-yr floodplain boundaries of the Gila River. Therefore, no changes to 100-yr floodplains delineated by FEMA are expected.

- **Offered Lands.** The 100-yr floodplains on the offered lands would come under BLM management and protection. The land exchange would have no other direct or indirect impacts on 100-yr floodplains of drainages near the offered lands.

< **No Land Exchange Alternative.** This alternative, in itself, would not change the hydrologic regimes of washes or the 100-year floodplain of the Gila River, nor would the Graham County landfill near the confluence of Cottonwood and Peterson Washes be affected under this alternative. However, as selection of this alternative requires BLM to select a mine plan alternative, impacts to 100-yr floodplains identical to those described under the Proposed Action would be expected to occur.

4.4.2.6.5 Waters of the U.S.

< **Land Exchange Alternative**

- **Selected Lands.** The land exchange would not directly or indirectly affect waters of the U.S., as the COE's jurisdiction of WUS extends to both private and public lands. However, the foreseeable uses of portions of the selected lands for the Dos Pobres/San Juan Project would result in the impacts described in Section 4.3.2.6.5. The foreseeable Production Operations and Support Uses, Transitional Uses, and Intermittent Uses of the remainder of the selected lands for the Dos Pobres sulfide and Lone Star projects would also impact waters of the U.S., although no formal delineation has been completed for these areas so no estimate of potential acres of impact can be calculated. As these two potential projects on the selected lands would still be subject to federal permitting under the CWA if PD acquires the land, the impacts to waters of the U.S. would be determined at the time PDSI applies for CWA Section 404 permit from the COE.
- **Offered Lands.** No potential waters of the U.S. on the offered lands would be affected by the land exchange. Any potential BLM activities that would impact waters of the U.S. would be subject to CWA Section 404 compliance with the COE.

< **No Land Exchange Alternative.** This alternative in itself would not result in impacts to waters of the U.S.; however, impacts from mining that are expected occur under this alternative would be identical to those described for the Proposed Action alternative.

4.4.3 Biological Resources

4.4.3.1 Vegetation

4.4.3.1.1 Land Exchange Alternative

< **Selected Lands.** The proposed land exchange, *per se*, would not physically impact vegetation on the selected lands. However, foreseeable uses of the traded selected lands are expected to physically impact vegetation. Direct effects of the Dos Pobres/San Juan Project on vegetation communities are described in detail under the impact assessment for the Proposed Action alternative. Activity related to the more distant Dos Pobres sulfide and Lone Star projects is expected to impact four vegetation community types (Sonoran Desertscrub, Semidesert Grassland, Sonoran Desertscrub-Semidesert Grassland Ecotone, and Disturbed Land—see Table 4-31), which would now be subject to private management under PD ownership. The total acreage impacted in each habitat community in Table 4-31 reflects the varying 5 to 100 percent disturbance assumptions for each foreseeable use category as identified at the beginning of this chapter. These acreages are rough approximations based on generalized footprints of the Dos Pobres sulfide and Lone Star projects depicted in Figure 2-23.

Table 4-31. Acres of Vegetation Communities Impacted on the Selected Lands by Foreseeable Use Category

		Dos Pobres Sulfide (DPS) / Lone Star (LS) Projects			
Vegetation Community Type	**Dos Pobres/San Juan Project (Proposed Action) Area Impacted (100%)**	**Production Operations and Support Areas Impacted (100%)**	**Transitional Use Areas Impacted (25%)**	**Intermittent Use Areas Impacted (5%)**	**TOTAL IMPACTED AREA (acres)**
Sonoran Desertscrub	527	221	19	731	1,498
Semidesert Grassland	0	506	29	150	685
Sonoran Desertscrub-Semidesert Grassland	1,220	997	41	409	2,667
Disturbed	184	0	1	24	209
TOTAL	**1,931**	**1,724**	**90**	**1,314**	**5,059**

< **Offered Lands.** Federal acquisition of the 11 offered properties would bring a wide range of desirable vegetation resources into public ownership and under the management of the BLM and the NPS. These resources include perennial water and associated riparian/wetland habitats on the Amado, Curtis, Clyne II, and Tavasci Marsh properties, as described in Chapter 3; xeroriparian habitat on all the properties; and upland habitats consisting of Sonoran Desertscrub, Semidesert Grassland, Oak

Woodland, and Crucifixion Thorn-Juniper-Creosotebush Association. Together, these vegetation communities provide habitats for diverse wildlife, contribute visual character and variety to the landscape, and offer dispersed recreational opportunities to the public.

4.4.3.1.2 No Land Exchange Alternative. Under this alternative, BLM would not dispose of the vegetation habitats on the selected lands nor acquire and manage the riparian/wetland, xeroriparian, and upland habitats of the 11 offered properties. In the short term, this alternative would result in no impacts to vegetation resources on either selected or offered lands. Over the long term, however, because PDSI has submitted an MPO to the BLM, it is reasonable to assume that mining activities would proceed on portions of the selected lands, and impacts of that mining are likely to be the same as those described under the Proposed Action alternative.

4.4.3.2 Wildlife Resources

4.4.3.2.1 Land Exchange Alternative

< **Selected Lands.** All wildlife within the state, regardless of land ownership, is under the jurisdiction of the State of Arizona and managed by the Arizona Game and Fish Department (AGFD) per ARS 17-102. PD ownership of the selected lands would not change this jurisdiction, although private ownership would allow PD to prohibit hunting on the selected lands in AGFD Hunt Unit 28.

In the near future, the impacts to wildlife on the selected lands as result of foreseeable uses would be the same as impacts described under the Proposed Action alternative. In the more distant future, projected potential impacts resulting from the Dos Pobres sulfide and Lone Star projects include loss of habitats and a corresponding impact to two game species as shown in Table 4-32. Figures given for the species are based on AGFD density estimates.

Table 4-32. Estimated Number of Mule Deer and Javelina Impacted by Foreseeable Uses of the Selected Lands

	Total BLM Lands Potentially Impacted		Corresponding Range of Potential Impacts to Mule Deer and Javelina Densities (based on AGFD density estimates)	
Foreseeable Uses	**acres**	**sq mi**	**Mule Deer (4 to 7/sq mi)**	**Javelina (1.5 to 3/sq mi)**
Dos Pobres/San Juan Project (Proposed Action) (100%)	1,931	3.02	12 to 21	5 to 9
Dos Pobres Sulfide/Lone Star Projects				
Production Operations & Support Use Areas (100%)	1,724	2.69	11 to 19	4 to 8
Transitional Use Areas (25%)	90	.14	< 1 to 1	<1
Intermittent Use Areas (5%)	1,314	2.05	8 to 14	3 to 6
TOTAL	**5,059**	**7.91**	**32 to 55**	**12 to 24**

< **Offered Lands.** Because the diversity of habitats on the offered lands, including some valuable riparian areas, is greater than on the selected lands, diversity of wildlife species on property coming into public ownership would be greater than diversity on property leaving public ownership. Habitats on offered lands include types that may support BLM priority species such as bighorn sheep (in Bonita Creek), black bear, mule deer, quail, dove, javelina, and mountain lion. Though these lands would become federal and be managed by the BLM or the NPS, wildlife itself would remain the property of the state and be under the jurisdiction of the AGFD.

4.4.3.2.2 No Land Exchange Alternative. This alternative would have no immediate effects on wildlife, which would remain under the jurisdiction of the AGFD on both the selected and offered lands. Over the long term, it is reasonable to assume that mining under a BLM-authorized MPO would proceed on portions of the selected lands. Impacts of that mining are likely to be the same as those described under the Proposed Action alternative.

4.4.3.3 Special Interest Species

4.4.3.3.1 Threatened and Endangered Plants

< **Land Exchange Alternative.** The only effect of the proposed land trade on federally listed, proposed, or candidate plant species would be a change in required consultation procedures for proposed actions. Section 9 of the ESA prohibits a person from removing, taking possession of, or maliciously destroying or damaging an endangered plant on areas under federal jurisdiction. These proscriptions do not apply to endangered plants on private or state property that is not subject to federal jurisdiction. Protection of listed plant species on such property is limited to the extent afforded by the pertinent state law—in this case, the Arizona Native Plant Law.

C **Selected Lands.** Under the Land Exchange alternative, the selected lands would become private lands, and activities affecting federally listed, proposed, or candidate plant species occurring on the property would no longer be subject to BLM review or Section 7 consultation by BLM. Under the ESA, in the absence of federal jurisdiction, protection of such species on private lands would be limited to that afforded by the Arizona Native Plant Law, which requires property owners to notify the Arizona Commission of Agriculture and Horticulture of planned clearing activities (except for activities that occur in the normal course of mining, which are exempt from the notification requirement under ARS Ch.7, Article 1, Sec.3-904 [G] 1993). Since it is highly likely, however, that any foreseeable mining uses on the selected lands undertaken by PDSI that would potentially impact an endangered plant would require one or more federal permits (such as a Section 404 permit from the COE), such activities would by subject to Section 7 consultation with USFWS, regardless of private land status.

At this time, no federally listed, proposed, or candidate plant species are known to occur on the selected lands. The BLM undertook a Section 7 consultation with the USFWS for the Arizona hedgehog cactus after a morphologically similar cactus was found in the project area. Consultation was concluded on June 11, 2002, with the issuance of a biological opinion that the Project would not affect the Arizona hedgehog cactus because the hedgehog cacti within the action area are not the listed entity (USFWS 2002).

- **Offered Lands.** No federally listed, proposed, or candidate plant species are known to occur on the offered lands.

< **No Land Exchange Alternative.** In the short term, this alternative would result in no impacts to federally listed, proposed, or candidate plant species on either the selected lands or the offered lands. Over the longer term, it is reasonable to assume that mining activities would proceed on portions of the selected lands. Impacts of that mining are likely to be identical to those described under the Proposed Action alternative. The offered lands would remain under private ownership. Protection afforded any federally listed, proposed, or candidate plant species found on the offered properties would be limited to that provided by the Arizona Native Plant Law, unless a federal jurisdiction (via a permit or other federal action) is involved.

4.4.3.3.2 Threatened and Endangered Animals

< **Land Exchange Alternative.** As with listed plant species, the proposed land trade would affect any federally listed, proposed, or candidate animal species on the selected or offered lands by changing required consultation procedures for proposed actions. However, the change in those procedures would be different for listed animals than for listed plants. Unlike the protection for listed plant species, protection for animal species under Section 9 of the ESA is the same whether the subject land is federal or non-federal. Section 7 of the ESA applies not only to all actions on federal lands but also to federal actions on non-federal lands (such as issuance of a federal permit). The federal agency issuing the permit would have to consult with the USFWS to identify, if possible, ways for the proposed action or an alternative action to proceed without violating Section 9 and jeopardizing the continued existence of the subject species.

- **Selected Lands.** Under this alternative, the selected lands would become the property of PD, and actions potentially affecting federally listed animal species would no longer be subject to BLM review or Section 7 consultation by the BLM. However, any proposed activity requiring a federal permit or other federal action potentially affecting listed animals would be subject to Section 7 consultation by the agency permitting the activity. PDSI has indicated that its foreseeable uses of the selected lands would be mining, and mining would require one or more federal permits, such as a Section 404 permit. These permits, in turn, would require the lead federal agency (i.e., COE) to comply with all applicable provisions of the ESA prior to issuing the permit. Thus, the most likely management effect of the federal lands becoming private would be that one or more federal agencies would still be responsible for protecting listed animal species under Section 7 of the ESA.

  The likely physical effects of the foreseeable uses associated with the Dos Pobres/San Juan Project would be the same as those resulting from the Proposed Action alternative. Section 7 consultation with the USFWS was concluded on June 11, 2002, with the issuance of a biological opinion in which the USFWS concurred that the Project may affect but is not likely to adversely affect the Gila topminnow, razorback sucker, spikedace, and loach minnow, and designated habitat for the razorback sucker, spikedace, and loach minnow. The USFWS also rendered the opinion that the Project, as proposed, is not likely to jeopardize the continued existence of the southwestern willow flycatcher.

Development of the Dos Pobres sulfide and Lone Star deposits could indirectly affect listed, proposed, or candidate animal species with suitable habitat along the Gila River and/or Bonita Creek if stormwater diversions and/or groundwater pumping were to impact flow in either stream. These species are the bald eagle, southwestern willow flycatcher, razorback sucker, spikedace, loach minnow, cactus ferruginous pygmy owl, Gila chub (proposed endangered), and yellow-billed cuckoo (candidate). If the endangered Gila topminnow has not been extirpated from the artesian well in Watson Wash, development of the Dos Pobres sulfide and Lone Star deposits could also indirectly impact that species under the same circumstances. The likelihood and magnitude of potential impacts could only be determined after PDSI developed mine plans for these operations. All potential impacts would have to be mitigated before PDSI could obtain the federal permits required for the project.

C **Offered Lands.** Three federally listed species (southwestern willow flycatcher, Yuma clapper rail, and razorback sucker) are known to occur, and an additional ten listed species may occur, within one or more of the offered lands. A proposed endangered species, Gila chub, is known to inhabit Bonita Creek, which flows through the Amado and Curtis properties, and a candidate species, yellow-billed cuckoo, is known from both Bonita Creek and Tavasci Marsh. These species, and any other federally listed, proposed, or candidate animal species potentially occurring on the offered lands would be affected by the Land Exchange alternative by coming under BLM management (except species on the Tavasci Marsh property, which would come under NPS management). Any action potentially impacting listed animal species would be subject to Section 7 consultation between the managing agency and the USFWS. (Critical habitat is discussed in Section 4.4.3.3.3, below.)

< **No Land Exchange Alternative.** This alternative would result in no immediate direct or indirect impacts to federally listed, proposed, or candidate animal species. Such species on the selected lands would remain under BLM management. Over the longer term, it is reasonable to assume that mining activities would proceed on portions of the selected lands. Impacts of that mining on listed species are likely to be the same as those described under the Proposed Action alternative. Offered lands would remain under private ownership, and any listed animal species on those properties would be protected by provisions of the ESA that pertain to non-federal lands.

4.4.3.3.3 Critical Habitat.

< **Land Exchange Alternative**

C **Selected Lands.** No designated critical habitat would be affected by the proposed land exchange itself. Potential effects of the more immediate foreseeable uses, the Dos Pobres/San Juan Project, are identical to those described under the Proposed Action alternative. Potential effects of the more distant foreseeable uses (development of the Dos Pobres sulfide and Lone Star deposits) cannot be quantified at this time; however, groundwater pumping and stormwater diversion would occur and any potential impacts of those activities on designated critical habitat for the razorback sucker in the Gila River, critical habitat for the spikedace and loach minnow in Bonita Creek, and proposed critical for the Gila chub in Bonita Creek would have to be mitigated before the federal permits required for the project could be issued.

- **Offered Lands.** This alternative would result in federal protection of additional areas of designated critical habitat for four federally listed species and proposed critical habitat for one proposed endangered species. The Amado and Curtis parcels include designated critical habitat for the spikedace and loach minnow, and proposed critical habitat for the Gila chub. Tavasci Marsh includes designated critical habitat for the spikedace, loach minnow, razorback sucker, and southwestern willow flycatcher.

< **No Land Exchange Alternative.** No designated critical habitat would be acquired or impacted by this alternative. Impacts of future BLM-authorized mining on the selected lands would likely be the same as those described under the Proposed Action alternative. No impacts are expected to designated critical habitat for the razorback sucker and the southwestern willow flycatcher in and along the Verde River adjacent to the offered Tavasci Marsh property.

4.4.3.3.4 BLM Sensitive Species

< **Land Exchange Alternative.** One BLM sensitive plant species (Pima Indian mallow) and seven sensitive animal species (California leaf-nosed bat, cave myotis, desert sucker, longfin dace, Sonora sucker, speckled dace, and loggerhead shrike) are known to occur regularly in the project area; fourteen other BLM sensitive species (Arizona giant sedge, big-tailed bat, canyon spotted whiptail, Chiricahua water scavenger beetle, Maricopa tiger beetle. Mexican long-tongued bat, northern gray hawk, pocketed free-tailed bat, three-nerved scurfpea, western burrowing owl, small-footed myotis, long-legged myotis, fringed myotis, and Allen's big-eared bat) may occur.

- **Selected Lands.** If this alternative is implemented, BLM sensitive species on the selected lands would inhabit private property and no longer be subject to the effects of BLM land management actions. Wildlife would remain under the jurisdiction of the AGFD. The known population of Pima Indian-mallow is not expected to be impacted by foreseeable uses of the selected lands because it lies outside the footprints for these projects. Though Pima Indian-mallow plants may be present in other parts of the project area, most of the habitat potentially impacted by mining activities does not appear suitable for this species.

  Foreseeable uses of the selected lands are not expected to adversely impact any special status bat species. Nine know mine features lie within the foreseeable use footprints of the Dos Pobres sulfide and Lone Star projects. Of the four features potentially impacted by the Dos Pobres sulfide project, three are considered unsuitable for bats (Features 15, 16, and 22), and one contained only a single bat, which was observed once in four visits over three years (a Townsend's big-eared bat) (SWCA 1997a). Of the five features potentially impacted by the Lone Star project, two features (7 and 8) are considered unsuitable for bats. Three features (9, 10, and 11) are each considered potentially suitable, but no bats or bat signs were recorded at any of them during three visits over five years (ibid.).

  All foreseeable uses of the selected lands are expected to affect the Gila monster in the same manner as described under the Proposed Action alternative.

- **Offered Lands.** The BLM sensitive species on the offered properties would be affected by implementation of this alternative only to the extent that they would be impacted by BLM land management actions. Wildlife would remain under the jurisdiction of the AGFD.

< **No Land Exchange Alternative.** Initially, BLM sensitive species on the selected lands would not be affected under this alternative. Over the long term, however, mining is likely to proceed on portions of the selected lands, and the resulting impacts are expected to be the same as those described under the Proposed Action alternative. BLM sensitive species on the offered lands would not be affected under this alternative.

4.4.3.4 Biodiversity

4.4.3.4.1 Land Exchange Alternative

< **Selected Lands.** Change in land ownership status of the selected lands would not affect biodiversity. The foreseeable uses would impact biodiversity on only a localized scale, affecting only the property modified by foreseeable uses or possibly adjacent property, depending on the land use. It is not anticipated that biodiversity of the region would be adversely affected by any of the foreseeable uses of the selected lands.

< **Offered Lands.** Federal acquisition and management of the offered lands would neither change nor increase the biodiversity of these properties nor of the regions containing the properties. Consolidation of public land through the exchange is expected to improve the agency's ability to manage the federal lands in the region, which could result in maintaining the current biodiversity of the areas under the current applicable resource management plans.

4.4.3.4.2 No Land Exchange Alternative. In the short term, this alternative would maintain the *status quo* of the subject properties and would have no direct or indirect impacts on biodiversity of either the project area or of the offered lands or the regions that include them. Over the long term, however, it is reasonable to assume that mining activities would proceed on portions of the selected lands; therefore, impacts are expected to be the same as those described under the Proposed Action alternative.

4.4.4 Cultural Resources

4.4.4.1 Historic and Prehistoric Archaeological Resources

4.4.4.1.1 Land Exchange Alternative

< **Selected Lands.** Disposal of the selected lands (currently the BLM-administered lands in the project area) would remove direct federal protection for all 61 archaeological sites located completely or partially on the selected lands. The selected lands would become the private property of PDSI. As such, they would no longer be subject to provisions of the National Historic Preservation Act, as amended (NHPA) and other federal statutes protecting archaeological resources, unless an action on that property were to require federal authorization of some kind (e.g., issuance of a permit under

the CWA by the COE). Also, the Native American Graves Protection and Repatriation Act (NAGPRA) would no longer protect Indian burial sites on the selected lands because it does not apply to private property under any circumstances. Human remains and burial goods that might incidentally be associated with archaeological sites would be subject to Arizona Revised Statute 41-865, which requires private landowners to follow specific notification and treatment procedures when human remains have been encountered on their property.

All 61 archaeological sites in the project area affected by the change in legal jurisdiction resulting from this alternative are listed in Table D-1 in Appendix D. Of these sites, 29 are prehistoric, 18 are historic, 7 are multicomponent, and 7 are of unknown temporal association. Fifty-seven of the 61 have been recommended as eligible for inclusion in the National Register for their scientific values, and four are considered to be ineligible. Before the 61 sites could be removed from public ownership and protection by the proposed land exchange, the scientific information contained in the 57 eligible sites would have to be retrieved through a test and data recovery program approved by the BLM. This program would be considered mitigation for all potential impacts on archaeological sites, including potential subsurface deposits and human burials, of foreseeable mining uses of the selected lands.

The Land Exchange alternative, *per se*, would have no physical impact on the archaeological resources on selected lands. However, the foreseeable mining uses of the selected lands would result in physical impacts to a total of 22 archaeological sites (see Table 4-33). The Dos Pobres/San Juan Project would affect 13 sites, of which 12 are considered eligible for the National Register for their scientific values. The more distant foreseeable uses related to development of the Dos Pobres sulfide and Lone Star orebodies would affect nine sites: six within Production Operations and Support areas and three within the Transitional areas. No sites are expected to be impacted in Intermittent Use areas because sites could be avoided by the types of activities anticipated for this category. Of the nine sites in these foreseeable use areas recommended eligible for the National Register for their scientific values, three are prehistoric, four are historic, one is multicomponent, and one is of unknown temporal association. It should be noted that under this alternative, mitigation (testing and data recovery) for impacts to archaeological resources resulting from the land exchange, i.e., loss of federal protection, would occur prior to any physical disturbance by foreseeable mining uses of the selected lands.

< **Offered Lands.** Under the Land Exchange alternative, the three recorded archaeological sites and several other suspected archaeological site on the offered lands would come under the management of the BLM and be protected by federal legislation such as NHPA and NAGPRA.

4.4.4.1.2 No Land Exchange Alternative. In the short term, this alternative would have no effect on historic and prehistoric archaeological resources on either the selected lands or the offered lands. No property would be exchanged; therefore, archaeological sites on public lands in the project area would continue to be managed by the BLM and be subject to NHPA, NAGPRA, and other relevant federal legislation. Over the long term, however, it is reasonable to assume that mining activities would proceed on portions of the selected lands. In that case, impacts to archaeological sites are expected to be the same as those described under the Proposed Action alternative.

Under the No Land Exchange alternative, archaeological resources on the offered properties would remain in private ownership with no direct protection from federal statutes. Human remains and burial goods that

might incidentally be associated with archaeological sites would continue to be subject to Arizona Revised Statute 41-865, which requires (with certain exemptions) private landowners to follow specific notification and treatment procedures when human remains of any kind have been encountered on their property.

Table 4-33. Archaeological Sites on Selected Lands That Would be Directly Impacted by Foreseeable Uses

	Dos Pobres/San Juan Project*		**Dos Pobres Sulfide and Lone Star Projects***	
Sites Recommended as Eligible for the National Register for their Scientific Values	AZ CC:2:148	AZ CC:2:193	AZ CC:2:146	AZ CC:2:189
	AZ CC:2:149	AZ CC:2:197	AZ CC:2:147	AZ CC:2:190
	AZ CC:2:151	AZ CC:2:204	AZ CC:2:183	AZ CC:2:194
	AZ CC:2:152	AZ CC:2:213	AZ CC:2:184	AZ CC:2:226
	AZ CC:2:191	AZ CC:2:215	AZ CC:2:188	
	AZ CC:2:192	AZ CC:2:225		
Sites Recommended as Ineligible for the National Register	AZ CC:2:206			

Note that AZ CC:2:200, 211, and 234 are excluded here because they have been named as sacred sites and efforts to avoid them are recommended.

4.4.4.2 Traditional Cultural Properties Identified by Indian Tribes

4.4.4.2.1 Land Exchange Alternative

< **Selected Lands.** The land exchange would affect all 43 sites on the selected lands identified by tribes as being traditional cultural properties (Table 4-34). Transferring ownership of the selected lands to PD would remove these sites from the direct federal oversight responsibilities required under NHPA. The transfer of ownership would also eliminate the federal consideration extended by the American Indian Religious Freedom Act (AIRFA) to three of the sites, AZ CC:2:200, 211, and 234, that have been identified by tribes as being sacred. Under AIRFA, allowing access to sacred sites, if so desired by Native Americans, should be a prime consideration of federal land management agencies. Additionally, Executive Order 13007--Indian Sacred Sites, May 24, 1996, states that federal agencies such as BLM must "to the extent practicable and not clearly inconsistent with essential agency functions, accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and avoid adversely affecting the physical integrity of such sacred sites." Under the Land Exchange alternative, access to sites on the selected lands that have been identified by tribes as being traditional cultural properties and/or sacred would be under the control of PDSI.

Under this alternative, 15 of the 43 archaeological sites on the selected lands identified by tribes as traditional cultural properties would be physically impacted by foreseeable mining uses (Table 4-35). Three additional sites, AZ CC:2:200, 211, and 234 had the potential to be impacted, but PDSI has agreed to avoid them because the sites have been identified as sacred places as well as traditional cultural properties. PDSI also has agreed to creage a buffer zone around AZ CC:2:200, construct a fence around AZ CC:2:211, and allow Native Americans access to the sites with sufficient notice.

Table 4-34. Traditional Cultural Properties that Would be Affected by the Loss of Federal Oversight under the Land Exchange Alternative

AZ CC:2:132	AZ CC:2:152	AZ CC:2:193	AZ CC:2:208	AZ CC:2:215	AZ CC:2:222	AZ CC:2:229
AZ CC:2:146	AZ CC:2:153	AZ CC:2:194	AZ CC:2:210	AZ CC:2:217	AZ CC:2:223	AZ CC:2:231
AZ CC:2:147	AZ CC:2:186	AZ CC:2:195	AZ CC:2:211	AZ CC:2:218	AZ CC:2:225	AZ CC:2:233
AZ CC:2:148	AZ CC:2:188	AZ CC:2:196	AZ CC:2:212	AZ CC:2:219	AZ CC:2:226	AZ CC:2:234
AZ CC:2:149	AZ CC:2:191	AZ CC:2:200	AZ CC:2:213	AZ CC:2:220	AZ CC:2:227	AZ CC:2:261
AZ CC:2:151	AZ CC:2:192	AZ CC:2:207	AZ CC:2:214	AZ CC:2:221	AZ CC:2:228	FS 998
						FS 999

Table 4-35. Sites Identified by Indian Tribes as Being Traditional Cultural Properties that Would be Directly Impacted by the Foreseeable Uses of the Selected Lands

Dos Pobres/San Juan Project			Dos Pobres Sulfide/Lone Star Projects	
AZ CC:2:148	AZ CC:2:191	AZ CC:2:215	AZ CC:2:146	AZ CC:2:194
AZ CC:2:149	AZ CC:2:192	AZ CC:2:225	AZ CC:2:147	AZ CC:2:226
AZ CC:2:151	AZ CC:2:193		AZ CC:2:188	
AZ CC:2:152	AZ CC:2:213			

The Dos Pobres/San Juan Project would destroy or damage ten sites on selected lands identified by tribes as traditional cultural properties. The more distant foreseeable uses related to development of the Dos Pobres sulfide and Lone Star orebodies (Production Operations and Support) would likely destroy or damage five such sites. Although sites considered by tribes to be traditional cultural properties are located in the Intermittent Use areas, they would not be impacted because the types of activities anticipated for this category can avoid sites.

< **Offered Lands.** Under the Land Exchange alternative, the known and unknown archaeological resources on the offered lands would come under the protection of federal legislation such as NHPA and NAGPRA. Although none of the 11 tribes consulted identified specific traditional cultural properties on any of the offered lands, the Hopi and Zuni consider all prehistoric archaeological sites within these lands to be traditional cultural properties (SWCA 1998 and 2000). Any traditional cultural properties occurring on the offered properties would benefit from protection under federal land ownership.

4.4.4.2.2 No Land Exchange Alternative. In the short term, sites on the selected lands identified by tribes as traditional cultural properties would not be physically affected by mining. They would remain under BLM management and be subject to consideration under NHPA, AIRFA, and Executive Order 13007, particularly regarding access to sacred sites by Native Americans who wish to visit the sites. Over the long term, however, it is reasonable to assume that mining activities would proceed on portions of the selected lands.

In that case, impacts to sites on the selected lands identified by tribes as traditional cultural properties are expected to be the same as those described under the Proposed Action alternative.

Traditional cultural properties on the offered properties, if any occur, would also be unaffected by this alternative. They would remain in private ownership, outside of federal oversight responsibilities. Treatment of these sites and access to them would be at the discretion of the landowner.

4.4.5 Socioeconomic Resources

4.4.5.1 Population and Demographics

4.4.5.1.1 Land Exchange Alternative

< **Selected Lands.** No impacts to the local Safford population is expected as a result of the exchange. The impacts of the foreseeable mining uses of the selected lands as described in the MPO are presented in Section 4.3.5.1.1 under the Proposed Action alternative. The more distant foreseeable uses related to development of the Dos Pobres sulfide and Lone Star orebodies would affect population size and demographics in the Safford area, but no information is yet available about the scale of the mining operations, so predictions cannot be made regarding the significance of those effects.

< **Offered Lands.** The Land Exchange alternative would not affect local or regional population size or demographics in or near the offered lands.

4.4.5.1.2 No Land Exchange Alternative. The No Land Exchange alternative would not, in and of itself, affect the current population size and demographics in Graham County or in or near the offered lands. However, it is reasonable to expect that mining would take place in the Safford area as BLM must subsequently respond to the mine plan proposal (Proposed Action); therefore, impacts identical to those of the Proposed Action would be expected to occur.

4.4.5.2 Local and Regional Economy

4.4.5.2.1 Employment

< **Land Exchange Alternative**

C **Selected Lands.** No impacts to local or regional economy are expected as a result of the exchange. The impacts on employment of the foreseeable mining uses of the selected lands as described in the MPO are presented in Section 4.3.5.2.1 under the Proposed Action alternative. The more distant foreseeable uses related to development of the Dos Pobres sulfide and Lone Star orebodies would affect employment in the Safford area, but no information is yet available about the scale of the mining operations, so predictions cannot be made regarding the significance of those effects.

- **Offered Lands.** The Land Exchange alternative would not affect local or regional employment in or near the offered lands.

< **No Land Exchange Alternative.** The No Land Exchange alternative would not, in and of itself, affect employment in Graham County or in or near the offered lands. However, it is reasonable to expect that mining would take place in the Safford area as BLM must subsequently respond to the mine plan proposal (Proposed Action); therefore, impacts identical to those of the Proposed Action would be expected to occur.

4.4.5.2.2 Income

< **Land Exchange Alternative**

- **Selected Lands.** The exchange would not affect the per capita income of the residents of Graham County. The impacts on income of the foreseeable mining uses of the selected lands as described in the MPO are presented in Section 4.3.5.2.2 under the Proposed Action alternative. The more distant foreseeable uses related to development of the Dos Pobres sulfide and Lone Star orebodies would affect income in the Safford area, but no information is yet available about the scale of the mining operations, so predictions cannot be made regarding the significance of those effects.

- **Offered Lands.** The Land Exchange alternative would not affect local or regional income in or near the offered lands.

< **No Land Exchange Alternative.** The No Land Exchange alternative would not, in and of itself, affect income trends in Graham County or in or near the offered lands. However, it is reasonable to expect that mining would take place in the Safford area as BLM must subsequently respond to the mine plan proposal (Proposed Action); therefore, impacts identical to those of the Proposed Action would be expected to occur.

4.4.5.2.3 Taxes

< **Land Exchange Alternative**

- **Selected Lands.** The exchange would result in a long-term increase in private property tax revenues for Graham County, as the selected lands would be taxed as private lands with mining/industrial uses. The impacts on taxes of the foreseeable mining uses of the selected lands as described in the MPO are presented in Section 4.3.5.2.3 under the Proposed Action alternative. The more distant foreseeable uses related to development of the Dos Pobres sulfide and Lone Star orebodies would affect taxes in the Safford area, but no information is yet available about the scale of the mining operations, so predictions cannot be made regarding the significance of those effects.

  Under the Land Exchange alternative, the impacts on local taxes of the foreseeable mining uses of the selected lands as described in the MPO would be identical to those presented

in Section 4.6.1 under the Proposed Action alternative, with the following exceptions: 1) Graham County would lose the payments in lieu of taxes (PILT) now paid by BLM for the selected lands. On the basis of $1.16 per acre, this loss would total $19,634 (ESI 1997). 2) Graham County would gain an undeterminable amount in annual property taxes after PDSI acquired the selected lands. The amount cannot be estimated because PD's real properties in Graham County are determined annually "in bulk," that is, a single figure is derived that represents the value of both improved and unimproved property (ESI 1997).

The more distant foreseeable uses related to development of the Dos Pobres sulfide and Lone Star orebodies would affect tax revenue in the Safford area, but no information is yet available about the scale of the mining operations, so predictions cannot be made regarding the significance of those effects.

C **Offered Lands.** The Land Exchange alternative would not affect local or regional taxes in or near the offered lands. Under this alternative, each offered property would be removed from the tax roles of the county in which it is located, and PILT payments by the federal government would increase in that county (ESI 1997). Table 4-36 shows the expected tax loss and PILT gain by county and offered property. The Land Exchange alternative would result in a total net loss of $5,595.00 in revenue each year.

Table 4-36. Annual Tax Revenues Lost and PILT Payments Gained Under the Land Exchange Alternative by County and Offered Property

County / Offered Property	Tax Loss Per Property	Tax Loss	PILT Gain Per Property	PILT Gain	NET Gain or (Loss)
Graham County		$113.00		$1,085.00	$972.00
Amado Property	$22.00		$209.00		
Curtis Property	$91.00		$876.00		
Pima County		$2,496.00		$835.00	($1,661.00)
Feulner Property	$74.00		$371.00		
Clyne II Property	$2,422.00		$464.00		
Santa Cruz County		$1,101.00		$278.00	($823.00)
Schock Property	$1,101.00		$278.00		
Cochise County		$1,080.00		$1,261.00	$181.00
Musnicki Property	$155.00		$742.00		
Freeland Property	$292.00		$162.00		
Butler-Borg Property	$633.00		$357.00		
Yavapai County		$4,640.00		$376.00	($4,264.00)
Tavasci Marsh Property	$4,640.00		$376.00		
TOTAL		**$9,430.00**		**$3,835.00**	**($5,595.00)**

Source: ESI 1997

< **No Land Exchange Alternative.** The No Land Exchange alternative would not, in and of itself, affect tax revenues in Graham County or in or near the offered lands. However, it is reasonable to expect that mining would take place in the Safford area as BLM must subsequently respond to the mine plan proposal (Proposed Action); therefore, impacts identical to those of the Proposed Action would be expected to occur.

4.4.5.3 Infrastructure

4.4.5.3.1 Housing

< **Land Exchange Alternative**

C **Selected Lands.** No impacts to local housing supply or demand are expected from the exchange. The impacts on local housing supply and demand of the foreseeable mining uses of the selected lands as described in the MPO are presented in Section 4.3.5.3.1 under the Proposed Action alternative. The more distant foreseeable uses related to development of the Dos Pobres sulfide and Lone Star orebodies could potentially affect housing supply and demand in the Safford area, but no information is yet available about the scale of the mining operations, so predictions cannot be made regarding the magnitude or significance of those effects.

C **Offered Lands.** The Land Exchange alternative would not affect housing supply or demand in or near the offered lands.

< **No Land Exchange Alternative.** The No Land Exchange alternative would not, in and of itself, affect the current local housing supply or demand in Graham County or in or near the offered lands. However, it is reasonable to expect that mining would take place in the Safford area as BLM must subsequently respond to the mine plan proposal (Proposed Action); therefore, impacts identical to those of the Proposed Action would be expected to occur.

4.4.5.3.2 Utilities (Water, Electric/Gas, Sewer, Telephone, Garbage)

< **Land Exchange Alternative**

C **Selected Lands.** The impacts on local utilities services from the foreseeable mining uses of the selected lands as described in the MPO are presented in Section 4.3.5.3.2 under the Proposed Action alternative. The more distant foreseeable uses related to development of the Dos Pobres sulfide and Lone Star orebodies would affect utilities in the Safford area, but no information is yet available about the scale of the mining operations, so predictions cannot be made regarding the magnitude or significance of those effects.

C **Offered Lands.** The Land Exchange alternative would not affect local utilities service in or near the offered lands.

< **No Land Exchange Alternative.** The No Land Exchange alternative would not, in and of itself, affect local utilities services in Graham County or in or near the offered lands. However, it is reasonable to expect that mining would take place in the Safford area as BLM must subsequently respond to the mine plan proposal (Proposed Action); therefore, impacts identical to those of the Proposed Action would be expected to occur.

4.4.5.3.3 Schools

< **Land Exchange Alternative**

C **Selected Lands.** The impacts on local schools of the foreseeable mining uses of the selected lands as described in the MPO are presented in Section 4.3.5.3.3 under the Proposed Action alternative. The more distant foreseeable uses related to development of the Dos Pobres sulfide and Lone Star orebodies could affect schools in the Safford area, but no information is yet available about the scale of the mining operations, so predictions cannot be made regarding the magnitude or significance of those effects.

C **Offered Lands.** The Land Exchange alternative would not affect schools near the offered lands.

< **No Land Exchange Alternative.** The No Land Exchange alternative would not, in and of itself, affect schools in Graham County or in or near the offered lands. However, it is reasonable to expect that mining would take place in the Safford area as BLM must subsequently respond to the mine plan proposal (Proposed Action); therefore, impacts identical to those of the Proposed Action would be expected to occur.

4.4.5.3.4 Emergency Response

< **Land Exchange Alternative**

C **Selected Lands.** The impacts on local emergency response services of the foreseeable mining uses of the selected lands as described in the MPO are presented in Section 4.3.5.3.4 under the Proposed Action alternative. The more distant foreseeable uses related to development of the Dos Pobres sulfide and Lone Star orebodies could affect such services in the Safford area, but no information is yet available about the scale of the mining operations, so predictions cannot be made regarding the significance of those effects.

C **Offered Lands.** The Land Exchange alternative would not affect local emergency response services in or near the offered lands.

< **No Land Exchange Alternative.** The No Land Exchange alternative would not, in and of itself, affect local emergency response services in Graham County or in or near the offered lands. However, it is reasonable to expect that mining would take place in the Safford area as BLM must subsequently respond to the mine plan proposal (Proposed Action); therefore, impacts identical to those of the Proposed Action would be expected to occur.

4.4.5.4 Transportation

4.4.5.4.1 Land Exchange Alternative

< **Selected Lands.** The impacts on local transportation of the foreseeable mining uses of the selected lands as described in the MPO are presented in Section 4.3.5.4.1 under the Proposed Action alternative. The more distant foreseeable uses related to development of the Dos Pobres sulfide and Lone Star orebodies could affect transportation in the Safford area, but no information is yet available about the scale of the mining operations, so predictions cannot be made regarding the significance of those effects.

< **Offered Lands.** The Land Exchange alternative would not affect transportation in the vicinity of the offered lands except as it relates to issues of access (see Section 4.4.1.2.1, Offered Lands).

4.4.5.4.2 No Land Exchange Alternative. The No Land Exchange alternative would not, in and of itself, affect local transportation in Graham County or in or near the offered lands. However, it is reasonable to expect that mining would take place in the Safford area as BLM must subsequently respond to the mine plan proposal (Proposed Action); therefore, impacts identical to those of the Proposed Action would be expected to occur.

4.4.6 Indian Trust Resources

4.4.6.1 Land Exchange Alternative

4.4.6.1.1 Selected Lands. The act of disposal of public lands *per se* to PD, without reference to the proposed mining operations, would not directly or indirectly impact Indian trust assets. Under this alternative, BLM is neither acquiring nor disposing of resources identified as Indian trust lands, tribal water rights, hunting or fishing rights, or other resources considered to be Indian trust resources (assets).

The near-term foreseeable mining uses of the selected lands (the Dos Pobres/San Juan Project), however, are predicted to physically result in reduced surface flows in the Gila River and its tributaries totaling a maximum of 149 af/yr as discussed in Section 4.3.2.6.2. Although this predicted impact is not measurable, PD has elected to offset this physical effect on Gila River flows by implementing the Alternate Year Fallowing Program, which would reduce consumptive use of river flows for irrigation by more than three times the predicted impact. As a consequence, surface flows, associated riparian habitat, and downstream Indian water rights to the Gila River will not be adversely impacted by the Project.

Future potential implementation of long-term foreseeable mining uses of the selected lands (the Dos Pobres sulfide and the Lone Star projects) could result in additional or continued impacts to flows of the Gila River and its tributaries. It is expected that any potential future impacts to Gila River flows associated with these projects would also be fully mitigated, therefore, adverse impacts to surface flows of the Gila River as a result of long-term foreseeable uses are not anticipated.

In addition to rights to surface flows in the Gila River, the San Carlos Apache Tribe holds an Indian trust asset in all groundwater under the Reservation based upon Sections 4.0 and 4.3 of the San Carlos Apache Tribe Water Rights Settlement Agreement of March 30, 1999, to which the United States was a signatory. This Agreement states that such rights "are held by the United States in trust for the Tribe," and that the scope thereof is "...a permanent right to the on-Reservation diversion, use, and storage of all Groundwater beneath the Reservation...." Impacts of the Dos Pobres/San Juan Project foreseeable uses on Indian trust assets would be identical to those described in Section 4.3.6.1 for the Proposed Action alternative.

Groundwater under the San Carlos Apache Reservation could be affected by the more distant foreseeable uses associated with Dos Pobres sulfide and the Lone Star projects. However, impacts cannot be predicted at this time because no information is yet available about the scale of these potential future mining operations and their potential water requirements. It is expected that a detailed analysis of impacts, including for trust assets such as the San Carlos Apache Tribe's groundwater, would be prepared when and if those potential projects are formally proposed.

4.4.6.1.2 Offered Lands. No Indian trust resources would be impacted as a result of public acquisition of the offered lands.

4.4.6.2 No Land Exchange Alternative

The No Land Exchange alternative would not, in and of itself, impact any Indian trust resources on either the selected or offered lands. However, if BLM subsequently selects a mining plan alternative, impacts to Indian trust resources would be identical to those described for the Proposed Action alternative.

4.5 CUMULATIVE IMPACTS

4.5.1 Approach

Cumulative effects analysis was undertaken following the requirements of NEPA and BLM regulations and policy. The objective of this analysis is to place the consequences of the Project into the context of other past actions, present actions, or reasonably foreseeable future actions (RFFAs), both federal and non-federal, to ensure that decisions stemming from this EIS consider the full range of potential Project consequences (CEQ 1997).

Five steps were taken to analyze cumulative effects associated with the Dos Pobres/San Juan Project. Each step is listed and briefly discussed below:

1) Identify cumulative effects issues;
2) Identify the temporal and spatial extent of the study area;
3) Identify Past, Present, and Reasonably Foreseeable Future Actions (RFFAs) relevant to each issue;
4) Establish the baseline/trend for the resources considered; and
5) Analyze cumulative effects.

While all of the impacts on affected resources are probably cumulative, the purpose of the first step is to limit cumulative effects analysis to important issues of national, regional, or local significance (CEQ 1997). Therefore, not all issues identified for direct and indirect impact assessment (refer to Table 1-4 in Chapter 1) have been analyzed for cumulative effects. The selection of issues for cumulative impacts consideration is based upon the scoping issues raised and the experience and expertise of the Interdisciplinary (ID) Team.

After considering the nature of direct and indirect effects, the resources and/or components of the environment identified by the ID Team for cumulative impact assessment include:

- Land Use
  - Land Tenure
  - Visual Resources
- Physical Resources
  - Air Quality
  - Ground Water Resources
  - Surface Water Resources
  - Waters of the United States
- Biological Resources:
  - Vegetation and Wildlife
  - Threatened & Endangered Species
- Cultural Resources
- Socioeconomic Resources
- Indian Trust Assets

These are resources that, after consideration of the Proposed Action, past actions, present actions, and RFFAs, are most likely to experience some level of cumulative impact within the spatial and temporal boundaries of this analysis or are locally, regionally, or nationally significant.

Steps 2 and 3 are, by their nature, interrelated; past, present, and RFFAs largely define the temporal and spatial extent of the study area. The completion of Steps 2, 3, and 4 provides the framework or context for consideration of cumulative effects discussed in the next section.

This assessment has been updated since the publication of the Draft EIS to reflect changes in the context of the analysis, modifications in the proposed Mine Plan of Operations (summarized in Table 2-1), and the public comments received after review of the Draft EIS. It analyzes resource management and development actions planned or projected to occur under each alternative. Projections of RFFAs, which have been developed for analytical purposes only, are based on current conditions and trends and represent a best professional estimate of RFFAs. Unforeseen changes in such factors as economics, demand, and federal, state, and local laws and policies could result in different outcomes than those projected for this analysis of cumulative effects.

4.5.2 Context

The framework in which the cumulative effects were considered is provided below. Past and present actions are commonly a major influence over the baseline/trend data for a resource, and RFFAs can likewise be

expected to influence future resource trends. Therefore information on past and present actions, RFFAs, and baselines/trends is presented together to provide the context for cumulative effects analysis provided in Section 4.5.3.

4.5.2.1 Temporal and Spatial Extent of the Study Area

Temporal and spatial boundaries for cumulative effect analysis vary by resource/issue. Rather than define multiple, arbitrary boundaries for each resource/issue, the ID Team reviewed each of the issues identified for cumulative effects analysis and identified the past actions, present actions, and RFFAs appropriate for a particular resource's cumulative impact analysis. The list of past actions, present actions, and RFFAs was updated for the Final EIS. Updates were provided by the ID team and by telephone interviews with a number of federal and state resource and land management agency personnel. The results of those interviews are provided in Table 4-37. Past, present, and reasonably foreseeable future actions that have been added to this assessment have been included in Table 4-38. These actions were then compiled and categorized by locationzone (distance from the proposed project area). This list of actions presented in Table 4-38 and graphically depicted in Figure 4-18 defines the temporal and spatial boundaries of this analysis.

Projects are divided into three broad temporal categories: past actions, present actions, and RFFAs. This compilation of projects reflects the collective experience and knowledge of the ID Team. These projects are considered because of their relevance to one or more of the issues identified for cumulative impacts analysis. The projects listed include those that have only recently been completed or are ongoing (such as the telescope construction projects on Mount Graham) as well as projects that have been components of the regional landscape for many decades, such as the mining activities at Morenci and agricultural uses of surface water and groundwater in the Safford Valley.

Projects identified as RFFAs are those projects that: 1) the ID Team is aware of and would classify as reasonably foreseeable, i.e., not overly speculative; and 2) have the potential to contribute to cumulative effects. Projects considered here include the Dos Pobres sulfide, Lone Star, and Sanchez projects in the Safford Mining District. These projects are reasonably likely, although not certain, to occur during or after completion of the mining activities of the proposed Project. A brief discussion of the more notable mine and land exchange projects that are considered in this analysis is provided below.

4.5.2.2 Mining - Past and Present Actions and RFFAs

Past mining activities have been prolific in the southeastern part of the state, with most of the mining and prospecting activities focused upon copper, gold, silver, lead, zinc, and/or tungsten. Very few of these old workings have been adequately reclaimed because regulations that required reclamation of mining activities on public lands were not in effect until 1981, and it was only in 1995 that the State of Arizona enacted mine reclamation laws for non-federal lands. Past copper mining activities have been mostly underground operations and were done before the commercial development of the SX/EW process. There are a number of old unreclaimed workings and tailings piles; the most notable ones nearest the Safford Mining District are located in the Aravaipa Mining District, some 45 miles west of Safford.

Table 4-37. Resource and Land Management Agency Responses Regarding Identification of Past, Present, and Reasonably Foreseeable Future Actions

Agency	Date of Contact	Response
Arizona Game and Fish Department	11-13-02	Various wildlife studies with BLM along the Gila River, Gila Box, and Bonita Creek areas
Arizona Department of Transportation	11-15-02	Highway reconstruction along US 191 between US 70 and SR 75
		5-6 miles of FHWA multi-use trails
Arizona State Land Department	11-19-02	Record of commercial activities within T6S, R25E, Sections 16 and 36; T6S, R26E, Sections 16 and 32; and T7S, R26E, Section 2
		Record of grazing activities within T5S, R25E, Sections 7,8,9,10,11,12,15,17,18,22, and 31; T5S, R26E, Sections 10, 15, 16, 17, and 21; and T7S, R25E, Sections 5, 8, 9, 10, 15, 16, 17, 18, and 32
		Records show pending mineral excavation activities within T5S, R25E, Sections 10, 11, and 15 by Kennecott Exploration Co.
City of Safford Department of Public Works	11-12-02	Planned reconstruction of Safford 8th Avenue Bridge Design and construction of arterial 20th Avenue from Route 7 to Relation Street
		Improvements to the Safford Airport Access Road, taxi-way, and navigation features
		5 to 6 miles of FHWA multi-use trails along Discovery Park Blvd. and Discovery Avenue
Graham County Planning and Zoning Department	11-23-02	Improvements to the City of Safford Airport
		Privatization of the Safford Landfill
		Overall little development activity expected in the area
The Nature Conservancy	11-23-02, 12-11-02	Identified the “Sonoran Desert Ecoregional Plan” and Apache Highlands
United States Fish and Wildlife Service	11-13-02	Consultation with BLM on St. John’s land exchange
Bureau of Land Management Safford Field Office	12-03-02	Completion of In-Lieu Selection of federal land owed to the State of Arizona (Arizona State Land Departement), primarily in the St. John’s area
		Land exchange with Fort Huachuca, BLM, and State of Arizona
		Highway-191 re-routing
		Valley Telephone Co-operative fiberoptic line from I-10 to Safford

The vast majority of 3809 fillings in the Safford Field Office are now reclaimed and closed. There are only about 12 open Notices of Intent (NOI) currently filed with the Safford Field Office. NOIs are mining activity involving less than five acres. The majority of these in the Safford Field Office are for exploration. Only two NOIs currently have any regular production activity. There are also presently three active Mining Plan of Operations in the Safford Field Office, only one of which is an active mine operation. This active MPO is for a series of zeolite pits in the San Simon Valley, with a total disturbed area of approximately 75 acres.

The only significant current mining operation anywhere near the Gila Mountains is the PD Morenci Mine complex, located on private land about 30 miles northeast of Safford. This is one of the largest open-pit copper mine operations in the world, producing oxide copper amenable to SX/EW. It is also important to note that the Dos Pobres/San Juan Project is the only major new copper mine currently planned in the U.S. (L. Thrasher, BLM, pers. comm.).

4.5.2.3 Land Use/Tenure - Past and Present Actions and RFFAs

From the end of fiscal year 1964 through fiscal year 1993, the acreage of federal land managed nationwide by the four federal land management agencies (BLM, U.S. Forest Service [USFS], United States Fish and Wildlife Service [USFWS], and National Park Service [NPS]), decreased by 11 percent, or approximately 77 million acres (General Accounting Office [GAO] 1995). However, the amount of land managed by these four agencies increased in 46 states and in the District of Columbia by almost 21 million acres. The largest decrease in acreage occurred in Alaska, where a total of nearly 96 million acres of land managed by the BLM was transferred to the State of Alaska (76 million acres) and to Native Alaskans (36 million acres) (ibid.). During this same period, an additional 16 million acres of land in Alaska were added to the inventory of lands managed by the USFS, USFWS, and NPS.

Table 4-38. Other Activities (Existing and Proposed) That May Cumulatively Affect Resources

Activity	Location Zone[1]	Status[2]	Anticipated Environmental Effect Which Could Be Cumulative3
1. Dos Pobres Sulfide Project	A	F	A, SW, GW, V, V&W, C, **SE**
2. Lone Star Project	A	F	A, SW, GW, V, V&W, C, **SE**
3. Sanchez Copper Project	A	F	A, SW, GW, V, V&W, C, **SE**
4. Morenci Mine	B	P, E, F	A, SW, GW, V, V&W, T&E, C, **SE**
5. Agricultural Practices Safford Valley	A	P, E, F	SW, GW, T&E, **SE**
6. Agricultural Development San Carlos Apache Reservation	B	E, F	SW, GW, T&E, **SE**
7. Gila Box Riparian National Conservation Area	A, B	E, F	**SW, V&W, T&E, C, SE**
8. BLM Grazing ESA Consultation with USFWS	A, B, C	E	**SW, V&W, T&E**
9. BLM Grazing Leases	A, B, C	P, E, F	SW, V&W, T&E
10. Mt. Graham Telescope Development	B	E, F	V&W, V, T&E, C
11. CMMC Leach Expansion Project	C	F	A, SW, GW, V, V&W, C, **SE**
12. ASARCO Ray Land Exchange	C	P	**SW, GW, V, V&W, T&E, C, SE**
13. Safford Conventional WWTP and Reuse Project	A	F	**SW,GW**

Table 4-38, continued. Other Activities (Existing and Proposed) that may Cumulatively Affect Resources

Activity	Location Zone[1]	Status[2]	Anticipated Environmental Effect Which Could Be Cumulative3
14. City of Safford Water Development Bonita Creek	A	E, F	SW, GW, V&W, T&E
15. Thatcher Wetland WWTP and Reuse Project	A	E	**V&W, SW**
16. San Simon Valley Restoration Project	B, C	P	**V&W, SW, GW, T&E**
17. AGFD Ash Creek Water Development Project	B	F	**V&W, SW**
18. Gila Monster (Non-point source working group)	C	F	**SW, GW, T&E**
19. National Forest Lands and Fire Management	C	P, E, F	SW, V, V&W, T&E, **SE**
20. Abandoned Mines	B	P	SW, GW
21. Gila River Indian Community agricultural development	C	P, E, F	SW, GW, V&W, T&E, C, **SE**
22. Chino Mine Expansion	C	F	A, SW, GW, V, V&W, C, **SE**
23. Continental Mine Expansion	C	F	A, SW, GW, V&W, **SE**, C
24. Copper Flat Project	C	F	A, SW, GW, V&W, SE
25. Little Rock Mine	C	F	A, SW, GW, V&W, **SE**
26. Morenci Land Exchange	C	E	**SW, GW, V&W, T&E, C, SE**
27. San Manuel Mine Closure	C	P, E, F	A, SW, GW, V&W, T&E, SE
28. BHP Pinto Valley Operations Closure	C	P, E, F	A, SW, GW, V&W, T&E, SE
29. Carlota Copper Co.	C	E, F	A, SW, GW, V&W, T&E, C, SE
30. Arizona Desert Wilderness Act	C	P	**V&W, T&E, A, SW, GW, C, V, SE**
31. Wild & Scenic Rivers Proposed Designations	A,B,C	E, F	**V&W, T&E, A, SW, GW, V, C, SE**
32. The Nature Conservancy Activities – San Pedro River, Ramsey Canyon, and Mule shoe Ranch	B,C	P, E, F	**V&W, T&E, SW, GW, SE, C**
33. Fort Huachuca Operations	C	E, F	A, V&W, T&E, SW, GW, SE
34. Existing Environmental Regulations (CWA, CAA, APP, ESA, NHPA, etc.)	A,B,C	P, E, F	**A, V&W, T&E, SW, GW, C, V**
35. BLM/Arizona State Land Exchanges (Mule Shoe Ranch, San Pedro River, Cienega Creek)	B,C	P	**V&W, T&E, SW, GW, V, SE, C**
36. BLM Hualapai Mountain Exchange	C	F	**V&W, T&E, SW, GW, V, SE, C**
37. Mission Mine Expansion	C	F	A, SW, GW, V&W, T&E, SE, C
38. Gila River Indian Community Farm Expansion	C	P, E, F	A, SW, GW, V&W, T&E, SE, C
39. Construction of 8th Ave Bridge -- Safford	A	F	SW, V&W, T&E
40. Hwy US-191 reconstruction	A	F	SW, V, V&W, T&E, C
41. Residential Development – Safford Area	A	F	SW, V, GW, V&W, T&E, C, **SE**
42. The Nature Conservancy Sonoran Desert Ecoregional Plan	A, B, C	F	**SW, V&W, T&E, C**
43. Gila Adjudication/Indian Water Settlement	A, B, C	F	SW, GW

Table 4-38, continued. Other Activities (Existing and Proposed) that may Cumulatively Affect Resources

Activity	Location Zone[1]	Status[2]	Anticipated Environmental Effect Which Could Be Cumulative3
44. Valley Telephone Co-operative Fiberoptic Line -I-10 to Safford	A	F	**SE**
45. Various AGFD and BLM wildlife studies along the Gila River, Gila Box area, and Bonita Creek	A, B	E, F	**V&W, T&E**
46. FHWA Multi-Use Trails - Safford Area	A	F	**V, SE**
47. BLM - Commercial Acitivities	A, B, C	E, F	A, SW
48. BLM - Kennecott Exploration Co. Activities	A, B	F	A, SW, GW, V&W, T&E, C, **SE**
49. Improvements to City of Safford Airport	A	E, F	**SE**
50. Design and Reconstruction of Arterial 20th Avenue - Safford	A	F	**SE**
51. Fort Huachuca-BLM-State of Arizona Land Exchange - St. John's area	C	F	A, SW, GW, V&W, T&E, C, SE
52. Delegation of NPDES Program to the State (ADEQ)	A, B, C	E, F	**SW**

1. A = 0-25 kilometers (km), B = 26-100 km, C = >100 km

2. F =future activity, E=existing activity, P=past activity

3. A=air, SW=surface water, GW=ground water, V=visual, V&W=vegetation & wildlife, T&E = listed species, C= cultural resources, SE=socioeconomic, **Bold** denotes a positive impact)

Table 4-39. Change in the Acreage Managed by Four Federal Agencies in Arizona

	Acres Managed		
Federal Agency	**1964**	**1993**	**Net Acreage - Gain (Loss)**
BLM	13,034,217	14,255,889	1,221,672
NPS	2,474,249	2,692,176	217,927
USFS	11,410,808	11,247,052	(163,756)
USFWS	6,977	1,672,499	1,665,522
TOTAL	**26,926,251**	**29,867,616**	**2,941,365**

Source: GAO 1995

The GAO (1995) reported that of the roughly 72,688,000 acres of land in Arizona, 29,867,616 (41 percent) are managed by one of four federal land management agencies. Table 4-39 summarizes the change in acreage of lands managed by these federal land management agencies in Arizona from 1964 to 1993.

Cumulatively, the lands subject to the multiple resource management objectives of the BLM or USFS and the management goals of the NPS and USFWS have increased by almost 2.9 million acres during this 30-year period. Arizona BLM experienced a net gain of approximately 1,221,672 acres of public lands (GAO 1995). Within the Safford Field Office, major land tenure adjustments in the past have included acquisitions of aquatic and upland resources within the Cienega Creek and San Pedro River corridors, acquisition of lands

surrounding the Muleshoe Ranch, and most recently acquisitions through the Morenci Land Exchange of inholdings within the Gila Box RNCA and Dos Cabezas Mountains Wilderness and disposal of encumbered public lands near the Morenci Mine.

From 1998 to 2002 a total of 96,366 acres of land has been acquired by BLM and 88,781 acres of land have been disposed of by the BLM through land exchanges (B. Ruddick, BLM, pers. comm.). Table 4-40 summarizes these changes in land status by year that resulted in a net gain in BLM managed public lands of 7,585 acres.

The U.S. Forest Service is currently pursuing 14 land exchanges in Arizona. These exchanges, if completed, would result in 10,784 acres of private land becoming public lands managed by the USFWS and 6,190 acres of public lands becoming privately owned (L. Odegaard, USFS, Southwestern Region, email to T. Furgason, SWCA). This would result in a net public land increase of 4,594 acres. However, the State of Arizona recently acquired 15,234 acres of federal lands owed to the State under the Arizona Enabling Act of June 20, 1910. The State has selected existing Federal lands administered by BLM in Apache County, Arizona, to satisfy their claim. This transfer of ownership is expected to be completed during the late fall of 2002. Additionally, The Defense Authorization Act of 2000 (P.L. 106-651, 113 Stat. 877, 878) provided for the friendly condemnation of State Trust lands within the East Range of Fort Huachuca in southeastern Arizona. BLM is assisting in this condemnation by providing the federal lands to the State of Arizona as compensation for the condemnation. Fort Huachuca selected 1,536 acres of surface estate in the East Range for condemnation. As compensation, the Arizona State Lands Department selected 5,903 acres of federal surface estate in Apache County, Arizona (B. Ruddick, BLM Arizona State Office, pers. comm.). Table 4-41 summarizes the land tenure adjustments considered for this analysis and shows a net loss of 1,669 acres of federal lands in Arizona (although it could be argued that the federal lands to be provided to the State of Arizona could still be considered “public” lands).

Table 4-40. BLM Land Exchange Summary 1998 to July 2002

Year	Acres Acquired	Acres Disposed
1998	6,971	9,556
1999	71,448	64,620
2000	0	0
2001	17,947	14,605
2002 (as of July 22)	0	0
TOTAL	96,366	88,781

4.5.2.4 Resource Baselines/Trends

Where possible, baseline conditions or trends were established from existing sources of information. This information was then supplemented by input from the ID Team based upon their experience and expertise.

Table 4-41. Potential Net Change in Public Lands Tenure as a Result of Recent/Ongoing Exchanges and Adjustments by the BLM and USFS in Arizona

Exchange	Selected Lands (acres) (Federal to Non-Federal Ownership)	Offered Lands (acres) (Private to Federal Ownership)	Net Federal Acreage Gain (Loss)
Safford Exchange Alternative	16,297	3,867	(12,430)
Morenci Land Exchange	3,758	1,040	(2,718)
Ray Land Exchange	10,976	8,994	(1,982)
BLM-State Lands In-lieu Selection	15,234	0	(15,234)
BLM-Fort Huachuca-ASLD Condemnation	1,536	5903	(4,367)
USFS Arizona Land Exchanges	6,190	10,784	4,594
TOTAL	43,124	41,455	(1,669)

These data are presented in both quantitative and qualitative formats. It should be noted that, in analyzing cumulative effects of an alternative, if that alternative has no direct or indirect impacts, it cannot contribute cumulatively to impacts on a given resource.

A trend analysis of surface water quality in the upper Gila River was completed by the USGS in 1995 (Baldys et al. 1995). The study was based upon data collected between 1972 and 1987. Two of the sites were located on the Gila River (Calva, Arizona and Redrock, New Mexico) and one was located on the San Francisco River near Clifton, Arizona. Table 4-42 summarizes the data presented in that study and in ADEQ's 1996 Arizona Water Quality Assessment (ADEQ 1996), which also used these data. Findings and conclusions at these three sites, by site, included (after ADEQ 1996):

< Total phosphorus, dissolved lead, total manganese, and dissolved zinc declined, while ammonia plus organic nitrogen increased at the Clifton, Arizona site;

< Dissolved solids, sodium, sulfate, and chloride were decreasing, while total lead was increasing at the Redrock, New Mexico site; and

< Hardness, dissolved solids, sodium, sulfate, chloride, total phosphate, dissolved lead, total manganese, and dissolved zinc were decreasing, while pH was increasing at the Calva site downstream of the Town of Safford.

< These data provide general indications of the cumulative effects of historic activities on water quality in the Gila River upstream from and in the vicinity of the proposed Project. The general activities reflected by the results of the measured water quality parameters include, but are not limited to, irrigation practices including return flows, historic and extant mining activities, and urban runoff from developed portions of the watershed.

In their CWA 305b Report, ADEQ (1996) also reported that:

< Past monitoring efforts at the Morenci Mine had detected contaminated water in Gold Gulch, a tributary to the San Francisco River. This water is now being captured on-site and pumped back to the mine for use as process water (ADEQ 1996); and

Table 4-42. Summary Statistics and Surface Water Quality Trend Analysis.

Data compiled from USGS Water-Resources Investigations Report 95-4083 (Baldys et. al. 1995). Units for summary statistics indicated next to water quality constituent name. Number in ( ) under mean is sample size. Trend refers to the temporal trend of the water quality constituent at the indicated sample location. N= no trend, I = increasing, and D = decreasing. Trend conclusions based on p=0.1 level of significance. '-' = data not available or not calculated. mg/l = milligrams per liter or parts per million and : /l = micrograms per liter or parts per billion.

Water Quality Constituent	**Location**											
	Gila River Near Red Rock, NM [collection period 9/73 to 9/87]				San Francisco River near Clifton, AZ [Collection period 1/76 to 9/87]				Gila River at Calva, Arizona [Collection period 10/74 to 9/87]			
	Mean (n)	Median	Range	Trend	Mean	Median	Range	Trend	Mean	Median	Range	Trend
pH	-(191)	8.2	6.9 -9.1	N	-(105)	8.2	6.9 - 9.6	N	-(133)	8.2	6.8 -9.8	I
Turbidity (NTU)	158 (64)	10	<0.01 - 6,500	N	87.7 (31)	5.5	0.60 1,500	N	472 (101)	40	0 - 21,000	N
Hardness (mg/l)	115 (141)	120	46 - 180	N	221 (109)	230	70 - 440	N	521 (142)	420	63 - 1,300	D
Dissolved Solids (mg/l)	221 (89)	229	68 - 349	D	676 (109)	630	178 -1,830	N	2060 (142)	1700	244 - 4,680	D
Dissolved Sodium	28.7 (139)	31.0	7.8 - 44.0	D	142 (83)	130	17 - 420	N	525 (142)	425	2.5 - 1,200	D
Dissolved Sulfate (mg/l)	32.8 (141)	34	<1.0 - 49.0	D	30.6 (109)	30.0	2.0 - 79.0	N	341 (142)	280	30.0 - 810	D
Dissolved Chloride	11.8 (141)	12	2.0 - 44.0	D	257 (83)	230	16 - 870	N	786 (145)	590	31 - 2,200	D
Total Ammonia + Org. N (mg/1)	0.80 (77)	0.47	0.10 - 11.0	N	1.08 (83)	0.40	0.01 - 18.0	I	2.01 (142)	0.80	0.10 - 74.0	D
Total Phosphorus (mg/l)	0.25 (77)	0.09	0.02 - 4.40	N	0.50 (82)	0.10	0.01 - 7.90	D	0.98 (146)	0.19	0.01 - 21.0	N
Dissolved Arsenic (µg/l)	1.74 (45)	2	<1.0 - 4.0	N	2.40 (25)	2.0	1.0 - 4.0	N	4.38 (88)	4.0	<1.0 - 8.0	D
Dissolved Barium (µg/l)	23.5 (41)	20.0	6.0 - 50.0	N	40.0 (24)	34.0	12.0 - 100	N	95.9 (75)	56	15.0 - 600	N
Total Boron (µ/l)	40 (2)	40	40 - 40	-	151 (45)	150	50 - 100	N	674 (64)	705	110 - 13,00	N
Dissolved Chromium	0.41 (36)	0.02	<1.0 - 10.0	N	0.78 (24)	0.67	<1.0 - 2.0	N	1.59 (85)	0.56	<1.0 - 3200	N
Suspended Copper (µ/l)	40.4 (16)	10.0	<1 - 410	N	27.7 (6)	22.0	3.0 - 63.0	-	137 (31)	20.0	<5 - 1,500	N
Total Copper (µ/l)	37.2 (19)	7.76	3.0 - 420	N	229 (110)	26.5	<1 - 10,000	N	152 (124)	43.0	<1 - 3,200	N
Dissolved Lead (µ/l)	1.39 (41)	1.00	<1.0 - 5.00	N	1.52 (61)	1.00	<1.0 - 12.0	D	3.41 (95)	1.00	<1.0 - 70.0	D
Total Lead (µ/l)	20.1 (23)	5.0	<1.0 - 330	I	11.8 (75)	5.5	<2.0 - 84.0	N	26.6 121)	8.0	<1.0 - 400	N
Total Manganese (µ/l)	685 (19)	40	8.0 - 11,000	N	321 (69)	110	10.0 - 3,900	D	953 (166)	300	8.0 - 11,000	D
Dissolved Zinc (µ/l)	11.8 (44)	8.0	<3.0 - 1,280	N	32.7 (65)	10.0	<3.0 - 600	D	20.5 (96)	11.50	<3.0 - 210	N
Total Organic Carbon (mg/1)	6.64	3.80	1.90 - 54.0	N	7.21	2.4	0.50 - 87.0	N	19.9	8.00	3.6 - 300	N

Table 4-43. Summary of Selected Stream/River Segment Data from the ADEQ June 2002 305(b) Report

Stream Segment	Year added to 303(d) List	Designated Use Support	Stressors	Comments
Eagle Creek				
Willow Creek to Sheep Wash	2000	Inconclusive	Turbidity	Turbidity standard exceeded in 1 of 4 samples. “Inconclusive” for A&Ww.
Sheep Wash to Gila River	1998	Inconclusive	Turbidity	Standards were exceeded in 3 of 10 samples. “Inconclusive” for A&Ww due to turbidity.
Bonita Creek				
Park Creek to Gila River	1997	Attaining	--	19 samples at 5 sites in 1997-2000. Reach assessed as “attaining all uses”.
San Francisco River				
Blue River to Limestone Gulch	1998	Inconclusive	Turbidity, Beryllium	13 samples in 1997-2000. “Inconclusive” for A&Ww and FC due to turbidity and beryllium exceedances. “Attaining” for all other uses.
Limestone Gulch to Gila River	1992	Impaired	Turbidity	33 samples at 2 sites in 1996-2000. “Impaired” for A&Ww due to turbidity (exceeded 9 of 33 samples); turbidity levels “Attaining for all other uses. Exceedances occurred in beryllium, copper, dissolved oxygen, Escherichia coli, and fecal coliform but “Attaining” for all uses.
Gila River				
San Francisco River to Eagle Creek	1998	Inconclusive	Turbidity	12 samples at 2 sites in 1997-2000; “Inconclusive” in A&Ww for turbidity; “Attaining” in all other uses.
Eagle Creek to Bonita Creek	1990	Inconclusive	Turbidity	12 samples in 1997-1998; “Inconclusive” for A&Ww due to turbidity exceedances; “Attaining” in all other uses.
Bonita Creek to Yuma Wash	1990	Not Supporting	Turbidity	6 samples collected by ADEQ and 27 by USGS in 1996-2000. “Impaired” for A&Ww by turbidity. Exceedances in Escherichia coli and fecal coliform but “Attaining” for designated uses.

< PD applied for an Aquifer Protection Permit for its Morenci facility. In the process of developing this permit, all surface and groundwater concerns should be addressed for this site (ADEQ 1996). (Note: On October 26, 2000, Phelps Dodge Morenci, Inc. was issued its APP for the Morenci Mine Facilities.)

Table 4-43 summarizes selected data from ADEQ 2002 305(b) report. The data presented are from stream/river segments in the general vicinity of the project area. As indicated by these data, several of the stream/river segments do not support their designated use. In all instances, the primary stressor was turbidity.

The discharge rate of the Gila River as it flows through the Safford Valley is roughly 284cfs (205,560 af/yr). The lowest annual average is 87 cfs (62,970 af/yr) and the highest is 1,119 cfs (810,660 af/yr). Consumptive water use for agriculture (combined groundwater pumping and surface water diversion) in the Safford valley is estimated to be 153,000 af/yr (211 cfs). The City of Safford obtains its water for municipal and industrial uses from wells located within the Safford Valley and from a diversion on Bonita Creek. The City's diversion structure is an infiltration gallery located in the channel-fill of the creek approximately four miles upstream of the confluence of Bonita Creek and the Gila River. Total withdrawals from the Gila Valley basin in 1985 were about 8,000 af (ADWR website @http://adwr.state.az.us).

Of all the resources being considered for cumulative impacts, conclusions regarding biological resources seem most sensitive to the spatial scale of analysis. On a local basis (the Safford Valley), discussions of cumulative impacts vary significantly from those that consider a larger analysis area.

At the local scale, past, present, and reasonably foreseeable future actions that most affect biological resources are:

< The potential mine-related RFFAs in the Safford Mining District;

< Future increases in water demand, if unmitigated; and

< Past and present agricultural activities in the Safford Valley.

Past agricultural development in the Safford Valley totals about 32,500 acres (Graham County Cooperative Extension, pers. comm., 1997) and has resulted in the clearing of extensive areas of riparian (broad-leaf and mesquite bosque) habitats within the Valley. Continued consumptive water use for irrigated lands of an estimated 153,000 af (211 cfs) of water annually from the Gila River and its alluvial aquifer for agricultural purposes continues to affect the distribution and characteristics of aquatic and riparian resources within and downstream of the Safford Valley. Added to these past and present impacts is the potential for a total of 11,675 acres of additional surface disturbance with full implementation of mine-related RFFAs within the Safford Mining District.

At a regional or statewide scale of analysis, localized impacts that result or would result from past, present, and RFFAs become less significant. Past, present, and RFFAs that shape the nature of potential cumulative impacts to biological resources at a regional or statewide scale include:

< The net increase in the acreage of federally managed public lands that has taken place since 1964;

< The net decrease of about 15,600 acres of public lands that would result from implementation of the Land Exchange alternative and other RFFAs listed in Table 4-41, which represents about 0.05 percent of the overall net gain in federal lands in Arizona since 1964;

- The establishment of wilderness areas and other special management actions such as the Gila Box Riparian National Conservation Area and the establishment of the four BLM staff positions dedicated to the management of the Gila Box;

- Mandated changes in the renewable resources management focus and practice by the BLM, USFS, and other agencies as a result of recent litigation by environmental groups; and

- Private/public initiatives such as the Gila Monster (a non-point source working group actively seeking solutions to non-point source water pollution issues along the Gila River) and The Nature Conservancy's active management role in southeastern Arizona (e.g. the San Pedro River and Muleshoe Ranch).

To a large extent, land acquisitions by federal land management agencies have focused on lands with high biological resource values and/or lands that facilitate the multiple resource management objectives of the managing federal agency. Of particular importance in these acquisitions has been the identification of lands with known populations of threatened and endangered species or lands with the potential to support threatened or endangered species. Specific examples of land acquisitions in southern Arizona by federal agencies to support and manage biological resources include the establishment and expansion of the Buenos Aires National Wildlife Refuge, land acquisitions along the San Pedro River, the Cienega Creek land exchange, the Muleshoe Ranch exchange, and past and proposed expansions of Saguaro National Park.

As outlined in Chapter 3, dominant habitats in the project area include Sonoran Desertscrub, Semidesert Grassland, and a broad ecotone combining elements of these two biotic communities. In Arizona, Upland Sonoran Desertscrub and Semidesert Grassland biotic communities cover approximately 10,379,00 acres and 6,892,000 acres, respectively.

Upland habitats throughout much of Arizona are crossed by numerous ephemeral drainages, the majority of which support xeroriparian vegetation. Xeroriparian vegetation in the project area is generally open and patchily distributed. As is typical of xeroriparian vegetation, most of the plant species present also occur in adjacent upland habitats, although at lower densities and generally in smaller sizes.

Based upon xeroriparian vegetation volume and composition, xeroriparian habitats in the project area are of relatively low value. Within the project area, creosotebush, not normally considered to be a riparian plant, comprised 30.4, 23.0, and 33.9 percent of the vegetation volume in the three categories, respectively, of xeroriparian habitat identified in the project area (SWCA 1997a). The average vegetation volume of all xeroriparian habitats measured in the project area was less than 0.42 m^3/m^2 (ibid.). Compared to many areas of southern Arizona, this volume of xeroriparian vegetation is low. While many of the more characteristic Upland Sonoran Desertscrub habitats in southern Arizona support vegetation volumes greater than 0.5 m^3/m^2, upland habitats in the project area supported an average vegetation volume of 0.24 m^3/m^2 (ibid.).

Surface management activities of the federal land management agencies have been affected by recent legal actions initiated by the Center for Biodiversity and other special-interest groups. As a result of a Notice of Intent to Sue, BLM entered into Section 7 Consultation with the USFWS regarding potential impacts to threatened and endangered species from ongoing implementation of BLM grazing programs. The BLM is actively implementing terms, conditions, and conservation measures outlined in the final biological opinion issued by the USFWS that resulted from this consultation (M. McQueen, BLM, pers. comm.). Fifteen grazing allotments are affected by the terms, conditions, and conservation measures that have resulted from this consultation. The net result of this consultation was removal of cattle from riparian habitats in the Safford Field

Office, which would affect five of these allotments (ibid.). It is expected that habitat values of riparian and aquatic habitats will be enhanced in these areas as a result of this action.

4.5.3 Analysis of Cumulative Effects

4.5.3.1 Mine Plan Alternatives Set

4.5.3.1.1 Land Use

The land use evaluation of cumulative impacts focuses on two categories: Land Tenure and Visual Resources. Land Tenure focuses upon the changes in federal land ownership that have or are likely to take place in the future on a state-wide basis. The Visual Resources section discusses the likely cumulative impacts to visual resources in the Safford Valley.

< **Land Tenure**

C **Proposed Action Alternative.** The proposed mining plan of operations will not contribute to cumulative effects that may be associated with the adjustment of land tenure and the resulting changes in land management goals and objectives. Selection of the Proposed Action alternative by the BLM would result in not acquiring the approximately 3,867 acres of lands within Long-Term Management Areas (LTMAs) and the potential benefits that result from changes in land management goals and objectives for these properties. Selection of this alternative by the BLM will also result in no disposal of 16,297 acres of public lands, all of which is encumbered by active PD mining claims and could be subject to patent in the future. After considering historic changes in public land tenure in Arizona and the resource management benefits that have occurred as a result, significant cumulative impacts are not expected from the selection of the Proposed Action alternative. Some portion or all of the 16,297 acres of selected lands could be subject to privatization through the patent process should the congressional moratorium be lifted at some time in the future. Permitting of the Proposed Action alternative by the cooperating agencies with permit authority would result in no cumulative effects upon land tenure.

C **Partial Backfill Alternative.** Cumulative impacts that would result from selection of this alternative are expected to be similar to those identified for the Proposed Action alternative.

C **No Action Alternative.** Under this alternative, the net cumulative increase in lands subject to multiple resource management objectives of the four federal land management agencies since 1964 will still exceed 2.9 million acres. And while selection of the No Action alternative would not result in the acquisition of offered lands nor the disposal of selected lands for the anticipated resource value and/or public lands management benefit, this alternative is not expected to result in significant adverse cumulative effects to federal land tenure. Some portions of selected lands could be subject to privatization by patenting should the current moratorium on second-stage patents be lifted.

< **Visual Resources**

C **Proposed Action Alternative.** The Proposed Action would create landscape features, most notably the development rock stockpiles and the leach pad, that strongly contrast with the form and line of the existing landscape. The color of the development stockpiles and the

leach pad will be similar to the colors of the Gila Mountains and would provide a weak contrast to the surrounding terrain. Because of the Project's distance from key observation points, no contrast in the texture of the Proposed Action with surrounding landforms is expected.

When considered in the context of RFFAs anticipated for the Safford Valley, specifically, the potential Lone Star, Dos Pobres sulfide, and the Sanchez projects, the Proposed Action alternative will contribute cumulatively to visual impacts to the northern viewsheds of the Safford Valley. Detailed mine plans for the Dos Pobres sulfide and the Lone Star projects have not been developed and the Sanchez Project MPO would likely be revised substantially prior to the initiation of any mining activity on that property (J. Korolsky, PDSI, pers. comm.). It is expected that, collectively, these RFFAs will result in an estimated 11,675 acres of additional mining-related disturbance. Facilities developed as part of these RFFAs will be generally similar in line, form, and color to the Proposed Action. Likely exceptions to this would be the sand-colored tailings impoundment developed as part of the Dos Pobres sulfide project and the development of the Lone Star open cut which, because of its location near the top of Lone Star Mountain, is expected to be more visible than the pits excavated for the Dos Pobres and San Juan ore bodies on the bajada of the Gila Mountains.

- **Partial Backfill Alternative.** When considering the Project's distance from key observation points and the nature of RFFAs, selection of this alternative will result in cumulative effects similar to those of the Proposed Action alternative.

- **No Action Alternative.** Selection of the No Action alternative by the BLM and cooperating agencies will maintain the existing conditions of the Dos Pobres and San Juan mine sites and will not result in adverse cumulative effects to visual resources in the Safford Valley.

4.5.3.1.2 Physical Resources

The discussions and analysis of cumulative impacts to physical resources are focused upon three distinct resources: Air Quality, Groundwater, and Surface Water Resources. The spatial context for this analysis is the Safford Mining District.

< Air Quality

- **Proposed Action Alternative.** As outlined in Section 4.3.2.2 of the DEIS the original mine plan of operations would have generated emissions that range from 5.0 to 66.2 percent of the established standards or guidelines (refer to Tables 4-7 and 4-8 from Section 4.3.2.2 of the Draft EIS). However, as outlined in Table 2.1 of this document, the Proposed Action Alternative has been refined. The proposed MPO will result in reduced haul truck traffic, reduced off-site vehicle trips for acid delivery, and reduced fugitive dust emissions from use of conveyors to move agglomerated ore instead of haul trucks. These increased efficiencies will significantly reduce the air emissions originally projected for mine operations evaluated in the DEIS. Additional development of mine-related RFFAs in the Safford Mining District would potentially increase concentrations of regulated pollutants within the Safford Valley. The degree to which concentrations of these pollutants would increase is a function of the timing of potential new development activities as well as mine design and control technologies implemented for any new development activities. For example, timing is important in that concentrations of some pollutants, such as PM_{10}, that would potentially be

generated by development of the Dos Pobres sulfide project may be offset to some degree by reductions in pollutant concentrations that result from reduced activities at the Dos Pobres/San Juan Project in its later phases.

Development of mine-related RFFAs or other industrial sources of air pollutants in the Safford Valley will require compliance with applicable ADEQ air quality control regulations. Under these regulations, future development of mine-related RFFAs by PDSI would require either modifying the Class II permit that must be obtained for the Dos Pobres/San Juan Project or obtaining a new permit prior to construction. Any permitting action by ADEQ would contain terms and conditions to ensure that the proposed facility will meet all applicable requirements and standards.

Cumulatively, the concentration of certain criteria air pollutants is likely to increase in the Safford Valley as a result of growth and implementation of RFFAs. However, the degree to which pollutant concentrations can increase from regulated activities or sources (including mine-related RFFAs) is regulated and limited by ADEQ. Through their permitting authority, ADEQ must ensure that criteria air pollutant concentrations at process boundaries for mine-related or other industrial RFFAs do not exceed applicable air quality standards.

- **Partial Backfill Alternative.** Cumulative effects to air resources of the Gila River Valley are expected to be similar to those associated with the Proposed Action alternative.

- **No Action Alternative.** Selection of the No Action alternative by the BLM and cooperating agencies will maintain the existing conditions of the Dos Pobres and San Juan mine sites and will not contribute to cumulative impacts to air resources in the Safford Valley.

< **Groundwater Resources**

- **Proposed Action Alternative.** Local and regional groundwater impacts were modeled for an approximately 500 square-mile region that contains the Dos Pobres/San Juan Project (URS 2002). The purpose of the model was to predict effects, if any, on regional groundwater flow from proposed development of two open-pit mines and groundwater production wells needed to support the mine. The model was not used to predict cumulative effects that would result from potential future development of the Dos Pobres sulfide, Lone Star, or Sanchez projects.

  Since completion of initial modeling efforts and the publication of the Draft EIS, Phelps Dodge has proposed revisions to the Mine Plan of Operations as outlined in Table 2-1 of this document. These modifications will reduce the anticipated total amount of groundwater used during the life of the Project by about 20 percent (from an average of 4,272 gpm to about 3,431 gpm). In response to public comments and changes in the mine plan, the model presented in the DEIS has been revised and refined and is now referred to as the 2002 model (URS 2002).

  Development of mine-related RFFAs in the Safford Mining District are likely to result in increased long-term groundwater impacts beyond those predicted for the Dos Pobres/San Juan Project. These increased impacts are likely to result from the short-term impacts associated with increased pumping from production wells, and the longer-term impacts associated with development of a deeper pit and/or additional pits within the mining district.

Cumulative impacts to the regional groundwater flow system are not expected to adversely impact known production wells of other municipal or industrial water users within the Safford Valley. Specific impacts to surface water resources as a result of changes in regional groundwater flow associated with implementation of mine-related RFFAs by PDSI are not known at this time. However, impacts from mine-related RFFAs are expected to increase beyond those predicted by the groundwater model for the Dos Pobres/San Juan Project. These effects will be more accurately predicted in the future, as monitoring programs for the Dos Pobres San Juan Project (see Section 4.9 and Appendix F) help to refine the regional groundwater model's predictive capabilities and as each RFFA is subjected to required environmental permitting and review.

Cumulative impacts to regional groundwater quality will be minimized by the protections inherent in Arizona's APP program. Included within APP permit that would have to be issued for any of the mine-related RFFAs in the Safford Mining District will be requirements to:

- Demonstrate compliance with BADCT design standards to minimize the potential for facilities to impact groundwater quality;
- Establish points of compliance at which the operator must demonstrate to ADEQ that potentially discharging facilities have not caused or contributed to exceedances of aquifer quality standards;
- Establish an alert monitoring system to provide early detection of potential problems;
- Develop contingency plans that clearly state procedures for implementing remedial actions; and
- Develop closure plans and post-closure monitoring plans for each potentially discharging facility.

Implementation of these programs will not only protect local groundwater systems, but will also contribute to the protection of water quality within the Gila River and Bonita Creek and their tributaries within the Safford Valley.

- **Partial Backfill Alternative.** Cumulative effects to groundwater resources of the Safford Valley are similar to those associated with the Proposed Action alternative.
- **No Action Alternative.** Selection of the No Action alternative by the BLM and the cooperating agencies will maintain the existing conditions of the Dos Pobres and San Juan mine sites and will not contribute to adverse cumulative impacts to groundwater resources in the Safford Valley.

< **Surface Water Quantity**

- **Proposed Action Alternative.** Cumulative adverse impacts to surface water quantity are not expected to result from implementation of the Dos Pobres/San Juan Project. Impacts of the Proposed Action to surface water quantity in the Gila River have been described in detail in Sections 4.3.2.5.1 and 4.3.2.6.1 of this document. Two potential sources of impact were identified: retention/detention features incorporated into the mine's stormwater management

facilities and the cone of depression from pumping and pit development. Some stormwater management features of the mine are designed to and will retain stormwater runoff that comes into contact with mine facilities in order to prevent discharge of pollutants to downstream resources. It is estimated that these facilities will decrease tributary runoff to the Gila River by approximately 94 af on an annual basis (Dames & Moore 1998). The second potential source of impact to river flow is a consequence of the cone of depression that is predicted to form in the vicinity of the Project as a result of groundwater pumping during the life of the mine, and the residual impacts of pit lake evaporation on groundwater flow following mine closure. The impact from these groundwater effects is expected to gradually reduce the river's surface flows by a maximum total of approximately 55 af/yr at about 450 years after Project initiation; this total includes predicted groundwater discharge into the pit lakes of 21 acre-feet/year (URS 2002). Together, the total predicted maximum annual impact of the proposed Project from surface water management, groundwater pumping, and pit lake effects is predicted to be 149 af/yr on Gila River flows.

As indicated in proposed water resources mitigation programs for the Dos Pobres/San Juan Project, predicted potential impacts to surface flows in the Gila River or Bonita Creek would be mitigated by PD through the Alternate Year Fallowing Program. Mitigation measures reflect the desire to avoid and minimize any potential indirect impacts to the physical resources that support the Gila River riparian corridor and its biota.

As a result of a proposed mitigation and monitoring plan (outlined in Section 4.9 and in Appendix F), detailed groundwater monitoring and model recalibration efforts will be implemented to verify or refine current projections of the Project's impacts to the regional groundwater system. The Alternate Year Fallowing Program will be implemented to mitigate for the predicted maximum impact to Gila River flows.

The average annual benefit to the Gila River system from the Alternate Year Fallowing Program is estimated to be 480 af/yr, 331 af/yr more than the 149 af/yr of predicted maximum total annual impact of proposed mine-development activities to the Gila River system.[48] This is more than three times the amount of mitigation needed to offset currently predicted model impacts. If, after completion of model recalibration, total maximum impacts to the Gila River are predicted to exceed 480 af/yr, PD will fallow additional decreed acreage to offset any model predicted increases in Project effects at a minimum 1:1 ratio.

As outlined in the MMP provided as Appendix F, the proposed Alternate Year Fallowing Program will have a net benefit to the Gila River system. A significant portion of the predicted impacts (ephemeral stormwater runoff reductions) is associated with episodic flash flood events. Conversely, the benefit to the Gila River from reduced agricultural consumptive use occurs throughout the growing season, during periods of normally reduced or intermittent flow conditions, the period of greatest potential environmental stress to riparian systems found along the Gila River. This benefit is furthermore demonstrated in light of:

- The ephemeral nature of surface water flows affected by proposed mine development compared to the seasonal, perpetual benefits of the Alternate Year Fallowing Program;

[48] Calculation of the annual benefit was determined by multiplying the Annual Consumptive use determined from five years of recorded agricultural activities at the farms that will be used in the Alternate Year Fallowing Program by the total acreage of land that will be fallowed each year. Therefore: 2.4 af/yr/acre*200 acres = 480 af/yr.

- The 480 af/yr reduction in consumptive water use is three times higher compared to the maximum total predicted impacts of 149 af/yr; and

- The maximum modeled impacts to the Gila River system will not occur for approximately 450 years after the Project and then are predicted to decrease after that point; in comparison, the benefits of reduced water consumption of the Alternate Year Fallowing Program would commence immediately upon Project authorization and extend in perpetuity.

It is unlikely that mine-related RFFAs within the Safford Mining District would have unmitigated impacts to surface water resources of the Gila River because of:

- The standing and legal status of aboriginal and decreed surface water rights on the Gila River;

- Resource agency concerns for biological resources (riparian vegetation, endangered species, critical habitat, etc.) along the Gila River near the Safford Mining District;

- Federal Endangered Species Act compliance requirements; and

- The monitoring, evaluation, and mitigation requirements incorporated into the Mitigation and Monitoring Plan for the proposed Dos Pobres/San Juan Project, and the mitigation and monitoring measures that would be required of future mining-related RFFAs.

- **Partial Backfill Alternative.** Cumulative effects to surface water resources of the Gila River are similar to those associated with the Proposed Action alternative.

- **No Action Alternative.** Selection of the No Action alternative by the BLM and cooperating agencies will maintain the existing conditions of the Dos Pobres and San Juan mine sites and will not result in adverse cumulative impacts to surface water quantity in the Safford Valley. The surface water resources associated with offered lands at Tavasci Marsh and Bonita Creek will also not be placed into public ownership and management.

< **Surface Water Quality**

- **Proposed Action.** No significant cumulative impacts to surface water quality are expected from development of the Dos Pobres/San Juan Project because of:

  - The generally positive trends in water quality within the Gila River;

- Features of the Project that respond to the substantive requirements of the CWA[49], which regulates point source and non-point source discharges to waters of the United States;

- The requirement of the Project to adhere to the Arizona's Aquifer Protection Program permit, which regulates discharges to groundwater resources;

- Specific management activities[50] currently underway to minimize or eliminate sources of surface water pollution within the Gila River watershed.

The Project storm water management design is conservative in that it is based upon the 100-yr/24-hr design storm event concurrent with a 24-hr power outage and BADCT standards, which greatly diminish the potential risk for accidental discharge of contaminants into both surface and groundwater systems. However, no design standard can guarantee, with absolute certainty, that there will not be an accidental discharge. If there is a discharge, it would most likely occur during extremely rare instances of increased surface water runoff that exceed the design standard. The high volumes of water associated with a storm event of a magnitude that would exceed Project design standards would also dilute such discharges. The risks of discharges are further reduced through implementation of a Spill Prevention Control and Countermeasures (SPCC) Plan, Stormwater Pollution Prevention Plan, and by the 6+ mile distance between the proposed Project and the Gila River, the nearest perennial surface water system. Thus, while these risks are generally comparable to the risks presented by other municipal, industrial, and agricultural uses within the Upper Gila watershed, the potential for cumulative impacts to water quality is very low and limited to periods of rare extreme storm events.

- **Partial Backfill Alternative.** Cumulative effects to surface water resources of the Gila River are identical to those associated with the Proposed Action alternative.

- **No Action Alternative.** Selection of the No Action alternative by the BLM and cooperating agencies will maintain the existing conditions of the Dos Pobres and San Juan mine sites and will not result in adverse cumulative effects to surface water quality in the Safford Valley.

[49] The Clean Water Act includes a number of substantive provisions that regulate the discharge of pollutants to the Gila River. These programs include: Section 401 which requires state the state to certify the discharge of dredged and fill material will not violate state water quality standards; Section 402 which regulates the point source and non-point source discharge of pollutants to waters of the United States; and Section 404 which regulates the discharge of dredge and fill material to waters of the United States. The principal federal agencies responsible for these programs are the ADEQ and the Corps, which is a cooperating agency for this EIS. These agencies would have oversight and permitting authority for all RFFAs that have the potential to discharge pollutants to surface water resources.

[50] These projects include recent APP activities at the Morenci Mine, the Gold Gulch Surface Water Management project, and the Gila Monster, an interstate watershed program consisting of more than 70 interested parties. The Gila Monster was formed to develop and implement strategies for management of non-point source loadings into the 8,500,000-acre Upper Gila watershed.

< **Waters of the U.S.**

C **Proposed Action Alternative.** As discussed in section 4.3.2.6.5, a total of 114.6 acres of waters of the United States will be directly or indirectly impacted by development of the proposed Dos Pobres/San Juan Project. The majority of these impacts are indirect (93.2 acres) and result from stormwater diversions and reduction in contributory watershed area. Only 21.4 acres of waters of the United States will be directly impacted by fill or excavation activities. For waters of the United States indirectly impacted by the proposed Project, the impact to identified functions is estimated to be a maximum of 50 percent at any point within the areas of indirect impact. Thus, the COE is requiring mitigation for 68 acres of waters of the United States [21.4 acres + (93.2 acres x 0.5) = 68 acres of mitigation].

Development of other foreseeable mining projects in the Safford Mining District (Lone Star, Dos Pobres sulfide, and Sanchez) is estimated to increase the acreage of waters of the United States affected by these projects to approximately 295 acres (including impacts from the Dos Pobres/San Juan Project). The acreage of mitigation required for direct and indirect impacts to waters of the United States from reasonably foreseeable future mining activities in the district, including the Dos Pobres/San Juan Project, is approximately 200 (WestLand Resources 1998). This cumulative mitigation requirement is based upon an analysis similar to that used to determine mitigation requirements for the Dos Pobres/San Juan Project.

C **Partial Backfill Alternative.** Cumulative impacts to waters of the United States are expected to be similar to those associated with the Proposed Action alternative.

C **No Action Alternative.** Selection of the No Action alternative by the BLM and cooperating agencies will maintain the existing conditions of the Dos Pobres and San Juan mine sites and will not result in adverse cumulative effects to waters of the United States.

4.5.3.1.3 Biological Resources

The discussions and analysis of cumulative impacts to biological resources are presented in the next two sections: Vegetation and Wildlife; and Threatened and Endangered Species and Designated or Proposed Critical Habitat.

< **Vegetation and Wildlife**

C **Proposed Action Alternative.** Given the past impacts to upland and riparian habitats that have resulted from development and continued operation of agricultural activities in the Safford Valley, and the potential impacts that would result from full development of 11,675 acres of mine-related RFFAs, the Project would contribute to cumulative impacts to vegetation and wildlife in the Safford Valley. However, on a regional or statewide scale these impacts are not considered cumulatively significant. This conclusion is supported by:

C The acquisition of over 2.9 million acres of public lands in Arizona since 1964;

C The widespread distribution and relatively low value of upland and xeroriparian habitats that will be impacted by proposed development of the Dos Pobres/San Juan Project;

- Land tenure RFFAs (including the Land Exchange alternative) that would result in a loss of less than one percent of the net increase in federal public lands since 1964; and

- Legally mandated changes in the renewable resources management focus and practice by the BLM and the USFS as a result of recent court actions by special-interest groups.

- **Partial Backfill Alternative.** Cumulative impacts to vegetation and wildlife resources are expected to be similar to those associated with the Proposed Action alternative.

- **No Action Alternative.** Selection of the No Action alternative by the BLM and cooperating agencies will maintain the existing conditions of the Dos Pobres and San Juan mine sites and will not result in adverse cumulative effects to vegetation and wildlife resources.

< **Threatened and Endangered Species/Designated or Proposed Critical Habitat**

- **Proposed Action Alternative.** Formal Section 7 consultation was initiated by the BLM for this project in May 1999 and was concluded in June 2002. The USFWS in their biological opinion concluded that the proposed Project or the proposed mitigation activities would not jeopardize the continued existence of southwestern willow flycatcher. While transitory effects may have occurred as a result of salt cedar eradication at the Pima mitigation site, the site is expected to remain suitable for the flycatcher and in fact follow-up surveys have shown a substantial increase in the number of nesting flycatchers at this site. The USFWS did not anticipate any take of an endangered species or adverse effects to proposed or designated critical habitat resulting from implementation of the proposed action and therefore, no adverse cumulative impacts are anticipated.

- **Partial Backfill Alternative.** Cumulative impacts to threatened and endangered species and designated or proposed critical habitat are not expected.

- **No Action Alternative.** Selection of the No Action alternative by the BLM and cooperating agencies will maintain the existing conditions of the Dos Pobres and San Juan mine sites and will not result in adverse cumulative impacts to threatened and endangered species or designated or proposed critical habitat.

4.5.3.1.4 Cultural Resources

< **Proposed Action Alternative.** This alternative would contribute to the total number of archaeological sites impacted by development, however, actions to avoid physical impacts to sacred Indian sites have been successfully incorporated into the MPO. Affected cultural resources on federal lands are subject to consideration under NHPA, NAGPRA, AIRFA, Executive Order 13007, and other federal laws and regulations. This protection extends to sites on private land potentially affected by actions requiring federal approval. Under federal law, the responsible federal agency must develop mitigation, or treatment, plans for affected sites eligible for inclusion in the National Register of Historic Places. Agencies must also consult with Indian tribes that claim cultural affiliation with a project area to develop plans for handling potential burials, to identify TCPs and sacred places in the project area, and to develop treatment plans for such sites.

Treatment plans for archaeological sites and sacred sites may include avoidance of the site, protection of the site by buffer zones and/or fencing, and guaranteed access to sacred sites. When avoidance is not possible, treatment generally consists of a program to gather information from or about the site, using means appropriate to the site (e.g., data recovery, records search, and interviews with knowledgeable individuals). Because of these measures, a substantial amount of information has been or will be accumulated about the prehistoric and historic occupation of the region. Information is being gained, but the physical site itself is also being irrevocably lost. Some tribes have expressed that, in their view, this loss is unmitigable.

Considering: 1) the land tenure adjustments outlined in Section 4.5.2.3 that have resulted in significant increases in federal public land holdings in Arizona; and 2) compliance with cultural resource regulations by federal, state, and local land jurisdictions, the loss of information and understanding that historically resulted from the unmitigated destruction of archaeological sites has been reduced significantly over the past several decades. The implementation of a state and federally approved data recovery program with extensive involvement and participation by interested Native American groups as a condition of the proposed project will mitigate for potential adverse direct and indirect effects. The mitigation program minimizes the loss of information and data regarding the history and prehistory of the region, provides for the appropriate treatment of any human remains encountered, and provides for the preservation in place of sacred sites in a manner acceptable to the consulted Native American groups. This further reduces potential cumulative impacts of the proposed project. In this context, the implementation of the Proposed Action alternative is not expected to result in significant adverse cumulative impacts to cultural resources.

< **Partial Backfill Alternative.** Cumulative effects of this alternative on cultural resources would be the same as those described under the Proposed Action alternative.

< **No Action Alternative.** Selection of the No Action alternative by the BLM and cooperating agencies will maintain the existing conditions of the Dos Pobres and San Juan mine sites and will not result in adverse cumulative effects on cultural resources.

4.5.3.1.5 Socioeconomic Resources

< **Proposed Action Alternative.** As outlined in Section 4.3.5, socioeconomic effects of the Proposed Action alternative stem from additional employment and revenue generated by the Proposed Action. The total construction and operations payroll over the life of the Project is estimated to be $214 million. Cumulatively, taxes paid by PD (excluding employee income taxes) for property, sales, income, payroll, construction, and severance taxes are estimated to total more than $420 million during the Project's 16-year life.

From 1995 to 2005, the total number of new households in Graham County is expected to increase by 3,466 (ESI 1997). Implementation of the Proposed Action alternative will create approximately 145 new households; 108 from direct employment and 37 from indirect employment. This represents approximately 5.9 percent of projected population increase and 3.5 percent of the projected new home demand for Graham County. For mine-related RFFAs, there are no specific economic data from which to estimate cumulative effects. Conservatively, mine-related RFFAs within the Safford area could extend the direct effects outlined above by an additional 20 years (J. Korolsky, PDSI, pers. comm.). The degree of increased economic activity that results from mine-related RFFAs will be largely dependent upon the degree of overlap that occurs among these mine-related RFFAs.

Anticipated growth and the subsequent increased demand for public services that would result from the Proposed Action are relatively small percentages of the projected growth for Graham County area for the 1995 to 2005 period. New demands on infrastructure resulting from the Project are disproportionately small relative to the socioeconomic benefits from additional tax revenues that would be generated directly and indirectly by the Project; cumulative impacts to socioeconomic resources of the Safford area are expected to be positive.

< **Partial Backfill Alternative.** Cumulative effects of the Partial Backfill alternative would be similar to the effects of the Proposed Action alternative.

< **No Action Alternative.** Selection of the No Action alternative by the BLM and cooperating agencies would not significantly affect the existing and projected growth patterns of the region, however, the Project's cumulative economic contributions in the form of various local, state, and federal taxes would not accrue to the economic development of the region.

4.5.3.1.6 Indian Trust Assets

< **Proposed Action Alternative.** As outlined in Section 4.3.6.1, the proposed action is not expected to result in any significant adverse impact to Indian trust assets. Proposed mitigation for predicted physical impacts to surface water of the Gila River are expected to result in a net benefit to the river; the very slight increase in the current rate of groundwater flow from the San Carlos Apache Reservation southward towards the Gila River and the nearly zero decline in the groundwater table on the Reservation is unmeasurable and not considered significant. Considering these effects in the context of past, present, and reasonably foreseeable future actions, the proposed project is not expected to result in significant adverse cumulative effects to Indian trust assets.

< **Partial Backfill Alternative.** Cumulative effects of the Partial Backfill alternative would be similar to the effects of the Proposed Action alternative.

< **No Action Alternative.** Selection of the No Action alternative by the cooperating agencies would not result in any significant adverse impact to Indian trust assets.

4.5.3.2 Land Exchange Alternatives Set

Two alternatives are presented: the Proposed Land Exchange alternative and the No Land Exchange alternative. Under the No Land Exchange alternative, BLM's land management responsibility for the selected lands would remain unchanged and mining operations have been assumed to proceed through implementation of the proposed Mining Plan of Operations or the Partial Backfill alternative presented in the Mine Plan Alternatives Set.

4.5.3.2.1 Land Use

The land use evaluation of cumulative impacts focuses on two categories: Land Tenure and Visual Resources. Land Tenure focuses upon the changes in federal land ownership that have or are likely to take place in the future on a state-wide basis. The Visual Resources discussion centers on the likely cumulative impacts to visual resources in the Safford Valley.

Land Tenure

< **Land Exchange Alternative.** Considering past, present (in process), and RFFA land tenure adjustments and the nature and values of the resources proposed for public acquisition through the Safford Land Exchange, the exchange alternative is not expected to have a significant adverse cumulative impact to public land tenure and management. Table 4-33 summarizes the net change in acreage of land management responsibilities for both the USFS and BLM that have or are reasonably expected to occur as a consequence of this land exchange as well as others in the foreseeable future.

Since 1964, the BLM, USFS, NPS, and USFWS combined have acquired management responsibility for more than 2.9 million acres of public lands to facilitate and enhance their resource management objectives in Arizona. The land exchanges currently being considered by the BLM and USFS (Table 4-33) continue these management-focused activities (see discussions in section 4.5.2.4 for additional information relating to biological resources on the offered and selected lands). The net reduction in federal lands (1,669 acres) that would result from the land tenure adjustments currently being considered by the BLM and USFS in Arizona represents about 0.05 percent of the net gain in federal lands in Arizona that occurred from 1964 to 1993.

All of the federal land exchanges currently in process or proposed are being evaluated under the guidelines and requirements of NEPA and must be consistent with the broader planning goals and objectives of the lead land management agency. For example, land acquisition objectives by the Safford Field Office are defined by their Resource Management Plan (BLM 1991, 1994b). Within this plan, the Safford Field Office has identified 24 LTMAs in which the BLM will intensively retain and manage public lands for their multiple resource values. Within these LTMAs the BLM intends to retain all public land and may seek to acquire state and private lands located therein. Future land acquisitions in the Safford Field Office through either exchange or purchase by the BLM will focus on improving agency management capabilities and protecting critical or important natural resources.

Permitting of the Proposed Action alternative by the COE, should the BLM select the Land Exchange alternative, will not result in significant adverse cumulative impacts to public lands tenure.

< **No Land Exchange Alternative.** No cumulative impacts are expected as a result of implementation of this alternative. Any effects would be similar to those reported in discussion of the cumulative effects of the proposed mining plan of operations or the partial backfill alternative. With selection of the No Land Exchange alternative by the BLM, approximately 3,543 acres of lands within Long-term Management Areas (LTMA) will not be acquired and the potential benefits that result from changes in land management goals and objectives for these properties will not be realized. Selection of this alternative by the BLM will also not result in disposal of 16,297 acres of public lands, all or some of which could be subject to patent in the future. After considering historic changes in public land tenure in Arizona and the resource management benefits that have occurred as a result, significant cumulative impacts to public land tenure are not expected from the selection of the No Land Exchange Alternative.

< **Visual Resources**

C **Land Exchange Alternative.** Land tenure adjustments associated with the proposed exchange, in and of themselves, will not result in significant adverse cumulative effects to visual resources in the Safford Valley.

If the BLM selects the Land Exchange alternative, permitting of either the Proposed Action or the Partial Backfill alternative by the COE will result in the creation of landscape features, most notably the development rock stockpiles and the leach pad, that strongly contrast with the form and line of the existing landscape. The color of the development stockpiles and the leach pad will be similar to the colors of the Gila Mountains and will provide a weak contrast to the surrounding terrain. Because of the distance from key observation points, no contrast in the texture of the proposed action with surrounding land forms is expected. It is expected that collectively, the RFFAs within the Safford Mining District will result in an estimated 11,675 acres of additional mining-related disturbance and implementation of the Proposed Action or the Partial Backfill Alternatives, in conjunction with the proposed land exchange, will have cumulative effects.

C **No Land Exchange Alternative.** When considering the distance from key observation points and the nature of RFFAs, selection of this alternative will result in cumulative effects similar to those identified for the proposed land exchange alternative.

4.5.3.2.2 Physical Resources

The discussions and analysis of cumulative impacts to physical resources are focused upon three distinct resource elements; Air Quality, Groundwater Resources, and Surface Water Resources.

< **Air Quality**

C **Land Exchange Alternative.** Land tenure adjustments associated with the proposed exchange, in and of themselves, will not result in adverse cumulative effects to air resources in the Safford Valley.

If the BLM selects the Land Exchange alternative, permitting of either the Proposed Action or the Partial Backfill alternative by the COE would result in the cumulative impacts to air resources described for the Proposed Action alternative.

C **No Land Exchange Alternative.** Cumulative effects to air resources of the Gila River Valley would be the same as those associated with the Proposed Action alternative (the Dos Pobres San Juan Project Mining Plan of Operations).

< **Groundwater Resources**

C **Land Exchange Alternative.** Land tenure adjustments associated with the proposed exchange, in and of themselves, will not result in significant adverse cumulative effects to groundwater resources in the Safford Valley.

If the BLM selects the Land Exchange alternative, permitting of either the Proposed Action or the Partial Backfill alternative by the COE would result in the cumulative impacts to groundwater resources described for the Proposed Action alternative.

C **No Land Exchange Alternative.** Cumulative effects to groundwater resources of the Safford Valley would be the same as those associated with the Proposed Action alternative.

< **Surface Water Quantity**

C **Land Exchange Alternative.** Land tenure adjustments associated with the proposed exchange, in and of themselves, will not result in significant adverse cumulative effects to surface water resources in the Safford Valley. Acquisition of the offered lands by the BLM will result in a net gain of surface water rights by the BLM of approximately 700 af/yr. Significant surface water features that will be acquired through the exchange include 324 acres of wetland and adjacent upland habitats at Tavasci Marsh (SWCA 1996b) and 935 acres consisting of the Curtis and Amado properties, which contain hydroriparian and aquatic resources associated with Bonita Creek in the Gila Box RNCA (ibid.).

If the BLM selects the Land Exchange alternative, permitting of either the Proposed Action or the Partial Backfill alternative by the COE is not expected to result in cumulative adverse impacts to surface water quantity following implementation of mitigation measures outlined in the Mitigation and Monitoring Plan included as Appendix F to this document.

It is unlikely that mine-related RFFAs within the Safford Mining District would have unmitigated impacts to surface water resources of the Gila River because of:

C The standing and legal status of aboriginal and decreed surface water rights on the Gila River;

C Resource agency concerns for biological resources along the Gila River near the Safford Mining District;

C Federal Endangered Species Act compliance requirements; and

C The monitoring, evaluation, and mitigation requirements incorporated into the Mitigation and Monitoring Plan for the proposed Dos Pobres/San Juan Project, and mitigation and monitoring measures that would be required of future mining-related RFFAs.

C **No Land Exchange Alternative.** Cumulative effects to surface water resources of the Gila River would be the same as those associated with the Proposed Action alternative presented in the Mine Plan Alternative Set.

< **Surface Water Quality**

C **Land Exchange Alternative.** Land tenure adjustments associated with the proposed exchange, in and of themselves, will not result in adverse cumulative effects to surface water resources in the Safford Valley.

Implementation of the RFFAs anticipated for the selected lands following an exchange will require authorization/approval under a variety of federal and state regulations. Under either federal or private land ownership, all mining operations must be conducted in compliance with the substantive federal and state laws that protect environmental quality, including the Clean Water Act and Arizona's Aquifer Protection Permit (APP) program under Arizona Revised Statutes Title 49 and Arizona Administrative Code Title 18.

If the BLM selects the Land Exchange alternative, permitting of either the Proposed Action or the Partial Backfill alternative by the COE is not expected to result in cumulative adverse impacts to surface water quality.

- **No Land Exchange Alternative.** Cumulative effects to surface water resources of the Gila River would be the same as those described for the Proposed Action alternative.

< **Waters of the United States**

- **Land Exchange Alternative.** Land tenure adjustments associated with the proposed exchange, in and of themselves, will not result in adverse cumulative impacts to waters of the United States. If the BLM selects the Land Exchange alternative, permitting of either the Proposed Action or the Partial Backfill alternative by the COE will result in cumulative adverse impacts identical in scope to those reported for the Proposed Action alternative.

- **No Land Exchange Alternative.** Cumulative impacts to waters of the United States would be the same as those associated with the Proposed Action alternative.

4.5.3.2.3 Biological Resources

The discussions and analysis of cumulative impacts to biological resources are focused upon two distinct resources; Vegetation and Wildlife, and Threatened and Endangered Species and Designated or Proposed Critical Habitat.

< **Vegetation and Wildlife**

- **Land Exchange Alternative**. Land tenure adjustments associated with the proposed exchange, in and of themselves, will not result in adverse cumulative impacts to vegetation and wildlife resources in the Safford Valley. The land exchange would continue state-wide trends in federal land ownership that have placed valuable vegetation and wildlife resources (e.g., Tavasci Marsh and portions of Bonita Creek) or lands that improve manageability of public lands (e.g., lands adjacent to the Dos Cabeza Mountains Wilderness and lands within the Las Cienegas Resource Conservation Area) into public ownership.

  If the BLM selects the Land Exchange alternative, permitting of either the Proposed Action or the Partial Backfill alternative by the COE will result in cumulative adverse impacts identical in scope to those described for the Proposed Action alternative.

- **No Land Exchange Alternative.** Cumulative impacts to vegetation and wildlife resources would be the same as those associated with the Proposed Action alternative.

< **Threatened and Endangered Species and Designated or Proposed Critical Habitat**

- **Land Exchange Alternative.** Land tenure adjustments associated with the proposed exchange, in and of themselves, will not result in adverse cumulative impacts to threatened and endangered species or proposed or designated critical habitat. Beneficial impacts are expected as a result of the land exchange. Bald eagle, American peregrine falcon, southwestern willow flycatcher, and lesser long-nosed bat are known to occur or are considered likely to occur on several of the offered land parcels (see section 4.4.3.3.2 for

additional discussion). Acquisition of the Tavasci Marsh, Curtis, and Amado offered properties will cumulatively increase the acreage of designated critical habitat, for spikedace, loach minnow, Gila topminnow, and southwestern willow flycatcher under federal management, protection, and control.

If the BLM selects the Land Exchange alternative, permitting of either the Proposed Action or the Partial Backfill alternative by the COE is not expected to result in cumulative adverse impacts to threatened and endangered species or proposed or designated critical habitat. This determination of cumulative effects is supported by the Biological Opinion issued by USFWS for the Project (USFWS 2002).

C **No Land Exchange Alternative.** Cumulative impacts to threatened and endangered species and designated or proposed critical habitat are not expected.

4.5.3.2.4 Cultural Resources

< **Land Exchange Alternative.** The proposed land exchange *per se* would not contribute to the cumulative physical impact on cultural resources resulting from the activities listed in Table 4-38. The proposed land exchange would, however, contribute to the total number of cultural resources shifted from public ownership to private ownership and from private ownership to public ownership. Cultural resources removed from public ownership would no longer be subject to federal oversight and consideration under NHPA, AIRFA, NAGPRA, Executive Order 13007, and other federal laws and regulations unless proposed activities that would result in adverse impact to these resources required federal approval. Under current regulation, this applies to all but the smallest development activities. Mining, commercial, and industrial activities, most residential subdivisions and development projects, etc. all require federal approval and thus trigger the full protection of NHPA and other applicable federal regulations. Cultural resources that contain human remains and other funerary objects that occur on private lands would be subject to the protections of applicable state regulations. Cultural resources transferred to public ownership with federal management would be protected by a suite of applicable federal regulations.

Under the three proposed or approved land exchanges in the general region (Safford, ASARCO Ray, and Morenci) that are associated with proposed mining activities, a maximum of 143 archaeological sites would be transferred from public to private ownership. The majority of these sites are prehistoric and considered to be TCPs by at least one tribe consulted by federal agencies. In addition, several specific sites have been identified as being of traditional importance to one or more tribes and at least three sites have been determined to be sacred sites per Executive Order 13007.

Cultural resources on offered lands would also shift from private ownership to public ownership. Public acquisition of offered lands would result in additional cultural resources becoming subject to federal oversight and protection under NHPS, AIRFA, NAGPRA, Executive Order 13007, and other pertinent federal laws and regulations. The total number and type of sites in this category on the offered lands are unknown, therefore, the net impact on cultural resources from these exchanges cannot be quantified.

Foreseeable uses of the selected lands in these three land exchanges would result in the loss of and/or damage to a large portion of the cultural resources recorded in the project areas.[51] The total

[51] Treatment plans as described under the Proposed Action Alternative in Section 4.5.3.1.4 have been or are currently being prepared for these sites.

number cultural resource sites within the selected lands is a small percentage of the recorded and unrecorded sites found within the geographic scope of the cumulative impacts assessment but the number is expected to be substantial. While the exact acreage of the lands within the geographic scope of the cumulative impact assessment that have been subjected to formal cultural resources investigation is unknown, it is not unreasonable to presume that the majority of this area has not been surveyed for cultural resources. For example, 3,984 archaeological sites are known in Pima County, a large county located west of the study area and containing similar landform and resource elements. Yet, only 12.1% of the lands within Pima County have ever been formally investigated for cultural resources (Sonoran Desert Conservation Plan Report -- Cultural and Historic Resources Element: Saving the Past for the Future, Pima County, August 2000).

Considering: 1) the land tenure adjustments outlined in Section 4.5.2.3 that have resulted in a net increase of more than 2.9 million acres in federal public land holdings in Arizona; and 2) the implementation of cultural resource regulations by federal, state, and local land jurisdictions, the loss of information and understanding that historically resulted from the unmitigated destruction of archaeological sites has been reduced significantly over the past several decades. The implementation of a state and federally approved data recovery program with extensive involvement and participation by interested Native American groups as a condition of the land exchange mitigates for potential adverse direct and indirect effects. The mitigation program minimizes the loss of information and data regarding the prehistory of the region, provides for the appropriate treatment of any human remains encountered, and provides for the preservation in place and access to sacred sites in a manner acceptable to consulted Native American groups. This further reduces potential cumulative adverse impacts of the proposed project. In this context, the implementation of the Land Exchange alternative is not expected to result in significant adverse cumulative impacts to cultural resources.

< **No Land Exchange Alternative.** Cumulative effects of this alternative on cultural resources would be the same as those described under the Proposed Action alternative.

4.5.3.2.5 Socioeconomic Resources

< **Land Exchange Alternative.** With the exception of increased property taxes that result from privatization of the selected lands, there are no anticipated cumulative effects within the Safford Area beyond those anticipated for the Proposed Action and Partial Backfill alternatives. Reductions in the property tax payments associated with the federalization of offered lands will be offset to a degree by Payments in Lieu of Taxes (PILT) from the federal government to the counties in which the offered lands are located. As all of these properties are assessed as rural/agricultural/vacant lands, one of the lowest tax categories, none of the counties are expected to be significantly affected by lost tax revenues.

If the BLM selects the Land Exchange alternative, permitting of either the Proposed Action or the Partial Backfill alternative by the COE will result in cumulative adverse impacts similar in scope to those reported for the Proposed Action alternative.

< **No Land Exchange Alternative.** Cumulative effects of the No Land Exchange alternative would be the same as those of the Proposed Action alternative.

4.5.3.2.6 Indian Trust Resources

< **Land Exchange Alternative.** The land exchange, in and of itself, will not result in any adverse impacts to Indian trust assets. Permitting of currently proposed mine activities by the COE on the selected lands will require implementation of the substantive requirements of the Mitigation and Monitoring Plan that will be made a part of any Corps permit issued for the proposed Dos Pobres/ San Juan Project. Further, we anticipate that similar requirements will exist for future foreseeable mining activities on the selected lands.

< **No Land Exchange Alternative.** Cumulative effects of the No Land Exchange alternative would be the same as those of the Proposed Action alternative.

4.6 IRRETRIEVABLE AND IRREVERSIBLE COMMITMENTS OF PUBLIC RESOURCES

This section identifies irretrievable or irreversible commitments of public resources that would likely occur with each of the alternatives. An irretrievable commitment of a resource occurs when the use or productivity of a renewable resource is lost over a limited period of time; for example, grazing suspended in an area during mining activity but resumed through post-mining land uses as rangeland. In this example, the grazing productivity during the period of suspension is irretrievably lost. An irreversible commitment occurs when a nonrenewable resource is permanently lost; for example, the extinction of a species. This analysis of irretrievable or irreversible commitments of public resources is provided in a comparative tabular format for both the Mine Plan Alternatives Set and the Land Exchange Alternatives Set and follows the general organization of resource categories used throughout this document.

4.6.1 Mine Plan Alternatives Set

4.6.1.1 Proposed Action Alternative

Table 4-44 summarizes the irretrievable and irreversible commitments of resources resulting from implementation of the Proposed Action alternative.

4.6.1.2 Partial Backfill Alternative

The Partial Backfill alternative would result in irretrievable and irreversible commitments of resources identical to those described for the Proposed Action alternative. The specific nature of these impacts is discussed in detail in earlier sections of this chapter and in Table 4-44.

4.6.1.3 No Action Alternative

This alternative would not irretrievably or irreversibly commit resources of public lands or federal agencies.

4.6.2 Land Exchange Alternatives Set

4.6.2.1 Land Exchange Alternative

The Land Exchange alternative itself would be an irretrievable and irreversible commitment of public selected lands and their resources. The specific nature of these impacts on land use, and physical, biological, cultural,

Table 4-44. Irretrievable and Irreversible Commitments of Public Resources Associated with the Proposed Action Alternative

Major Category	Subcategory	Irretrievable Commitments of Resources	Irreversible Commitments of Resources
Land Use	Access/ Recreation	None	Loss of public access on the San Juan Mine Road; loss of dispersed recreation (hunting, recreational driving) on public lands at mine site; mitigated by upgrading an existing alternate route to public recreation areas
	Grazing	Loss of grazing on 3,238 acres of public lands removed from BLM grazing allotments during life of Project but would be returned to allotments after mine closure	Permanent loss of 1,931 acres of public lands in BLM grazing allotments due to surface disturbance by mining activity
	Noise and Vibrations	Loss of quiet for short periods daily in Safford area during life of Project due to noise and low-level vibrations from mine blasting	None
	Visual Resources	None	Modification of natural forms, colors, textures, and structures of the landscape of mine site as seen from the Safford area
Physical Resources	Climate	None	On very localized scale, minor changes in wind patterns on mine site resulting from topographical changes from mining facilities
	Air Quality	Reduced air quality in project area during life of Project due to increased emissions for some criteria pollutants (but no standards are predicted to be exceeded)	None
	Geology (Mineral Potential)	None	Loss through extraction of most known metallic mineral resources and some aggregates on lands in project area
	Soils	Loss of productivity of stockpiled project area soils (all poor quality) until used for concurrent and post-mine reclamation efforts	Loss of soils (all poor quality) from public lands removed or covered during mine development but not stockpiled for reclamation purposes
	Groundwater Quantity	Nearly zero decline in groundwater table elevation due to pumping at Project; commitment of resource reversible but not in a human time frame (>3,000 yrs); physical effects on Gila River flows mitigated	None

Table 4-44, continued. Irretrievable and Irreversible Commitments of Public Resources Associated with the Proposed Action Alternative

Major Category	Subcategory	Irretrievable Commitments of Resources	Irreversible Commitments of Resources
	Surface Water Quantity	Reduced water flow (94 af/yr average) in some washes due to stormwater diversions on the mine site; although this commitment of resource is reversible, since the Project is a zero-discharge facility it is essentially irretrievable for the foreseeable future; physical effects on Gila River flows would be mitigated in perpetuity	Loss of washes and associated surface water flow due to fill and excavation activity during mine development; loss of DP seep; physical effects on Gila River flow mitigated
	Waters of the U.S.	Same as above; 93.2 acres of jurisdictional waters affected during mining operations	Same as above; 21.4 acres of jurisdictional waters lost due to mine facilities
Biological Resources	Vegetation	Loss of productivity of an unquantified amount of Sonoran Desertscrub, Sonoran Desertscrub/ semidesert Grassland Ecotone, and Xeroriparian vegetation on parts of mine site slated for reclamation until those areas are revegetated as a result of human effort or natural processes	Loss of an unquantified amount of Sonoran Desertscrub, Sonoran Desertscrub/semidesert Grassland Ecotone, and Xeroriparian vegetation from unreclaimed areas of mine site (pits).
	Wildlife	Reduced wildlife presence in project area due to lost habitat as described above and from noise, nighttime lighting, and other human activity during life of Project	Reduced wildlife presence due to lost habitat as described above or destruction of wildlife, particularly small animals like invertebrates, reptiles, or rodents, due to construction and mining activity
	Special Interest Species	None	Due to surface disturbance by mining activity, loss of mine features potentially used by special status bats, loss of population of Pima Indian mallow, and loss of some Gila monster habitat and individuals
Cultural Resources	Archaeological Sites	None	Loss of 13 archaeological sites on public lands and 24 on PD land due to surface disturbance by mining activity; potential loss of scientific information about history/prehistory may be offset by archaeological data recovery and analysis
	Traditional Cultural Properties	None	Loss of 10 sites on public lands and 16 sites on PD land identified as TCPs by Indian tribes; tribal access to some sacred sites during and after operations prevents irreversible impacts
Indian Trust Resources	Indian Trust Assets	Unmeasurable but predicted temporary impact to groundwater flow under the San Carlos Apache Reservation (very small increase in rate of flow off the Reservation). The current model predicts a nearly zero decline of the groundwater table elevation, which could be confirmed or revised by future model recalibration(s).	None

socioeconomic, and Indian trust resources is discussed in detail in earlier sections of this chapter, along with discussion of proposed mitigation for adverse impacts. There would also be an irretrievable loss of BLM authority for management of the public resources on the selected lands; however, federal oversight for future land uses on the selected lands as private lands is required for activities subject to compliance with the CWA, the Clean Air Act, and other federal laws and regulations.

While acquisition of the offered lands is not mitigation, *per se*, for loss of the selected lands, the resources of the lands acquired by the public are meant to provide public benefit and value equal to or beyond those values associated with the selected lands.

The foreseeable uses of the selected lands would have irretrievable and irreversible commitments of resources described in part in Section 4.6.1.1 above. Additional irretrievable commitments of resources similar to these would be expected if the foreseeable uses at Dos Pobres sulfide and Lone Star were implemented in the future.

4.6.2.2 No Land Exchange Alternative

This alternative would not, in and of itself, irretrievable or irreversibly commit any resources associated with the selected or offered lands. It would commit BLM personnel to subsequently make a decision regarding the one of the mine plan alternatives, and given the regulations at 43 CFR § 3809, it is likely that a mine plan alternative would be authorized

4.7 SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY

This section identifies the impacts to long-term productivity of resources resulting from the short-term uses proposed by the alternatives in both the Mine Plan Alternatives Set and the Land Exchange Alternatives Set. Long-term productivity refers to the ability for continued production or sustained yield of a resource (i.e., the productivity of renewable resources). Short-term uses include activities such as mineral extraction, timber and fuelwood harvesting, recreation uses, livestock grazing, and special land uses. The analysis is focused on impacts of the alternatives on renewable resources, such as soils, vegetation, and surface water and groundwater quantity and quality, upon which productivity is generally based.

4.7.1 Mine Plan Alternatives Set

4.7.1.1 Proposed Action Alternative

The mineral extraction activities proposed in this alternative would affect the long-term productivity of some soils, vegetation, and both surface and groundwater resources on the public lands proposed for mining. The long-term productivity of most soils and vegetation resources in the proposed mining areas would be permanently lost through surface disturbance, burial under stockpiles or leach pad, or other construction. These impacts would subsequently have long-term but localized adverse impacts on other resources, such as wildlife and wildlife habitat, grazing capacity, some dispersed recreational opportunities, and on public access within those disturbed areas. Reclamation measures, such as revegetation and removal of structures and roads, would mitigate this loss of soil and vegetation productivity to some degree.

Impacts to the long-term productivity of surface and groundwater quantity are evidenced by the anticipated long-term by slight lowering of groundwater elevations in the region of the Project. While the consequent

impacts of this on surface water quantity in the Gila River can and would be mitigated (see Appendix F), this long-term change in groundwater gradients in the project area resulting from the cone of depression and mine pits is nearly zero and would not potentially affect the long-term yield and availability or, or access to, groundwater to current and future users of this resource, including residents of the San Carlos Apache Reservation (the current model predicts an impact to water table elevation of nearly zero, a prediction that could be confirmed or revised by future model recalibrations).

Impacts to the long-term productivity of surface and groundwater quality have been minimized through a variety of environmental protection measures, such as the use of liner systems; secondary containment systems; stormwater diversions and detention and retention basins; application of BADCT criteria for design, construction, and operation of potentially discharging facilities; and operation of the Project as a non-discharge facility under Section 402 of the CWA. Thus, the current quality of the surface and groundwater resources is expected to be maintained and with it its long-term productivity as a renewable resource.

4.7.1.2 Partial Backfill Alternative

This alternative would be expected to result in identical impacts to long-term productivity of soil, vegetation, and water resources as the Proposed Action alternative.

4.7.1.3 No Action Alternative

This alternative would have no impact on the long-term productivity of soils, vegetation, and water resources.

4.7.2 Land Exchange Alternatives Set

4.7.2.1 Land Exchange Alternative

In a strict sense, a land exchange alternative does not involve any “short-term uses” of resources; public lands would be placed permanently into private ownership. As such, this alternative, which is a realty action, would not affect the long-term productivity of soil, vegetation, or water resources of the selected lands. However, foreseeable uses of the selected lands (mining) would result in the same impacts to long-term productivity as those described for the Proposed Action alternative and would also include similar impacts to productivity of resources on the Dos Pobres sulfide and Lone Star areas of the selected lands that would occur later in time. The long-term productivity of renewable resources acquired on the offered lands would benefit from this alternative, as BLM’s “management [of public lands] is based upon the principles of multiple use and sustained yield...” (see inside front cover for BLM and Safford Field Office’s mission statements).

4.7.2.2 No Land Exchange Alternative

This alternative, in and of itself, would have no impacts on the long-term productivity of resources on federal lands. However, since mining is the reasonably foreseeable use of the selected lands given the BLM’s subsequent requirement to select a mine plan alternative if this alternative is chosen, the impacts to long-term productivity would be identical to those described in Section 4.7.1. The long-term productivity of the offered lands would be subject to private management by PDSI.

4.8 UNAVOIDABLE ADVERSE IMPACTS

Unavoidable impacts are those impacts that remain following the implementation of all applicable mitigation measures. This section describes the impacts resulting from the Project or its alternatives that are both unavoidable and adverse.

4.8.1 Mine Plan Alternatives Set

4.8.1.1 Proposed Action Alternative

Because of mitigation measures developed as part of the NEPA planning process and in compliance with BLM guidance and the COE's CWA Section 404 permitting requirements (e.g., the Mitigation and Monitoring Plan), unavoidable adverse impacts of the alternatives presented in this EIS would be limited to the following:

< temporary loss of grazing on 3,238 acres of public lands, and permanent loss of 1,931 acres of grazing on public lands;

< major permanent modifications to the landscape (e.g., development rock stockpiles, leach pad, pit lakes) whose visual impacts have been reduced to some degree by mitigation measures but not entirely;

< increased noise and vibrations resulting from mine blasting during the 16-year life of the Project;

< permanent loss of DP seep; and

< destruction of 37 archaeological sites, 26 of which are considered to be traditional cultural properties by Indian tribes. The potential loss of scientific information associated with these sites would be mitigated by archaeological investigations, however, some tribes such as the Hopi and the San Carlos Apache, consider destruction of sites to be an unmitigable effect on cultural resources.

4.8.1.2 Partial Backfill Alternative

This alternative would have the same unavoidable impacts as those described for the Proposed Action alternative.

4.8.1.3 No Action Alternative

This alternative would have no unavoidable adverse impacts.

4.8.2 Land Exchange Alternatives Set

4.8.2.1 Land Exchange Alternative

The land exchange itself would have no unavoidable adverse impacts; foreseeable uses of the selected lands would result in the same unavoidable adverse impacts to resources as those described for the Proposed Action alternative.

4.8.2.2 No Land Exchange Alternative

This alternative, in and of itself, would have no unavoidable adverse impacts. However, the unavoidable adverse impacts associated with the Proposed Action alternative would be presumed to occur, given the BLM's requirement to make a subsequent decision regarding a mine plan alternative if this alternative is selected.

4.9 MITIGATION

This section summarizes the proposed mitigation measures for direct and indirect impacts resulting from the action alternatives considered in this document (Table 4-45). Detailed mitigation and monitoring measures for impacts to waters of the U.S. and other water resources are provided in Appendix F.

Table 4-45. Proposed Mitigation Measures for Impacts of Action Alternatives for the Dos Pobres/San Juan Project (N/A = mitigation not applicable since this alternative would not cause a measurable impact)

IMPACTS		PROPOSED MITIGATION MEASURES		
Subcategory	**Issue/Impact**	**Mine Plan Alternatives Set**		**Land Exchange Alternatives Set**
		Proposed Action Alternative	**Partial Backfill of San Juan Alternative**	**Land Exchange Alternative***
LAND USE				
Public Lands Management	Loss of BLM jurisdiction over selected lands, including for mine reclamation.	N/A	Same as for Proposed Action.	No mitigation required. Other federal agency jurisdiction still applicable (e.g., COE). PDSI's Reclamation Plan meets both federal and state requirements and APP monitoring and closure requirements would still apply, so no adverse impact from loss of BLM oversight.
Access and Recreation	Loss of public access on San Juan Mine Road to Gila Mountains.	Although alternate access to the Gila Mountains is still available, PDSI will upgrade portions of the existing Solomon Pass Road to accommodate fair-weather travel of 2-wheel-drive passenger vehicles as mitigation. Other mitigation measures for this impact include BLM retaining easements on portions of West Ranch and Salt Trap Tank roads to provide continued access to the Gila Mountains and Gila Box RNCA.	Same as for Proposed Action.	Same as for Proposed Action.
	Loss of dispersed recreational opportunities on public lands.	PDSI would provide 'scenic overview' opportunities as part of educational/tourism post-mining land uses. No other specific mitigation is proposed.	Same as for Proposed Action.	Recreational opportunities gained on offered lands compensate for this impact.
	Impact to part of route for Johnny Creek Ride through public lands	No mitigation proposed; BLM may continue to issue Special Use Permit to event organizers if an alternate route on public lands is proposed.	Same as for Proposed Action.	Same as for Proposed Action.
Grazing	Reduced stocking capacity and loss of use of range improvements, including those for stock/wildlife watering, within proposed security fence.	Mitigation (i.e., payment) would be made to the appropriate party(s) for the eight registered range improvements directly impacted by the proposed mining operations (i.e., those improvements located within the proposed security/grazing fence). No mitigation for reduced allotment stocking capacity. Mitigation for loss of range improvements for stock/wildlife would be provisions for replacement water features if possible.	Same as for Proposed Action.	Same as for Proposed Action.
Visual Resources	Major modifications to the landscape in the Safford Valley; increased nighttime lighting effects.	Mitigation for visual impacts include revegetation of portions of development rock stockpiles as described in Reclamation Plan (PDSI 2003), as well as the following measures: 1) use earth-toned paint colors for buildings to reduce their visibility; 2) recontour the land disturbed for road cuts and fills, stormwater diversions, impoundment dams, borrow areas, stockpiles, and other facilities; and 3) recontour the sharp angles of the corners and edges of the front, sides, and tops of the pad and stockpiles as described in Reclamation Plan to reflect the natural, adjacent landforms. Nighttime lighting effects will be minimized through compliance with Graham County Nighttime Lighting Ordinance (shielding, use of sodium lighting, etc.); use of conveyors will minimize haul truck usage thereby reducing need for portable light plants at the leach pad and effects from truck headlights.	Same as for Proposed Action.	N/A
Hazardous Materials	Risk of contamination by hazardous materials through spills.	To minimize risks associated with use and transport of hazardous materials, all such materials would be transported, handled, stored, and disposed of per requirements of MSHA, RCRA, and CERCLA (see Sections 2.1.2.3.5 to 2.1.2.3.8). The shipping company selected by PDSI to transport hazardous materials would be required to comply with applicable federal and state regulations governing such transport, and implement additional safety and truck design measures as discussed in General Response No. 14. PDSI would develop a Spill Prevention Control and Countermeasures (SPCC) Plan to address requirements for preventing accidental spills and developing procedures to be followed in the event of a spill. Upon closure of the mines, PDSI would be required to properly remove and dispose of hazardous materials from the mine sites per APP and reclamation requirements.	Same as for Proposed Action.	N/A

Table 4-45 (continued). Proposed Mitigation Measures for Impacts of Action Alternatives for the Dos Pobres/San Juan Project (N/A = mitigation not applicable since this alternative would not cause a measurable impact)

IMPACTS		PROPOSED MITIGATION MEASURES		
		Mine Plan Alternatives Set		Land Exchange Alternatives Set
Subcategory	Issue/Impact	Proposed Action Alternative	Partial Backfill of San Juan Alternative	Land Exchange Alternative*
PHYSICAL RESOURCES				
Air Quality	Some decrease in ambient air quality but within federal and state standards due to implementation of environmental protection measures.	Environmental protection measures incorporated into the MPO include dust control at crushing and screening facilities and at ore surge piles consisting of fog nozzles and water-wetting systems to suppress dust, and air pulse dust collection systems to filter dust-laden air. Water trucks would systematically suppress dust on roads. Methods being evaluated by PDSI to control sulfuric acid mist in the tankhouse include heat retention beads and balls, surfactants, water foggers, and cell wipers. Emissions of VOCs during the solution extraction process would be minimized through engineering design and diluent selection for low vapor pressure. Boiler combustion gasses would be minimized through use of clean-burning fuels, such as propane and/or natural gas.	Same as for Proposed Action.	N/A
Soils	Direct, long-term impacts to soil productivity.	Mitigation includes stormwater control measures to limit erosion potential, watering during construction and operations to control soil loss by wind erosion, stockpiling soils for reclamation, revegetation programs, and contouring sides and tops of stockpiles to reduce wind and water erosion effects.	Same as for Proposed Action.	N/A
Groundwater Quantity	Pumping causes lowered groundwater surface elevation in project area vicinity (cone of depression); 1' drawdown contour does not reach Reservation, Bonita Creek, or Gila River; predicted wellhead pressure reduced by 0.72 ft at Watson Wash; Dos Pobres and San Juan pit lake evaporation estimated at 21 af/yr in perpetuity	No direct mitigation for predicted cone of depression is proposed, however, reduced tributary groundwater is predicted to affect surface water flows and associated legally protected resources such as jurisdictional waters of the U.S., habitat for listed species, designated critical habitat, and/or Indian trust assets (surface water rights and reservation groundwater). To mitigate for subsequent predicted physical effects on surface flows (total predicted maximum of 149 af/yr, including pit lake evaporation), 3M Program will be implemented (see also Mitigation under Surface Water Quantity). Program involves monitoring groundwater levels and using actual well data to recalibrate the predictive groundwater model; if necessary, adjust acres of fallowed lands in Alternate Year Fallowing Program to reduce consumptive use of river flow to offset predicted effects from pumping. Flows at the Watson Wash artesian well would also be monitored and height of discharge pipe lowered if necessary to offset reduced groundwater flow. (See appropriate sections of this table and Appendix F for specifics.)	Same as for Proposed Action.	N/A
Groundwater Quality	No impacts expected due to implementation of environmental protection measures required by ADEQ's APP Program. Risk of discharge to groundwater would be reduced by these measures but cannot be eliminated.	Environmental protection measures incorporated into the MPO include BADCT applications such as liner system for the leach pad, use of PLS excess solution pond and stormwater impoundment; a stormwater impoundment conservatively sized for a 100-year/24-hour storm event combined with 24-hour power outage; and double containment systems for the SX/EW tankhouse facilities. Groundwater quality would be monitored systematically for APP compliance and also for 3M Program (Appendix F). APP closure requirements include permanent strategies to control run-on, runoff, and infiltration.	Same as for Proposed Action.	N/A
Surface Water Quantity	Model-predicted reduction (unmeasurable) in surface water flows in the Gila River; total maximum peak impact is 149 af/yr at Year 450 after mining starts. Bonita Creek flows reduction also unmeasurable.	Alternate Year Fallowing of decreed farmland that PDSI owns in the Safford Valley would offset predicted impacts to surface water flows in the Gila River by reducing consumptive use for agriculture. The net effect of the Alternate Year Fallowing Program (see Appendix F) would be to leave water in the river that otherwise would have been diverted for irrigation. The program calls for fallowing 200 acres each year in an alternating pattern. Based on recent per-acre consumptive use in the Safford Valley, fallowing 200 acres would reduce consumptive use by 480 af/yr of water in the Gila River that would otherwise be diverted. Because 480 af/yr is more than three times the total maximum predicted impact on Gila River flows (149 af/yr), the program as currently configured will be more than adequate even if the monitoring program and future model recalibration predicts a higher impact. Should revised estimates exceed 480 af/yr, additional decreed farmland is available to be fallowed to make up the difference. The Alternate Year Fallowing Program would be implemented in perpetuity and protected by placing deed restrictions on the decreed lands incorporated into the program.	Same as for Proposed Action.	N/A
	Model-predicted reduction in surface water flow at the Watson Wash artesian well.	Predicted 0.72 ft reduction in wellhead pressure would be mitigated by lowering the height of the well discharge pipe by the appropriate amount to maintain surface flows at the current volume.	Same as for Proposed Action.	N/A
	Placement of fill into waters of the U.S. from mining activities.	To reduce temporal impacts associated with loss of riparian functions of 68 acres of WUS on the project site, proposed mitigation measures (creation, enhancement, and preservation of riparian and wetland habitats) have already been implemented at the Pima and Thatcher mitigation sites as described in Appendix F. Habitat mitigation objectives include creation of 30 acres of riparian habitat, enhancement of 18 acres of riparian and wetland habitat; and preservation of 160 acres of riparian habitats along the Gila River in the Safford Valley.	Same as for Proposed Action.	N/A

Table 4-45 (continued). Proposed Mitigation Measures for Impacts of Action Alternatives for the Dos Pobres/San Juan Project (N/A = mitigation not applicable since this alternative would not cause a measurable impact)

IMPACTS		PROPOSED MITIGATION MEASURES		
Subcategory	Issue/Impact	Mine Plan Alternatives Set		Land Exchange Alternatives Set
		Proposed Action Alternative	Partial Backfill of San Juan Alternative	Land Exchange Alternative*
PHYSICAL RESOURCES (continued)				
Surface Water Quality	No impacts expected due to implementation of environmental protection measures required by CWA Sections 404, 402 (AZPDES permit), and 401 (state water quality certification).	Environmental protection measures incorporated into the MPO include designing and operating the Project as a non-discharge facility (per Section 402 of the CWA), i.e., using BADCT criteria for the design, construction, and operation of all potentially discharging facilities such as the leach pad and stormwater management system. The stormwater management system has been conservatively sized for a 100-year, 24-hour storm event combined with a 24-hour power outage (a very unlikely and extreme scenario). PD will prepare and comply with a Stormwater Pollution Prevention Plan that stipulates Best Management Practices to be implemented to minimize surface water quality impacts during mine construction.	Same as for Proposed Action.	N/A
BIOLOGICAL RESOURCES				
Vegetation	Loss of upland habitat (grubbing) and xeroriparian habitat (scouring, dewatering).	Air quality permit requirements and reclamation measures to restore vegetation on some facilities (including on soil stockpiles for dust control) would help to mitigate for these impacts. As described above, COE requires mitigation for indirect impacts to riparian habitat resulting from permitted impacts to waters of the U.S.	Same as for Proposed Action	N/A
Special Interest Species	Potential impacts to habitats and designated critical habitat for special interest species from construction, mining operations, and groundwater pumping.	Potential impacts to Gila topminnow (if present) due to predicted reduced wellhead pressure (i.e., reduced flow) at the Watson Wash artesian well would be mitigated by lowering the well discharge pipe height by the same amount (Appendix F). Alternate Year Fallowing Program (Appendix F) will reduce any potential for indirect impacts to critical habitat or to listed species, such as southwestern willow flycatcher, that are known to occur along the Gila River. Prior to mine construction, caves and other mine features will be examined for bat use, vacated in an appropriate manner, and closed. Biological Opinion issued by FWS considered the proposed fallowing and habitat mitigation measures as described in Appendix F and concurred with BLM's and COE's determination that the Project and these measures were unlikely to adversely affect listed species or critical habitat.	Same as for Proposed Action	N/A
Wildlife	Loss of wildlife habitat and small wildlife (rodents, reptiles, insects, etc.) during mine and road construction. Potential adverse impacts to wildlife through exposure to PLS pond.	PDSI will monitor potential wildlife use of the excess process solution impoundment for one year. Should monitoring results indicate that significant adverse impacts are occurring to wildlife, appropriate mitigation measures would be implemented. Security fencing around active mine area will help reduce adverse impacts to larger wildlife.	Same as for Proposed Action	N/A
CULTURAL RESOURCES				
Archaeological Sites and TCPs	Destruction of 13 archaeological sites on public lands and 24 sites on private lands. Loss of 26 sites identified as TCPs by Indian tribes: 10 on public lands and 16 on private lands.	A treatment plan has been developed to address impacts on cultural resources (SWCA 2003b). Some archaeological sites may be avoided by judicious placement of certain mine facilities, such as access roads, transmission line poles, etc. Mitigation for sites that cannot be avoided consists of implementing a BLM-approved and SHPO-reviewed testing and data recovery plan that was developed with input from Indian tribes that have consulted with BLM for this project. The purpose of testing and data recovery (which itself destroys a site) is to gather as much scientific information as possible from the sites before they are physically impacted by the Project. Twenty-six of the thirty-four affected archaeological sites have been identified as traditional cultural properties by one or more Indian tribes. In the case of sacred sites, provisions have been made for avoidance/protection of three sacred traditional cultural places. PDSI has agreed to provide access to two of these sites to tribes under either the land exchange alternative or the MPO alternative. Relocation of eight boulders bearing petroglyphs that would otherwise be impacted by mining has been recommended and is included in the treatment plan. BLM recognizes that certain tribes feel that some kinds of direct and indirect impacts on cultural resources cannot be mitigated.	Same as for Proposed Action.	N/A
	Loss of BLM (federal) jurisdiction over 115 archaeological sites on the selected lands, including 76 sites identified as TCPs by Indian tribes. Four of the 76 sites were also identified as sacred places.	N/A	N/A	To mitigate for the loss of federal oversight and protection, the testing and data recovery plan approved by BLM and reviewed by SHPO for sites on the selected and private lands to be impacted by the foreseeable mining uses would be implemented prior to the exchange of title for the selected lands. BLM recognizes that certain tribes feel that some kinds of direct and indirect impacts to cultural resources cannot be mitigated.

Table 4-45 (continued). Proposed Mitigation Measures for Impacts of Action Alternatives for the Dos Pobres/San Juan Project (N/A = mitigation not applicable since this alternative would not cause a measurable impact)

IMPACTS		PROPOSED MITIGATION MEASURES		
Subcategory	Issue/Impact	Mine Plan Alternatives Set		Land Exchange Alternatives Set
		Proposed Action Alternative	Partial Backfill of San Juan Alternative	Land Exchange Alternative*
SOCIOECONOMIC RESOURCES				
Taxes	Net loss of private property tax income to Pima, Santa Cruz, and Yavapai Counties (Net gain for Graham and Cochise Counties).	N/A	N/A	This impact would be offset partly through Payments in Lieu of Taxes (PILT) from the federal government to counties for federal land holdings; no other mitigation is proposed or required.
Transportation	Degraded pavement and increased vehicle and truck traffic on parts of Safford-Bryce Road.	The Proposed Project would result in substantial payments by PDSI in state and local taxes that fund road repair and other improvements. No mitigation is proposed or necessary	Same as for Proposed Action.	N/A
INDIAN TRUST RESOURCES				
Indian Trust Assets	Reduced tributary surface and groundwater flow to the Gila River resulting from pumping may have potential adverse impacts to Indian holders of priority water rights on the Gila River.	Implementation of the fallowing program for model-predicted reductions in surface water flows in the Gila River from groundwater pumping and surface water diversion would eliminate the potential for adverse impacts to holders of priority water rights on the Gila River, such as the Gila River Indian Community and the San Carlos Apache Tribe.	Same as for Proposed Action.	N/A
	Model-predicted decline in groundwater elevation under San Carlos Apache Reservation is nearly zero and unmeasurable; very slight predicted temporary increase in flow of groundwater off Reservation	N/A	Same as for Proposed Action.	N/A

* This column applies only to the proposed land exchange *per se*; foreseeable uses of the selected lands are not included. Mitigation for impacts attributable to foreseeable uses associated with the Dos Pobres/San Juan Project is described under "Proposed Action." Any mitigation for impacts attributable to foreseeable uses associated with development of the Dos Pobres sulfide and Lone Star deposits would be determined at the time of federal permitting for those potential future projects.

CHAPTER 5

CONSULTATION AND COORDINATION

The project team's efforts to consult and coordinate with potentially interested and affected publics was continuous throughout the NEPA process, but specifically included two separate scoping periods. An initial scoping was conducted from November 1994 through January 1995 when the proposed action was solely a BLM land exchange; a second scoping effort was conducted with COE and EPA as cooperators in August-October 1996 after PD submitted the Dos Pobres/San Juan Plan of Operations. During both scoping efforts, input was solicited and received from federal, state, and local agencies; elected representatives; tribal officials; non-governmental organizations; and private individuals. In addition, the BLM consulted with Native American tribes and with the Office of American Indian Trust (OAIT) regarding potential impacts to Indian trust assets. This chapter summarizes efforts to notify and involve potentially interested or affected parties in the proposed Project.

5.1 PUBLIC PARTICIPATION AND SCOPING

The initial Public Participation Plan (PPP) for the Project was approved on October 25, 1994, by the BLM's State Director as part of the BLM's EIS Preparation Plan for the Safford Land Exchange. A revised PPP was approved on July 23, 1996, as part of the BLM's EIS Preparation Plan for the Dos Pobres/San Juan Project. The objective of both PPPs was to identify the efforts to be used to notify potentially interested parties of the proposed Project and provide opportunities for public involvement in the environmental analysis process. The primary public scoping elements of both PPPs are described below.

5.1.1 Publication of a Notice of Intent (NOI)

Two formal Notices of Intent (NOIs) to Prepare an EIS were published in the *Federal Register* for this Project. The first NOI was published on November 3, 1994; the second, on July 31, 1996. Both NOIs briefly described the proposed action, provided 30-day advance notice of scheduled public meetings in which public comments on the Project were being solicited, indicated the closing date for receipt of scoping comments, and provided a contact name and telephone number for those wanting more information or wishing to submit comments to the BLM's Safford Field Office.

5.1.2 News Release

For the first scoping effort, a news release was sent in November 1994 to media within the state, and an informational letter was mailed to approximately 1,400 persons, groups, agencies, tribes, and congressional offices potentially interested in the proposed land exchange. The mailing list was developed from a master list maintained by the Safford Field Office and supplemented with names of owners of properties adjacent to the selected and offered lands. A second news release notifying the public of the change in scope of the proposed action was mailed in August and September 1996. The second mailing list included the initial list plus the media and COE's Phoenix Branch mailing list.

In addition to describing the proposed Project and extending a general invitation to the public to attend scheduled open-house public meetings, each news release gave the closing date for the scoping comment period (January 17, 1995, and October 12, 1996, respectively, for the initial and rescoping periods).

Table 5-1. Federal, State, and Local Agencies Contacted for this Project

Federal	State	Local
U.S. Army Corps of Engineers Los Angeles District, Regulatory Branch (Cooperating Agency)	Arizona Department of Agriculture	Graham County Planning and Zoning Department
Environmental Protection Agency Region IX (Cooperating Agency)	Arizona Department of Environmental Quality	Graham County Sheriff's Department
Bureau of Indian Affairs Phoenix Area Office	State Historic Preservation Office	
U.S. Fish and Wildlife Service (Phoenix and Tucson Offices)	Arizona Department of Water Resources	
National Park Service Tuzigoot National Monument	State Mine Inspector's Office	
Natural Resources Conservation Service (Safford)	Arizona Geological Survey	
Bureau of Reclamation Lower Colorado Regional Office	Arizona State Land Department	
U.S.D.A. Forest Service (Coronado National Forest and Apache-Sitgreaves National Forests)	Arizona Department of Mines and Mineral Resources	
U.S. Geological Survey	Arizona Department of Transportation	
U.S.D.I. Office of American Indian Trust	Arizona Game and Fish Department	
	Arizona State Parks Department	

5.1.3 Agency Coordination

In November 1994 and in early September 1996, letters were sent to the state and federal agencies listed in Table 5-1 describing the Project and requesting their relevant comments.

BLM's efforts to coordinate with Indian tribes and the Office of American Indian Trust (OAIT) regarding Indian trust assets are expected to continue until the ROD is issued (see Section 5.1.6). Formal Section 7 Consultation with the U.S. Fish and Wildlife Service regarding potential impacts to threatened and endangered species resulted in issuance of FWS' Biological Opinion on June 11, 2002, regarding the potential impacts of the Project on listed species and critical habitat; consultation will be reinitiated if new species are listed prior to issuance of the ROD. At the request of the Deputy Secretary of the Interior, the U.S. Geological Survey provided technical expertise to the BLM in resolving issues raised regarding the modeling effort, impact assessment, and potential monitoring and mitigation measures for predicted effects on water resources.

5.1.4 Public Scoping/Open House and Tribal Information Meetings

During the initial public scoping, in 1994, four open-house public meetings were held in Arizona, one each in Safford, Clifton, Phoenix, and Tucson on December 6, 7, 13, and 15, respectively, to inform the public about the Project and solicit comments. During the second scoping, in 1996, three public open-house meetings were held, one each in Safford, Tucson, and Phoenix on September 5, 10, and 11, respectively. Each meeting lasted four hours to provide adequate opportunities for the public to attend and receive information about the Project. Open-house meetings were advertised through publication of the NOIs in the *Federal Register*, legal notices in local papers, the aforementioned mailers to potentially interested parties, news releases to media, and radio announcements in the Safford-Clifton area.

For both sets of meetings, participants were asked to sign in and were provided with a Project information sheet and comment form. The information sheets briefly described the Project, identified the lead agency and the Project proponent, and included a statement written in Spanish indicating that information about the Project was available in the Spanish language through the BLM contact person. A total of 141 and 183 individuals attended the initial and second scoping meetings, respectively.

Additionally, presentations were made in September and October 1994 to the Land and Water Resources Committee of the Gila River Indian Community and to the San Carlos Apache Tribal Council to inform these tribes of the Project and to determine whether each tribe wanted public meetings held on their respective reservations. Both tribes independently requested informational presentations rather than public meetings. Twenty-two tribal representatives from the San Carlos Apache Tribe and seven from the Gila River Indian Community attended presentations made on December 7 and 13, 1994, respectively, at each reservation. Attendees were asked to sign in and were given the information sheet and comment form provided at the public scoping meetings.

During the rescoping, in September 1996, the BLM sent letters to the San Carlos Apache Tribe, White Mountain Apache Tribe, Gila River Indian Community, Ak-Chin Indian Community, Salt River Pima-Maricopa Indian Community, Tohono O'odham Nation, Hopi Tribe, and Zuni Pueblo, asking if these tribes had any interest in, and wished to consult on, the Project. The BLM also offered to give presentations about the Project to tribal representatives. By January 17, 1997, four tribes had responded with requests for presentations (the Gila River Indian Community, Ak-chin Indian Community, Salt River Pima-Maricopa Indian Community, and Tohono O'odham Nation). On December 20, 1996, the BLM presented information about the project to representatives of these tribes. The BLM also contacted the Navajo Nation, Mescalero Apache Tribe, and Fort Sill Apache Tribe to ask if they had concerns or wished to consult on the Project. Based on tribal responses, the BLM and third-party consultant SWCA Inc. consulted with all eleven tribes through meetings, telephone calls, and field trips to the Project area. Consultations were conducted primarily with tribal staffs and elders and focused on identification of and resolution of impacts to traditional cultural properties, Indian trust resources, and other Native American values. Potential impacts to these resources were discussed and avoidance/mitigation recommendations were provided by the consulting tribes.

5.1.5 Public Outreach Activities

For the initial scoping in 1994, the BLM developed a public affairs plan for the Project and undertook public outreach efforts that involved appearances by BLM personnel on local radio talk shows, announcements on local radio, and presentations to civic organizations. These public outreach activities extended beyond the initial 30-day comment period.

For the rescoping effort, public outreach was limited to efforts by the Safford Field Manager and Area Manager to inform local community leaders of the changes to the Project through a community forum.

BLM managers provided updates to member of Arizona's congressional delegation and their staff throughout the development of the EIS. This was done at meetings in Safford, visits to congressional offices in Tucson, and quarterly congressional briefings at the BLM Arizona State Office in Phoenix.

5.1.6 Consultations for Potential Impacts to Indian Trust Assets

5.1.6.1 Tribal Consultation

After withdrawal of the BIA as a cooperator in June 2000, BLM reinitiated consultations directly with the Gila River Indian Community and with the designated agent of the San Carlos Apache Tribe regarding the predicted impacts of the project on surface flows in the Gila River and groundwater beneath the San Carlos Apache Reservation (Reservation). Indian trust assets of concern to this Project include water rights to Gila River surface flows (held by both tribes) and Reservation groundwater.

On August 7, 2001, BLM met with representatives of the Gila River Indian Community's Natural Resources Committee, Water Resources Committee, and Tribal Water Rights Group to provide information regarding the predicted impacts of the Project on Gila River surface flows, a trust asset of the Community. Representatives of the Community also attended a June 25, 2002, meeting involving BLM, USGS, BIA, PD, and representatives of the San Carlos Apache Tribe to discuss the Project status and water resources issues. At this time, BLM is continuing to consult with both the Tribe and the Community regarding the Alternate Year Fallowing Program and the predicted but unmeasurable impacts on both surface flows in the Gila River and groundwater flows beneath the San Carlos Apache Reservation.

5.1.6.2 Office of American Indian Trust

As required by departmental regulations, BLM initiated consultation with the OAIT, an agency of the Department of Interior created to ensure that the Secretary's obligations under the federal Indian trust responsibility are performed in accordance with the standards required by the laws and policies of the United States. The OAIT, among its other duties, reviews significant Departmental decisions affecting American Indian trust resources, including treaty rights.

The OAIT was kept apprised of the BLM's efforts to consult with potentially affected tribes about the Project's possible impacts to Indian trust resources, specifically Indian water rights to Gila River flows and to groundwater under the San Carlos Apache Reservation. At meetings attended by OAIT and through copies of correspondence with tribes, BLM provided information on how the proposed Alternate Year Fallowing Program (see Appendix F) for predicted physical impacts to Gila River flows would ensure no detrimental effects on tribal rights, trust resources, or health and safety. Consultation with OAIT is expected to continue through publication of the FEIS and conclude prior to issuance of the ROD.

5.2 ENVIRONMENTAL JUSTICE

All federal agencies must comply with Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." As defined by the BLM and EPA, compliance involves "the fair treatment and meaningful involvement of all people regardless of race, color, national origin,

or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies" (EPA 1997). The goal of "fair treatment" is "to identify potential disproportionately high and adverse effects and identify alternatives that may mitigate these impacts" (ibid.).

For this EIS, compliance with Executive Order 12898 concerning Environmental Justice was accomplished through several means. Initial efforts focused on informing the widest possible cross section of the potentially interested public about the Project, and providing opportunities for input from not only the general public but from members of local and regional ethnic minority and low-income populations. Efforts targeting these populations included 1) making information about the proposed Project available in the Spanish language during both scoping periods; 2) contacting 11 Indian tribes regarding their concerns about the Project and making several special presentations to tribal representatives on their reservations; and 3) making extensive use of local radio in Safford and surrounding communities to disseminate information about the Project and announce public meetings. Especially in rural areas, radio can reach a wide spectrum of individuals across income lines. News releases and Public Service Announcements included a statement in Spanish regarding the availability of Spanish-speaking contacts at the BLM for those seeking more information.

In addition to these efforts, an analysis was conducted to determine if the Project would have disproportionate adverse effects on ethnic minority and/or low-income groups, including Native Americans. Results of such an analysis depends in part upon its scale. For example, on a statewide basis, it could be concluded that the Project disproportionally affects (either positively or negatively) low-income populations because Project impacts are concentrated in Graham County, and Graham County has a disproportionately poor population compared to the rest of the state. In 1990, Graham County ranked 13 out of the 15 counties in Arizona for both median household income and median per capita income, and had the fourth highest rate of persons in poverty (26.7 percent).

However, an analysis on this scale would not take into consideration the fact that the Project, and all reasonable and practicable action alternatives to the Project that meet the purpose and need, can *only* be located in Graham County. The project site is dictated by the location of the Dos Pobres and San Juan copper ore deposits and PD's mining claims. Therefore, the approach to Environmental Justice taken in this EIS is to focus the analysis on populations within Graham County and address other groups only when possible adverse impacts extend beyond county lines. As shown in Section 3.2.5.1.1 of this document, the primary ethnic minority groups in Graham County are Hispanic and Native American. The portions of the county with the greatest concentrations of persons identifying themselves as Hispanic are parts of Safford; parts of Thatcher; and the towns of Solomon, San Jose, and Sanchez. Areas with the greatest concentrations of persons identifying themselves as Native American are the San Carlos Apache Reservation in general and the towns of Bylas and Peridot in particular. Areas with the highest proportion of low-income households are within and just outside the boundary of the San Carlos Apache Reservation, and within pockets in the communities of Safford, Thatcher, and Pima.

Regarding the issues analyzed in this EIS, and relative to other populations in Graham County, residents of the geographic areas cited above are not likely to suffer disproportionately high adverse effects from the Proposed Action and action alternatives. Table 5-2 lists potential direct, indirect, and cumulative adverse impacts identified in Chapter 4 for these alternatives remaining after consideration of mitigation, and identifies the group(s) most affected. In many cases, PD has proposed mitigation for impacts (see Table 4-42 and Appendix F); such mitigation measures, to the degree they are incorporated into the Proposed Action, have been considered in this analysis and preclude impacts from being significant or measurable.

In reviewing the information in Table 5-2, the project team determined that geographic scope/recipient groups ranged from localized (the project area; BLM allottees) to extremely broad (the American public); that a variety of groups are exposed to the potentially adverse residual impacts of the Project; that most of these groups are representative of the general demographic profile of Graham County or the Safford region; and that no pattern reflecting disproportionately high and adverse impacts to low-income and/or minority groups is apparent.

For those issues that are of special concern to Indian tribes in the region—notably, Native American archaeological and sacred sites, burials, and traditional cultural properties on potentially affected public lands—the BLM has consulted with the concerned tribes as required by the National Historic Preservation Act (NHPA), Native American Graves Protection and Repatriation Act (NAGPRA), and other federal laws, orders, and policies. The San Carlos Apache Tribe has gone on record as opposing an exchange of or mining on the selected public lands (letter from J.P. Sparks to M.L. Jensen and T. Terry, BLM Safford District, October 11, 1996. The Tribe's Elder's Cultural Advisory Council has stated that, among other concerns, "Some of the land parcels involved in this plan are located on land that is currently claimed by the San Carlos Apache Tribe. It would be wrong to continue with the proposed plan while this matter is unresolved....While this mine will provide jobs and money for the near future, it will destroy the land and good health of our grandchildren and future generations....The most important consultation we can give you is to ask you to reexamine the values that this mine represents" (letter from J. Cassa to M.L. Jensen, BLM Safford Field Office, January 15, 1997). For information on why the San Carlos Apache Tribe land claim was not analyzed as an environmental justice issue in this EIS, see Section 1.6.2.2.1.

Table 5-2. Summary of Residual Adverse Impacts of the Action Alternatives for the Dos Pobres/San Juan Project: Environmental Justice Analysis

Impact	Proposed Action	Partial Backfill	Land Exchange*	Group(s) Affected
Land Use				
Loss of BLM jurisdiction over land use	-	-	X	public lands users, including PD
Reduced use of public lands for the Johnny Creek Ride	X	X	X	Johnny Creek Ride event participants
Loss of use of surface water rights within the mine plan footprint	X	X	-	BLM allottees
Increased noise and vibrations from mine blasting	X	X	-	Safford Valley residents
Modifications to visual resources, nighttime lighting, and views of the Gila Mountains	X	X	-	Safford Valley residents
Increased potential for acid and materials spills and truck traffic	X	X	-	residents and drivers along portions of Hwys 77 and 191, including San Carlos Apache Tribal members
Physical Resources				
Creation of pit lakes	X	X	-	the public
Biological Resources				

Loss of vegetation and wildlife habitat on the project area	X	X	-	public recreationists, hunters
Impacts to historic and prehistoric archaeological sites	X	X	X	the public; various Indian tribes
Impacts to Traditional Cultural Properties identified by Indian tribes	X	X	X	various Indian tribes
Reduced grazing	X	X	-	BLM allottees

Table 5-2, continued. Summary of Residual Adverse Impacts of the Action Alternatives for the Dos Pobres/San Juan Project: Environmental Justice Analysis

Impact	Proposed Action	Partial Backfill	Land Exchange*	Group(s) Affected
Cultural Resources				
Socioeconomic Resources				
Increased demands on infrastructure (schools, utilities, housing, roads)	X	X	-	Safford Valley residents; Graham Co. residents
Reduced federal Payment In Lieu of Taxes (PILT) to county for federal lands	-	-	X	Graham County residents
Reduced BLM income from public lands grazing	X	X	X	the public

* Impacts of the foreseeable mining uses of the selected and offered lands are not attributed to the land exchange alternative because the impacts are not caused by the exchange, simply enabled by it.

CHAPTER 6

LIST OF PREPARERS

Responsibility	Name	Qualifications
Bureau of Land Management, Safford Field Office and Arizona State Office Dos Pobres/San Juan Project EIS Interdisciplinary and Project Management Teams		
Arizona Exchange Team Leader, Senior Technical Specialist	William Ruddick	Business Administration Studies, Crowder College and Arizona State University 23 years of BLM experience
Resource Use and Protection Program Manager	Wayne King	B.S., Natural Resource Management, California Polytechnic State University 26 years of BLM experience
Project Leader and Realty Specialist	Scott Evans	B.A., Spanish, Arizona State University 8 years of BLM experience
Planning and Environmental Coordinator; Environmental Justice and Socioeconomics	Marlo M. Draper	B.S., Environmental Resource in Agriculture Arizona State University 9 years of BLM experience
Land Law Examiner	Joseph W. Malys	A.A., Civil Engineering Technology, Phoenix College 5 years of BLM experience
Chief State Appraiser	Michael S. Redfield	B.S., History, South Dakota State University Real Property Review Appraiser, American Society of Farm Managers and Rural Appraisers 22 years of BLM experience
Public Affairs Specialist	Diane Drobka	A.A., Journalism, Eastern Arizona College B.S., Wildlife Ecology, University of Arizona 20 years of BLM experience
Geologist	Larry Thrasher	B.S., Geology, University of Maryland M.S., Geology, University of North Dakota 17 years of BLM experience
Wildlife Biologist	Ben Robles	B.S., Wildlife Science, New Mexico State University 23 years of BLM experience
Archaeologist and Native American Coordinator	Gay Kinkade	B.A., History, Ft. Lewis College M.A., Anthropology, Eastern New Mexico University 27 years of BLM experience
Archaeologist	Anna Rago	B.A., Anthropology, San Francisco State University M.A., Anthropology, University of Colorado-Boulder 4 years of BLM experience

Responsibility	Name	Qualifications
Bureau of Land Management, Safford Field Office Dos Pobres/San Juan Project EIS Interdisciplinary and Project Management Teams (continued)		
Hydrologist	Thomas T. Olsen	B.S., Geology, University of Wisconsin M.S., Geology, University of Pennsylvania Ph.D., Geology, Southwest University of Louisiana 24 years of federal experience
Consulting Hydrologist	Robert MacNish	B.S., Geology, Tufts University M.S., Geology, University of Michigan, Ann Arbor Ph.D., Geology, University of Michigan, Ann Arbor 29 years of USGS experience
Natural Resource Specialist	Tom Schnell	B.S., Natural Resource Management University of Wisconsin-Stevens Point 10 years of BLM experience
Rangeland Management Specialist	Tim D. Goodman	B.S., Natural Resource Management, University of Arizona M.S., Range Science, New Mexico State University 17 years of BLM experience
Fishery Biologist	Jeffrey B. Simms	B.S., Wildlife and Fisheries, University of Arizona M.S., Fisheries Science, University of Arizona 9 years of BLM experience
Air Resources Specialist	Scott F. Archer	B.S., Chemistry, Environmental Science, and Police Administration, Northern Arizona University 18 years of BLM experience
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CHAPTER 7

COMMENTS AND RESPONSES

7.1 THE PUBLIC REVIEW PROCESS FOR THE DEIS

7.1.1 Notice of Availability, Distribution of the DEIS, and Public Comment Period(s)

BLM published its Notice of Availability (NOA) for the DEIS in the *Federal Register* on September 24, 1998 (Volume 63, No. 185, pp. 51091-51092). The NOA briefly described the project, provided due dates for public comments on the DEIS, and informed the public of dates, locations, and times for three public open house meetings to be held by BLM at which written or oral comments on the DEIS could be made. EPA published its NOA for the DEIS on September 25, 1998 (Volume 63, No. 186, pp. 51349-51350), under the specific authority of Section 309 of the Clean Air Act, which authorizes the agency to conduct reviews of all EISs, comment in writing, and make those comments available to the public. The COE issued its public notice in early November 1998 notifying the public of a 30-day comment period on PD's application for a Department of the Army permit and the availability of the DEIS. Additional notification of the DEIS's availability was made through mailing a BLM news release to individuals, media representatives, organizations/special interest groups, and governmental entities. One thousand copies of the two-volume DEIS were printed and distributed to the mailing list for this project, attendees at open house meetings who requested copies, and other entities who requested copies.

A notice published in the *Federal Register* on September 24, 1998, and the "Dear Reader" letter in the DEIS informed readers that a 60-day comment period would end on November 25,1998. During this period, BLM received three requests by electronic or regular mail for an extension of the comment period. BLM notified these three requesters via electronic mail and the public at large by a notice published in the *Federal Register* on November 30, 1998, that the comment period was being extended until December 18, 1998. The public was notified of a second extension of the comment period until January 29, 1999, through a notice printed in the *Federal Register* on December 18, 1998. Thus, the public comment period on the Dos Pobres/San Juan Project DEIS lasted a total of 127 days.

Since publication of the DEIS, BLM, COE, and EPA have made significant efforts to address the comments received, in particular, those on the groundwater model and 3M Program. Although several changes in the MPO have also been made in the interim to improve efficiency and reduce resource use and impacts (see Table 2-1 for a summary of these changes), the Project and its alternatives remain essentially the same as those described in the DEIS.

7.1.2 Public Open House Meetings and Public Outreach

Three public open house meetings lasting four hours each were held at BLM field offices in Safford, Tucson, and Phoenix on, respectively, October 27, 28, and 29, 1998. Representatives from the BLM, COE, and EPA were present in each meeting. A total of 212 members of the public attended the three meetings. A tribal open house meeting was held on December 4, 1998, on the San Carlos Apache Reservation in which 23 persons representing the tribe attended. Graphic depictions of the mine layout and selected and offered lands, a summary of the impacts of the project, and self-addressed comment sheets were available to the public at these meetings.

7.2 COMMENT SUMMARY

Within the comment period, BLM received 269 letters on the DEIS including two letters originally sent to the COE. Of the total, 127 letters were from private individuals and 142 were from persons representing organizations, groups, businesses, or agencies. The ID Team identified 650 comments in these letters.

7.3 LETTERS RECEIVED OUTSIDE OF THE COMMENT PERIOD

In addition to the 269 letters received during the comment period, 24 letters were received after the close of the extended comment period on January 29, 1999. These letters are not included in the official administrative record for this project; however, all were read by the ID Team and analyzed for comments. The ID Team determined that all the issues and comments raised in the late letters had already been raised by other commentors and were being considered in the preparation of the FEIS.

Another series of letters was received outside the comment period. These letters were from the BIA to the BLM and covered an approximately two-year period beginning in May 1998 (prior to publication of the DEIS) to June 2000, when BIA formally withdrew from this EIS process as a cooperating agency. Originally submitted by BIA in their role as a cooperating agency, these five letters comprise primarily data requests and comments regarding the groundwater model, but include some comments on the DEIS as well. All five letters were read and considered by the ID Team but are not included individually in Section 7.6.2. Instead, we have summarized the BIA's comments about the groundwater modeling effort and prepared General Response No. 16, Groundwater Model Review, wherein these comments are addressed. Other comments within these letters pertain to the adequacy of the Environmental Justice and cumulative impacts analyses in the DEIS and BIA's disagreement with BLM's position that foreseeable uses are not caused by the proposed exchange. All of these comments are issues that were already raised in a letter submitted by BIA during the initial comment period (Letter 237) or by other commentors; therefore BIA and the reader are directed to responses to Letter 237.

7.4 ANALYSIS AND CATEGORIZATION OF COMMENTS

NEPA requires the responsible federal agency to respond to all substantive comments received on the DEIS. After the close of the extended comment period, the ID Team analyzed all comments received on the DEIS. The BLM's National Environmental Policy Act Handbook (H-1790-1) (BLM 1988) provides guidelines for categorizing comments into five common types. These are: (A) comments on inaccuracies and discrepancies; (B) comments on the adequacy of the environmental analysis; (C) comments which identify new impacts, alternatives, or mitigation measures; (D) disagreements with significance determinations; and (E) expressions of personal preferences. The ID Team developed one additional comment type: (X), requests for extension of the comment period. Statements that reiterated or restated data, analyses, or conclusions presented in the DEIS were not considered substantive comments.

All 269 letters and 650 comments identified by the ID Team were logged into an electronic database. Each letter received within the comment period was assigned a number. Specific comments within each letter were also assigned a number, such that any given comment could be uniquely identified (e.g., the third comment in Letter 12 would be identified as "12-3", and so on). Comments were categorized in two ways: by comment type (A, B, C, D, E, or X) and by a topic that generally corresponded to a resource topic addressed in the EIS (e.g., 100-year floodplains, public lands management, access and recreation, biodiversity, etc.). This categorization allowed the ID Team to group comments into two categories for the purpose of developing responses: 1) comments which reflect similar concerns that could be addressed with a general response and 2) comments requiring specific responses.

7.5 TRACKING RESPONSES TO COMMENTS

To comply with the Council on Environmental Quality (CEQ) regulations on page limits for EISs (40 CFR 1502.7), BLM has modified the traditional "Comments and Responses" format, which usually incorporates copies of actual comment letters. Instead, comments identified by the ID Team were excerpted *verbatim* and are presented by letter number. All excerpted comments, including expressions of personal preferences or opinions, have been addressed by either a general or a specific response in this chapter and/or by a revision of the EIS. For specific queries about how the BLM addressed any given comment letter, copies of the original comment letters and the comment/response database are maintained at the BLM Safford Field Office and are available for inspection by the public during normal business hours.

7.6 RESPONSES TO COMMENTS

BLM addressed all 650 comments with either a specific response or a general response. The following 16 general responses were developed by ID Team members to address issues for which multiple comments were received. Each general response briefly summarizes the nature and scope of the comments received on that topic before providing the response. General responses are followed by specific responses (Section 7.6.2), which are presented numerically by comment letter number (Letter No. 1 through Letter No. 269). To find the letter number corresponding to a specific commentor, please see the Letter Index in Table 7-1 in Section 7.6.2, which alphabetically lists commentors' by last name.

7.6.1. General Responses

No. 1. Expressions of Personal Preferences or Opinions

The majority of comment letters received on the DEIS (about 85 percent) expressed the writer's personal preference for one or more of the alternatives or expressed opinions about the adequacy of the EIS and its analyses. BLM received letters that both supported or objected to the proposed mine project and/or the land exchange. Although the agencies' decisions regarding the Dos Pobres/San Juan Project are not based on a "majority vote," personal preferences or opinions expressed by the public constitute one of many considerations in the final selection of the agencies' preferred action(s). Additionally, factual information regarding agency requirements or procedures were considered as comments. BLM and its cooperators thank the public and other agencies for their comments and appreciate the public's efforts to participate in the NEPA process and to make their opinions and concerns known.

No. 2. Milestones in the NEPA Process

Comments in the form of questions were received about two major milestones in the Project's environmental review process under NEPA: an extension of the comment period and when the agencies' Records of Decision (RODs) would be issued.

Regarding the public comment period, a notice published in the *Federal Register* on September 24, 1998, and the "Dear Reader" letter in the DEIS notified readers that the 60-day comment period would end on November 25,1998. During this period, BLM received three requests by electronic or regular mail for an extension of the comment period. BLM notified these three requesters via electronic mail and the public at large by a notice published in the *Federal Register* on November 30, 1998, that the comment period was being extended until December 18, 1998. The public was notified of a second extension of the comment period until January 29, 1999, through a notice printed in the *Federal Register* on December 18, 1998. Thus, the public comment period on the Dos Pobres/San Juan Project DEIS was extended to a total of 127 days from the original 60 days.

Regarding the sequence of the agencies' decisions, the BLM and COE will each follow their internal agency guidelines in issuing their respective decisions on the proposed Project (see Section 1.4.1 and Figure 1-3). After this Final EIS (FEIS) is published, BLM must wait 30 days before issuing its ROD. The actual BLM process will depend upon which alternative is selected under the ROD. If the Mining Plan of

Operation alternative is approved, a 30-day period ensues during which the BLM's Authorized Officer's decision would be appealable to BLM's Arizona State Director. If the State Director's decision is adverse to the appellant, the decision is appealable to the Interior Board of Land Appeals (IBLA), pursuant to 43 CFR Part 4.

If BLM selects the Land Exchange alternative, a Notice of Decision (NOD) will be published upon approval of the ROD. The NOD will provide for 45-day protest period. If a protest is filed during that period, BLM has two options to address protests. Protests of the NOD would be evaluated by the BLM's Arizona State Director who, in most cases, would issue a formal decision on the protests. In accordance with 43 CFR Part 4, this protest decision is appealable to IBLA within 30 days of receipt of the decision by the appellant. Alternatively, protests to the NOD may be evaluated by the Department of the Interior's Assistant Secretary for Lands and Minerals Management. Protest decisions issued by the Assistant Secretary constitute the final administrative determination of the Department of the Interior and are not appealable under 43 CFR Part 4.

Assuming that the COE decides to issue their permit, it will follow a different schedule and process. The COE will issue a ROD on its Section 404 permit simultaneous with, or just after, issuance of the BLM's ROD/NOD. The COE has no public appeal period on its ROD, and the COE's Section 404 permit would remain in effect should BLM's ROD/NOD be appealed/protested.

Each of the three cooperating agencies makes an independent decision regarding its respective authorization of the Dos Pobres/San Juan Project. Because it has no jurisdiction to do so, BLM cannot require PDSI to have all state and federal permits in place prior to issuing its decision; however, no mining could occur, even if BLM approved the MPO or the exchange, until PDSI secures <u>all</u> necessary permits to implement mining activities (including those listed in Table 1-1, among others).

No. 3. Scope of Analysis of the EIS

BLM received comments expressing disagreement with the impact analysis assumption (EIS Section 4.2) that the land exchange alternative would not cause the foreseeable mining uses of the selected lands, and therefore, would not cause direct or indirect impacts associated with those uses. This assumption underlies BLM's decision not to analyze potential impacts of foreseeable mining uses related to possible future development of the Dos Pobres sulfide and Lone Star ore deposits to the same level as that for the MPO. Some commentors strongly objected to this conclusion and advocated a detailed analysis of all such impacts, including the effects of production operations, tailing piles, and acid-generating waste associated with these possible future operations on environmental resources.

The BLM stands by its original position. Support for this decision is provided by the judgment of the Interior Board of Land Appeals (IBLA) of the U.S. Department of the Interior's Office of Hearing and Appeals in the appeal filed by San Carlos Apache Tribe *et al.* to the ROD for the Morenci Land Exchange FEIS (IBLA 97-299, 97-311, 98-142, 98-173). In this judgment, decided on May 21, 1999, the IBLA found that:

> *Mining and/or mineral development on the selected lands, on which...mining claims exist, is not caused by, or a direct effect of, the land exchange. Similarly, indirect effects which BLM must analyze are limited to those "caused by the action," even though "later in time and farther removed in distance, "provided they "are still reasonably foreseeable." 40 CFR §1508.8(b). Because Morenci had every right to conduct mining operations consistent with its unpatented mining claims on the selected lands regardless of whether the exchange is approved or not, BLM was not required to analyze as an indirect effect that which would occur independent of its decision to approve the land exchange. The same rationale applies with regard to cumulative impacts.* (149 IBLA 47).

The land exchange alternative in the Dos Pobres/San Juan EIS is directly parallel to the Morenci land exchange. Existing mining laws and federal land use regulations authorize PD to develop its mining

claims on the selected lands whether the land exchange is approved or not, and such development cannot proceed until PDSI obtains all required federal and other permits—again, whether the land exchange is approved or not. Therefore, neither the proposed nor the foreseeable future mining activities on the selected lands would be caused by the land exchange, nor would any impacts resulting from such activities. Therefore, it is outside of the scope of analysis for the Dos Pobres/San Juan Project EIS to analyze in detail the potential impacts on the selected lands related to possible future development of the Dos Pobres sulfide and Lone Star orebodies. These potential future projects have, however, been considered in the Cumulative Effects discussion, to the degree that information exists on the nature and extent of these projects.

No. 4. Alternatives

Comments about the alternatives varied greatly. A majority of commentors expressed a personal preference for one of the alternatives, but some commentors asked for additional consideration of off-site alternatives or questioned why the Partial Backfill alternative was considered an alternative rather than as mitigation, why purchase of the offered lands was not being pursued as an alternative, why a smaller selected lands package was not considered, or whether it is legal to exchange lands for which no economic orebody has been demonstrated. Each of these comments is addressed in this general response.

< **Off-Site Alternatives.** Consideration of off-site alternatives was described in Section 2.1.5.2.3. The COE's 404(b)(1) Alternatives Analysis (see Appendix A) examined two off-site mine alternatives: development of the Sanchez orebody and development of the Lone Star deposit, both of which are within PD's control and within the Safford Mining District. These alternatives were eliminated from further consideration for the reasons stated in Table 4 of Appendix A and furthermore, do not meet the purpose and need for the project.

The purpose of the Project is not, as some commentors suggested, the production of copper to meet a continuing demand. Meeting this purpose would require programmatic consideration of any copper mining project, at off-site or even international locations, and for deposits not controlled by PD. Clearly, such alternatives are not reasonable, practical, or feasible (see CEQ Forty Questions). Rather, the purpose of the Project, as stated in Section 1.4.1, is the development of PD's mineral resources at the Dos Pobres and San Juan deposits, as authorized under the General Mining Law and BLM's surface management regulations at 43 CFR 3809 (see revised Section 1.4, Purpose of and Need for Action). Reasonable alternatives for this project, then, would include alternative configurations of the mine plan or alternative locations for mine plan facilities but not development of alternative orebodies within the Safford Mining District or elsewhere, even those controlled by PD (e.g., Sanchez or Lone Star). As nine other alternative mine configurations at Dos Pobres/San Juan and two off-site alternatives were considered and rejected in the COE's 404(b)(1) Alternatives Analysis, no further consideration is given to off-site alternatives in this EIS.

< **Partial Backfill Alternative.** Whenever possible, the BLM seeks to incorporate mitigation measures into an alternative. For example, measures to avoid impacting three sacred sites and to provide Native American access to these sites were specifically incorporated into both the Proposed Action and the Partial Backfill alternatives to resolve tribal concerns with those alternatives. These measures were not proposed as a separate alternative because they do not constitute a different approach to fulfilling the purpose and need. In contrast, the Partial Backfill alternative represents a different approach (i.e., an alternative way to store development rock), involving different logistical, technical, and cost factors. Either approach, the Proposed Action or the Partial Backfill alternative, may be preferable to the other for different reasons and, thus, each constitutes a reasonable, practical, and feasible alternative action.

< **Acquisition Using the Land and Water Conservation Fund.** BLM addressed this issue earlier

in Section 2.2.4.2 of the DEIS, Alternatives Eliminated from Further Consideration. In addition to the several reasons explained in Section 2.2.4.2, acquisition of private lands via a land sale requires a willing seller. At this time, PD has proposed to BLM an exchange, and not a sale, of the offered lands. Even if BLM were eventually to succeed in securing congressional approval and monies to buy the offered lands using the Land and Water Conservation Fund, there is no guarantee these lands would be available for sale to the BLM or the NPS. Therefore, while use of the Land and Water Conservation Fund could be an option to achieve some of BLM's land tenure adjustment goals, it is not a viable alternative to the currently proposed land exchange without a willing seller.

< **Size and Configuration of the Selected Lands.** Consideration of alternative configurations of the selected lands, such as a smaller acreage of selected lands covering only the public lands involved in the MPO (about 2,000 acres instead of the approximately 16,297 acres currently proposed), was discussed in the DEIS in Sections 2.2.1.3.1 and 2.2.4.1 and eliminated for the following reasons. As described in Section 2.2.2.1.1, nearly all the public lands proposed for exchange are legally encumbered by PD-owned lode claims, which restricts their availability for public use and management. Furthermore, as consistent with the goals outlined in the Safford District Resource Management Plan, the BLM seeks to use land exchanges as a means to dispose of public lands that are difficult to manage (for a variety of reasons such as legal encumbrances, lack of access, or irregular land boundaries, among others) and acquire private lands that provide high resource values and help to consolidate BLM-administered lands. The package of selected and offered lands considered in this proposal meets the BLM's land tenure adjustment goals.

PD proposed a land exchange for more acres than identified in the MPO for the Dos Pobres/San Juan Project partly to support possible future development of their adjacent Lone Star orebody. To reiterate the explanation provided in Section 1.4 of the EIS, Purpose of and Need for Action, the Lone Star deposit, as currently defined, lies entirely on PD-owned land and is not included as part of the MPO for the Dos Pobres/San Juan Project or the land exchange. It is a factor, however, in identifying the foreseeable uses of some of the selected (public) lands being proposed for acquisition by PD. PD has indicated to the BLM and the EIS cooperators that it foresees development of the Lone Star deposit at some point in the future and that some of the public lands adjacent to the deposit, if acquired in the exchange, would likely be used for mining-support operations, such as rock stockpiling, stormwater management, support facilities, access, safety buffers, etc. At this time, only limited exploratory and geological data have been collected, and the feasibility of developing the Lone Star orebody is still under study. This uncertainty led a commentor to question the legality of BLM's considering an "MPO or an exchange when an economical ore body may not exist at this time." The BLM is not concerned with the economic feasibility of the Lone Star copper deposit because, first, that feasibility is entirely unrelated to the proposed MPO, which concerns only development of the Dos Pobres/San Juan orebodies, and, second, a mining proponent is not required under the federal land exchange regulations to demonstrate the economic viability of developing a mineral deposit on its private lands. Thus, there is no question of the legality of the BLM's consideration of this project. By initiating the land exchange, PD has assumed the risk and costs of acquiring the public lands adjacent to the Lone Star deposit, including any losses that may be incurred should Lone Star prove not to be an economical orebody.

No. 5. Loss of Federal Oversight for Mining on Private Lands under the Land Exchange Alternative

This response addresses commentors' concern that PD and its proposed mining operations at Dos Pobres/San Juan will avoid public review or become exempt from compliance with environmental regulations if the land exchange scenario takes place.

It is a misconception that loss of BLM administration and public ownership of the selected lands means

loss of federal and/or state jurisdiction over mining or mining-related activities on those lands. Whether mining activities occur on public or private lands, any mining proponent, including PDSI, must obtain a number of federal and state authorizations to implement the foreseeable mining uses as described in Chapter 2 of this EIS. These authorizations are summarized in Table 1-1. Furthermore, many of these permits (such as Title V air quality permit, the Army Corps of Engineers Section 404 permit, and the state Aquifer Protection Permit (APP) and the Arizona state reclamation rules provide for public notification and review prior to issuance of the permits (see Section 1.6.2.2.4). The state rules, under which PDSI would operate if the exchange occurs, also require review and reauthorization for any proposed major modifications of the mine activities for which a permit has been issued. The following discussion clarifies the specific regulatory responsibilities of the BLM and other federal and state agencies in regard to mining and mine-related activities on public versus private lands.

Mining on public lands is authorized under the General Mining Law of 1872 (as amended) (30 USC 2111-42), the Mining and Minerals Policy Act of 1970 (30 USC 21a), the Federal Land Policy and Management Act (FLPMA) of 1976 (as amended) (43 USC 1701-84), and the National Materials and Minerals Policy, Research and Development Act of 1980 (30 USC 1601-05). The BLM's regulatory responsibilities for oversight of mining activities on federal lands are set forth in 43 CFR 3809, which established "procedures to prevent unnecessary or undue degradation of federal lands which may result from operations authorized by the mining laws." On BLM-administered lands, a claimant may file a Mining Plan of Operations (MPO) with the BLM to develop their claims. The BLM is responsible for federal review and authorization for the MPO, which includes environmental analysis under the National Environmental Policy Act (NEPA) and its implementing regulations (43 CFR 3809.1-6). For other specific regulatory programs, however, BLM defers to state and other federal regulatory agencies to ensure that the activities described in the MPO are in compliance with applicable environmental laws, including, but not limited to, the Clean Water Act (COE), Federal Water Pollution Control Act (ADEQ), Clean Air Act (ADEQ), Solid Waste Disposal Act (ADEQ), and the ADEQ's Arizona State APP Program and AZPDES Program, and 43 CFR 3809.1-6 and 3809.2-2. These compliance responsibilities are summarized in Table 1-1. As part of their primary oversight responsibilities for mining on public lands, the BLM requires that federal reclamation requirements be addressed in the MPO and that adequate bonding or insurance is provided by the proponent to ensure that post-closure reclamation will be completed as proposed. The 43 CFR 3809 regulations require that an applicant disclose the sources used to develop their reclamation costs.

As one alternative to mine development under an MPO, claim holders to public lands may submit a patent application to the BLM to acquire title to public lands for which they hold mining claims. (Note: Congress currently has imposed a temporary moratorium on acceptance of new mineral patent applications.) Another alternative is to complete a land exchange, as PD has elected to do in this case. Upon completion of a patent or land exchange, the encumbered federal lands become privately-owned and the owners can proceed with their mine plans without BLM authorization. However, mine operators on private lands must obtain exactly the same federal and state environmental permits that are required for mining on public lands—those previously listed in Table 1-1. While the BLM no longer provides federal oversight of reclamation in such circumstances, a mine on private lands in Arizona is still subject to state reclamation requirements, including the closure and monitoring requirements of the state's APP Program.

Thus, the two major distinctions between regulatory requirements of mining activities on public versus private lands are: 1) NEPA analysis of an MPO *by the BLM* applies in the first instance but not in the second; and 2) federal reclamation requirements apply in the first instance and state reclamation requirements apply in the second. Both of these distinctions is discussed further below.

Once BLM-administered public lands pass into private ownership, BLM is no longer responsible for NEPA analysis of the mine plan. However, to implement mining on public lands, specific activities in a proponent's mining plan must be authorized by the federal agencies listed in Table 1-1. Federal approvals such as the COE's Section 404 permit would constitute federal actions subject to environmental analysis under NEPA. In those instances, a federal agency other than the BLM would be required to conduct NEPA review of the proposed mine activity subject to its jurisdiction. Therefore, it is the loss of BLM authority in particular, and not federal authority in general, that is the consequence of the proposed

exchange alternative.

Table 4-27 briefly compares the requirements of the State of Arizona and federal mine reclamation requirements. The Arizona Mined Land Reclamation Rules would apply to the mining activities proposed by PD if it acquires the selected lands. Should the exchange be denied, federal reclamation standards that would apply have been established in several pieces of legislation, including the Mining and Mineral Policy Act, FLPMA, and 43 CFR 3809. In general, the state's policy tends to be more site-specific, for example, applying different reclamation standards to exploration activities than to mineral recovery activities, whereas the federal policy makes no such distinction.

It is important to note that under either federal or state jurisdiction, all mining operations must be conducted in compliance with the laws that substantively protect environmental quality, such as the Clean Water Act, Clean Air Act, Resource Conservation and Recovery Act, and the APP Program under Arizona Revised Statutes (ARS) Title 49 and Arizona Administrative Code (AAC) Title 18. These laws require a mining proponent to reclaim and/or mitigate in some manner disturbances to the land and natural resources resulting from their activities.

It is also important to note that, in this particular case, PDSI's mining and reclamation plans have been developed to meet both state and federal mining regulations, thus loss of federal oversight for mine reclamation would not result in any reduced or different requirements for reclamation under the land exchange alternative.

No. 6. Endangered Species Act Compliance and Section 7 Consultation

Commentors voiced concerns about BLM's efforts to consult with the U.S. Fish and Wildlife Service as required by the Endangered Species Act (ESA) regarding potential impacts of the Project on listed species and requested consultation documents. The BLM, as lead agency, with the COE as a cooperator, initiated Section 7 consultation just prior to publication of the DEIS with the USFWS to ensure compliance with the Endangered Species Act and its implementing regulations. This process started on October 16, 1998, with the submission of a biological assessment to the USFWS. Since then, BLM has met several times with USFWS to clarify and/or add more data to the biological assessment. Six species were the subject of formal consultation: Arizona hedgehog cactus, within the project area, and southwestern willow flycatcher, razorback sucker, Gila topminnow, spikedace, and loach minnow, outside the project area.

A biological opinion on the effects of the Project was issued by the USFWS on June 11, 2002. Regarding the Arizona hedgehog cactus, it was determined that the Project will not affect this species because the hedgehog cacti found in the project area are a different species (USFWS 2002). Regarding southwestern willow flycatcher, "it is the Service's biological opinion that the Dos Pobres/San Juan Project, as proposed, is not likely to jeopardize the continued existence of the southwestern willow flycatcher" (ibid.). This opinion includes consideration of the habitat enhancement and creation activities undertaken at the Pima and Thatcher mitigation sites as well. Regarding critical habitat for either species, none is designated for the cactus and none for willow flycatcher is present in the action area, therefore, no critical habitat for either species will be affected by the Project (ibid.). The Service also provided concurrence "with BLM's determination that the Dos Pobres/San Juan Project may affect, but is not likely to adversely affect the Gila topminnow, razorback sucker, spikedace, loach minnow and designated critical habitat for the razorback sucker, spikedace, and loach minnow..." (ibid.).

No. 7. Appraisals

Commentors raised concerns about the appraisal process that BLM undertook to establish the monetary values of the selected and offered lands. The Federal Land Exchange Facilitation Act of 1988 (FLEFA) and the Federal Land Policy and Management Act of 1976 (FLPMA) require that standardized appraisal methods be used in determining the value of proposed exchange lands. The specific methods and standards by which the values of the offered and selected lands are computed must follow the Uniform Appraisal Standards for Federal Land Acquisitions (UASFLA) (Department of Justice 1992). These

standards stem from eminent domain court cases and provide strict guidance for all federal appraisals. All appraisals for this project were completed by professional, state-certified appraisers, either on BLM staff or contract fee appraisers working for BLM. A BLM review appraiser then reviewed all appraisals for compliance with the UASFLA.

All federal land exchanges are based on a dollar-for-dollar exchange; that is, the dollar values of the selected and the offered lands must be within 25 percent of each other, regardless of acreage discrepancies. Differences in dollar value of up to 25 percent of the value of the public land between selected and offered lands that cannot be balanced with acreage adjustments may be addressed with a cash equalization payment by the agency or proponent. This guarantees that the exchange is economically fair, regardless of acreage differences.

In determining the dollar value of both selected and offered lands, it is important to note that not all acres of land are of equal value. As an example, an acre in downtown Phoenix is not of the same monetary value as an acre in downtown Safford. The appraisals consider the current and potential uses of the lands; the arms' length value of similar land; and, in cases involving the mineral estate, the mineral potential of the lands.

The appraisal method used for the lands in this project is the "comparable sales" approach, which is the most commonly used and defensible method. In this method, the property being appraised is compared to other similar land that has recently been sold. The comparable sales approach considers comparisons between the properties for location, time of sale, access, amenities, physical features, water, terms, current and potential uses, etc., in determining a property's fair market value.

The highest and best use of a property must be determined to complete an appraisal. This is defined as the most financially productive, physically possible, and legally permissible use to which the property is suited. Determining physical and legal uses is usually relatively straightforward, whereas determining the most financially productive use requires more study. A use must be probable, since any given use is unlikely to be financially productive if such a use is unlikely to occur. In the case of the selected lands, the most likely, legally permissible, physically possible use of the lands would be incorporation into the proposed Dos Pobres/San Juan Project as mine support lands. In the case of the offered lands, highest and best use would be recreational or rural home site development.

The mineral potentials of the selected and offered lands were reviewed and considered during the appraisal process. Mineral potential reports independently prepared for this land exchange and reviewed by BLM addressed the mineral potentials of both the offered and selected lands. It was determined that the offered lands held no mineral value that would warrant consideration in the appraisal. The mineral potential report (Wahl 1997a) identified approximately 190 acres of selected lands (near the San Juan deposit) as having high open pit mineral potential at a high level of certainty. As a result of this finding, the mineral value of these acres was included in the selected lands appraisal. With the exception of these 190 acres, the remaining approximately 16,097acres of selected lands were found to be lacking in mineral potential that warrants consideration in the appraisal.

Information provided by PDSI in their Mining Plan of Operation as to foreseeable uses, in conjunction with the mineral report, support these findings and demonstrate that all but approximately 190 acres of the selected lands will be used solely for mine support activities, such as leach or development stockpiles, shops and ancillary facilities, and safety and security buffers.

With all of these factors to consider, the final appraised values of the selected and offered lands were calculated, reviewed, and approved by the BLM, and are provided in Table 2-11. All appraisal documents, except those portions containing legally designated proprietary data, are available for public review at the BLM Arizona State Office during normal business hours.

Before the ROD is issued, the appraisals for the selected and offered lands will be revisited by the BLM through a market analysis to determine if a reappraisal is warranted. The current appraised values are in

PD's favor and based on the current appraisals, PD has elected to donate the discrepancy in dollar values to BLM.

No. 8. Public Lands Management

Some commentors indicated that the Draft EIS failed to make clear how the exchange alternatives would improve public land management, while other commentors offered the opinion that the exchange would not improve public land management at all. Some commentors expressed the opinion that as few as three of the offered land parcels hold values worthy of acquiring. Other commentors encouraged the BLM to select different optional parcels to be included in the land exchange action alternative.

As described in Section 2.2.4.1 of the FEIS, the BLM ID Team chose from PD's list of offered optional properties to formulate the package of offered lands presented in the Land Exchange alternative. After considering public comments on this matter, the ID Team continues to support the selection of optional properties as presented in the EIS. It is true that each parcel of offered land differs in the quantity and quality of its resources. Notwithstanding these differences, the BLM finds that the collective values of the offered parcels in the Land Exchange alternative far exceed the values and management objectives served by the selected lands. The BLM will and must consider the exchange proposal in light of its clear potential to serve the public interest. The foreseeable uses of the offered lands, their resource values, the management objectives to be served by their acquisition, and a wealth of other pertinent information to be considered in the BLM's decision are described in Chapters 2 and 3 of the EIS.

No. 9. Cultural Resources Mitigation

Commentors voiced concern about BLM's efforts to consult with Indian tribes regarding the treatment of archaeological sites and traditional cultural properties that would be adversely impacted by the proposed mining and/or land exchange. A treatment plan for the mitigation of impacts on cultural resources, including archaeological sites, cultural properties, and traditional cultural places, has been prepared and is being reviewed by the State Historic Preservation Officer (SWCA 2003b). This plan addresses both the mine plan and land exchange action alternatives, as some sites would be affected by the land exchange, some would be affected by mining operations, and some sites would be affected by both actions. Information received from Native Americans during tribal consultations was used to develop the initial draft treatment plan, which was then submitted to all interested tribes for review. Their comments were considered in preparing the final plan, which is available to interested tribes and agencies, including BIA..

Every attempt has been made during this process to acquire from the consulting tribes the information and recommendations needed to determine significance and the appropriate treatment of cultural sites in the project area. The initial treatment recommendation received from most of the tribes was to not complete the land exchange and to not authorize the mining operations, thereby preserving the sites in place. Alternatives to this action, however, have been identified by BLM through consultations with tribes and PDSI and have been incorporated into the treatment plan. This plan (SWCA 2003b) includes the following provisions:

< Data recovery is planned for the majority of archaeological sites because they are eligible for inclusion in the National Register of Historic Places under criterion D, direct physical impacts are expected at some of these sites, and the tribes recommend (or do not oppose) data recovery in these cases.

< In the case of sacred sites, the BLM has determined that archaeological data recovery would not be appropriate. Specifically, provisions have been made for avoidance/protection of three sacred sites (AZ CC:2:200 ASM, AZ CC:2:211 ASM, and AZ CC:2:234 ASM). PDSI modified the mine plan design and agreed to provide a buffer zone and/or fence to avoid impacts on the first two of these sites, which are of primary concern to some tribes. Additionally, PDSI has agreed to provide access to these two sites to tribes under either the land exchange alternative or the MPO alternative. Site AZ CC:2:234 (ASM) will be avoided by mining operations.

< Mitigation of impacts on the project area's petroglyph sites was discussed with tribes to determine the most appropriate treatment. Relocation of boulders bearing petroglyphs has been recommended and is included in the treatment plan.

The treatment plan also includes ethnohistoric and ethnographic studies to determine the significance and use of sites, particularly traditional cultural places. When possible, treatment is based on use; however, mitigation of impacts on values other than use or information is not always feasible. For example, the impact of visual intrusions from mining facilities may not be mitigable. Likewise, in the opinion of some commentors, mitigation of impacts on traditional cultural places is not possible in some instances.

Under the land exchange alternative, the transfer of cultural resources out of federal ownership is considered an adverse impact. Such impacts will be mitigated by recovering or protecting the values and uses ascribed to individual properties in the same manner used to mitigate impacts to cultural resources from mining operations.

No. 10. Indian Trust Resources

Indian trust resources or assets are defined by the BLM as legal interests in property held in trust by the United States for Indian tribes or individuals (Departmental Manual: Intergovernmental Relations--Departmental Responsibilities for Indian Trust Resources, Department of the Interior 1995b). Trust assets are further defined as "anything owned that has monetary value...[such as] real property, physical assets or intangible property rights" (ibid). Comments received relative to Indian trust resources include several stating the belief that groundwater beneath the San Carlos Apache Reservation is the property of the Tribe and a federal Indian trust asset, and as such, should not be impacted by the proposed federal undertakings. Concern was also expressed about potential impacts to tribal water rights to the Gila River owned by the Gila River Indian Community and the San Carlos Apache Tribe. Some commentors stated that no mitigation had been proposed for impacts to Indian trust resources or assets.

BLM agrees that groundwater under the San Carlos Apache Reservation is an Indian trust asset (see revised Section 1.5.3, Section 3.2.6, and Section 4.3.6 in the FEIS), as are Indian surface water rights to the Gila River. Current model predictions show a slight increase in the rate of groundwater flow southward from the Reservation due to the proposed mining activities (maximum increase in this rate is predicted to peak at 0.2 af/yr in Year 50 [URS 2002]). This increase is only about 0.07 percent of the estimated pre-mining flow. The predicted decline of the groundwater table elevation under the Reservation is nearly zero, with the 1-ft drawdown contour never reaching the Reservation's southern boundary. The model also predicts a potential reduction in groundwater and surface water flows to the Gila River, which, if unmitigated, could affect downstream holders of water rights, including the Gila River Indian Community and the San Carlos Apache Tribe.

Neither the BLM nor the COE control or regulate water rights to groundwater or the Gila River. These agencies do, however, have legal responsibilities, including trust responsibilities in the case of BLM, pertaining to protection of surface water quantity and quality. Mitigation measures have been incorporated into the proposed Project to ensure that these responsibilities are carried out. See revised Section 4.3.6.1 in the FEIS for details. Proposed mitigation for potential impacts on Gila River flows and Reservation groundwater involve fallowing agricultural acreage in the Safford Valley (see the Mitigation and Monitoring Plan in Appendix F) to reduce consumptive use of Gila River water. The proposed mitigation program includes feedback mechanisms (recalibration triggers) to adjust mitigation measures, if necessary, should monitoring indicate that maximum impacts to water resources will exceed the current mitigation volume of 480 af/yr (see Appendix F and General Response No. 16 below for details).

One commentor recommended that further analysis of impacts must be conducted regarding their claim that the exchange will "negatively affect the San Carlos Apache tribal and the BIA trust resources" but does not provide lands to the BIA to hold in trust for the San Carlos Apache Tribe. BLM is not aware of any trust resources held by BIA in the project area. PDSI will mitigate for predicted physical impacts to surface flows in the Gila River. Therefore, impacts to downstream surface water rights holders of the Gila River, including the San Carlos Apache Tribe and Gila River Indian Community, are not expected and neither tribe's Indian trust assets in the form of surface water rights are expected to be adversely impacted. The predicted drawdown of groundwater under the San Carlos Apache Reservation, another Indian trust asset, is unmeasurable. Therefore, no measurable impacts to this trust asset are expected.

No. 11. Water Rights Authority

Comments were received about the accuracy of BLM's discussion and interpretation of the water rights authority(s) as it applies to the proposed action and alternatives. BLM has revised Section 1.5.3 in light of these comments and consideration of additional information that has been developed since publication of the DEIS.

No. 12. Nighttime Lighting

Comments were received about the BLM's analysis of the effects of the proposed mine's nighttime lighting

on existing astronomical activities in the Gila Valley. The purpose of Chapter 3 in the EIS is to present a description of the existing environment, including nighttime lighting, at the project location. We believe that the description of the existing nighttime lighting is accurately presented in Section 3.2.1.8.5 in Chapter 3. BLM was not attempting to minimize the presence of the lights at Site No. 2 by comparing them to lighting at the nearby prison. Instead, it was simply stated that the presence of existing lights in the valley, including those of the prison, may make it difficult for some viewers to discern the presence of the existing lighting at Site No. 2 in the project area.

It is difficult to create a mental picture for the reader of what the Project will look like at night, but text has been added to Chapter 4 to further describe how the nighttime scene would change with development of a mining operation. This analysis is a discussion of the effects on residents in the Gila Valley. We believe it is an adequate assessment of the potential impacts to nighttime lighting conditions associated with the proposed mine.

No comments were received during the DEIS comment period from officials at the Mt. Graham observatories, Discovery Park, or Eastern Arizona College regarding potential impacts of the project on their respective astronomical observations. However, early in the EIS process, the University of Arizona, which operates the Mt. Graham observatories, adopted a neutral position regarding the proposed land trade between the BLM and PD. The University requested that the Project comply with the local Graham County Lighting Ordinance to control light pollution. As stated in the EIS, PD will comply with this ordinance under both the MPO or land exchange alternatives.

The distance from the Gila Valley to the Project location (between 6 to 9 miles depending on the viewer's location in the valley) will reduce the effect of lighting on the nighttime scene, to some degree, however, it is impossible to prevent light from the project area from being visible off the Project site. It should be noted that the proposed use of conveyors and stackers to deliver agglomerated ore to the leach pad (instead of haul trucks as originally stated in the DEIS) will also reduce nighttime lighting impacts. Light plants will only be needed when run-of-mine (ROM) ore is deposited at night on the pad by trucks. Because the majority of leach material will be conveyed and stacked, only low vapor sodium lighting, and not the focused lighting provided by light plants, will be necessary. Additionally, since ROM ore will primarily comprise the face of the pad, and light plants will be located behind the southward face of the pad, the light plants will be out of view for most viewers in Safford. According to PD, the use of motion sensors to turn light plants on and off as trucks enter and leave a stockpile area cannot be employed for safety reasons. To mitigate the impacts of fugitive dust on air quality and on visibility (safety), dust abatement measures (water trucks, etc.) would be implemented. See also revised Section 4.3.1.8 on nighttime lighting impacts.

No. 13. 100-year Floodplains

Comments about impacts to 100-year floodplains focused on compliance with Section 3(d) of Executive Order 11988 on Floodplain Management. Section 3(d) of Executive Order 11988 requires that a federal agency, when disposing of lands to a private or non-federal public entity, "...(1) reference in the conveyance those uses that are restricted under identified federal, state or local floodplain regulations; and (2) attach other appropriate restrictions to the uses of properties by the grantee or purchaser and any successors, except where prohibited by law; or (3) withhold such properties from conveyance." In Graham County, applicable regulations and restrictions pertaining to protection of all or portions of floodplains include, but are not limited to, Flood Disaster Protection Act and the Graham County Flood Damage Preventions Ordinance (No. 1998-100). If the land exchange alternative is selected, reference to the use restrictions in these regulations will be made in the applicable conveyance documents in compliance with Executive Order 11988.

There are no 100-year floodplains with determined base flow elevations within the project area and construction of stormwater diversions upstream of the two mine pits is expected to reduce the amount of flow in several washes (i.e., Watson, Talley, Cottonwood, Peterson, and Lone Star washes) within the project area, thereby significantly reducing the flood potential of these washes within the project

operations area. None of the proposed mine facilities is located within regulated 100-year floodplains.

No. 14. Hazardous Materials

Comments about hazardous materials focused on the increased potential for spills affecting Reservation lands and the Gila River flows, and mitigation measures for potential spills.

As discussed in Section 2.1.2.3.5 (Hazardous Materials Storage, Handling, and Transport), the proposed Dos Pobres/San Juan Project will require delivery of chemicals (sulfuric acid, diluent, reagent, and fuel) by tanker trucks, 90 percent of which will be 3,500-gallon capacity acid trucks (projected at about 70 acid trucks per day). The most likely source of the acid is from smelters located in central Arizona and western New Mexico. The following safety precautions and procedures that would be enforced for the Project reduce the chances of a hazardous spill in general and into the Gila River in particular: 1) the truck route avoids Safford's 8th Avenue Bridge, a narrow, substandard bridge over the Gila River with the highest vehicle traffic volume; 2) truck speeds when approaching and crossing bridges are restricted to 35 miles per hour, 10 miles per hour below the county road speed limit; 3) trucking company managers randomly monitor truck speeds using radar guns and drivers are disciplined for exceedances; 4) new tanker design has been engineered to withstand both full pressure and full vacuum is conditions to minimize potential for ruptures if a truck is involved in an accident; 5) the pressure release valve design used on acid trucks exceeds the Department of Transportation's recommended valve design by using a corrosion-resistant pressure release valve made from teflon-lined stainless steel; and 6) required Department of Transportation driver safety training and additional training required by the trucking company.

PDSI intends to contract a trucking firm with a sound safety record. For example, a major acid carrier in southeast Arizona who has been providing these services to PD and other mining companies maintains an excellent safety record. Between1997 and 1999, this firm logged 14,582,582 miles in Arizona and New Mexico in acid shipments, with only three accidents (a rate of one accident per 4,860,861 miles). None of the accidents occurred on a bridge. No acid was released in one of the accidents; a second accident occurred on a mining company's private property and the acid was intentionally drained from the tanker for use in the leaching process system; at the third accident, the acid was intentionally released and neutralized at the accident site.

The trucking company that will be selected for this project will be required by PD to have a 24-hour emergency response unit that keeps lime and other neutralizing agents, as well as containment structures, on hand for rapid deployment. ADEQ, Arizona Department of Public Safety, and frequently, local jurisdictions, also maintain hazmat emergency response units that could be called on in the case of a spill. Local emergency response units such as fire departments could also be used if needed. It is beyond the authority of the BLM to require communities to increase their fire, police, or hazmat response capabilities, or require improved highway conditions.

In addition, the probability of a spill large enough to affect the Gila River or its riparian vegetation or wildlife is extremely small. While it is possible an acid spill could happen at any point along the delivery route, the bridge segments make up an extremely small portion of the total miles driven (about 0.16 of one percent of the total projected acid truck miles driven during the 16-year life of the mine). Furthermore, the chances that an accidental acid spill on a bridge will directly contact the waters of the Gila River are even smaller, given the narrowness of the channel and low flow of the river during the majority of the year. The highest probability of an acid spill into the river occurs when the river is at its widest—that is, when the river is at its highest flow. This is also when the river has the highest potential to neutralize the acid (waters in the Gila River are alkaline [USGS Water-Data Report AZ-95-1]) and dilute the acid by sheer volume. Based on the extremely low probability of a spill large enough to have any measurable effect on the Gila River or riparian habitats, BLM has concluded that the increased risk of spill into the river from the increased truck traffic associated with the proposed project is negligible. The June 2002 Biological Opinion issued by U.S. Fish and Wildlife Service concurs with this determination, stating that "the probability of a hazardous spill large enough to affect the [endangered southwestern willow] flycatcher or its habitat on the Gila River is

extremely small and discountable" (USFWS 2002).

Like the Gila River water, the soils in the area from the base of the Gila Mountains to the Gila River are alkaline, with pH values ranging from about 7.4 to 9 (SCS 1981). Caliche is common, and many of the soils are weakly consolidated by a naturally occurring calcareous cement. This alkalinity will also contribute to neutralizing an acid spill in the project area or along the transport route on Highway 77, including the segment through the San Carlos Apache Reservation.

No. 15. Conflict of Interest

Some commentors felt that PD's payment of some of BLM's costs, including portions of BLM salaries and third-party NEPA contractor costs, appeared to create a conflict of interest in BLM preparing a fair and accurate analysis of the Project.

Federal agencies such as the BLM are encouraged and authorized to recover costs from applicants for "products and services provided to the public...," such as the processing of rights-of-way applications, MPOs, land exchanges, special use permits, etc. (OMB Circular A-130; BLM Manual 1270-2). Additionally, as provided for in 43 CFR 2201.1-3 (Exchanges: General Procedures, Subpart 2201, Specific Requirements), "one or more of the parties [to a land exchange] may assume, without compensation, all or part of the costs or other responsibilities or requirements that the authorized officer determines would ordinarily be borne by the other parties." Cost recovery occurs through a BLM-administered contributed funds account; at BLM's request, PD periodically deposits funds into this account from which the BLM can draw to cover the costs of staff time and expenses spent in processing PD's proposal, in this case, both the land exchange and the MPO.

This comment presupposes that BLM personnel and/or NEPA contractors would bias the analysis in favor of the applicant, in this case PD, who is paying, in part, their wages. While cost recovery may appear to provide the basis for a conflict of interest, in fact, it is clearly in the interest of <u>all</u> parties that the Project be consistent with the agency's goals and mission, meet the agency's criteria for approval of such projects, and that the NEPA process, documentation, and administrative record demonstrate this in an accurate and defensible manner should the ROD be appealed. It is also important to note that the NEPA process is a dynamic planning process, so that mitigative measures that are developed during the analysis to address identified impacts often become incorporated into a Project such that the final analysis may show little or no significant impact. This effort does not reflect a bias on the part of the agency but rather an effective functioning of the NEPA process "to insure that planning and decisions reflect environmental values, to avoid delays later in the process, and to head off potential conflicts" (40 CFR 1501.2).

The basis for authorizing an exchange or an MPO is clearly spelled out in the various authorities that govern these activities (see Table 1-1, Federal and State Regulatory Requirements Applicable to the Dos Pobres/San Juan Project and Alternatives). With several opportunities for public input and review of the document, and legal recourse available to the participating public (i.e., those with standing) if the document is deficient, it is highly unlikely that a land exchange or an MPO that does not clearly meet the agency's approval criteria would be authorized, regardless of who is paying for preparation of the NEPA document.

No. 16. Groundwater Model Review

The model developed to predict groundwater impacts resulting from pumping has undergone numerous intensive and technical reviews, most significantly by Dr. Robert Mac Nish, BLM's hydrological consultant, Mr. Tom Olsen, BLM hydrologist; and BIA's consultant, Stetson Engineers (Stetson). In addition, James Brown and Stan Leake, U.S. Geological Survey, provided technical comments and suggestions on particular aspects of the model. This general response summarizes for the reader, in a non-technical manner, BLM's efforts to address the technical questions raised by Stetson about the groundwater model in their comment letter on the DEIS (see Comment Letter 237), and in a series of letters and meetings with

BLM from May 1998 to October 2002.

Early in the EIS process, the ID Team identified the potential for groundwater and surface water impacts from the proposed mining as a significant concern to be addressed. Soon thereafter, PD proposed that a groundwater model be developed to estimate the potential impacts of groundwater pumping and hired a hydrologic contractor, Dames & Moore (now URS Corporation). PD then started to collect data from wells installed as part of its APP studies and implemented a rigorous pump testing program. Recognizing the necessity of an independent reviewer of the model, BLM contracted with Dr. Robert Mac Nish, former USGS District Chief for Arizona and currently Co-Director of the University of Arizona's Arizona Research Laboratory for Riparian Studies, to assist URS in the review and fine-tuning of the model (see Section 4.3.2.5.1, Groundwater Quantity, for a description of the groundwater model development process).

In all, five phases of model calibration and refinement have been completed to this point (URS 2002a). Phases I-III preceded publication of the DEIS, while Phases IV-V occurred after the DEIS, largely in response to concerns expressed by the BIA and its consultants.

< **Phase I:** Model developed and calibrated by Dames & Moore and reviewed by Dr. Mac Nish and Hana West (former BLM hydrologist). This comprehensive review of the preliminary model included, but was not limited to, re-evaluating model assumptions on inflow and outflow parameters, reviewing well and pump test data, and examining the values used to represent hydraulic properties in the aquifers.

< **Phase II:** Refinement and recalibration by Dames & Moore based on the review comments of Dr. Mac Nish and Hana West. Dr. Mac Nish and Hana West participated briefly in refining the model, and additional research was conducted to better define material properties and boundary conditions. Phase II focused mainly on material properties and the role of faults in the regional groundwater flow system rather than boundary conditions. The model was rerun for both steady-state (pre-stress) and transient (a 500-year simulation of mine pumping and recovery) conditions.

< **Phase III:** Refinement and recalibration by Dames & Moore and Dr. Mac Nish based on review of the Phase II model. Dr. Mac Nish participated fully during this phase of model refinement, and the overall and specific components of the water balance were the main focus of the refinements to the model. Impacts on Bonita Creek were also added to the modeling scope. The Phase III model's projections on the behavior of groundwater in the 500-square mile model area, which includes portions of the San Carlos Apache Reservation, and on Gila River and Bonita Creek surface flows under transient conditions, were reported in the DEIS in Section 4.3.2.5.1. As noted in the DEIS, "the model represents hydrogeologists' current understanding of the regional groundwater system and *is but one of many unique solutions that match computed and observed values with equal precision*" (emphasis added).

< **Phase IV:** Refinement by URS (2001) and Dr. Mac Nish to better simulate decline and subsequent rise of the water table during and after mining. This iteration of the model included a "rewetting" package; reduced the modeled peak pumping rate per the revised MPO; included more realistic pit bottom areas and mine depths; contained one transient simulation stage rather than two; simulated a 3,000-year period rather than a 516-year period; and used time steps of shorter duration. No re-calibration was needed.

< **Phase V:** Refinements documented in the 2002 report were made to reduce small errors in the water balance of the Phase IV 2001 model. These small errors are apparent only when calculating small changes in the water balance or in water levels, however, they caused the 2001 model to over predict impacts by as much as a factor of 65 percent. No recalibration of the 2002 model was needed.

To address mitigation requirements and in recognition that "the model is not the 'real world,'" Dr. Mac Nish

developed the "3M Program" (**M**odel, **M**onitor, and **M**itigate) as an integral part of the groundwater model application. The 3M Program requires an iterative process of modeling the system response, then monitoring actual system response to pumping, then comparing model projections to actual system response, and finally recalibrating the model when comparison criteria are exceeded. The 3M Program ties mitigation requirements to any subsequent predictions made after model recalibration (see Appendix F).

The BIA, on behalf of Indian tribes potentially affected by the Project, requested that their consultant, Stetson, review the model and its projections prior to publication of the DEIS. Stetson, Dr. Mac Nish, and URS hydrologists initiated a nearly four-year-long dialogue regarding the groundwater model application. In addition to technical questions about the model, Stetson requested to review some of the hydrological data and computer code and to have BLM run model projections under different scenarios. In the meantime, BIA formally submitted its comments on the DEIS and Stetson's comments on the model in a letter to BLM dated December 17, 1998 (Comment Letter 237). After the close of the comment period, Stetson, Dr. Mac Nish, and URS hydrologists continued their dialogue regarding the groundwater model through a series of letters, meetings, and phone conversations. In spring of 2002, USGS became involved in the review of the groundwater model and the 3M Program.

Stetson's comments about the model application can be grouped into three general categories. These categories and the manner in which BLM responded to the three categories are described below.

(1) Requests for more information (graphs, maps, etc.) supporting model assumptions.

Stetson requested, and was sent, a variety of materials pertaining to the modeling effort, including, but not limited to, copies of model (MODFLOW) input and output files; maps showing the model grid, geological faults, springs, well locations, etc.; hydrographs showing simulated vs. historical water elevations in wells within the model area; maps of evaporatranspiration rates for the model area; detailed steady-state and transient water budgets; tables of initial and final model parameters for aquifer and streambed properties, etc. Below are summarized Stetson's technical questions, descriptions of how or whether its concerns pertain to the evaluation of the model or model results, and summaries of BLM's response. Also, additional or revised figures, tables, or charts that were developed as part of the model reviews to clarify projected groundwater impacts have been included or replace earlier versions in Volume 2. For interested members of the public, Stetson's technical questions and comments and BLM's responses have been documented and compiled in the BLM's case file for this project, which is available for public review at the BLM Safford Field Office during regular business hours.

Written responses to a large number of the questions/issues raised by BIA and Stetson were provided by Dr. Mac Nish and URS hydrologists. Most of these items were related to assumptions, data sources, and model performance in simulating both the steady state (pre-stress) condition of the hydrologic system, as well as to the model's simulation of a six-month aquifer test conducted in the last half of 1996.

The principal assumptions in the model relate primarily to the amounts of water entering and leaving the area of the model and to the data sources upon which these assumptions are based. Water entering the model consisted of areal recharge in the Gila Mountains and along the Gila Mountain front on the northeast side of the Gila River, groundwater inflow from the Peloncillo and Pinaleno Mountains and the San Simon Valley, as well as surface water inflow from Bonita Creek and the Gila River. Stream gauges operated by USGS on the Gila River at the head of the Safford Valley and on Bonita Creek provided data on average stream inflows, not including storm runoff to provide background or baseline stream data. Inflows from the San Simon Valley, and the Pinaleno and Peloncillo Mountains were based on USGS reports, and the amount of recharge coming from the Gila Mountains was limited to conform to total groundwater inflows to the Safford Valley as listed in the same USGS reports. Outflows from the model included surface flows in the Gila River and groundwater, as well as the consumptive use by crops grown in the model area. Crop acreages from public records and consumptive use rates for the principal crops from the literature were used to estimate the total consumptive use of water by crops. The amount of

water so used was assumed to come from a combination of surface diversions from the Gila River and groundwater pumping in the Safford Valley. The downvalley outflow of groundwater and surface water was constrained by the USGS-measured inflow and outflow from the San Carlos Reservoir, as all water leaving the Safford Valley is assumed to pass through this reservoir. The effects of extensive areas of salt cedar (*Tamarix* sp.) and other plants that can extract and use groundwater between the western model boundary and the San Carlos Reservoir were estimated from values in the literature, and together with the flow through the reservoir, constrained the downstream outflow of groundwater. Additionally, the downstream outflow of surface water was constrained by data from the USGS stream gauge near the Calva Bridge.

Other important assumptions relate to the values assigned to the hydraulic properties (the ability to store and transmit water) of the various formations through which the groundwater moves, and to the sources of data from which these values were obtained. Published reports of prior investigations provide values for these properties for most of the formations in the Safford Valley, and the values used in this model were generally near the midpoint of reported ranges. In the vicinity of the mine, the six-month aquifer test conducted by PD yielded estimated values for the hydraulic properties of geological formations. These values were used for similar formations in the Gila Mountains; otherwise, where non-similar formations were present, values reported in the literature for such formations were used. All requested information of this type was provided to Stetson, either in reports documenting model construction or in response to specific requests.

A model's performance can be assessed in several ways. During model construction and testing, sensitivity analyses are useful in determining which hydraulic properties have the greatest effects on model behavior. Such analyses are done by varying values for hydraulic properties, usually by some percentage, and observing the effects on model-simulated water levels, gradients, and fluxes. Sensitivity analyses of this kind have been performed on the groundwater model, and a discussion of the results has been provided to BIA.

Another means of assessing model performance is to statistically compare the model-predicted water levels in model cells with actual water levels measured in wells in those same model cells. Using data from existing wells in the vicinity of the planned pumping wells, these statistical comparisons were completed after the six-month aquifer test and provided to Stetson for the entire model as well as for selected groups of wells.

Stetson Engineers also requested four additional model runs[1] with different levels of pumping stress. As none of the requested scenarios were realistic in view of the project's water requirements, these requests were rejected by BLM as unwarranted. Stetson Engineers withdrew an earlier request for transient calibration statistics for individual well groups during a conference call with BLM on February 2, 2000.

(2) Comments reflecting differences of professional judgment (e.g., regarding the nature of the model grid, the effects of pumping on springs, pit lake evaporation, etc.).

A hydrologic modeler develops a model based on a set of guiding hydrological principles; only one set of professional judgments can be accommodated in any given model. Several of Stetson's comments on the model reflected a difference in professional judgments with URS hydrologists and Dr. Mac Nish regarding the nature of the model grid, the effects of pumping on springs, the effects of pit lake evaporation, etc. Data and/or pertinent information supporting the professional judgments made by URS and Dr. Mac Nish

[1] The four model runs requested by BIA were: (1) a model run with pumping stress reduced to the point that drawdown at the San Carlos Apache Reservation boundary would not exceed one foot. This would require multiple model runs in a "trial and error" process to achieve, and thus would be a very expensive effort; (2) a model run with mine pumpage reduced by one half; (3) a model run with the mine pumpage increased by a factor of two; and (4) a model run with mine pumpage increased above the mining needs and the excess water recharged into wells north of the Butte Fault.

in developing the model were provided to Stetson, except in two instances. In these cases, BLM determined that a full response to the comment would be more complete and appropriate after the first recalibration of the model.

The two comments that will be addressed at the first model recalibration include: a) that pit lake evaporation was not simulated in the model; and b) that the nature of the simulation of interaction between the groundwater system and Bonita Creek could lead to error if drawdown caused by mine pumping was large in the vicinity of Bonita Creek. The rationale for addressing each after model recalibration is that a significant recalibration of the model will be required before mining begins, primarily because the Group 4 well data will lead to model parameter changes very close to the mine well field, and the long term mitigation requirements must include pit lake evaporation effects. The reason for delaying this recalibration is to allow the Group 1 wells to be drilled before recalibration as these wells are the key monitoring wells to assess the accuracy of model projected impacts on the Gila River. More detail on these two comments is provided below.

< **a) Pit lake evaporation.** Neither current evaporation from the present San Juan pit lake nor future evaporation from the eventual pit lakes at Dos Pobres and San Juan were simulated in the model. In early model runs, the rate of pit lake evaporation was thought to be minuscule in comparison to the pumping rates the mine will use, therefore its effect on the Gila River was anticipated to be negligible. However, after the calibrated model predictions showed the mine pumping impacts on the Gila River would be spread out over centuries, the model predicted that the effects of pit lake evaporation would be larger than those of the mine pumping, though it may be hundreds of years before the full effects are felt at the river. Pit lake evaporation becomes a factor after mining ends and the system starts to recover, however, the effect of pit lake evaporation will be to slow the recovery by some small but finite amount. Presently estimated at approximately 21 af/yr, pit lake evaporation will continue in perpetuity, with effects of similar magnitude on Gila River flows.

< **b) Drawdown near Bonita Creek causing error.** The model's projected drawdowns in the vicinity of Bonita Creek are far too small to introduce error, suggesting the nature of the simulation of stream-aquifer interaction is not a critical factor. For error to be introduced, the model would have to predict water levels dropping below the level of Bonita Creek. Nonetheless, at the first recalibration of the model before mining begins, the same computer code to simulate the stream-aquifer interaction on the Gila River will be included in the model for Bonita Creek.

The two Stetson comments for which BLM decided to not change the model included: a) the effects of groundwater pumping on springs was not modeled; and b) the model grid resolution was unnecessarily fine. BLM's rationales for not changing the model in response to these comments are provided below.

< **a) Effects on springs.** Field visits during March and December 1998 by Dr. Mac Nish to the four springs located between the mine and the San Carlos Apache Reservation revealed dramatic differences in flow, as would be expected for springs that are fed from local sources (perched aquifers of limited areal extent, rather than hydrological connection to the regional groundwater aquifers) that wax and wane with the size and frequency of storms. The steep hydraulic gradients between the springs and the graben aquifer, which is the proposed groundwater source for the mine, argue against a direct and highly transmissive connection between the two. Regardless, the 3M Program includes monitoring of Groups 4 and 5 wells located between the pits and the San Carlos Apache Reservation boundary to provide 'advance warning' of potential drawdown on the Reservation.

< **b) Model grid resolution.** The model grid resolution has no bearing on model results beyond the complexity it imposes on data handling requirements. The model has 17 layers and the degree of connection between layers is governed by the same equations that govern horizontal connections between adjacent cells in each layer. The model resolution is appropriate for the type

of impact predictions made (i.e., the model cell dimensions are small enough and the number of significant digits used in calculations is large enough to reduce error).

(3) Comments related to the approach in dealing with model uncertainties.

All models have uncertainties associated with their outcomes. BIA/Stetson and BLM/Dr. Mac Nish have different, but equally valid, philosophical approaches to dealing with model uncertainties. Stetson's approach to model uncertainty is to do extensive sensitivity analyses to identify ranges of uncertainty in various model projections. The culmination of this approach would be a set of ranges for model-predicted values for storage change, drawdowns, etc. In contrast, the approach BLM has taken to address uncertainties of the model is to conduct a limited sensitivity analysis before mining begins and annual 'reality checks' (monitoring) to see if the model has predicted accurately what the real world is experiencing. At the end of pumping, an exhaustive sensitivity analysis of the final calibration of the model will be undertaken. If the 'reality checks' show the model is deviating from the real world, the model is recalibrated using the monitoring data until it acceptably replicates the behavior of the hydrologic system. The culmination of this approach is a systematic reduction of model uncertainties over time as the model's accuracy improves. While either approach is acceptable from a modeling perspective, BLM's approach allows for more accurate mitigation for actual impacts and more accurate prediction of recovery of the groundwater system once mine pumping ceases.

In response to Stetson's request to assess the uncertainty associated with model projections into the future, BLM indicated that such an analysis was most useful at the end of pumping, when the model's utility will be to make long-term projections into the future (i.e., in perpetuity) for mitigation purposes. Until then, any evaluation of model uncertainty will only be valid until the next model recalibration is triggered. The model is considered a "work in progress" and the 3M Program has been designed to evaluate model performance by comparing model predictions with water level observations on an annual basis as mining progresses. The 3M Program triggers a recalibration of the model whenever the observed responses of the hydrologic system to the mine pumping deviate from model-projected responses in excess of specified criteria. The criteria are specified differences between observed and projected water level changes in wells and changes in water level gradients between wells. At the end of mining, the model calibration process will be complete and the model will accurately replicate the response of the aquifer systems to the entire period of pumping stress. At that time, the calibrated model will then be used to predict the effects of 16 years of groundwater pumping on the hydrologic system for a long period into the future as the aquifer system slowly returns to its pre-stress conditions. It will be appropriate at that time to conduct a thorough analysis of the uncertainty in model projections into the future.

During Phase V of the modeling effort, the USGS became involved in the model review process and identified a need to consolidate all model documentation into a single report. In the process of compiling this report (URS 2002a), URS completed several sensitivity runs of the type requested earlier by Stetson Engineers (see category (1) above). While not an exhaustive suite as will be developed at the end of mining using the final calibration of the model, these runs tested "worst case" scenarios that would tend to exacerbate water resource impacts on the Gila River and the San Carlos Apache Reservation. The sensitivity runs that were made did show changes in these predicted impacts, but the changes were of a minor nature. The combination of this suite of sensitivity runs on the model and the 3M Program allows the analysis of the Project to move forward with confidence that any impacts to the Gila River or the San Carlos Apache Reservation will be identified and quantified and can be mitigated before they occur.

7.6.2 Specific Responses

This section consists of 650 excerpted comments followed by the specific responses developed by ID Team members to address them. Comments are presented numerically by letter numbers randomly assigned to commentors. To assist readers in locating a specific letter(s), Table 7-1 provides an index of each of the 269 commentors listed alphabetically by last name and lists their corresponding letter number.

Table 7-1. Index of Letter Numbers by Commentor's Last Name

Last Name	First Name	Organization	Letter	Number
ADAMS	DAN			226
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ALLEN	SYLVIA	PEOPLE FOR THE USA		4
ARMSTRONG	DALE G.			27
ASTON	THOMAS & CAROLE	GOLD TOOTH MINE		261
BAKER	DONNA L.			189
BALENTINE	MARION E.	BALENTINE OFFICE PRODUCTS		201
BALENTINE	CHERRILL	BALENTINE OFFICE PRODUCTS		202
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BARNEY	JERALD A.			223
BEAL	LAURENCE H.			26
BEGAY	RICHARD	THE NAVAJO NATION		259
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BLACK	JODI B.			167
BLAELOCH	JANINE	WESTERN LAND EXCHANGE PROJECT		141
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BOWERS	MELVILLE S.	PEOPLE FOR THE USA, RIM CHAPTER		3
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BOWLING	MARK			172
BOWLING	KENNETH G.			193
BRAUN	TERRY	SRK CONSULTING		40
BRIAN SEGEE	JANINE BLAELOCH	SOUTHWEST CENTER & WESTERN LAND EXCHANGE		252
BRINEY	PEG			98
BRINEY	WILLIAM F.			99
BRODERICK	A.J.			233
BROWN	KATHY			186
BROWN	MARNIE			50
BRUNSSEN	BARBARA L.	ZENECA SPECIALTIES		78
BRYCE	RICHARD A.			160
BRYCE	SCOTT			42
BUSBY	DONDRE			94
BUSBY	MALCOLM			93
BUSH	JAMES M.	FENNEMORE CRAIG		222
BUTTLER	GUY A.	PHOENIX FUEL COMPANIES		58
CALLEN	BRENT			154
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CAUTHEN	GEORGE A.		91
CHANDLER	RANDY		134
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CHRISTENSEN	GARY		9
CLUFF	ELSIE R.		101
CLUFF	E.		100
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COLEMAN	REBECCA		133
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COMMENTOR	ANONYMOUS		188
CONGER	H.M.		242
CORN	RUSSELL M.		145
CORTE	ELENA N.		6
COUTTS	GEORGE	APPLIED INDUSTRIAL TECHNOLOGIES	29
COWELL	GARY		110
COX	BRIAN		12
COX	A. D.		97
CRAMER	KEITH A.	ZENECA SPECIALTIES	59
CRANDELL	TIMAREE K.		48
CURTIS	GARY D.	COLDWELL BANKER/CURTIS REAL ESTATE	120
CURTIS	JANET E.	TROPHIES 'N TEES	185
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DEAN	KAY		144
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EADY	CHARLES S.		157
ELIAS	WILLIAM	PHELPS DODGE	34
EVANS	RANDALL C.		168
FANELLO	R. PAT	COUNTRYWIDE HOMES	114
FARRAN, P.E.	YUSEF E.	INT'L BOUNDARY & WATER COMMISSION U.S.& MEXICO	8
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FERREE	DAVID		39
FILIPPONE	COLLEEN		195
FINES	L. ANTHONY	GILA VALLEY AND FRANKLIN IRRIGATION DISTRICTS	268
FOREMAN	RICHARD L.	SOUTHWEST GAS CORPORATION	215
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GOODMAN	HENRY W.		22
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GRAY	CATHARINE L.		107
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HENRY	JACK A.		263
HERBERT	RONALD		128
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JUNION	STEVE	VALLEY FURNITURE	85
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KEMPTON	KYLE	GRAHAM COUNTY CHAMBER OF COMMERCE	80
KEMPTON	KYLE	KEMPTON CHEVROLET BUICK, LTD.	77
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KENNEDY	JIM & GLENDA		118
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ZAMAR	JOHN		229

Letter 1	Commentor	Rob Giebel of P&H MinePro Services
	Comment 1	*As an avid outdoorsman, I would encourage you to take advantage of the land exchange proposal before you. Giving up desert wasteland in exchange for more valuable real estate seems to make a lot of sense.*
	Response:	See General Response No. 1.
Letter 2	Commentor	Jonathan DuHamel of People for the USA, Tucson Chapter
	Comment 1	*On behalf of the 150 Tucson area members and nearly 4,000 Arizona members of People for the USA, I am writing in support of the proposed land exchange.*
	Response:	See General Response No. 1.
Letter 3	Commentor	Melville S. Bowers of People for the USA, Rim Chapter
	Comment 1	*I strongly support the Phelps Dodge Dos Pobres/San Juan Mine near Safford.*
	Response:	See General Response No. 1.
Letter 4	Commentor	Sylvia Allen of People for the USA
	Comment 1	*We whole heartedly support this project, and urge that any obstacles, which hinder speedy completion for operation, be removed without delay for the best good of the many interests already mentioned.*
	Response:	See General Response No. 1.
Letter 5	Commentor	Jeffry Harris of People for the USA
	Comment 1	*I would like to add to the official record our support of the Dos Pobres/San Juan Mine near Safford.*
	Response:	See General Response No. 1.
Letter 6	Commentor	Elena N. Corte
	Comment 1	*I would like to state on that record that I am in full agreement with the proposed Mine Plan of Operations which will allow Phelps Dodge to operate upon all lands it has lawfully obtained access to through the mineral claims process.*
	Response:	See General Response No. 1.
Letter 7	Commentor	T. Shawn Rasey of Cobre Tire Company
	Comment 1	*...Cobre Tire Company would like to extend our support to the Phelps Dodge Corporation regarding the development of the Dos Pobres and San Juan Mines near Safford.*
	Response:	See General Response No. 1.
Letter 8	Commentor	Yusef E. Farran, P.E. of Int'l Boundary & Water Commission U.S.& Mexico
	Comment 1	*We have reviewed the EIS and have determined that there would be no adverse impacts to United States Section, International Boundary and Water Commission ((USIBWC) property because there is none in the vicinity of the proposed project.*
	Response:	Thank you for this information.
Letter 9	Commentor	Gary Christensen
	Comment 1	*Finally, it seems like a good deal, for PD, to trade 3,858 acres for 17,000 acres of public land. Even though you state the exchange is based on equal land values it seems pretty one-sided to me. The proposed land exchange seems to be considerably more "equal" to PD than it is to the citizens.*
	Response:	See General Response No. 7, Appraisals
	Comment 2	*I believe they (PD) should be required to restore the plunderized land (tailings, waste, etc.) to some semblance of natural beauty and productivity.*
	Response:	PD's proposed reclamation plan, which has been developed to meet both federal and state standards, provides for several types of reclamation activities. Revegetation of portions of roads, leach pad, and development rock stockpiles and debris and waste removal will meet several reclamation objectives including stabilizing slopes, reducing erosion potential, providing wildlife habitat, increasing primary productivity of soils, and reducing visual impacts, among others. By far the most visible features of the proposed mine would be the side slopes of the leach pad and development rock stockpiles (see Figure 4-4). As discussed in Section 2.1.2.4, Closure and Reclamation Measures, and in the Summary, basin-fill sediments or a comparable growth medium about one foot thick are to be placed on the side slopes of these structures and then seeded. As also discussed, reclamation will also occur on the tops of these piles for the enhancement of wildlife habitat; see Section 2.1.2.4 for other proposed reclamation activities. As there are no plans for milling operations for the Dos Pobres/San Juan Project, there will be no tailings.
Letter 10	Commentor	J.L. Tenney
	Comment 1	*I feel that the BLM has provided adequate and good information.*
	Response:	See General Response No. 1.
	Comment 2	*This should go forward without further delay.*
	Response:	See General Response No. 1.

Letter 11 Commentor James D. Toole

Comment 1 *This project is positive for Arizona and the nation.*

Response: See General Response No. 1.

Letter 12 Commentor Brian Cox

Comment 1 *I think the BLM should approve the proposed land exchange.*

Response: See General Response No. 1.

Letter 13 Commentor Doug Lindsay, Sr. of Lindco Equipment and Supply, Inc.

Comment 1 *I urge you to quickly approve this EIS so that work can begin within at least the next 18 months. Much sooner would be much better.*

Response: See General Response No. 1.

Letter 14 Commentor David Travis

Comment 1 *Environmental compliance for this project is mandatory and adequately addressed in the draft document.*

Response: See General Response No. 1.

Comment 2 *Federal agencies involved with these types of projects in the future should mitigate lost job opportunities, lost business revenues and lost taxes with the "no action alternative."*

Response: NEPA requires an analysis of environmental impacts associated with a No Action alternative (40 CFR 1502.14(d)), even if it does not meet or address the project's purpose and need. Mitigation of impacts such as lost potential job opportunities and tax revenues that may result from selection of the No Action alternative is neither required nor authorized by law.

Comment 3 *And further more, appellants to the "Record of Decision" should provide mitigating measures for lost or delayed opportunities before the appeals are heard. Using this method will provide the judge or Internal Board of Land Appeals with a balance of cause-and-affect information, and the intent of the appellant.*

Response: Appellants of the BLM's decision are not required by law or BLM regulations to mitigate for potential or real lost or delayed opportunities resulting from the appeal. See also response 14-2.

Comment 4 *As a citizen of southeastern Arizona, I recommend that the BLM's "preferred action alternative" be adopted.*

Response: See General Response No. 1.

Letter 15 Commentor Carole A. O'Brien of Arizona Department of Revenue

Comment 1 *In Table 4-7, Summary of Air Quality Model Results at the Process Boundary, you give a column of Ambient concentration levels of the criteria pollutants taken from a station at Montezuma Castle. It seems to me that Montezuma Castle is so far removed from the site of the project and even the special receptor sites referenced in Section 4.3.2.2.1 as to render it a very contentious issue for those who might oppose this project.*

Response: Use of data from the Montezuma Castle site to represent rural ambient background concentrations was limited to PM10 measurements. As part of the Final Air Impact Analysis (AEC 1999a), a review of available data (Air Quality Data for Arizona, published annually by the ADEQ) showed that PM10 is collected at a site in Safford. Further review of the Safford PM10 data, however, indicated that the measured PM10 concentrations are not characteristic of the background levels that would be expected near the rural Dos Pobres/San Juan (DP/SJ) Project location. This is due to the suburban monitoring site being affected by Safford residential and business activities and being located in close proximity to a major highway and an agricultural field. Because PM10 concentrations from the suburban Safford site are not representative of the rural Dos Pobres/San Juan Project location, which is devoid of population and agricultural activities, PM10 data from the rural Montezuma Castle monitoring site, located in the Verde Valley of Yavapai County, were used. Specifically, the average of the first-maximum highest 24-hour PM10 concentrations and the average of the annual concentrations, measured at the Montezuma Castle site over three years of data (1995-1997) were used to represent background concentrations.

Although the Montezuma Castle and Dos Pobres/San Juan Project locations are far apart, both sites are very similar with respect to their rural settings and general elevation. As a result, PM10 concentrations from the Montezuma Castle site are representative of background concentrations at the Dos Pobres/San Juan Project location. Additionally, the ADEQ approved the use of the Montezuma Castle data for the modeling conducted as part of the Dos Pobres/San Juan Project Class II permit application. Data from the Montezuma Castle site were also previously used to represent background concentrations in the ADEQ-approved air impact analysis conducted for the Sanchez Copper Project, which is located approximately 12 kilometers (about 7.2 miles) southeast of the Dos Pobres/San Juan Project location in similar terrain and at a similar elevation. See also 256-1.

Letter 16 Commentor Herman Voth of Komatsu Mining Systems, Inc.

Comment 1 *I would like to express my support in regards to the proposed Phelps Dodge Mining Company Dos Pobres and San Juan Copper Project.*

Response: See General Response No. 1.

Letter 17	Commentor	Gary Kordosky of Henkel Corporation
	Comment 1	*I favor the land exchange alternative for one major reason. It will allow PD to fully develop all of the copper reserves in the area in a fully comprehensive manner that can best meet the needs of PD and the regulatory agencies.*
	Response:	See General Response No. 1.
Letter 18	Commentor	Joan McNamara
	Comment 1	*I am writing in support of the Phelps Dodge project to develop a copper mine in the Safford area. ...I urge approval of any permits necessary and of the land exchange.*
	Response:	See General Response No. 1.
Letter 19	Commentor	Roy Glen Lewis of Henkel Corporation
	Comment 1	*I feel this is a proper use of the land.*
	Response:	See General Response No. 1.
Letter 20	Commentor	Lewis N. Tenny Sr.
	Comment 1	*We support the Dos Pobres/San Juan Project without reservation for the economic benefits to Graham County, the State of Arizona, and national consumers and thank you for all your efforts.*
	Response:	See General Response No. 1.
Letter 21	Commentor	Al Chicago of Purcell Western States Tire
	Comment 1	*...I am pleased with the positive social and economic impact this new Phelps Dodge facility will have on not only on our business but on the entire southeast Arizona area as well.*
	Response:	See General Response No. 1.
Letter 22	Commentor	Henry W. Goodman
	Comment 1	*The idea that the industry should pay for the use of the land which is mineable is specious, considering the expenses involved in development of a viable mining property. More power to the mining industry!*
	Response:	See General Response No. 1.
Letter 23	Commentor	John R. Spence of Zeneca Specialties
	Comment 1	*Our business solely depends on supplying the mining industries, but also in view of Phelps Dodge concern for the community and diligence in preparing the EIS urge issue of permitting for the Safford project.*
	Response:	See General Response No. 1.
Letter 24	Commentor	David L. Smith of Kvaerner Metals Constructors
	Comment 1	*...Kvaerner supports the Phelps Dodge Safford Project and urges a swift approval process so that benefits will not be delayed.*
	Response:	See General Response No. 1.
Letter 25	Commentor	Mike Dwyer of Quadna Inc.
	Comment 1	*I fully support Phelps Dodge in it's effort to establish a new mine in the Safford Arizona area.*
	Response:	See General Response No. 1.
Letter 26	Commentor	Laurence H. Beal
	Comment 1	*I strongly recommend continued development of and the subsequent production from the Dos Pobres/San Juan Mine north of Safford, Arizona as it is imperative that the United States has a continuing future supply of domestic copper.*
	Response:	See General Response No. 1.
Letter 27	Commentor	Dale G. Armstrong
	Comment 1	*I would like to take this opportunity to voice my support for the planned Safford project of the Phelps Dodge Mining Corporation.*
	Response:	See General Response No. 1.
	Comment 2	*I would suggest that the potential risks of inaction or of denial on the part of the government to approve the land exchange and to issue the EIS will have injurious consequences to the city of Safford, it's citizens, and the state of Arizona as a whole.*
	Response:	See General Response No. 1.
Letter 28	Commentor	Raymond R. Berry of People for the USA, Pikes Peak Chapter
	Comment 1	*I am in favor of the mine.*
	Response:	See General Response No. 1.

Letter 29	Commentor	George Coutts of Applied Industrial Technologies
	Comment 1	*On behalf of the ten employees of Applied Industrial Technologies, Tucson, AZ, I wish to express our support for the development of subject mine.*
	Response:	See General Response No. 1.
Letter 30	Commentor	H. Mason Coggin of Arizona Department of Mines and Mineral Resources
	Comment 1	*The Draft Environmental Impact Statement should be accepted so that we can provide the raw materials for our future generations.*
	Response:	See General Response No. 1.
Letter 31	Commentor	William T. Sherlock of Collins Precision Manufacturing, Inc.
	Comment 1	*This project is very important to my business.*
	Response:	See General Response No. 1.
Letter 32	Commentor	Corolla Hoag
	Comment 1	*I am writing to support the development of the Dos Pobres/San Juan Mine north of Safford, Arizona.*
	Response:	See General Response No. 1.
Letter 33	Commentor	Lyle Taylor of Geotemps
	Comment 1	*I am pleased to write to you in support of the Environmental Impact Statement issued for comment on the Phelps Dodge Dos Pobres/San Juan Mine.*
	Response:	See General Response No. 1.
Letter 34	Commentor	William Elias of Phelps Dodge
	Comment 1	*I strongly support the Safford project, which includes the Dos Pobres and San Juan deposits.*
	Response:	See General Response No. 1.
Letter 35	Commentor	David Godwin
	Comment 1	*I have reviewed the subject project draft and I have no concerns. It's a viable project that needs to happen.*
	Response:	See General Response No. 1.
	Comment 2	*Everything in the study seems to be covered and nothing missed.*
	Response:	See General Response No. 1.
Letter 36	Commentor	Cliff White of Sunstate Equipment
	Comment 1	*...I feel P.D. Safford will be a definite benefit to the Safford, Graham County areas.*
	Response:	See General Response No. 1.
Letter 37	Commentor	Bret Hunt of Phelps Dodge
	Comment 1	*The economical impacts on the Gila Valley will be a great benefit to the residents there. Added tax revenues will also be a great help to local governments and schools.*
	Response:	See General Response No. 1.
Letter 38	Commentor	Henry Truebe of AlpEx - geologic mapping
	Comment 1	*I would like to offer this letter in support of Phelps Dodge's Safford Project.*
	Response:	See General Response No. 1.
Letter 39	Commentor	David Ferree
	Comment 1	*I believe the proposed mine would benefit both the local community and the state of Arizona.*
	Response:	See General Response No. 1.
Letter 40	Commentor	Terry Braun of SRK Consulting
	Comment 1	*SRK Consulting supports the development of the PD Safford Project.*
	Response:	See General Response No. 1.
Letter 41	Commentor	Stu Bengson of Arizona Mining Association
	Comment 1	*My concerns focus on providing the mineral resources (in this case Cu) that our nation depends upon. We must find ways to mine minerals and ensure environmental protection. This project (the proposed plan) accomplishes this.*
	Response:	See General Response No. 1.
	Comment 2	*This project has not missed any aspect of the site specific conditions. It meets all requirements of NEPA and all environmental issues.*
	Response:	See General Response No. 1.

Letter 42 Commentor Scott Bryce

Comment 1 *I fully support Phelps Dodge's new mining operation.*

Response: See General Response No. 1.

Letter 43 Commentor Nathan Bennett of Phelps Dodge

Comment 1 *The depth of research into possible contingencies was impressive.*

Response: See General Response No. 1.

Letter 44 Commentor C. H. Henline

Comment 1 *I urge you to approve this potential copper project, as it is apparent to me that we will urgently need new sources of copper in the coming century, as currently operating copper operations will have depleted their viable ore bodies.*

Response: See General Response No. 1.

Letter 45 Commentor Toby Dunn

Comment 1 *The project I believe is essential to the growth and well being of the Gila Valley.*

Response: See General Response No. 1.

Letter 46 Commentor Carla Lemen

Comment 1 *I am very much in favor of the Land Exchange.*

Response: See General Response No. 1.

Letter 47 Commentor Sydney Hoff Hay of AMIGOS (AZ Mining & Indus. Get Our Support)

Comment 1 *We support this project because of the jobs it represents--not just direct employment--but the indirect employment that benefits the entire economy of state of Arizona. We believe that this project effectively balances environmental concerns with economic benefits.*

Response: See General Response No. 1.

Letter 48 Commentor Timaree K. Crandell

Comment 1 *I support the Phelps Dodge Dos Pobres/San Juan Mine north of Safford.*

Response: See General Response No. 1.

Letter 49 Commentor Jena Hunt

Comment 1 *I support the Phelps Dodge Dos Pobres/San Juan Mine north of Safford.*

Response: See General Response No. 1.

Letter 50 Commentor Marnie Brown

Comment 1 *I support the Phelps Dodge Dos Pobres/San Juan Mine north of Safford.*

Response: See General Response No. 1.

Letter 51 Commentor Ben Nuvamsa of Bureau of Indian Affairs, Fort Apache Agency

Comment 1 *While the analysis of impacts to the cultural and archaeological resources found within the area of potential effect is adequate, the document does not indicate any mitigation efforts being taken to protect these sites. Is there a plan for mitigating the impacts? Were Indian tribes consulted about the mitigation plan? Are cultural sites to be protected as well as archaeological sites?*

Response: See General Response No. 9, Cultural Resources Mitigation.

Comment 2 *There does not appear to be any discussion of the fact that the cultural resources that are to be impacted or destroyed are primarily Indian or that the Indian tribes associated with these sites are uniquely opposed to the traumatized by the destruction of these sites. Along the same lines, the only cultural impacts considered are site specific and do not discuss the harmful effects of the destruction of aboriginal lands even those there lands may not be under the direct control of the Indian tribes that claim aboriginal ties to the area.*

Response: BLM agrees that the majority of cultural properties in the project area are of Indian origin. The assumption was made during preparation of the EIS that readers would know that prehistoric archaeological sites in southeast Arizona are Indian in affiliation. In addition, the following statement was included in the DEIS on pp. 3-47 and 3-48: "Most of the tribes consulted consider the lands in the project area to be part of their historic aboriginal territory, or they claim ancestry to the prehistoric peoples who occupied these lands (SWCA 1997k)." Regarding the opposition of Indian tribes to, and trauma caused by destruction of, these sites during consultations with the 11 interested tribes, the majority stated that they opposed the proposed undertakings because of the expected impact to resources and the transfer of land out of federal management. The tribes also offered recommendations for avoidance and mitigation of expected impacts in the event the undertakings would proceed. A statement has been added to Section 4.3.4.2 to the effect that tribes consulted were generally opposed to the proposed undertakings, and a discussion of the cumulative impacts to cultural resources has been added to Section 4.5.3. This discussion addresses the development of aboriginal lands currently under non-Indian ownership by stating that approval of the MPO would have a cumulative impact on Native Americans by permanently decreasing the amount of undisturbed aboriginal lands, and the land exchange would have a cumulative effect on Native Americans

by decreasing the amount of aboriginal lands under federal management.

Comment 3 *If or when a mitigation plan for the archaeological and cultural resources becomes available, I would appreciate it if you would forward a copy to me.*

Response: This commentor was sent a copy of the draft archaeological data recovery and mitigation plan on June 16, 1999.

Letter 52 Commentor Mike Suggs

Comment 1 *I fully support this project!!!*

Response: See General Response No. 1.

Letter 53 Commentor Audrey Sobisek

Comment 1 *Please do not let Phelps Dodge get any more land from us the people.*

Response: See General Response No. 1.

Letter 54 Commentor Mike Schmelling of Phoenix Fuel Companies

Comment 1 *I am writing you in support of Phelps Dodge Corporation as they pursue the development of the Dos Pobres/San Juan Mine north of Safford.*

Response: See General Response No. 1.

Letter 55 Commentor Jeff Stevens of Phoenix Fuel Companies

Comment 1 *I am writing you in support of Phelps Dodge Corporation as they pursue the development of the Dos Pobres/San Juan Mine north of Safford.*

Response: See General Response No. 1.

Letter 56 Commentor Cory Funk of Phoenix Fuel Companies

Comment 1 *I am writing you in support of Phelps Dodge Corporation as they pursue the development of the Dos Pobres/San Juan Mine north of Safford.*

Response: See General Response No. 1.

Letter 57 Commentor Jack Keller of Phoenix Fuel Companies

Comment 1 *I am writing you in support of Phelps Dodge Corporation as they pursue the development of the Dos Pobres/San Juan Mine north of Safford.*

Response: See General Response No. 1.

Letter 58 Commentor Guy A. Buttler of Phoenix Fuel Companies

Comment 1 *...I strongly support the efforts of Phelps Dodge to develop the mineral recources of the Dos Pobres and San Juan Deposits near Safford.*

Response: See General Response No. 1.

Letter 59 Commentor Keith A. Cramer of Zeneca Specialties

Comment 1 *Our business solely depends on supplying the mining industries, but also in view of Phelps Dodge concern for the community and diligence in preparing the EIS urge issue of permitting for the Safford project.*

Response: See General Response No. 1.

Letter 60 Commentor Charles J. Maes of Zeneca Specialties

Comment 1 *Our business solely depends on supplying the mining industries, but also in view of Phelps Dodge concern for the community and diligence in preparing the EIS urge issue of permitting for the Safford project.*

Response: See General Response No. 1.

Letter 61 Commentor Peter Tetlow of Zeneca Specialties

Comment 1 *Our business solely depends on supplying the mining industries, but also in view of Phelps Dodge concern for the community and diligence in preparing the EIS urge issue of permitting for the Safford project.*

Response: See General Response No. 1.

Letter 62 Commentor Ren Northup of Arizona Department of Environmental Quality

Comment 1 *The Gila River and Eagle Creek (HUCs 15040005--022 and 15040005--025) are stressed by turbidity.*

Response: Thank you for this information.

Comment 2 *Where applicable the Management Agency and or Owner/Operator should over-see any construction to ensure that discharges from the watershed or to all Waters of the State/Waters of the U.S. shall meet all applicable Water Quality Standards.*

Response: Thank you for this information. Section 401 State Water Quality Certification is mandatory for any activity that requires a Section 404 Permit. For this project, PD will secure this certification from ADEQ (see Table 1-1). This certification is required prior to discharging any dredged or fill material into a Water of the United States.

Comment 3 *Best Management Practices should be implemented during and after all construction phases to protect watershed condition and riparian areas, to maintain adequate vegetative cover, and to minimize the*

discharge of sediment, petroleum, nutrients, bacteria and other pollutants to the watershed or to all Waters of the State/Waters of the U.S.

Response: PD will prepare a Stormwater Pollution Prevention Plan as required under CWA Section 402 and will employ Best Management Practices for all construction and operations phases.

Comment 4 *Best Management Practices should be implemented for construction activities for mechanical equipment to minimize ground disturbance.*

Response: Thank you for this information. See response 62-3.

Comment 5 *Be aware that portable sources of air pollution i.e., rock, sand, gravel and asphaltic concrete plants are required to be permitted by ADEQ prior to commencing operations. Contractors and subcontractors working on this project may be required to comply with these regulations. Contact Mr. Prabhat Bhargava at (602) 207-2329 with the Arizona Department of Environmental Quality, Air Quality Permits Section.*

Response: Thank you for this information; PD is aware of this requirement.

Comment 6 *A monitoring program should be implemented to evaluate the effectiveness of Best Management Practices in protecting watershed condition and Waters of the State.*

Response: Compliance with EPA and ADEQ requirements for general stormwater and point-source discharges and for state water quality authorizations, respectively, is required to implement the proposed mining and will ensure protection of watershed and water quality conditions.

Comment 7 *Where applicable the Management Agency and or Owner/Operator should demonstrate a knowledge of waste streams, permits and hazardous materials handling as well as indicate the destination of each hazardous waste being disposed off-site.*

Response: At the Dos Pobres/San Juan Project, as with its other mining operations in the U.S., PD must abide by all state, county, and federal laws applicable to mining operations, including the handling, storage, and disposal of hazardous materials.

Comment 8 *Public or semi-public water supply systems shall be developed to comply with "Public and Semi-Public Water Supply Systems Rules." Contact Mr. Dale Ohnmeiss at (602) 207-4648 with the Arizona Department of Environmental Quality, Program Development & Outreach Unit, regarding assistance.*

Response: Thank you for this information.

Comment 9 *All underground storage tanks must be registered with ADEQ. Contact Mr. Ian Bingham at (602) 207-4315 with the Arizona Department of Environmental Quality, Inspection and Compliance Unit, regarding assistance in registration.*

Response: Thank you for this information; PD is aware of this requirement.

Comment 10 *All solid wastes generated by the activity shall be transported to an ADEQ approved facility. Waste stored on site for more than 90 days, or will be treated or disposed of on-site, may require facility approval. Contact Mr. David Phillips at (602) 207-4122 with the Arizona Department of Environmental Quality, Solid Waste Plan Review Unit, regarding assistance in applying for this permit.*

Response: Thank you for this information; PD is aware of this requirement.

Comment 11 *Sewage treatment facilities for human waste shall be planned and developed in such a manner to ensure protection of both surface and groundwater resources. An Aquifer Protection Permit (APP) may be required for such facilities. Contact Mr. Troy Day at (602) 207-4661 with the Arizona Department of Environmental Quality, Aquifer Protection Program Section, regarding assistance in applying for this permit.*

Response: Thank you for this information. PD submitted its APP application to ADEQ in October 1998. That application is in final technical review.

Comment 12 *Sanitary waste facilities provided during construction phases shall be planned and developed in such a manner to ensure protection of both surface and groundwater resources.*

Response: PD will comply with all regulations pertaining to the operation of sanitary waste facilities provided during the construction phase of the Project.

Comment 13 *An Aquifer Protection Permit (APP) will be required, as noted on page 2-18. Contact Mr. Troy Day at (602) 207-4661 with the Arizona Department of Environmental Quality, Aquifer Protection Program Section, if you have questions about this permit application.*

Response: See response 62-11.

Comment 14 *A Clean Water Act, Section 402, NPDES Permit is required for all ground disturbing activities which exceed 5 acres in impact. Contact Mr. Robert Wilson at (602) 207-4574 with the Arizona Department of Environmental Quality, regarding assistance in applying for this federal permit.*

Response: PD will be submitting its Notice of Intent to EPA and to ADEQ as part of compliance with Section 402, NPDES, for general construction. Thank you for this information.

Comment 15 *A Clean Water Act, Section 404 permit may be required to discharge dredged or fill material into navigable waters. Contact the US Army Corp of Engineers at (602) 640-5385 to learn more about the Section 404 requirements. A Section 401 Certification from ADEQ may also be required. Contact the Arizona Department of Environmental Quality, Engineering Review and Permits at (602) 207-4502 for assistance in obtaining certification.*

Response: The COE, as a cooperator in the preparation of this EIS, will make a decision on whether to issue or deny PD a Section 404 permit for activities subject to COE jurisdiction. PD will also be applying for its Section 401 State Water Quality Certification from ADEQ. Thank you for this information.

Comment 16 *Numeric water quality standards listed in A.A.C. R18-11-109.G. and A.A.C. R-18-11-406 must be complied with, as well as narrative water quality standards in A.A.C. R-18-11-405. To obtain a copy of the A.A.C. R18-11-107, 108, 109, 405 and 406 water quality standards, call the Arizona Department of Environmental Quality, Water Quality Division Compliance Section at (602) 207-4466*

Response: Thank you for this information.

Letter 63 Commentor J. Darrell Jordan of Arizona Department of Water Resources

Comment 1 *It appears that groundwater will be utilized to meet the project's water supply needs (see eg. Pages S-4 and 2-10). Accordingly, Phelps Dodge will be required to file Notices of Intent to drill the proposed wells, and otherwise comply with the Groundwater Management Act of 1980.*

Response: Thank you for this information; PD is aware of this requirement.

Comment 2 *The DEIS discusses a series of stormwater diversion and retention structures, some which appear to include a diversion of public water from a natural channel. To the extent that appropriable waters, as defined in A.R.S. § 45-141, are diverted from or impounded in natural channels, a permit to appropriate public water must be obtained from ADWR. Specifically, those diversions listed on pages 2-15 and 2-16 (South Diversion, West Diversion, Site No. 1 Diversion and Peterson Wash Diversion) appear to divert waters from their natural channels in an effort to redistribute the flows of that water. Such activity requires a permit to appropriate public water. In contrast, however, retention of the sheet flows discussed on page 3-26 "within the footprints of the development rock" does not require a permit to appropriate as those waters fall outside the definition of "appropriable waters".*

Response: Thank you for this information; PD is aware of this requirement.

Comment 3 *The discussion on page 4-54 indicates that water right holders will not be affected by the land exchange and will retain water rights on land no longer owned by them. Surface water rights are appurtenant to the lands upon which the water is beneficially used, and the holder of a water right must own or possess the land to which the right is appurtenant. When land is conveyed, the water right remains appurtenant and passes to the new owner unless reserved by the conveyor and severed and transferred for use elsewhere. Those water rights subject to the exchange should be assigned to the new land owner.*

Response: This information has been used to revise Section 4.4.1.6.1.

Comment 4 *The main stormwater impoundment dam and certain retention dams described elsewhere in the DEIS appear to be of jurisdictional size. The stormwater impoundment dam described on page 2-17 is listed as having a capacity of 332 acre feet and a height of "about 25 feet." In addition, the DEIS describes a number of additional retention dams on page 2-19, at least three of which appear to be over 25 feet in height. Any dams that are more than 25 feet high or that store more than 15 acre feet of water are subject to review by ADWR's Safety of Dams Section and must comply with Arizona law regarding Dam Safety. These laws also apply to a series of retention structures that cumulatively exceed the jurisdictional limit if the series is part of a common retention operation and one structure poses a risk of cascading failure of other structures.*

Response: Thank you for this information.

Comment 5 *On page 1-8, the DEIS states that the Gila River is "over-appropriated." Neither ADWR, nor the Maricopa County Superior Court has made this legal determination, although it does appear that there is no unappropriated water available at or near the proposed site.*

Response: Comment noted. Please see revised Section 1.5.3.

Comment 6 *The discussions regarding the project's impact on surface water flows in the Gila River (see e.g. pages 1-8 and 4-6) assumes that wells proposed for use in the mining operation will be pumping some amount of appropriable subflow of the Gila River. The legal distinction between groundwater and appropriable subflow remains unclear and the issue is currently on interlocutory appeal to the Arizona Supreme Court. The mitigation measures discussed in the DEIS may be impacted by resolution of this issue. In addition, accounting for the impacts of pumping appropriable subflow of the mainstem of the Gila River is an issue before the Globe Equity No. 59 Court.*

Response: Comment noted; please see revised Section 1.5.3.

Comment 7 *The issue of ownership of water rights on state and federal lands is also currently pending before the Arizona Supreme Court and its resolution may potentially affect the issue of compensation for lost water rights discussed on page 4-6.*

Response: The pendency of the issue of ownership of water rights on federal and state lands before the Supreme Court of Arizona is likely a reference to the so-called interlocutory issues number 4 and 5, which were decided by that Court on November 19, 1999, under the caption In Re The General Adjudication of all Rights to use Water in the Gila River System and Source, 195 Ariz. 411. There the Court held that federal reserved rights extend to groundwater to the extent that groundwater is necessary to accomplish the purpose of the federal (Indian) reservation, and for this same purpose holders of federal reserved rights enjoy greater protection from groundwater pumping than do holders of state law rights. Interlocutory issue number 3, regarding the appropriate standard to be applied in determining the amount of these Federal reserved rights is still pending before the Court.

Comment 8 *The discussion of issues related to the Globe Equity No. 59 Decree (see e.g. Page 1-8 and 1-9), is accurate. We note, however, that the continuing jurisdiction of the Globe Equity No. 59 Court is limited to decreed lands specified in the 1935 Consent Order, as modified with approval of the Gila River Water Commissioner and the Court. Aside from use or a change in beneficial use on decreed lands, or a severance and transfer of water rights from decreed lands to new lands, issues of surface water rights and*

responsibilities for this project are subject to the jurisdiction of the State of Arizona.

Response: Comment noted. Section 1.5.3 has been revised.

Letter 64 Commentor Craig R. Tyler

Comment 1 *I support the development of the Safford Mine, and hope you will do your best to facilitate Phelps Dodge in their efforts.*

Response: See General Response No. 1.

Letter 65 Commentor Jarrett Munkittrick

Comment 1 *I am writing to express my SUPPORT for the proposed Phelps Dodge open-pit mine and related plants near Safford Arizona.*

Response: See General Response No. 1.

Letter 66 Commentor George A. Wolfe of Henkel Corporation

Comment 1 *I support this final EIS.*

Response: See General Response No. 1.

Letter 67 Commentor Stephan M. Olafson of Henkel Corporation

Comment 1 *I support the Land Exchange Alternative.*

Response: See General Response No. 1.

Letter 68 Commentor Robert J. Kline

Comment 1 *I am in full support of this project.*

Response: See General Response No. 1.

Letter 69 Commentor Glen Wyman

Comment 1 *I would like to go on record as supporting the proposed mining operations of the Dos Pobres and San Juan deposits.*

Response: See General Response No. 1.

Comment 2 *My request would be for the BLM to hold PD to best mining practices, but not excessively delay the project with suspect studies of questionable environmental concerns.*

Response: See General Response No. 1.

Letter 70 Commentor John Ligon

Comment 1 *I like the proposed Dos Pobres/San Juan Mine project as proposed by Phelps Dodge. I liked the things I read in the EIS. I especially like the land swaps that Phelps Dodge has offered in exchange for the BLM land on which a substantial portion of the mine would be located. I think the whole idea is good. Please log me as one high-dollar taxpayer who is totally in favor of the whole operation.*

Response: See General Response No. 1.

Letter 71 Commentor Russ Perlich of Quadna PSI

Comment 1 *I am writing to express my support for the BLM's granting of permits to Phelps Dodge Corp. for the planned Safford project.*

Response: See General Response No. 1.

Letter 72 Commentor Richard Lines, D.D.S.

Comment 1 *This letter is one of support for the proposed project and the accompanying environmental impact that will accompany the mineral development.*

Response: See General Response No. 1.

Letter 73 Commentor Danny Smith of Gila Outdoor, L.L.C.

Comment 1 *...I support the Dos Pobres/San Juan Project.*

Response: See General Response No. 1.

Comment 2 *The lands Phelps Dodge would like to exchange as identified on pages 2-38 through 2-40 of the EIS are at a glance, worth more money, have more environmental value, and offer more recreational value to residents of Arizona then the mine site property.*

Response: See General Response No. 1.

Letter 74 Commentor Terry J. Bingham of Graham County Board of Supervisors

Comment 1 *On behalf of the Graham County Board of Supervisors, as well as the vast majority of citizens in Graham County, I am writing this letter of support for the proposed Phelps-Dodge Safford Mine.*

Response: See General Response No. 1.

Comment 2 *After reviewing the EIS and discussing the plans that officials of Phelps-Dodge propose with respect to this mining operation and given their outstanding record at the Morenci mine, we concur with BLM's preferred alternative and fully support the land exchange alternative as outlined in this report. We feel that BLM's*

policy 'that identify land exchanges as the preferred method of disposing of unwanted federal lands and acquiring desirable private lands' (see 1.6.2.2.1 of the EIS) is a win-win approach in this case.

Response: See General Response No. 1.

Comment 3 *It should be pointed out that the land exchange alternative will not minimize the governments regulatory oversight for this project, while providing valuable private lands to the public lands' repository. In fact, the federal government will offer their preferred alternative with regard to the proposed mine with the Corps of Engineers (COE) determining 'the least environmentally damaging and practicable alternative', while the Environmental Protection Agency (EPA) selects 'the alternative which causes the least damage to the biological and physical environment, and which best protects, preserves, and enhances historic, cultural, and natural resources' (see 2.3 of the EIS).*

Further the State Mine Inspector's Office has some oversight responsibility over the reclamation of mines on private lands, while the Arizona Department Environmental Quality will also monitor this operation through their various permits related to the Clean Air and Clean Water regulations.

Response: See General Response No. 1.

Comment 4 *Graham County concurs with BLM's position that the issue surrounding the disputed southern boundary with the San Carlos Apache Tribe 'has been reviewed and addressed adequately by BLM and other federal entities; the Tribe accepted fair compensation for all disputed aboriginal lands' (see 1.6.2.2.1). We believe that BLM's decision not to carry this issue forward in review of this project is appropriate and one the County fully supports.*

Response: See General Response No. 1.

Comment 5 *I would also point out that the mining activity proposed by the Phelps-Dodge Safford Mine supports the Graham County Land Use and Resource Policy Plan and Implementation Plan (LURRP), which was adopted in July 1996. The policy statement for mining reads, 'Graham County will work cooperatively with Federal and State Agencies regarding private and public land and resource issues related to mining.' It further states that these agencies 'recognize the county's support and encouragement of beneficial mining efforts, recognizes the economic benefits it provides, and encourages mining efforts on public and private lands.'*

Response: This information was incorporated into revised Section 4.3.1.1.1 of the EIS.

Comment 6 *… I would hope that you would carefully consider this project's importance to our community as you review this request.*

Response: See General Response No. 1.

Letter 75 Commentor John W. Martin of Quail Ridge Construction

Comment 1 *… I have concluded that the Land Exchange Alternative is the most practical option available.*

Response: See General Response No. 1.

Letter 76 Commentor Walter Heinrichs of Heinrichs Geoexploration Co.

Comment 1 *Your desire to avoid, prevent or reduce potential and realistic impacts have been well addressed by the DEIS.*

Response: See General Response No. 1.

Letter 77 Commentor Kyle Kempton of Kempton Chevrolet Buick, LTD.

Comment 1 *As a local businessman, I want to go on record in support of the Phelps Dodge Safford Project.*

Response: See General Response No. 1.

Letter 78 Commentor Barbara L. Brunssen of Zeneca Specialties

Comment 1 *Our business solely depends on supplying the mining industries, but also in view of Phelps Dodge concern for the community and diligence in preparing the EIS urge issue of permitting for the Safford project.*

Response: See General Response No. 1.

Letter 79 Commentor Owen Tinkler of Zeneca Specialties

Comment 1 *Our business solely depends on supplying the mining industries, but also in view of Phelps Dodge concern for the community and diligence in preparing the EIS urge issue of permitting for the Safford project.*

Response: See General Response No. 1.

Letter 80 Commentor Kyle Kempton of Graham County Chamber of Commerce

Comment 1 *…We support BLM's preferred alternative of the land exchange found on page 2-44 of the Draft EIS.*

Response: See General Response No. 1.

Comment 2 *The Dos Pobres/San Juan Project will provide a needed compliment to the existing agricultural, tourism, education and government mix in the Gila Valley. Section 4.3.5 of the EIS documents this very positive impact of the project quite well.*

Response: See General Response No. 1.

Comment 3 *The Graham County Chamber of Commerce feels that BLM has done a more than adequate job of evaluating the issue of the boundary between BLM land and land owned by the San Carlos Apache Tribe.*

Businesses need to be able to count on government to stand behind their businesses. Your review of this matter on page 1-16 is a clear and convincing discussion of the history of this issue, and we support your decision to not carry the matter forth for further consideration in the EIS.

Response: See General Response No. 1.

Comment 4 *We understand that the nearly thirty laws/regulations, which are applicable to the Dos Pobres/San Juan Project and are shown in Table 1.1 of volume 1 of the EIS, apply whether the land exchange alternative is selected or rejected. Therefore, the Graham County Chamber of Commerce is comfortable with the environmental protection checks and balances that will be employed in this project and support the Land Exchange alternative.*

Response: See General Response No. 1.

Letter 81 Commentor Ivan J. Smith of Smith and Bell Construction Co.

Comment 1 *We are writing to ask that you go forward with the planned development of the Safford Mine.*

Response: See General Response No. 1.

Letter 82 Commentor Jay W. Spehar of Cyprus Miami Mining

Comment 1 *Upon review of the DEIS it is clear that the preferred alternative for a land exchange is the best alternative under consideration by the Bureau of Land Management (BLM).*

Response: See General Response No. 1.

Comment 2 *BLM should complete the National Environmental Policy Act (NEPA) process and consummate this land exchange as soon as possible.*

Response: See General Response No. 1.

Comment 3 *Chapter 1, section 1.5.3 of the DEIS identifies and discusses "the regulatory authority governing water use of the Gila River and the relationship of decisions to be made by BLM, COE and EPA with regard to that regulatory authority." "Postulated" impacts to the Gila River are identified as a deficit amount of water in the Gila River approximating 74.5 acre feet per year (af/yr), including 40 af/yr related to storm water runoff management and 35.4 af/yr related to ground water pumping. The proposed mitigation measures, which includes monitoring, modeling and mitigation, together with the actual fallowing of deeded lands and their attendant decreed water rights, more than adequately compensate for these "postulated" impacts. The Water Resources Mitigation Plan is clearly excessive when compared to the "postulated" impacts.*

Response: The amount of decreed agricultural lands to be fallowed (and subsequently, the amount of water not being diverted and consumed from the river to irrigate these lands) is tied to the results of the groundwater monitoring program (3M Program) described in Appendix F. Initial mitigation amounts calculated based on the current groundwater model results may indeed overcompensate for actual and postulated impacts by three times, but if recalibration is triggered, the amount of mitigation actually required could either increase or decrease.

Comment 4 *Notwithstanding the controversial legal status of these water rights, the DEIS implies that that BLM and other federal agencies may have jurisdictional authority over water rights within the Gila River Basin as administered by Globe Equity No. 59 Decree and the laws of the State of Arizona. The DEIS appears to proffer the legal opinion that the project proponent is limited in implementing certain portions of its mine plan due to Article XIII of the Globe Equity No. 59 Decree. The DEIS states correctly that BLM has the authority to approve mining related uses of public land and the authority to approve the proposed land exchange. However, the DEIS implies incorrectly that BLM and other agencies have jurisdictional authority to approve title and rights to water sources and uses for the proposed operation.*

BLM and other cooperating or coordinating agencies have no jurisdictional authority to adjudicate, interpret or apply the terms and conditions of Globe Equity No. 59 Decree or other water rights administered under the laws of the State of Arizona. Nor do the respective agencies have any jurisdictional authority over the delineation of ground and surface water under the laws of the State of Arizona. Approval of the project by BLM and other agencies through the NEPA process, including analysis of the project's water sources and uses, does not constitute a "grant" of water rights nor an infringement on any water right claimant, including claimants for whom the Department of Interior may have trust responsibilities.

Response: Comment noted. Please see revised Section 1.5.3.

Comment 5 *The project proponent is not required to procure approval of its title or rights to sources and uses of water through the NEPA process. The NEPA process is intended to focus on impact and alternative analysis and not to interpret, apply or adjudicate title to water rights. The issue of water rights must be left to the appropriate legal processes such as the legislative and judicial branches of state and federal government.*

Response: The commentor is correct that water rights cannot be and are not being adjudicated under this NEPA process. NEPA simply requires that effects of the proposed action and alternatives on water rights, including the ability of holders of water rights to exercise those rights, must be identified and disclosed. Mining or implementation of mining-related activities is subject to compliance with all of the applicable federal, state, and local laws and regulations pertaining to such actions; BLM's authorization of the MPO or land exchange is but one such requirement. Rights to surface flows in the Gila River are currently subject to ongoing adjudication in federal and county courts. Please see revised Section 1.5.3.

Letter 83	Commentor	Ronald J. Jacobson of City of Safford
	Comment 1	*The City of Safford strongly supports the development of Phelps Dodge's Safford Project. … we support the land exchange between the Bureau of Land Management and Phelps Dodge.*
	Response:	See General Response No. 1.
Letter 84	Commentor	Diane Curtis-Junion
	Comment 1	*I would like to write this letter in support of the Land Exchange with BLM and Phelps Dodge.*
	Response:	See General Response No. 1.
Letter 85	Commentor	Steve Junion of Valley Furniture
	Comment 1	*I am a private businessman, thus the writing of this letter in support of the Land Exchange with BLM and Phelps Dodge.*
	Response:	See General Response No. 1.
Letter 86	Commentor	Bettyann Hazell
	Comment 1	*… I wish to convey my support for the Land Exchange Alternative and The Dos Pobres/San Juan Project proposed by the Phelps Dodge Mining Company.*
	Response:	See General Response No. 1.
Letter 87	Commentor	Florin & Sally Schlautman
	Comment 1	*We are in favor of the development of the proposed Safford Mine by Phelps Dodge. … The Land Exchange Alternative as selected by the Bureau of Land Management is a good choice for this project.*
	Response:	See General Response No. 1.
Letter 88	Commentor	Roger Shastri of Best Western Desert Inn Motor Hotel
	Comment 1	*I am in favor of the BLM's preferred alternative of the land exchange to support the proposed project By Phelps Dodge Mining Company.*
	Response:	See General Response No. 1.
Letter 89	Commentor	Tom Johnson of Johnson Motors Corp.
	Comment 1	*I am writing to support the Dos Pobres/San Juan Project. … I would appreciate the Bureau of Land Management approving the Dos Pobres/San Juan Project.*
	Response:	See General Response No. 1.
Letter 90	Commentor	Dale Luce
	Comment 1	*I am writing in support of the Phelps Dodge Dos Pobres/San Juan Project. I also support your agency's preferred alternative of the land exchange found on page 2-44 of the Draft EIS.*
	Response:	See General Response No. 1.
Letter 91	Commentor	George A. Cauthen
	Comment 1	*I am writing in support of the Phelps Dodge Dos Pobres/San Juan Project. I also support your agency's preferred alternative of the land exchange found on page 2-44 of the Draft EIS.*
	Response:	See General Response No. 1.
Letter 92	Commentor	Van Talley of City of Safford
	Comment 1	*On behalf of the City Council, I am writing this letter in support of Phelps Dodge Dos Pobres San Juan Project. We also support the agency's preferred alternative of the land exchange as found in the EIS draft.*
	Response:	See General Response No. 1.
Letter 93	Commentor	Malcolm Busby
	Comment 1	*I am writing this letter to express my support for the proposed action set forth by the BLM on the Mine Plan Alternative Set along with the Land Exchange Alternative Set for the Safford Mine.*
	Response:	See General Response No. 1.
Letter 94	Commentor	Dondre Busby
	Comment 1	*I support the Proposed Action of the BLM in reference to the new Safford Mine project.*
	Response:	See General Response No. 1.
Letter 95	Commentor	T.E. Scartaccini
	Comment 1	*The purpose and need for proposed action (a Land Exchange) is well covered.*
	Response:	See General Response No. 1.
	Comment 2	*The alternative study for impact covers the range very well. The project design address the impacts to a very acceptable level.*
	Response:	See General Response No. 1.
	Comment 3	*The preferred alternative action should be carried out.*

	Response:	See General Response No. 1.
Letter 96	Commentor	Lainie Levick of Sierra Club, Rincon Group
	Comment 1	*The Rincon Group of the Sierra Club respectfully requests a 30 day extension of the comment period on the DEIS for the Dos Pobres/San Juan Project until December 28, 1998.*
	Response:	This request was granted; see General Response No. 2, NEPA Process.
Letter 97	Commentor	A. D. Cox
	Comment 1	*I think BLM should approve the proposed land exchange because they would gain some good land for the state.*
	Response:	See General Response No. 1.
Letter 98	Commentor	Peg Briney
	Comment 1	*Now that the opportunity [for the land exchange] has presented itself to obtain these lands, I fervently hope nothing, no one or anything will decrease or destroy this opportunity.*
	Response:	See General Response No. 1.
Letter 99	Commentor	William F. Briney
	Comment 1	*I am writing to you to support the land exchange alternative (the BLM's preferred alternative) as outlined in the Draft Environmental Impact Statement for the Dos Pobres/San Juan Project.*
	Response:	See General Response No. 1.
Letter 100	Commentor	E. Cluff
	Comment 1	*I am in favor of the land swap alternative because it will add many riparian areas to BLM control.*
	Response:	See General Response No. 1.
Letter 101	Commentor	Elsie R. Cluff
	Comment 1	*I support the draft EIS for Dos Pobres/San Juan project.*
	Response:	See General Response No. 1.
Letter 102	Commentor	Lorraine N. Gardner of Gardner Accounting Service
	Comment 1	*I am writing to express my strong desire to have the Safford Mine developed.*
	Response:	See General Response No. 1.
Letter 103	Commentor	Robert S. Woolsey
	Comment 1	*I certainly support the new copper mine project….*
	Response:	See General Response No. 1.
Letter 104	Commentor	John R. Doherty of J & K Investments
	Comment 1	*…I support the BLM preferred alternative of the land exchange.*
	Response:	See General Response No. 1.
Letter 105	Commentor	Gary L. Muncy, M.D.
	Comment 1	*Now we are asked to give up use of the San Juan Mine Road. The draft EIS states that this will only increase the time to reach the Johnny Creek loop by 15 - 30 minutes. I have been in that area many times from both directions and by experience I know that it will be more like 1 - 1.5 hrs in extra time to reach what now can be reached in about 30 minutes.*
	Response:	BLM re-evaluated the driving time that would be required to reach the Johnny Creek area assuming the closure of the San Juan Mine Road. To determine the time needed to reach the Johnny Creek area via the San Juan Mine Road vs. the Solomon Pass Road, both routes were driven under comparable conditions. Leaving Safford (from the intersection of 8th Avenue and Highway 70), it took 34 minutes via the San Juan Mine Road to reach the junction with the West Ranch Road (see Figure 1-2). This junction was chosen as the destination representing the beginning of the Johnny Creek area as accessed by the San Juan Mine Road. If the San Juan Mine Road is closed, the Johnny Creek Loop can be reached via the Solomon Pass, Salt Trap, and West Ranch Roads. Using this alternative route, it took 70 minutes to reach the junction of the San Juan Mine Road and West Ranch Road, a difference of 36 minutes to be exact. The FEIS has been revised to reflect the exact additional difference in driving time.
	Comment 2	*I don't think that it would be too much to ask to have PD maintain access for thru traffic on the San Juan Mine road to reach the country surrounding the Johnny Creek area. This should be negotiated as part of the land exchange.*
	Response:	It will not be possible to keep the San Juan Mine Road open to the public as a means of access to the Gila Mountains north of the project area. As the San Juan Mine pit grows, it will eventually consume a portion of the existing road. Also, to provide for safety and security, PD is proposing to gate the San Juan Mine Road at the property line between their private property and public lands. Initially, PD and the BLM explored construction of other routes around the mining operation to replace this road. Because of public safety and security concerns, no feasible alternative was found. Access to public lands north of the project area, however, is still available by using the existing Solomon Pass Road. Thus PD and BLM evaluated the feasibility of upgrading portions of the Solomon Pass Road to mitigate the loss of the San Juan Mine

Road. BLM recreation planners are working with PD to develop this proposed mitigation measure.

Comment 3 *In general I support the land exchange proposal but only if it does not allow PD to close off ready public access to this beautiful public land.*

Response: See response 105-2.

Letter 106 Commentor Kirk Gray

Comment 1 *I am writing in support of the Phelps Dodge Dos Pobres/San Juan Project. I also support your agency's preferred alternative of the land exchange found on page 2-44 of the Draft EIS.*

Response: See General Response No. 1.

Letter 107 Commentor Catharine L. Gray

Comment 1 *I am writing in support of the Phelps Dodge Dos Pobres/San Juan Project. I also support your agency's preferred alternative of the land exchange found on page 2-44 of the Draft EIS.*

Response: See General Response No. 1.

Letter 108 Commentor Ruby Cauthen

Comment 1 *I am writing in support of the Phelps Dodge Dos Pobres/San Juan Project. I also support your agency's preferred alternative of the land exchange found on page 2-44 of the Draft EIS.*

Response: See General Response No. 1.

Letter 109 Commentor Donald R. Stacy of Greenlee County Board of Supervisors

Comment 1 *Greenlee County enjoys a very good working relationship with both BLM and Phelps Dodge Corporation. BLM Safford District staff demonstrates professionalism as it works to accomplish the myriad tasks necessary to manage federal lands in our area. We find the local office is willing to meet with County officials and solicit our concerns regarding public land management impacts to our area. We have not always achieved a consensus, but we maintain an ongoing working dialog.*

Response: See General Response No. 1.

Comment 2 *We support the proposed land exchange as described in the EIS. It is our belief that this proposal will benefit both the public and private parties. The lands that BLM will acquire are areas that are environmental valuable and sensitive. Lands acquired by Phelps Dodge will benefit their operations and provide a buffer to public lands. Federal regulation dictates the appropriate manner to trade these properties and we feel it treats both private and public concerns fairly.*

Response: See General Response No. 1.

Comment 3 *Greenlee County fully supports the BLM preferred land exchange alternate.*

Response: See General Response No. 1.

Letter 110 Commentor Gary Cowell

Comment 1 *I am writing this letter in support of the above referenced project (Dos Pobres/San Juan Project).*

Response: See General Response No. 1.

Letter 111 Commentor Harvey Green of Quadna PSI

Comment 1 *I would like to express my support for the BLM granting a permit to Phelps Dodge Mining Company for the planned Safford Project.*

Response: See General Response No. 1.

Letter 112 Commentor Michael H. Thompson of Phelps Dodge Morenci, Inc.

Comment 1 *…I am in full support of the implementation of this project. … I also like the proposal of the PD/BLM land exchange.*

Response: See General Response No. 1.

Letter 113 Commentor Dee Jaksich

Comment 1 *I am in support of the Land Exchange Alternative.*

Response: See General Response No. 1.

Letter 114 Commentor R. Pat Fanello of Countrywide Homes

Comment 1 *I am writing this letter to express my support for the Dos Pobres/San Juan Project in the Safford area.*

Response: See General Response No. 1.

Letter 115 Commentor Thomas D. Toole

Comment 1 *I am writing this letter to support the development of the Dos Pobres/San Juan mine.*

Response: See General Response No. 1.

Letter 116 Commentor Margaret Schade

Comment 1 *I support BLM's preferred alternative of the land exchange found on page 2-44 of the Draft EIS.*

Response: See General Response No. 1.

Letter 117	Commentor	Glenda Kennedy of People for the USA, Greenlee Chapter
	Comment 1	*The Greenlee Chapter of People For The USA is in support of the Dos Pobres/San Juan Mine north of Safford.*
	Response:	See General Response No. 1.
Letter 118	Commentor	Jim & Glenda Kennedy
	Comment 1	*We strongly support the Dos Pobres/San Juan Mine north of Safford.*
	Response:	See General Response No. 1.
Letter 119	Commentor	Dean G. & Mary Krieg of Ramada Inn
	Comment 1	*… I as well as my wife would like to offer our full support of the Dos Pobres/San Juan Project proposed by the Phelps Dodge Mining Company and BLM's preferred alternative of the land exchange found on pages 2-44 of the Draft EIS.*
	Response:	See General Response No. 1.
Letter 120	Commentor	Gary D. Curtis of Coldwell Banker/Curtis Real Estate
	Comment 1	*I fully support the land exchange pertaining to Phelps Dodge, so they may open Dos Pobres and San Juan mines.*
	Response:	See General Response No. 1.
Letter 121	Commentor	Glenn Gable
	Comment 1	*I am writing in support of the Phelps Dodge Dos Pobres/San Juan Project. I also support your agency's preferred alternative of the land exchange found on page 2-44 of the Draft EIS.*
	Response:	See General Response No. 1.
Letter 122	Commentor	Mary Ann Luzania
	Comment 1	*I am writing in support of the Phelps Dodge Dos Pobres/San Juan Project. I also support your agency's preferred alternative of the land exchange found on page 2-44 of the Draft EIS.*
	Response:	See General Response No. 1.
Letter 123	Commentor	Ana A. Navarrete
	Comment 1	*I am writing in support of the Phelps Dodge Dos Pobres/San Juan Project. I also support your agency's preferred alternative of the land exchange found on page 2-44 of the Draft EIS.*
	Response:	See General Response No. 1.
Letter 124	Commentor	Eric Mayhew
	Comment 1	*I am writing in support of the Phelps Dodge Dos Pobres/San Juan Project. I also support your agency's preferred alternative of the land exchange found on page 2-44 of the Draft EIS.*
	Response:	See General Response No. 1.
Letter 125	Commentor	Jodi Merrick
	Comment 1	*I am writing in support of the Phelps Dodge Dos Pobres/San Juan Project. I also support your agency's preferred alternative of the land exchange found on page 2-44 of the Draft EIS.*
	Response:	See General Response No. 1.
Letter 126	Commentor	Tammy Mayhew
	Comment 1	*I am writing in support of the Phelps Dodge Dos Pobres/San Juan Project. I also support your agency's preferred alternative of the land exchange found on page 2-44 of the Draft EIS.*
	Response:	See General Response No. 1.
Letter 127	Commentor	Dean G. Krieg
	Comment 1	*I am writing in support of the Phelps Dodge Dos Pobres/San Juan Project. I also support your agency's preferred alternative of the land exchange found on page 2-44 of the Draft EIS.*
	Response:	See General Response No. 1.
Letter 128	Commentor	Ronald Herbert
	Comment 1	*I am writing in support of the Phelps Dodge Dos Pobres/San Juan Project. I also support your agency's preferred alternative of the land exchange found on page 2-44 of the Draft EIS.*
	Response:	See General Response No. 1.
Letter 129	Commentor	Mary L. Krieg
	Comment 1	*I am writing in support of the Phelps Dodge Dos Pobres/San Juan Project. I also support your agency's preferred alternative of the land exchange found on page 2-44 of the Draft EIS.*
	Response:	See General Response No. 1.

Letter 130	Commentor	Brenda Bejarano
	Comment 1	*I am writing in support of the Phelps Dodge Dos Pobres/San Juan Project. I also support your agency's preferred alternative of the land exchange found on page 2-44 of the Draft EIS.*
	Response:	See General Response No. 1.
Letter 131	Commentor	Lyndall Nichols
	Comment 1	*I am writing in support of the Phelps Dodge Dos Pobres/San Juan Project. I also support your agency's preferred alternative of the land exchange found on page 2-44 of the Draft EIS.*
	Response:	See General Response No. 1.
Letter 132	Commentor	Rosie Rivera
	Comment 1	*I am writing in support of the Phelps Dodge Dos Pobres/San Juan Project. I also support your agency's preferred alternative of the land exchange found on page 2-44 of the Draft EIS.*
	Response:	See General Response No. 1.
Letter 133	Commentor	Rebecca Coleman
	Comment 1	*I am writing in support of the Phelps Dodge Dos Pobres/San Juan Project. I also support your agency's preferred alternative of the land exchange found on page 2-44 of the Draft EIS.*
	Response:	See General Response No. 1.
Letter 134	Commentor	Randy Chandler
	Comment 1	*I am writing in support of the Phelps Dodge Dos Pobres/San Juan Project. I also support your agency's preferred alternative of the land exchange found on page 2-44 of the Draft EIS.*
	Response:	See General Response No. 1.
Letter 135	Commentor	David Nelson
	Comment 1	*I am writing in support of the Phelps Dodge Dos Pobres/San Juan Project. I also support your agency's preferred alternative of the land exchange found on page 2-44 of the Draft EIS.*
	Response:	See General Response No. 1.
Letter 136	Commentor	R. Gene Fowler of Eastern Arizona Computers
	Comment 1	*I would like to go on record as favoring the land exchange referenced above (BLM/Phelps Dodge Land Exchange).*
	Response:	See General Response No. 1.
Letter 137	Commentor	Tim E. Alder of GMI Insurance Group
	Comment 1	*We are writing in support of the Dos Pobres/San Juan Project proposed by Phelps Dodge Mining Company. We also support the Bureau of Land Management's preferred land exchange alternative as proposed in the draft EIS.*
	Response:	See General Response No. 1.
Letter 138	Commentor	Emilio M. Membrila
	Comment 1	*I am in full support of the Land Exchange Alternative being considered for the Safford Mine Project.*
	Response:	See General Response No. 1.
Letter 139	Commentor	Charlie Hatch of Hatch Brothers Auto Center
	Comment 1	*I am writing in support of the Dos Pobres/ San Juan project.*
	Response:	See General Response No. 1.
Letter 140	Commentor	Brian Segee of Southwest Center for Biological Diversity
	Comment 1	*We are requesting that the Safford BLM office extend the comment period for the Dos Pobres/San Jaun Project for 30 days to December 28, 1998.*
	Response:	This request was granted; see General Response No. 2, NEPA Process.
Letter 141	Commentor	Janine Blaeloch of Western Land Exchange Project
	Comment 1	*We are requesting that your office extend the comment period on the Draft EIS for the Dos Pobres/San Juan Project to December 28, 1998.*
	Response:	This request was granted; see General Response No. 2, NEPA Process.
Letter 142	Commentor	Max & Helen Wilson
	Comment 1	*I am writing in support of the Phelps Dodge Dos Pobres / San Juan Project. I also support your agency's preferred alternative of the land exchange found on page 2-44 of the Draft EIS.*
	Response:	See General Response No. 1.

Letter 143 Commentor Ronald W. Harrington

Comment 1 *It is my judgment that the location is in an area, which is ideal for mining because it would not cause a big impact on any other uses in the area, such as the closure of the Johnny Creek road. It is my experience, this road does not have the use as suggested on page 4-3 and if it's allowed to remain open, it would create a potential public safety issue.*

Response: The number of backcountry drivers using the general project area was estimated by the following calculations: an average of 18 - 20 vehicles/week times the average of 3 people/vehicle times 52 weeks/year equals 2,808 to 3,120 visitors/year. The DEIS stated that this would be the maximum number of backcountry drivers affected by the closure of the San Juan Mine Road. If all vehicles/users drove that road, that would be the maximum number of visitors affected. The reader should remember, however, that not all visitors individually drive a vehicle (thus the assumption of 3 people/vehicle on average), and not all vehicles drive only on the San Juan Mine Road. The number of visitors that are estimated to participate in this activity (2,800 - 3,100 visitors) includes use by any type of motorized vehicle driving on all existing backcountry roads on selected public lands. It is acknowledged that most of the backcountry driving use occurs on the Solomon Pass, San Juan Mine, West Ranch, and Johnny Creek Loop roads. In the absence of actual visitor use counts, we believe this is still a reasonable estimate of the amount of backcountry visitation that occurs in the project area, and appropriate for this analysis.

Comment 2 *The Solomon Pass road provides ample access to the ranchers, recreational hunters and others who might travel in the area. I do not believe the Solomon Pass road needs to be improved but if so, with the tax dollars which will be generated by Phelps Dodge, it should be done by the County.*

Response: See General Response No. 1.

Comment 3 *Therefore it is my wish the BLM will expedite the approval of all actions and permits required so the project can become a reality.*

Response: See General Response No. 1.

Letter 144 Commentor Kay Dean

Comment 1 *This letter is in support of the Phelps Dodge Dos Pobre/San Juan Mining Project.*

Response: See General Response No. 1.

Letter 145 Commentor Russell M. Corn

Comment 1 *I support the Dos Pobres/San Juan Mine project. … I support the proposed land exchange….*

Response: See General Response No. 1.

Letter 146 Commentor Mary Hartung of Thatcher Building Supply

Comment 1 *Please move as quickly as you can to make the new environmentally compatible mine a reality for the valley.*

Response: See General Response No. 1.

Letter 147 Commentor Paul Hanson of Quadna PSI

Comment 1 *I am writing to express my support for the BLM's granting of permits to Phelps Dodge Corp. for the planned Safford Project.*

Response: See General Response No. 1.

Letter 148 Commentor Harvey Hibl of Quadna PSI

Comment 1 *I am writing to express my support for the BLM's granting of permits to Phelps Dodge Corp. for the planned Safford Project.*

Response: See General Response No. 1.

Letter 149 Commentor Jeff Wright of Quadna PSI

Comment 1 *I am writing to express my support for the BLM's granting of permits to Phelps Dodge Corp. for the planned Safford Project.*

Response: See General Response No. 1.

Letter 150 Commentor Stuart H. Jones

Comment 1 *But with only 13% of Arizona land area as private property, exchanging another 17,000 acres of private land for 3,858 acres of environmentally valuable public land is moving in the wrong direction. If this land is environmentally valuable, perhaps it should be purchased by the environmental groups concerned.*

Response: The commentor has incorrectly identified the selected lands as private and the offered lands as public. Selection of the land exchange alternative would result in a net increase in the amount of private land in the State of Arizona.

Letter 151 Commentor Thomas D. Green

Comment 1 *The proposed land exchange looks to be a beneficial arrangement for all parties concerned.*

Response: See General Response No. 1.

Letter 152	Commentor	Blair M. Miller of Quadna PSI
	Comment 1	*The purpose of this letter is to ask for a favorable recommendation regarding the permitting of the Phelps Dodge Safford Project.*
	Response:	See General Response No. 1.
Letter 153	Commentor	Mary Ann Bermudez
	Comment 1	*I am writing this letter to show my support for the Dos Pobres/San Juan Project proposed by Phelps Dodge Mining Company.*
	Response:	See General Response No. 1.
Letter 154	Commentor	Brent Callen
	Comment 1	*I am writing in support of the Phelps Dodge Dos Pobres/San Juan Project. I support the BLM's preferred alternative of the Land Exchange. … This operation will greatly benefit the local and surrounding economies.*
	Response:	See General Response No. 1.
	Comment 2	*The closure of the San Juan road and its effect on 3000 back country drivers seems to be overstated. I have seldom seen anyone but the occasional rancher or hunter on this access. I do not think it would be easy to miss 60 travelers a week on this road. The same areas can be reached from the Solomon Pass Road.*
	Response:	See response 143-1.
Letter 155	Commentor	Barbara A. Harrington
	Comment 1	*It is my judgment that the location is in an area, which is ideal for mining because it would not cause a big impact on any other uses in the area, such as the closure of the Johnny Creek road. It is my experience, this road does not have the use as suggested on page 4-3 and if it's allowed to remain open, it would create a potential public safety issue.*
	Response:	See response 143-1.
	Comment 2	*The Solomon Pass road provides ample access to the ranchers, recreational hunters and others who might travel in the area.*
	Response:	See General Response No. 1.
	Comment 3	*Therefore it is my wish the BLM will expedite the approval of all actions and permits required so the project can become a reality.*
	Response:	See General Response No. 1.
Letter 156	Commentor	Nellie E. Plasencio
	Comment 1	*… I whole heartily support the land exchange and do support the Dos Pobres/San Juan Project proposed by Phelps-Dodge.*
	Response:	See General Response No. 1.
Letter 157	Commentor	Charles S. Eady
	Comment 1	*I am writing in support of the Phelps Dodge Dos Pobres / San Juan Project. I also support the BLM's preferred alternative of the land exchange found on page 2-44 of the DEIS.*
	Response:	See General Response No. 1.
	Comment 2	*… if you can get the good quality land exchanged for the lesser quality land and still have the environment protected, the exchange should be the alternative to choose.*
	Response:	See General Response No. 1.
Letter 158	Commentor	Charles M. Sanders
	Comment 1	*I support this project because the mining phase only affects the area to be mined for minerals.*
	Response:	See General Response No. 1.
Letter 159	Commentor	Donald H. Woodman
	Comment 1	*I am in favor of these mines being developed if for no other reason than national security.*
	Response:	See General Response No. 1.
	Comment 2	*Contrarily, it is inconceiveable that the BLM Safford District and the BLM State Office would knowingly and willingly contribute and/or condone untruths, ommisions-of-import, blatent inferences and suppositions v.s. factual information and/or an admission of simply not being knowledgeable. BLM has not represented the public in their best interest.*
	Response:	See General Response No. 1.
	Comment 3	*Contrary to the DEIS, the RMP and subsequent amendments of 1991 and 1994 do not cite any field investigations/narratives that the lands offered by PD were of such significant value whereby these lands were "targeted for acquisition" (finally conceded to be the case by Tom Terry on 10/21/98). This false inference should be deleted. Whereas, the BLM never got permission from the landowners of the offered parcels to conduct Visual Resource Evaluations, formal archeological transects, factual on-the-ground*

wildlife determinations the credibility of these lands significance is seriously questionable. Of the 14 seperate parcels of offered lands (the DEIS cites 11 in error) only 3 parcels have significant public value (Amado, Curtis, and travasci Marsh (wetlands); the balance have little to offer above millions of acres BLM now administers.

Response: The Safford District RMP, as amended, specifies 24 Long-Term Management Areas (LTMAs), defined as areas in which the BLM seeks to retain or acquire lands. With the exception of the Tavasci Marsh property, the offered lands proposed for this exchange are located within these LTMAs and are therefore "high priority acquisition targets." The Tavasci Marsh property is a high priority acquisition target because it is within the boundaries of the area approved as the Tuzigoot National Monument by Congress. Permission to conduct baseline studies of the offered lands in order to characterize their resources was given to BLM by the land owner, Phelps Dodge Mining Company. Only 11 of the 14 offered properties are included in the proposed Land Exchange alternative; the remaining 3 properties are optional parcels that were not selected by the ID Team to be included in the offered lands package for acquisition the Land Exchange alternative.

Comment 4 *Because BLM assumed the "passive role", SWCA was not caused to conduct any Visual Resource Evaluations (aesthetics (no formal archeological/cultural transects were demanded with a narrative and map for each parcel. SWCA made cursory "walk-overs" thence made the inference(s) cultural findings of significant value may be found on the offered lands when factually only common shards and lithics were found on 3 three parcels and rederences/inferences that findings on area lands quantifies even greater discoveries. Unfounded suppositions.*

Response: This comment cites the fact that intensive field inventories were not conducted on the offered lands and concludes that evaluations of the parcels' potential for the presence of cultural resources are consequently unfounded. BLM did not require intensive inventories of the offered lands because they are not required by law, regulation, or BLM policy. This is because it is assumed that the transfer of land into federal ownership generally has a beneficial effect. Concerning the predictions on the potential for the various parcels to contain significant cultural resources, such predictions were based on more than just the reconnaissance surveys. They were also based on the professional archaeologists' knowledge of the archaeology of the region, a review of the archaeological sites and inventory files for the region, and comparisons of the terrain and environment of the area with neighboring areas where sites are known to occur. The purpose of the evaluations was to characterize the properties for acquisition purposes, not to fully inventory their resources.

Comment 5 *SWCA used the U.S.W.S. sensitive species list that applies to each Arizona Counties list is not absolute in accuracy. Albeit the parcels are seperated by significant distances 13 parcels listed the Perigren Falcon and two bat species (only) as species that often occupy the lands (165); 50-70% may occupy the lands on interim basis; 14% do not occur at all. The list(s) were not the result of field observations, and BLM did not cause SWCA to verify them.*

Response: The species list maintained and provided by the U.S. Fish and Wildlife Service (USFWS) is accurate and up-to-date. The USFWS makes these lists available upon request as part of the Section 7 consultation process and posts them on the Internet. Species are listed by county, and the database used to generate the lists includes AGFD heritage data, as well as data from historical records and current literature. The potential for occurrence of the listed species on the offered lands is based on the presence of potentially suitable habitat for a specific species. The offered lands were field checked for the presence of suitable habitat, and each species' potential for occurrence was subsequently evaluated and reported in the EIS, and updated for the FEIS.

Comment 6 *Why isn't the terms "physical access; legal public access; negotiated access, condemnation-for-access" defined in the DEIS Glossary.*

Response: The term "access" has been added to the glossary. The terms "negotiated access" and "condemnation-for-access" have not been used in this document and therefore are not defined.

Comment 7 *Why isn't the status of the physical and legal public access for each parcel of offered land given in the DEIS? Note: 9 parcels do not have legal public access out of the total of 14.*

Response: Physical access to each of the 11 offered parcels in the land exchange alternative was described in the DEIS. The FEIS also describes the status of legal access to each parcel.

Comment 8 *Why has the BLM signed their approval of SWCA's having directed and encouraged the public to trespass on private lands, and cross private fences as well, and further trespass across State lands (which require a USE PERMIT for any activities thereon?*

Response: The EIS neither directs nor encourages the public to trespass private or state lands It simply describes the physical access to each offered parcel. Many of the offered lands have vehicular access. While the current physical access in all cases may not be legal access, landowners may allow use of the roads leading to the offered lands or adjacent public lands. In other cases, access to the offered lands may be by foot from adjacent public lands.

Comment 9 *In what timeframe will BLM initiate acquisition of legal and physical access to these purported high-value recreational lands?*

Response: The BLM does not have a timetable in which to acquire legal and physical access to every offered parcel of land. Due to limited staff and budget, and competing work items, the BLM does not plan to pursue acquisition of legal and physical access to every parcel. If problems or conflicts develop that prevent public or administrative access to these parcels and adjacent public lands, those issues will determine BLM's priority for acquisition of access. Furthermore, the type of access (motorized, non-motorized, or no access) allowed also depends on the management objectives for a particular parcel of land. It may, or

may not, include development of access, whether motorized or by foot. The BLM has no plans to condemn for access to the offered lands.

Comment 10 *If access negotiations fail, will BLM initiate condemnation proceedings for legal public access?*

Response: The BLM has no plans to condemn for access to the offered lands. The BLM is interested in acquiring the offered parcels for a variety of resource values and public uses, not just recreational uses that necessitate acquisition of legal and public access, whether motorized or non-motorized. The value of some of these lands may also lie in other resource values not directly related to recreation or other uses that require access for people (wildlife habitat, watershed protection, or cultural resource values). The EIS describes at some length the natural and cultural resource values and land uses present on the offered lands, how the lands would be managed if acquired, and the current status of physical access to the parcels.

Comment 11 *BLM allowed itself to be "locked in" re: base parcels; what precluded the BLM from breaking the 17,000 acres into smaller parcels for appraisal purposes whereby the public would thence realize more value per acre?*

Response: The ID Team reviewed the resources of the base properties and determined that this package was desirable as a "base package" to which additional, optional properties could be added to equalize the exchange values. Regarding breaking up the selected lands into smaller parcels for appraisal purposes, the appraisal process did account for two groups of selected lands: those with high mineral potential, about 190 acres near the San Juan deposit, and those without (the remainder of the selected lands). The per-acre value of the mineralized lands was appraised much higher than that of the non-/low mineralized lands. There would be no advantage to breaking up the non-mineralized selected lands into smaller parcels for appraisal purposes, as the factors considered in the appraisals would be the same and a per-acre value applied.

Letter 160 Commentor Richard A. Bryce

Comment 1 *The stockpile lining measures are among the best that I have seen. The double protection offered by both the clay layer and the 60-mil liner should be adequate protection for this project.*

Response: See General Response No. 1.

Comment 2 *The 100 year rainfall storage facilities for process solutions are more that adequate for this facility.*

Response: See General Response No. 1.

Comment 3 *The DEIS and MPO are well done.*

Response: See General Response No. 1.

Letter 161 Commentor Rick Parlett of Industrial Tool and Supply Co.

Comment 1 *I urge you to allow the permitting of the Dos Pobres / San Juan Mine.*

Response: See General Response No. 1.

Letter 162 Commentor Robert C. Walish

Comment 1 *I urge the BLM to accept the Land Exchange Alternative. If this does not occur, I then urge the BLM to adopt the Proposed Action from the Mine Plans Alternatives Set.*

Response: See General Response No. 1.

Comment 2 *It is important that a decision on the Land Exchange be made as soon as possible. What is the schedule for a decision?*

Response: This comment has been addressed in General Response No. 2, NEPA Process.

Letter 163 Commentor Tonya L. Williams of Town of Clifton

Comment 1 *The Town of Clifton has reviewed the Draft EIS and favors approval of the proposed land exchanges, which appear to be in the best interest of both the public and Phelps Dodge. …we strongly support approval of this project.*

Response: See General Response No. 1.

Letter 164 Commentor J.D. Hayworth of Congress of the United States

Comment 1 *In accordance with all applicable federal laws and agency regulations, I would urge approval of this project.*

Response: See General Response No. 1.

Letter 165 Commentor Johnson, Karl Hartung, Mary of Mount Graham Community Hospital

Comment 1 *Mt. Graham Community Hospital supports the development of the proposed Phelps Dodge Safford mine. ...Please convey our support for the Land Exchange Alternative to the development of the Dos Pobres/San Juan Project by the Phelps Dodge Mining Company to the appropriate parties and agencies.*

Response: See General Response No. 1.

Letter 166 Commentor Frank Sosnoskie

Comment 1 *I am writing in support of the Phelps Dodge Dos Pobres/San Juan Project. I also support your agency's preferred alternative of the land exchange found on page 2-44 of the Draft EIS.*

Response: See General Response No. 1.

Letter 167	Commentor	Jodi B. Black
	Comment 1	*I am writing in support of the Phelps Dodge Dos Pobres/San Juan Project. I also support your agency's preferred alternative of the land exchange found on page 2-44 of the Draft EIS.*
	Response:	See General Response No. 1.
Letter 168	Commentor	Randall C. Evans
	Comment 1	*I am writing in support of the Phelps Dodge Dos Pobres/San Juan Project. I also support your agency's preferred alternative of the land exchange found on page 2-44 of the Draft EIS.*
	Response:	See General Response No. 1.
Letter 169	Commentor	Tom Johnson of Johnson Motors Corp.
	Comment 1	*As employees of Johnson Motors Corporation we support the Dos Pobres/San Juan Project in the Safford area.*
	Response:	See General Response No. 1.
Letter 170	Commentor	Robbin MacDonald
	Comment 1	*I urge BLM to cooperate with Phelps Dodge representatives to bring safe, clean, environmentally-wide mining to Graham County.*
	Response:	See General Response No. 1.
Letter 171	Commentor	Jack Howell of People for the USA, Capitol Chapter
	Comment 1	*The BLM should accept the land trades…*
	Response:	See General Response No. 1.
Letter 172	Commentor	Mark Bowling
	Comment 1	*...I'm writing to support the Phelps Dodge Dos Pobres/San Juan project located north of Safford, Arizona.*
	Response:	See General Response No. 1.
Letter 173	Commentor	Eben Robinson
	Comment 1	*I support the mine.*
	Response:	See General Response No. 1.
Letter 174	Commentor	Rodney Saulters
	Comment 1	*I'd like to take the opportunity to express my support for the Safford Project.*
	Response:	See General Response No. 1.
Letter 175	Commentor	Kerry B. Lawson
	Comment 1	*Please consider my comments in support of the Dos Pobres/San Juan Project.*
	Response:	See General Response No. 1.
Letter 176	Commentor	Eugenia F. Howell of People for the USA
	Comment 1	*I support the proposed Dos Pobres-San Juan mines north of Safford…*
	Response:	See General Response No. 1.
Letter 177	Commentor	Eric Hancock of Hancock Embroidery Co./Hancock Enterprises, LLC
	Comment 1	*I am writing this letter to express my STRONG SUPPORT for the proposed land exchange and Safford Mine Project.*
	Response:	See General Response No. 1.
Letter 178	Commentor	Ivan & Kathryn Hancock of Ivan F. Hancock Enterprises, LLC
	Comment 1	*We are sending this email to you to express our support for the Land Exchange Alternative.*
	Response:	See General Response No. 1.
Letter 179	Commentor	Michael Bowling
	Comment 1	*I feel this project would be a great benefit to the people of Safford.*
	Response:	See General Response No. 1.
Letter 180	Commentor	Joe Lecocq
	Comment 1	*After studing the Safford Project, my feelings are as long as they meel all requirements, why shouldn't they be allowed to mine.*
	Response:	See General Response No. 1.
Letter 181	Commentor	Leora Hunsaker of Quick-Draw Signs LLC
	Comment 1	*I support the Land Exchange Alternative which will allow this much needed mine to open.*
	Response:	See General Response No. 1.

Letter 182	Commentor	Donald W. Kimball of Arizona Electric Power Cooperative, Inc.
	Comment 1	*AEPCO is writing this letter in support of the proposed Dos Pobres/San Juan copper mine and to enter this support into the official record for this project.*
	Response:	See General Response No. 1.
Letter 183	Commentor	F. Dwight Schnebly of Treasures and Trinkets
	Comment 1	*Let the new Safford mine open.*
	Response:	See General Response No. 1.
Letter 184	Commentor	John R. Ratje
	Comment 1	*I would like to express my strong support for the Phelps Dodge Safford Mine Project.*
	Response:	See General Response No. 1.
Letter 185	Commentor	Janet E. Curtis of Trophies 'N Tees
	Comment 1	*I would like to go on record as being in support of the Safford Mine Project.*
	Response:	See General Response No. 1.
Letter 186	Commentor	Kathy Brown
	Comment 1	*I am entirely in favor of the Safford mine being developed.*
	Response:	See General Response No. 1.
Letter 187	Commentor	Scott Kohls of Superfast Label Service, Inc.
	Comment 1	*I understand this means an economic boost to the area. I also have driven through Globe and the Clifton/Morenci area and find the destruction of the land appalling. What will the landscape look like years from now? Where is the proposed mine going in?*
	Response:	See Figure 4.4 for a visual simulation of the Dos Pobres/San Juan Mine with a 400-ft-tall leach pad. Revegetation and reclamation are likely to reduce some of the visual impacts of the pad, stockpiles, roadways, and other disturbed areas. The location of the proposed mine relative to the Town of Safford is depicted in Figure 1-1.
Letter 188	Commentor	Anonymous Commentor
	Comment 1	*This would be the most tragik thing that could hapen to our beautiful Safford.*
	Response:	See General Response No. 1.
Letter 189	Commentor	Donna L. Baker
	Comment 1	*I would like to give my letter of support to the Phelps Dodge Mining Company for the Safford mine project.*
	Response:	See General Response No. 1.
Letter 190	Commentor	James V. Warren
	Comment 1	*The amount of public land now accessed would be greatly diminished. Public access would be denied on all Phelps Dodge prop. and this would not allow access to many hunting and camping areas. This is change so it would outweigh the positives of a project such as this.*
	Response:	See General Response No. 1 and response 105-2.
Letter 191	Commentor	Rod McElwain
	Comment 1	*At this time, I support this project for your area; but I think the Arizona Eastern Railroad should build a spur to the mine from its main line so that sulfuric acid and copper anodes can be hauled to there individual consumption points.*
	Response:	This suggested alternative mode of transporting materials to and from the proposed mine has not been proposed by Arizona Eastern Railroad, is not under the control of PD, and is therefore outside the scope of analysis for this EIS. For these reasons, this issue is not considered further.
Letter 192	Commentor	Judith Warren
	Comment 1	*I am in favor of the Dos Pobres/San Juan mining project because of the positive impact it will have on our community, providing much needed jobs for our Gila Valley families.*
	Response:	See General Response No. 1.
	Comment 2	*The land exchange seems more than fair, although I don't see any particular benefit for the public.*
	Response:	See General Response No. 1.
Letter 193	Commentor	Kenneth G. Bowling
	Comment 1	*I like this mine project.*
	Response:	See General Response No. 1.

Letter 194 Commentor Robert A. Metz

Comment 1 *BLM and Phelps Dodge have done a very creditable job on preparation of the Draft EIS.*

Response: See General Response No. 1.

Letter 195 Commentor Colleen Filippone

Comment 1 *I support the land exchange.*

Response: See General Response No. 1.

Comment 2 *It is clear from the EIS that the project design conforms to state of the art environmental protection standards at every opportunity. The zero-discharge approach provides maximum protection for water resource quality of the Safford Valley, providing for exclusion of surface runoff from the project area and for containment of impacted water within the area through liners and solution control methods that have been found to be effective at other similar facilities.*

Response: See General Response No. 1.

Comment 3 *The least desirable aspect of the project to me is the visual impact. If there were a cost effective way to reduce that impact after closure I think it would desirable to do so, i.e., via more extensive (than 20%) vegetation after closure or returning more of the waste rock to the pits.*

Response: The reclamation plan has been revised to revegetate 100 percent of top surfaces of the rock stockpiles, as well as 100 percent of the more visible side slopes. The Partial Backfill alternative reduces the visual impact of the project somewhat by lowering the heights of both the West and East development rock stockpiles by about 50 feet relative to the Proposed Action alternative. See also response 9-2.

Letter 196 Commentor Stan Barnes Jr. of Copper State Consulting Group

Comment 1 *...I wholeheartedly support the project.*

Response: See General Response No. 1.

Letter 197 Commentor Chuck Shipley of Arizona Mining Association

Comment 1 *I would like to register our support in the official record for this project.*

Response: See General Response No. 1.

Letter 198 Commentor Steve Saway

Comment 1 *I concur and support the Land Exchange alternative and believe it is in the public's best interest.*

Response: See General Response No. 1.

Comment 2 *After analyzing the various parcels of offered lands, I would urge BLM to consider adjusting the preferred alternative so as to include the Davison Property in the offered lands package. This property appears to offer distinct and important natural resource values that would benefit the Empire-Cienega RCA, including watershed, recreation, and presence of special interest wildlife species.*

Response: See General Response No. 1.

Comment 3 *As a consideration, the National Park Service (NPS) is authorized to acquire non-federal land with the congressionally approved boundary of the Tuzigoot National Monument. Since the Tavasci Marsh property lies within that boundary, BLM could delete that property from the offered lands package and let the NPS use their available options to pursue that acquisition.*

Response: PD has neither proposed an exchange with or sale to the NPS directly for the Tavasci Marsh property. However, as this property is included in the proposed land exchange package for this Project and lies within the congressionally approved boundaries of the NPS' Tuzigoot National Monument. If BLM selects the land exchange alternative, it will undertake a simple administrative action to convey the property to the NPS, a sister agency in the Department of the Interior.

Letter 199 Commentor M. E. Oldaker of Balentine Office Products

Comment 1 *The Land Exchange is the Best choise for this project, I am in favor of the Land Exchange and the plan for the Mine Development.*

Response: See General Response No. 1.

Letter 200 Commentor William Schahan of Balentine Office Products

Comment 1 *BLM should be applauded for selecting the land exchange alternative as the preferred alternative and I support this.*

Response: See General Response No. 1.

Letter 201 Commentor Marion E. Balentine of Balentine Office Products

Comment 1 *I am in support of the Land Exchange Alternative.*

Response: See General Response No. 1.

Letter 202 Commentor Cherrill Balentine of Balentine Office Products

Comment 1 *...I support BLM's preferred alternative of the land exchange found on page 2-44 of the Draft EIS.*

Response: See General Response No. 1.

Letter 203 Commentor Glen Henderson of NPS, Montezuma Castle & Tuzigoot Nat'l Monuments

Comment 1 *RE: Tavasci Marsh. I have two concerns with Zenitech's analysis. First, Zenitech chose to compare sediment data in the marsh only to U.S. EPA Region 9 PRGs that predict the potential for the sediment to contaminate groundwater. To be consistent with Zenitech's comparison to Arizona ingestion levels, I compared the metal concentrations in the marsh sediment to U.S. EPA Region 9 PRGs for potential ingestion of sediment by humans. This comparison shows arsenic in the marsh exceeds the Region 9 PRG by two orders of magnitude (Table 2 in letter). All other metals are below the PRGs for soil ingestion. Second, Zenitech chose to compare the potential of the contaminated sediment to contaminate groundwater to a U.S. EPA Region 9 PRG that assumes a dilution and attenuation factor of 20. We believe it is more appropriate to assume no dilution or attenuation because, as I have observed at Shea Springs (within Tavasci Marsh), groundwater is in direct contact with the sediments. This comparison shows that levels of arsenic, cadmium, and chromium exceed the Region 9 PRGs for migration to groundwater (Table 2 in letter).*

Response: In response to these concerns, BLM had URS Greiner Woodward Clyde (now URS Corporation) conduct supplemental testing for the presence of metals and toxicity in sediment and surface waters on the Tavasci Marsh property. Results of the tests were reported in "Tavasci Marsh Supplemental Sampling Report" dated September 29, 1999. According to a letter dated October 7, 1999, from G. Henderson, then Superintendent of Tuzigoot N.M. (commentor), to W. Civish, BLM Safford Field Office, the results of the additional sampling "suggest that conditions in the Marsh are not adversely affecting aquatic life. Therefore, there would be no need for Tuzigoot National Monument to undertake clean up of the Marsh or to actively manage the habitat to prevent ecologic exposure."

Comment 2 *The data analysis shows that soil-metal concentrations for arsenic, cadmium, and chromium exceed some commonly accepted benchmarks for protection of associated biota, human ingestion, and migration to groundwater. I have therefore concluded that BLM should require of Phelps Dodge a more thorough pre-acquisition site assessment. This will minimize the potential for Department liability for hazardous substances, or other environmental remediation or injury. Given foreseeable exposure pathways, my greatest concern is for ecologic risk. Therefore, I feel the pre-acquisition site assessment should include, as a component, a baseline ecologic risk assessment in accordance with U.S. EPA guidance (5). The baseline ecologic risk assessment should address contaminant fate and transport, potential receptors, exposure pathways, and assessment endpoints.*

Response: See response 203-1.

Letter 204 Commentor Ben Hawkins of Desert Glen Inc.

Comment 1 *I hope you will support the Phelps Dodge Dos Pobres request.*

Response: See General Response No. 1.

Letter 205 Commentor Joe Malisewski of Sundt Construction, Inc.

Comment 1 *I hope you'll support the development of the Dos Pobres/San Juan mines.*

Response: See General Response No. 1.

Letter 206 Commentor Anonymous Commentor of United Steel Workers of America

Comment 1 *Because of conflicts of interest posed by Phelps Dodge payment of staff salaries, the BLM's regional staff must recuse itself from further deliberations on the San Juan/Dos Pobres land exchange.*

Response: See General Response No. 15, Conflict of Interest.

Comment 2 *The BLM should ensure the use of income based as well as comparable sales appraisal methods. This should include a detailed estimate of the financial value of all benefits to Phelps Dodge, including mineral extraction, regulatory exemptions and reduced regulatory requirements resulting from the exchange.*

Response: See General Response No. 7, Appraisals, and General Response No. 5, Loss of Federal Oversight for Mining on Private Lands, wherein these comments are addressed.

Comment 3 *The BLM and Phelps Dodge should be required to immediately disclose all data on which land valuation is based, including all existing mineralization studies, and all prior sales and transactions in the vicinity of Phelps Dodge mining operations.*

Response: See General Response No. 7, Appraisals.

Comment 4 *Federal rules state that the agencies "shall reserve such rights or retain such interests as are needed to protect the public interest or shall otherwise restrict the use of Federal lands to be exchanged, as appropriate" (36 CFR 254.3(h)). In the case of these land exchanges with Phelps Dodge federal authority would be lost over the sites, including resource management duties, national environmental policy act compliance and federal hard rock mining rules. Any exchange should include restrictions on the deeds to protect groundwater and ecology by maintaining the applicability of such federal regulations and duties on the mining on the traded federal lands (such a proposal is detailed in the Coalition to Save Kneeling Nun Mountain's Proposal to Preserve and Defend Kneeling Nun Mountain).*

Response: See General Response No. 5, Loss of Federal Oversight/Regulatory Requirements.

Letter 207 Commentor Ken A. Phillips of Arizona Department of Mines and Mineral Resources

Comment 1 *The Arizona Department of Mines and Mineral Resources supports the development of the Dos Pobres/San Juan copper mine.*

Response: See General Response No. 1.

Letter 208 Commentor Lou McDonald

Comment 1 *I Recommend that the project for Phelps Dodge Mining Company Dos Pobres/San Juan Project be approved.*

Response: See General Response No. 1.

Letter 209 Commentor Rachel Thomas of People for the USA

Comment 1 *Recommend approval of the Phelps Dodge Mining Company Dos Pobres/San Juan Project.*

Response: See General Response No. 1.

Letter 210 Commentor Lainie Levick of Sierra Club, Rincon Group

Comment 1 *We support the No Action Alternative because it is the least environmentally damaging alternative. However, since the Mining Law of 1872 does not allow the BLM that option, we prefer the Partial Backfill of the San Juan pit alternative as the least environmentally damaging per Chapter 11 of the BLM Handbook H-3042-1.*

Response: See General Response No. 1.

Comment 2 *We believe that the BLM should still select one of the Mine Plan alternatives in the EIS process because mining is a known, foreseeable use of these lands (even though the DEIS states that if the BLM approves the land exchange there would be no need to select an alternative from the Mine Plan Alternatives Set).*

Response: See General Response No. 1.

Comment 3 *Section 1.5 of the DEIS, Regulatory Framework and authorizing actions, lists the federal, state, and local laws under which this project must conform and under which it was analyzed. But the BLM's Solid Minerals Reclamation Handbook (BLM Manual H-3042-1) was not listed as one of the Federal Requirements. Table 1-1 does not include BLM reclamation requirements for mining on public lands, but lists the Arizona Mined Land Reclamation Act as being applicable to the Land Exchange (mining on private lands). This makes the DEIS a flawed and biased document.*

Response: The Solid Minerals Reclamation Handbook is not a required permit or authorization, so it is not included in Table 1-1. The table has been revised to list regulations at 43 CFR 3809, which detail procedures that must be followed for BLM to approve an MPO. In the DEIS, the 3809 regulations were not listed but were implied by the first five laws listed in Table 1-1 (the authorities for the regulations). Furthermore, BLM reclamation requirements under 43 CFR 3809 are discussed in the second paragraph of Section 1.5.1, before any reference is made to Table 1-1. Table 1-1 is then introduced to summarize necessary permits and authorizations. See also General Response No. 5, Loss of Federal Oversight.

Comment 4 *The final EIS should more thoroughly examine the reclamation requirements for this project under BLM guidelines.*

Response: The reclamation measures described in Section 2.1.2.4 meet both federal and state reclamation requirements, regardless of whether the land exchange or an MPO scenario is selected by BLM. A general comparison of the State of Arizona and BLM's reclamation requirements is provided in Table 4-27.

Comment 5 *PD is offering some very beautiful and desirable properties in the land exchange. However, the end result of this land exchange will be to relinquish public and BLM review and oversight of the environmental impacts and reclamation of future mining activities on these 17,000 acres. The Rincon Group is very much opposed to the prospect of the mine reclamation, in particular, being regulated under the Arizona Mined Land Reclamation Act.*

Response: See General Response No. 1 and General Response No. 5, Loss of Federal Oversight.

Comment 6 *We strongly feel that Section 4.4 Land Exchange Alternative Impact Analysis is intentionally misleading regarding the transfer of oversight from the BLM to the State with regards to mining and reclamation. Page 4-48 and Table 4-27 imply that this change will be insignificant; i.e. "State reclamation requirements are similar to federal requirements." They are "similar" but definitely not the same. Table 4-27 leaves out some glaring differences that would show how much weaker the state standards are than the federal standards. For example:*
1) Federal standards give the Approving Officer (BLM) the discretion to approve the post-closure reclamation objective, while the state standards pre-approve a variety of measures that will not result in reclamation (scenic overlooks for tourism, re-mining, etc.).
2) Federal standards have stronger, more secure bonding and insurance requirements to ensure that costs for reclamation are covered by the mining company and not left for the public. State standards allow difficult to recover and weak mechanisms such as certificates of self-insurance. Federal standards require a bond or cash be placed in a Federal depository account.
3) the State standards include a section that allows a variance from any rule or requirement of the standards providing that public safety is not endangered. The state standards are thus mainly "safety" standards, not reclamation standards. In fact, the definition in the state standards for "reclamation" refers to site safety and stability, not land restoration.
4) There is no opportunity for public review or comment on the mining plan or reclamation plan with state oversight.
The DEIS did not bring out these very important differences in the text or in Table 4-27, leading the public to incorrectly think that there would be little difference in the future restoration of these lands if the land exchange was approved.

Response: While there are certainly differences between the federal and state reclamation requirements, the EIS does not seek to speculate or make a value judgment as to whether one is "weaker" or "stronger" than the other;

instead, BLM's intention in providing Table 4-27 is to disclose these differences. Please note that the commentor's statement that state reclamation requirements do not provide an opportunity for public review and comment is incorrect. For example, Section 27-929 of the Arizona Mined Land Reclamation Rules and Statutes states that the State Mine Inspector "shall give notice of a proposed reclamation plan or a substantial change to an approved reclamation plan once each week for two consecutive weeks in a newspaper of general circulation in the county or counties in which the exploration operation or mining unit is or will be located. . . .The notice shall . . . state that any person who may be adversely affected by the plan or substantial change may . . . [r]equest a public hearing." See this section and Section 27-931 of the Arizona Mined Land Reclamation Rules and Statutes for further information on public hearings. Note also that because the reclamation plan submitted to the BLM by PD has been prepared to meet both federal and state standards, there is no difference between the proposed reclamation activities that would be implemented under either the land exchange or MPO alternatives, despite any meaningful differences between federal and state standards.

Comment 7 *According to the DEIS, the development stockpiles are not expected to become saturated to the point that there is water flow through them (page 2-18), therefore the retention dams below were not designed to handle rainfall volume as well as surface runoff volume. This optimism is not appropriate in mine design, especially one adjacent to an important river system and an agricultural community dependent on that river system. The retention dams below the stockpiles should be designed to control rainfall volume in addition to runoff volumes for best protection of the local ecology.*

Response: The stormwater retention dams below the development rock stockpiles are designed to retain stormwater runoff from the 100-year, 10-day storm (which is greater than the 100-year, 24-hour storm) from the tributary watershed between the face of the stockpiles and the dams. Stormwater runoff from the tops of the development rock stockpiles is not included in the calculated required capacities of the dams since the top surfaces of the stockpiles will be sloped away from the crest and because the thickness of the stockpile lifts will provide a sufficient amount of absorption capacity to preclude stormwater from infiltrating completely through the stockpiles. Additionally, based on extensive characterization testing of the development rock, stormwater collected in the retention dams below the stockpiles is expected to be of good quality. The purpose of the retention dams is to ensure compliance with turbidity standards for surface water. See also response 237-4.

Comment 8 *Although PD will be relinquishing their right to mine on the offered properties, several of the properties will remain open to mineral entry. The Rincon Group insists that the BLM remove all of these lands from mineral entry if they are acquired.*

Response: Whether the offered lands are open to mineral entry after acquisition by BLM is determined by the directives for that area as specified in BLM's applicable management plan(s). In the case of the Amado, Tavasci Marsh, Schock, Feulner, Clyne I, Clyne II, and all but 80 acres of the Curtis properties, mineral entry will be prohibited.

Comment 9 *What would be the point of this exchange if the offered lands were not protected from future mining and degradation? Furthermore, the value of the offered lands should be much less if their future uses included mining than if they were protected from mining degradation.*

Response: See response 210-8.

Comment 10 *Can PD demonstrate their good intentions to the community by making all environmental permits readily available to the public, and voluntarily strengthening the standards by which they agree to comply?*

Response: All environmental permits issued by state or federal agencies are a matter of public record and are available for public review through the issuing agency. Whether PD chooses to provide access to their permits is outside the scope of this EIS. PD must meet all pertinent federal and state regulatory standards to receive the environmental permits required for their proposed mining-related activities. They may voluntarily take measures to exceed those standards, as they have done to meet 'zero-discharge' criteria for the Section 402 AZPDES permit.

Comment 11 *Despite PD's best intentions with respect to control of drainage and development of a zero discharge facility, there will probably be accidental leaks and spills across this land (land between the mine site and Gila River). Whether or not the land exchange is approved, we suggest that PD set up a permanent fund specifically to be used to clean up these lands when spills/leaks occur.*

Response: The mine has been designed as a zero discharge facility. Extensive run-on control measures have been designed to route clean water around the mine and onsite components of the stormwater management system have been designed to meet or exceed generally accepted engineering design standards. To further reduce discharge potential, the capacity of the primary stormwater impoundment has been increased to account for 24-hour power failure despite the ready availability of portable electric generators that would satisfy power demand for system pumps integrated into the stormwater containment system. The specific details of the stormwater management system are provided in the EIS and mine plan of operations in Section 2.1.2.3.2. Exceeding the design capacity of the impoundment (i.e. a "discharge') requires that the discharges associated with the 100-year, 24-hour storm event occur simultaneously with a 24-hour power outage. Because of the buffering capacities of the leach stockpile relative to the discharge of stormwater and the general rarity of the design storm event, the inadvertent discharge of stormwater is improbable, therefore no permanent clean up fund is warranted or required.

Comment 12 *With regards to the Habitat Mitigation and Monitoring Plan (HMMP), we strongly believe that the 15 year limit for monitoring is insufficient time to observe any significant changes in the locations downstream of the proposed mine (Appendix F, page 19). Montioring should continue for at least 15 years after the life of the mine, for a total of 30 years.*

Response: The 15-year monitoring period should be more than adequate to ascertain the nature and extent of impacts to downstream resources as a result of the stormwater management program implemented at the mine. While it is certainly possible that a significant storm event will not occur during the monitoring period, this does not detract from the efficacy of the monitoring effort nor does it argue for a longer monitoring period. The xeroriparian systems that provide much of the functional value of the downstream jurisdictional areas are dependent upon more frequent rainfall and runoff intervals than would be represented by lower return-frequency storm events. We believe that the systems in question are in fact primarily dependent upon local runoff from adjacent hillsides and not upon the less frequent storm events that cause these normally dry washes to flow all the way to the Gila River. The plant species that dominate these arroyos are quick to respond to drought; it is one of their key adaptive mechanisms that has allowed them to survive in the arid Southwest. The response of vegetation to reduced availability of water because of reductions in watershed size, if it is a factor determining the nature and character of xeroriparian habitats, will be reductions in the size and density (=biomass or vegetation volume) of plants within these habitats. As many of the plant species within the xeroriparian habitats potentially affected are also common upland species in the area, significant shifts in species composition will not be as apparent, though some species, such as canyon ragweed, may become less common. The detailed measurement of vegetation and habitat characteristics within these systems will allow for the detection of any significant impact or trends.

Comment 13 *How will PD guarantee no adverse impacts will happen to the Gila River and these washes when the 100 year flood comes? What flood control devices or structures are included in the plan, and what is the contingency plan if these devices fail? Who will maintain these (flood control) structures and developments after PD is through mining?*

Response: See Section 2.1.2.3.2 for discussion of proposed stormwater management facilities. It is the ADEQ, with additional review by EPA, through their AZPDES permit that regulates discharges to surface waters and requires design and operation of stormwater management facilities to minimize the potential for impacts from flooding on surface water quality and floodplains. The stormwater management facilities have been designed to be self-scouring to minimize the need for post-closure maintenance by PD.

Comment 14 *The DEIS states that the diversion channels around the site for clean stormwater runoff will reach equilibrium with respect to sediment transport within the site boundaries. However, these channels could convey several times their normal flow volumes during extreme events. How will the channels react to increased flows off-site and where the waters enter the Gila River channel, specifically at Butler Wash where a 9.5% average annual increase in flow is predicted (Table 4-9)? Increased flow volumes normally cause degradation and erosion in river channels. These issues were not adequately addressed in the DEIS and should be investigated more thoroughly in the final EIS.*

Response: The projected 9.5% increase in flow to the Gila River in Butler Wash is a result of upstream diversions (West Diversions) which outfall in Coyote Wash, a tributary to Butler Wash (see Figure 4-15). As depicted in Figure 4-15, the recovery point for sediment transport as result of the increased flow in Coyote Wash is less than 0.5 mile downstream of the outfall, meaning that the sediment transport characteristics of the wash return to their original character at that point. Washes in the project area, such as Butler, are ephemeral and only flow in response to extreme events, especially at their downstream ends. The projected 9.5% increase in flows in Butler Wash is not expected to result in any significant off-site degradation in Butler Wash near the Gila River because the main cause of scouring (the flows' increased capacity to carry sediment due to absence of sediment in flows) is expected to recover well upstream of the confluence of Butler and Coyote Washes.

Letter 211 Commentor John L. Uhrie

Comment 1 *I strongly support the Phelps Dodge Safford mining project. Additionally, I support the proposed land exchange as is preferred by the BLM and is outlined on pages 2-44 of the Draft EIS.*

Response: See General Response No. 1.

Letter 212 Commentor Nancy E. Jacobson

Comment 1 *I hope they (PD) will be permitted to bring this expertise and this contribution, to Safford, Graham County, and the State of Arizona.*

Response: See General Response No. 1.

Letter 213 Commentor Dennis E. Stacy

Comment 1 *I am writing you today to voice my support on approving the EIS on the Dos Pobres and San Juan proposed mine.*

Response: See General Response No. 1.

Letter 214 Commentor Kevin R. Kinsall

Comment 1 *I would like to register my strong support in the official record for this project.*

Response: See General Response No. 1.

Letter 215 Commentor Richard L. Foreman of Southwest Gas Corporation

Comment 1 *I would like to register my support in the official record for this project.*

Response: See General Response No. 1.

Letter 216 Commentor Carol Heathington of State Historic Preservation Office

Comment 1 *EPA and USACE must consult with this office under the National Historic Preservation Act (NHPA), by virtue of their permitting responsibilities. Has either agency requested that BLM consult on its behalf under the NHPA?*

Response: Yes, COE requested that BLM, on their behalf, take the lead in conducting consultations with the SHPO and with tribes for compliance with the NHPA. With delegation of permitting authority to ADEQ for Clean Water Act Section 402 in December 2002, EPA no longer has the responsibility for consultation under NHPA for issuance of this permit and so has not requested that BLM consult with tribes or SHPO on their behalf.

Comment 2 *Resolving the eligibility issue is a critical part of assessing impacts, because places that are eligible for reasons other than their information potential (criterion d) may be adversely affected by factors other than direct physical disturbance.*

Response: The BLM agrees with this comment and is concerned with determining eligibility and with identifying, assessing, and mitigating potential non-physical impacts. Some archaeological sites in the project area may be eligible for listing on the National Register of Historic Places as Traditional Cultural Properties (TCPs) because of values under criteria A or B assigned by tribes claiming cultural affiliation with the sites. Four of these sites also have been determined by the BLM to be sacred according to the eligibility requirements of the American Indian Religious Freedom Act and Executive Order 13007. We agree that consideration of indirect and non-physical impacts to these properties is crucial, as mitigation measures other than data recovery must be considered. Indirect non-physical impacts have been identified and consist of visual intrusions, modification of the surrounding environment, and potential termination of access. The BLM has consulted with the tribes and PD to develop a treatment plan that addresses tribal concerns to the extent possible; for example, expected impacts from visual intrusions and modification of the surrounding environment have been mitigated at the two sites of primary concern to tribes (AZ CC:2:200 ASM and AZ CC:2:211 ASM) through redesign of mining operations and fencing. A third sacred site (AZ CC:2:234 ASM) will be avoided as well. The BLM realizes, however, that some direct and indirect impacts cannot be mitigated; the FEIS contains a statement to this effect. See also response 216-3 and General Response 9, Cultural Resources Mitigation.

Comment 3 *Your Table 4-41 summarizes "Irretrievable and Irreversible Commitments of Public Resources Associated with the Proposed Action Alternative;" however, in my opinion, this analysis is premature.*

Response: Analysis of irretrievable and irreversible commitments of resources in an EIS is required by 40 CFR 1502.16, the Council on Environmental Quality regulations for implementing NEPA. The BLM has included archaeological resources as resources that would be irreversibly and irretrievably impacted by the Proposed Action, regardless of whether these resources are deemed significant or not, because some resources, one possible example being traditional cultural places, cannot be fully mitigated.

Comment 4 *Please be advised that the loss of cultural resources is not always amenable to mitigation. ...while the loss of certain traditional cultural places can be mitigated, in other instances, no mitigation is possible. Evaluating the significance of these resources should be completed as a part of this analysis.*

Response: See responses 216-2 and 216-3.

Letter 217 Commentor Donald H. Woodman

Comment 1 *Three- at the most four- of the Offered lands have public values worthy of acquiring; the balance is solely an "accomodation" with Phelps-Dodge.*

Response: See General Response No. 8, Public Lands Management.

Letter 218 Commentor James L. Madson

Comment 1 *I strongly support this Land Exchange as the preferred alternative.*

Response: See General Response No. 1.

Letter 219 Commentor John Kennedy of Arizona Game and Fish Department

Comment 1 *We are pleased that some of our earlier comments and concerns have been addressed in this latest version of the draft Mitigation Plan. The Department requests the opportunity to review the final Mitigation Plan prior to acceptance by the Army Corps of Engineers (ACOE).*

Response: Thank you for your comment. A draft of the final MMP (see Appendix F) was provided to the commentor for review and comment prior to acceptance by the COE and publication in this FEIS.

Comment 2 *It is not clear whether the mechanisms which are to be placed on Preserved Habitats are to remain in place for perpetuity. Likewise, there is some indication that Enhanced and Restored Habitats will also benefit from a conservation mechanism, but only under condition of a transfer of title (See draft Mitigation Plan, page 12). The Department prefers that conservation mechanisms be in place for perpetuity and that implementation of a conservation mechanism is appropriate even if the applicant retains title to the mitigation lands.*

Response: The properties incorporated into the mitigation plan for habitat preservation, enhancement, or creation and for the Alternate Year Fallowing Program will be protected in perpetuity. This will be accomplished through establishment of appropriate restrictive covenants, such as deed restrictions, tied to the land in perpetuity. These restrictions will be established and recorded with the appropriate jurisdiction prior to initiation of mine construction for the Dos Pobres/San Juan Project.

Comment 3 *RE: Success Criteria for Exotic Control. ...there is no documentation or discussion that a 15% tamarisk*

basal area reduces the threat of non-natives to a level of non-significance. The success criteria for Enhanced Habitats should be limited to the allowable percentage of tamarisk by basal area. The only enhancement activities addressed in the draft Mitigation Plan are to occur on the Thatcher site and are to entail removal of exotic species from the existing wetland habitats. Therefore, Section 2.4.2 seems to be extraneous and probably could be omitted.

Response: The establishment of a control standard is based upon balancing the desire to provide opportunities for establishment of a native-dominated riparian habitat and the need to provide for an attainable level of control. We are aware of no data that suggest or document a specific target for the relative dominance of tamarisk within a small patch of riparian habitat, such as the enhancement area at the Pima Mitigation Site, that would reduce the risk from non-natives to a level of "non-significance." In fact, the risk to riparian systems from non-natives is a regional issue. The site selected for this effort is bounded by mature riparian habitats that are in fact dominated by non-natives. This site, in the early stages of development, is dominated by natives and provides good opportunity for long-term, sustainable habitat enhancement at a very local level. The establishment of a target goal for the relative dominance of non-natives at 15% of the total stand basal area provides a reasonable expectation that the community will remain dominated by natives, thus significantly enhancing the overall quality of habitats within the enhancement area. Because the site has existing habitat value and because the risk from non-natives cannot be reduced to levels of non-significance (that is, invasion of exotics is a regional issue), the COE has determined that the mitigation credit ratio for the property should be less than 1:1. The established mitigation credit ratio for the enhancement site is 3:1; that is, three acres of high value hydroriparian habitat must be enhanced to compensate for one acre of impact to relatively low value xeroriparian habitats affected by the proposed mine project.

Comment 4 *The success criteria applied to Restored Habitats should answer the question "did the restored area achieve the desired condition?"*

Response: We agree. The success criteria provided within the MMP (see Appendix F) have been established based upon the desired future condition. This condition will be achieved over time; however, it is not necessary to wait for these communities to achieve their mature structural and species composition to determine success. Rather the criteria were established to ensure that these communities become established and not dependent upon external inputs for their maintenance and growth to achieve desired future conditions. Riparian communities are, by their nature, dynamic and controlled by disturbance regimes beyond the control of the applicant. The establishment of each community on a course to achieve the desired future condition or their establishment at that condition will not guarantee that they achieve or maintain that condition in perpetuity; in fact, no native plant community can be expected to maintain its present or climax condition in perpetuity. The mitigation program establishes the course of recovery of these disturbed areas in a manner that is consistent with their historic, natural climax condition. The establishment of the native-dominated riparian habitats will affect the response of these habitats to future disturbance regimes, including exotic species invasion, fire, and flood. The establishment of deed restrictions removes/reduces the risk that anthropogenic activities will affect their response to future natural disturbance regimes.

Comment 5 *The Department believes that the scope of success criteria should be broadened to reflect the distinguishing characteristics of riparian communities (e.g., canopy cover, structural diversity, vegetation density, etc.). Although we are not prepared at this time to offer quantitative thresholds, we encourage the ACOE and the applicant to further evaluate this issue.*

Response: Comment noted. The final MMP (Appendix F) includes discussion regarding the distinguishing characteristics of riparian communities targeted for preservation, enhancement, or creation at each of the mitigation sites.

Comment 6 *The draft Mitigation Plan does not offer any detail regarding the methodologies to be used in this monitoring program (monitoring downstream impacts).*

Response: Comment noted . The final MMP (Appendix F) includes the detailed methodology and monitoring triggers that will be used to determine change within downstream waters of the United States that are potentially impacted by proposed stormwater control measures.

Comment 7 *Discussion of Contingency Measures should acknowledge the measured uncertainty associated with this (Groundwater) model and its relationship to the proposed mitigation for impacts to WUS. Additionally, the effects and ramifications of a catastrophic event (s) should be specifically addressed here.*

Response: A detailed contingency plan has been established regarding the groundwater model predictions and associated impacts to waters of the U.S. The 3M Program in the MMP (see Appendix F) addresses model uncertainties and outlines the specific criteria that will be used to monitor model predictions and actual impacts to the groundwater system. Should measured or updated model results indicate greater impact, additional mitigation will be required pursuant to the MMP.

The effects of catastrophic events relative to the groundwater modeling effort have not and will not be considered. The groundwater model and its outputs are dependent upon geologic properties of the region; dramatic or significant changes in these features are not predictable and cannot be reasonably nor rationally considered. Regardless, the Model, Monitor, and Mitigate program would document the consequences of such a catastrophic event on the groundwater system near the mine.

Letter 220 Commentor John Kennedy of Arizona Game and Fish Department

Comment 1 *Overall, the studies used to model the potential impacts of the proposed project on the groundwater and surface water regimes is commendable.*

Response: See General Response No. 1.

Comment 2 *Several species of bats could be using the Dos Pobres/San Juan project area for roosting (old mine features). Section 4.4.3.3.4 explains that of the features of the Dos Pobres Sulfide and Lone Star projects, four mine features are considered "potentially suitable" for bats. For this reason, the Department recommends inspection of these sites and, if necessary, implementation of measures to exclude bats from these areas prior to project-related disturbances.*

Response: See revisions to Section 4.4.3.3.4 regarding measures to protect any bats potentially using these features.

Comment 3 *If monitoring results indicate any problems associated with wildlife exposure to PLS (pregnant leach solution ponds), the Department would like to be involved in the development of measures to minimize or eliminate these problems.*

Response: Comment noted.

Comment 4 *The Draft EIS should explain the potential for, and possible impacts resulting from, an accidental spill of sulfuric acid at the Gila River. A contingency plan should be prepared to respond to accidental spills.*

Response: See General Response 14, Hazardous Materials. Note also that in their Biological Opinion (USFWS 2002), USFWS concurred with the BLM's determination that the probability of a hazardous materials spill large enough to adversely affect the aquatic ecosystem of the Gila River was insignificant and discountable due to the safety precautions and procedures that will be taken by the selected trucking company.

Comment 5 *...monitoring of pit lake water quality is not addressed in the Draft EIS. Predicted toxicity levels are based on modeling which should be validated with actual water quality measurements for a specified period after mine closure. Additionally, the party who will be responsible for the monitoring and mitigation should be specified.*

Response: Pit lakes will consist of natural groundwater inflow and captured precipitation. It is expected that pit lake water quality will actually exceed that of the Gila River. Based on extensive review of the available scientific evidence, pit lake water quality monitoring for Dos Pobres/San Juan is not warranted.

The detailed results of a material characterization study for development rock were given to the ADEQ by PD as a requirement for obtaining their APP permit to operate the proposed mine. These results are summarized in Section 2.1.2.1.6.

Comment 6 *...we are concerned about the loss of public access to the San Juan Mine Road which currently provides access to public leand in the Johnny Creek area of the Gila Mountains. Approval of the Draft EIS would result in the closure of this route to the public. As mitigation, Phelps Dodge is evaluating the feasibility of upgrading portions of the Solomon Pass Road (Table 4-42). While we would support such an action, the West Ranch Road is currently passable only in a high-clearance 4-wheel drive vehicle and is in greater need of improvement than the Solomon Pass Road. We believe that minor improvements and annual maintenance of the West Ranch Road would be reasonable mitigation for closure of the San Juan Mine Road. The Department recommends that this mitigation measure be considered in the Final EIS.*

Response: The BLM does not plan to require PD to upgrade the West Ranch Road as mitigation for the loss of the San Juan Mine Road because the current 2 WD/4 WD condition of the West Ranch Road meets the BLM's objectives for the type of recreation activities (hunting, back country/four-wheel driving, horseback riding, sightseeing, and mountain biking) and recreation experiences they wish to provide (challenging back country driving, quality big game hunting, challenging mountain biking, natural landscapes/scenes, and a moderate degree of solitude and isolation). Improvement of the Solomon Pass Road provides a reasonable alternative to the loss of the San Juan Mine Road. See response 105-2.

Comment 7 *We are concerned about BLM's interpretation of the Globe Equity No. 59 Decree (pages 1-8 to 1-10) as it pertains to the rights of Phelps Dodge to change the point of diversion or the use of a decreed water right. However, this is a legal issue and we are aware that BLM's interpretation has been disputed. The Draft EIS indicates that Phelps Dodge must seek and obtain approval from the Gila Valley Water Commissioner and the U.S. District Court to mitigate reduced flows in the Gila River by using water that would otherwise flow in the river. "BLM will not take final action until it is determined whether and to what extent such action might be precluded by the Globe Equity Decree" (p 1-9, last paragraph). It is unclear whether "final action" would entail signing the Record of Decision (ROD) or the actual transference of property ownership. The Department recommends that all proposed mitigation measures be developed and enforceable before signing the ROD.*

Response: Please see Section 1.5.3, which has been revised to clarify several issues and comments that were made about the discussion of water rights authorities in the DEIS. The BLM, in its Record of Decision, will specify mitigation measures to be implemented regarding potential impacts on surface water and groundwater resources that may result from its decision. Any mitigation measures specified in the ROD must be implemented as a condition of BLM's authorization of the selected alternative.

Comment 8 *The groundwater model developed to predict impacts of pumping on water resources predicts a maximum net reduction in Bonita Creek flows of less than one acre-foot/year. While the predicted change in stream flow is probably too small to have any measurable impact on the fishery, actual reductions in stream flow may differ substantially from projected values. However, it is unclear if the number and location of monitoring wells to be used to test model accuracy will be sufficient to detect differences between model-projected values and actual values for Bonita Creek. The Draft EIS should include an assessment of potential risks to stream flows and native fish in Bonita Creek. We recommend that monitoring be designed to measure these risks and to provide an "early-warning" system to prevent negative impacts to Bonita Creek.*

Response: The Mitigation and Monitoring Plan (Appendix F) of the EIS outlines the groundwater resource monitoring program that will drive recalibration of the model if observed water levels deviate from model-projected

water levels beyond the levels specified in the MMP. The model does not project measurable impacts on Bonita Creek, and as long as the model accurately predicts the response of the groundwater system to mine-related pumping, no additional monitoring is required. While the Group 3 wells, a number of which are between the wellfield pumping center and Bonita Creek, are measured annually, they are not included in the evaluation that triggers model recalibration. Nevertheless, the data from the Group 3 wells will serve as an "early warning" of potential impacts on Bonita Creek, and will also be used in the recalibration of the model. It can be stated with a high degree of certainty that if the model projections are "off" on the Group 3 wells, the projections on the well groups that trigger recalibration will be "off" as well (i.e., recalibration will be triggered).

Comment 9 *Potential impacts to surface water in Watson Wash due to groundwater pumping should also be considered.*

Response: See Appendix F, Section 3.3.2 Watson Wash Flowing Well Monitoring System, for proposed mitigation should impacts of groundwater pumping be observed at the Watson Wash artesian well.

Comment 10 *The Department recommends specific monitoring of potential impacts to the Gila topminnow and, if necessary, development of mitigation measures to address adverse impacts. The Department requests involvement in surface water monitoring efforts associated with this project.*

Response: BLM is aware that the AGFD has and continues to monitor the Gila topminnow population potentially affected by the Project. See Appendix F for proposed mitigation measures to address potential adverse impacts from groundwater pumping on this population.

Comment 11 *Transfer of this property (Tavasci Marsh) to public ownership would be desirable provided it is managed for fish and wildlife purposes.*

Response: See General Response No. 1.

Comment 12 *The fourth paragraph on pages 3-74 and 4-51 of the Draft EIS does not describe the Department's construction of two water control structures as improvements/facilities currently available on the Tavasci Marsh property. Also, the first full paragraph on page 3-77 describes Tavasci Marsh as "AGFD Resource Category I habitat". To explain the meaning of this habitat designation by the Department, the Draft EIS should include the following definition: Habitats in this category are of the highest value to Arizona wildlife species, and are unique and/or irreplaceable on a statewide or ecoregion basis. Table 3-36 on page 3-78 of the Draft EIS lists special status species potentially occurring on the Tavasci Marsh property. This list should include the osprey (Pandion haliaetus), WSCA, as a "Species Likely to Occur with Some Regularity".*

Response: This information has been used to revise the EIS.

Comment 13 *There is an issue of reimbursement or replacement for the loss of Commission-owned improvements at Tavasci Marsh that must be addressed.*

Response: BLM is in the process of determining whether the improvements at Tavasci Marsh were paid for with public funds. It is BLM's position that since this offered property would be put into public ownership under the land exchange alternative and managed by a federal agency as a public resource, no reimbursement would be warranted for improvements funded by public monies. If improvements were funded with non-public funds, BLM will negotiate reimbursement with the appropriate entity.

Letter 221 Commentor Bart Judd of Roadrunner Rehab

Comment 1 *This letter is to show my support for Phelps Dodge.*

Response: See General Response No. 1.

Letter 222 Commentor James M. Bush of Fennemore Craig

Comment 1 *...I wholeheartedly support the Project.*

Response: See General Response No. 1.

Letter 223 Commentor Jerald A. Barney

Comment 1 *Do the land exchange!*

Response: See General Response No. 1.

Comment 2 *The group is also opposed to any backfilling of the mine when the 16-year plan ends. This is a waste of natural resources if the material must be removed again for future mining.*

Response: See General Response No. 1.

Letter 224 Commentor Sam Mardian, Jr.

Comment 1 *I am in strong support of this proposed new mining venture and urge favorable consideration.*

Response: See General Response No. 1.

Letter 225 Commentor John C. Camper of Tucson Metropolitan Chamber of Commerce

Comment 1 *I would like to register the Chamber's support in the official record for this project.*

Response: See General Response No. 1.

Letter 226 Commentor Dan Adams

Comment 1 *I trust that you will take all of this (I.e., socioeconomic benefits to rural communities) into consideration as you make your momentuous decisions.*

Response: See General Response No. 1.

Letter 227 Commentor Ken Quartermain of Arizona Rock Products Association

Comment 1 *I would like to register my support in the official record for this project.*

Response: See General Response No. 1.

Letter 228 Commentor Mark Minter of Arizona Builders' Alliance

Comment 1 *...we wholeheartedly support the project.*

Response: See General Response No. 1.

Letter 229 Commentor John Zamar

Comment 1 *I support Phelps Dodge Dos Pobres / San Juan project located in the Safford area. In addition, I support BLM's position concerning the preferred alternative for the land exchange as presented in the draft EIS.*

Response: See General Response No. 1.

Letter 230 Commentor James F. Devine of U.S. Geological Survey

Comment 1 *Information is needed on ore mineralization chemistry; analysis of grab, composite or core samples; and possible by-product minerals in the ore i.e., molybdenum, silver, gold, etc., in order to evaluate the impact of leaching of stockpiles and other waste repositories.*

Response: The results of the material characterization study for development rock were given to ADEQ by PDSI as a requirement for obtaining their APP permit. Results of this study show that the development rock stockpiles will be inert and furthermore, these stockpiles will not be leached. A summary of these results is provided in Section 2.1.2.1.6.

Detailed ore composition and mineralization is not relevant for evaluating the impact of leaching since that information does not describe the resultant leach solutions produced during the leaching process. Leach solutions used in mining were characterized as part of the APP application studies. The leach pad will be a lined facility designed to fully contain leach solutions. Only copper is recovered in the SX/EW process; no by-product minerals are recovered.

Comment 2 *Chemical data on water quality and baseline water conditions (pre-mining) are needed in the EIS. Also needed is data on water chemistry in, around, and through the deposit, which is essential for the EIS discussion. For example, data on the geochemistry of springs (on faults) as compared to well chemistry is needed.*

Response: Baseline water quality conditions and chemical data for three springs and groundwater are discussed in Section 3.2.2.5.2 in the EIS. These data were collected as part of documenting baseline conditions for the Aquifer Protection Permit (APP), for which PD made an application to ADEQ in the fall of 1998. The MMP also includes chemical and isotope sampling of springs to assist in determining the water source of the springs.

Comment 3 *The west diversion channel as drawn on figure 2-1 should be drawn as one (single) channel as discussed in the text, and not two, as shown in the diagram.*

Response: The West Diversion channel is one continuous channel; however, in places, the natural topography is used to direct flows. Figure 2-1 shows only where surface disturbances are needed to construct this channel. As indicated on Figures 2-1 and 2-11 and discussed on page 2-15 of the DEIS, the West Diversion channel is a continuous system with the stormwater ultimately entering Coyote Wash.

Comment 4 *The (west) diversion channel seems to open into the head of a drainage that flows directly into the west development rock stockpile. The opening (as drawn) ultimately leads to an unnamed tributary that feeds into upper Watson Wash, which cuts through a soil stockpile and an aggregate borrow source. This design does not achieve the desired result of minimizing leaching of exposed materials into the surface or ground water.*

Response: The West Diversion channel is designed to divert stormwater runoff from the Watson Wash drainage around the West development rock stockpile and into the Coyote Wash basin, which drains in a southwesterly direction away from the stockpile. See Section 2.1.2.3.2 and Figure 2-11 in the EIS.

Comment 5 *Because the topography is obscured, it is difficult to see where storm water is diverted; however, it appears that the topography forces the drainage close to or into upper Wilson Wash, which is not consistent with the statements in the text.*

Response: The statement in Section 2.1.2.3.2 regarding diversion of stormwater from the South Diversion channel into an unnamed tributary of Peterson Wash is correct. A more detailed map in the Stormwater Master Plan (Dames & Moore 1999a, 2nd revision) showing topography is available at the BLM's Safford Field Office for review. See also response 230-4.

Comment 6 *Chapter 3, Section 3.2.2.3: Page 3-17. The statement, "All the rocks that will be exposed in walls of both the Dos Pobres and San Juan pits are high in carbonate minerals which are alkaline," is unsupported.*

Response: Your observation is correct; use of the term "carbonate" was inappropriate. The rocks in the pit walls will be primarily andesite, which has a calc-alkaline component but is not a carbonate in the geological sense.

There are no limestones present in the Safford Mining District; however, andesite, which is present, is also acid-neutralizing as evidenced by data presented in Section 2.1.2.1.6. The statement in Section 3.2.2.3 has been reworded to reflect this information.

Comment 7 *Chapter 3, Section 3.2.2.3: Figure 3-6, Geologic map: You need to show the down-drop wall on the southwest side of Butte fault and northeast side of Valley fault to define the graben.*

Response: We did not want to further clutter Figure 3-6, so we clearly show the graben on the following figure, Figure 3-7, the geologic cross section. Furthermore, we discuss this graben in the text in Section 3.2.2.3.1.

Comment 8 *Do springs line up along Butte fault indicating artesian activity?*

Response: The springs in the project area lie north of the Butte Fault in the foothills of the Gila Mountains. Their locations relative to the Butte Fault do not indicate artesian activity.

Comment 9 *The presence of the fault suggests an increase in water that could fill the pits and produce runoff problems. A plan for pumping or other mitigation procedures to control any excess water that might occur should be included in the EIS.*

Response: Pumping of groundwater from production wells, in addition to pit dewatering, will control groundwater inflow to the pits during operations. At the end of operations/pumping, studies indicate that pit lake water levels will reach steady-state conditions at elevations well below the surface rim of the pits. See Section 4.3.2.6.3.

Comment 10 *Figure 3-10: The position of Butte fault in the figure is unclear.*

Response: The map scale in Figure 3-10 is adequate for showing its intended information, i.e., the location of wells and the water table within the project area. This level of detail does not allow for the Butte Fault to be clearly delineated; see Figure 3-6 for a larger scale view of the location of Butte Fault.

Letter 231 Commentor Ron Gibbs

Comment 1 *I support the Proposed Alternative, which would operate the Dos Pobres/San Juan Project as described in the Draft EIS.*

Response: See General Response No. 1.

Letter 232 Commentor Dolan Campbell

Comment 1 *My own feelings are that Phelps Dodge should not be forced to give up any land to the BLM to open this mine and that more land should be placed on the tax roles and out of your control. ...Now I have had time to talk with the folks at Phelps Dodge and they feel that this land swap is the best deal which they can cut. To me this is not the best deal, but the best one which they can come up with. I go on record as favoring this land swap, even though I don't feel it is fair to all concerned.*

Response: See General Response No. 1.

Letter 233 Commentor A.J. Broderick

Comment 1 *I am writing in support of the Phelps Dodge Dos Pobres / San Jaun Project. I have reviewed the Draft EIS and concur with the Bureau of Land Management's preferred alternative of a land exchange (page 2-44).*

Response: See General Response No. 1.

Comment 2 *I concur with BLM's position that the issue concerning the disputed southern boundary with the San Carlos Apache Reservation 'has been reviewed and addressed adequately by BLM and other federal entities; the Tribe accepted fair compensation for all disputed aboriginal lands' (see 1.6.2.2.1). I agree that the BLM decision not to carry this issue forward as part of the project review is appropriate.*

Response: See General Response No. 1.

Letter 234 Commentor Steve McClain of ACM Equipment Rental

Comment 1 *I would like to go on record as supporting the Dos Pobres/San Juan Mining project proposed by the Phelps Dodge Corporation. ...I also support the related land exchange.*

Response: See General Response No. 1.

Letter 235 Commentor James R. Juday of Southwest Energy Inc.

Comment 1 *I am writing in support of the proposed Phelps Dodge Dos Pobres/San Juan Progect, located north of Safford Arizona.*

Response: See General Response No. 1.

Letter 236 Commentor John H. Ryley of San Carlos Apache Tribe

Comment 1 *The Apache Tribe objects to both of the proposed Morenci and Safford Land Exchanges. The cumulative impacts from the Morenci and Safford copper mines, should have been evaluated together at the same time as part of a programmatic environmental approach by BLM, as required under both the National Environmental Policy Act and the Endangered Species Act.*

Response: The DEIS addressed cumulative impacts of the proposed action and alternatives and considered in its analysis the cumulative effects of the land exchange and mine activities known to us at the time the DEIS was prepared. In addition, a detailed summary of the changes in public land ownership were summarized from available GAO reports, providing appropriate context for analysis of project effects and the making of an informed decision by BLM.

Analysis of the relationship of the proposed land exchange alternative and the MPO to the other projects mentioned by the commentors clearly indicate that it they are an independent action, unconnected to the other mining-related land exchanges or MPOs currently or recently analyzed by the Forest Service and/or the BLM and that these projects are all appropriately analyzed as independent actions under NEPA. The rationale for this decision has been presented by the BLM in previous documents, but will be reiterated here. The rationale for this position, presented below, follows guidance for determining the scope of an Environmental Impact Statement found in 40 CFR 1508.25. Please also refer to General Response No. 3 in this chapter which pertains to the scope of analysis of the EIS for additional information and discussion.

1. Completion of the Morenci and Safford Land Exchanges and the Dos Pobres/San Juan MPO or any of the other mine-related projects evaluated by BLM will not trigger other actions that may require an EIS. Selection of the land exchange alternative by BLM does not trigger or authorize additional actions, including implementation of the Dos Pobres/San Juan MPO, or development of any of the other ore bodies in the Safford District. Similarly, selection of the MPO alternative does not trigger or authorize subsequent development of the Lone Star, Dos Pobres Sulfide, or the Sanchez projects within the Safford Mining District.

2. The Morenci Land Exchange and Asarco Ray Unit Land Exchange were not necessary to authorize or approve either the Safford Land Exchange or the Dos Pobres/San Juan MPO. These projects are economically, technically, and geographically independent from one another.

3. The land exchange and mining actions identified by the commentor are not interdependent parts of a larger action that depend on the larger action for their justification. These actions are clearly independent of each other and may proceed and operate independently.

4. Although the activities identified by the commentor are independent and are being evaluated in separate NEPA documents, the cumulative impacts of all these actions are being considered in Section 4.5, the cumulative impacts analysis of the Dos Pobres/San Juan Project EIS.

5. The projects identified by the commentor have separate geographies and are on different time schedules. The Morenci Land Exchange, including resolution of appeal to the IBLA, has been completed and the ASARCO Ray Complex Land Exchange FEIS and ROD were published in 1999 and 2000, respectively. A similar demonstration of separate geography and timing could just as easily be made for the remaining projects identified by the proponent, providing further documentation of their independence.

Therefore, the BLM considers the mining-related land exchange activities recently or currently being reviewed by the agency to be separate and independent actions that appropriately should be addressed separately.

Comment 2 *The DEIS for the Dos Pobres/San Juan Project contains a section called "Water Rights Authority" at pages 1-10 through 1-12, Section 1.6.2, Vol. 1. The "Water Rights Section" generally discusses water rights under a federal decree, known as "Globe Equity No. 59" (herein the "Decree"; and how the proposed Safford Land Exchange and Phelps Dodge mining projects will impact those water rights. Because these mining projects will impact and violate the water rights of other parties, including the Apache Tribe, Phelps Dodge has proposed a mitigation plan. See Appendix F to Volume Two of the DEIS, "Draft Mitigation and Monitoring Plan." The Apache Tribe opposes the mitigation plan.*

Response: Both Water Rights Authority, Section 1.5.3, and Appendix F, Mitigation and Monitoring Plan, have been revised, The Apache Tribe's opposition to the mitigation plan has been noted; please see General Response No. 1.

Comment 3 *The Apache Tribe does not agree with the mitigation plan of Phelps Dodge, because this "fallowing" theory violates the law of the Decree, and the common law of appropriation. Nor does the Apache Tribe agree with Phelps Dodge's predicted, but substantially and materially understated, amount of depletion of water from the Gila River that will result from its proposed mining operations, based upon the groundwater model that it has been preparing. The mitigation plan also is too general so that it is unknown how such plan would actually operate and what its effect would be. The Apache Tribe therefore objects to Phelps Dodge's mitigation plan.*

Response: Please see Section 1.5.3, Water Rights Authority, for a discussion of how the BLM is addressing the potential legal issues surrounding the proposed pumping and mitigation plan.

Comment 4 *The Apache Tribe submits that BLM cannot approve the land exchange until, and if, Phelps Dodge obtains approval from the District Court for its mitigation plan to fallow its farmlands. While BLM can require*

mitigation generally, it should not approve mitigation which violates the water and property rights of parties under the Decree, particularly Indian Tribes.

Response: Please see revised Section 1.5.3 to clarify some of the issues surrounding the Globe Equity No. 59 Decree and the proposed mining and mitigation activities.

Comment 5 *The Proposed Land Exchange and Phelps Dodge Mining Projects will Violate the Federal Reserved Water Rights of the Apache Tribe.*

Response: See Section 1.5.3 for a discussion of water rights authorities under which this Project would be authorized; see also Section 4.3.6 for an analysis of impacts to Indian Trust Resources, including Indian water rights.

Comment 6 *The Phelps Dodge Groundwater Model Projecting Adverse Impacts Upon the Apache Tribe's Water Rights Under the Globe Equity No. 59 Decree, and the Apache Tribe's Federal Reserved Water Rights, is Not Reliable and Substantially Underestimates Such Impacts.*

Response: See General Response No. 16, Groundwater Model Review.

Comment 7 *BLM Has Failed to Comply With The Endangered Species Act.*

Response: See General Response No. 6, Endangered Species Act Compliance.

Comment 8 *The Proposed Land Exchange is Not in the Public Interest.*

Response: See General Response No. 1.

Comment 9 *BLM Failed to Analyze and Consider Cumulative Adverse Environmental Impacts.*

Response: See Section 4.5.3, Cumulative Impacts.

Comment 10 *BLM Failed to Address Environmental Justice Concerns.*

Response: See Section 5.2, Environmental Justice.

Comment 11 *BLM Failed to Follow a Programmatic Approach Required By NEPA.*

Response: NEPA does not require programmatic EISs; rather, CEQ regulations at 40 CFR 1502.4 (b)(c) provide for such analyses "for broad federal actions such as the adoption of new agency programs or regulations." The decision whether to prepare a programmatic EIS, in the absence of a regional plan or program, has largely been left to the agency of record by court decisions (notably Kleppe v. Sierra Club). The BLM determined that the Dos Pobres/San Juan Project does not fall within a group of actions that meets CEQ guidelines for a programmatic approach to NEPA compliance.

Comment 12 *Part of the Selected Lands are Part of the San Carlos Apache Tribe Indian Reservation and Therefore Cannot be Exchanged with Phelps Dodge.*

Response: This issue is addressed in Section 1.6.2.2.1 of the EIS. See also response 250-18.

Comment 13 *The DEIS Improperly Avoids Any Environmental Analysis by Deferring Such Analysis to Environmental Permits to be Issued to Phelps Dodge Sometime in the Future.*

Response: See General Response No. 3, Scope of Analysis.

Comment 14 *BLM Has Failed to Conduct Any Environmental Analysis Regarding Degradation of the Water Quality of the Gila River From Groundwater Pollution.*

Response: See Section 4.3.2.5.2, which states that no impacts to groundwater quality are expected at or beyond the points of compliance. We have revised Section 4.3.2.6.2, Surface Water Quality, to clarify that, since the Gila River is beyond the points of compliance identified in PD's APP permit, no impacts to its water quality are anticipated as a result of the Project.

Comment 15 *BLM Inadequately Analyzes the No Land Exchange Alternative.*

Response: See Section 4.4, in which the No Land Exchange alternative is analyzed throughout.

Comment 16 *BLM Inadequately Analyzes the No Mining Alternative.*

Response: BLM fully analyzed the No Action Alternative. As explained in Section 2.1.4, as a practical matter, No Action in this case does not necessarily mean 'no mining whatsoever' as BLM typically works with an applicant to develop an approved mine plan. Therefore, a No Mining alternative was not considered a reasonable alternative.

Comment 17 *BLM Has Failed to Comply With 40 C.F.R. 1502.16 (analyze the environmental consequences of the proposed land exchange).*

Response: See Section 4.4, in which the Land Exchange alternative is analyzed throughout.

Comment 18 *Based on all of the above objections and reasons, the DEIS is inadequate, and BLM should not approve the Safford Land Exchange.*

Response: See General Response No. 1.

Letter 237 Commentor Wayne C. Nordwall of Bureau of Indian Affairs, Phoenix Area Office

Comment 1 *It is the BIA's understanding that use of the groundwater source associated with the proposed federal action will result in the interception of mountain-front recharge to, and in the mining of, that groundwater source. As such, regardless of the timing of the underground flow of this groundwater source to the mainstream Gila River, it appears that Phelps Dodge's proposed use of this groundwater source will permanently remove it from the Gila River surface supply for use by decreed water rights holders under the Decree. As you know, the San Carlos Apache Tribe (Tribe) and the Gila River Indian Community are water users under this Decree. The information provided to the BIA indicates that approximately 8,000 acre-feet a year for sixteen years (life of the mine) will be pumped from this groundwater source and will never reach the Gila River. This number appears to be underestimated. In addition, it appears that the DEIS over-estimates recharge and underestimates the permeability of the Valley Fault.*

Response: The volume of water necessary to operate the mine was calculated by PD based on the water needs of similar mine operations. The volume of 8,000 acre-feet per year (af/yr) in water use for the life of the mine as cited in this comment is incorrect and probably derives from the Dames & Moore estimates that the aquifer is capable of a sustained yield of 8,065 af/yr as stated in paragraph 1 of Section 2.1.2.2.1 in the DEIS. In paragraph 2 of the DEIS, the average expected water use was stated to be 6,891 af/yr. Changes to the MPO submitted by PD since publication of the DEIS have reduced the anticipated groundwater use by nearly 20%, to an average volume of 5,532 af/yr (see Table 2-4 in FEIS). BLM has no reason to consider this volume an underestimation.

Regarding estimates of recharge and permeability, the model structure and input values are compatible with the suggested concept that water "will never reach the river." Estimates of recharge and the permeability of the Valley Fault cannot be resolved with existing data. However, more accurate estimates will be possible only after sufficient stress from mine pumping has perturbed the hydrologic system, and sufficient data have been collected on which to base the new estimates, as is proposed in the 3M Program.

Comment 2 *It is the BIA's position that groundwater beneath this Reservation is the property of the Tribe, held in trust by the United States. As such, the BIA does not believe it is acceptable to approve a federal action which will de-water the groundwater storage on this Reservation and deprive the Tribe of this federal Indian trust asset.*

Response: See General Response No. 10, Indian Trust Resources. See also revised Section 1.5.3, Section 3.2.6, and Section 4.3.6.1 in the FEIS.

Comment 3 *The BIA is concerned about the adverse impacts to mountain-front springs and seeps on the San Carlos Apache Reservation which might result from the groundwater pumping associated with the proposed federal action. Apparently, technical conclusions were reached by the BLM that these mountain-front springs and seeps will not be affected. The BIA's technical experts are continuing to evaluate the BLM's conclusion on this matter. At a minimum, it may be advisable to monitor at least one mountain-front spring off-reservation as a means of obtaining advance warning of potential impacts to on-reservation mountain-front springs.*

Response: Group 5 wells located north of the Butte Fault below the Reservation boundary will provide 'early warning' of groundwater effects before they affect the Reservation. As for springs, the 3M Program includes isotope, water chemistry, and flow sampling of several springs to determine connectivity to the regional groundwater system and potential impacts from groundwater pumping.

Comment 4 *The BIA is concerned about the extent to which surface water will be captured and used under the proposed action. The BIA has been advised that Phelps Dodge plans to increase the capacity of its retention facilities. If so, this modification of the DEIS needs to be evaluated thoroughly and the BIA will be discussing this matter with the BLM and its contractors.*

Response: The larger stormwater impoundment referred to in this comment was analyzed as part of the Proposed Action alternative in the DEIS. Increasing the storage capacity of the stormwater impoundment enhances only the "zero discharge" capability of the Project's stormwater management system during design storm events; it does not increase the annual average volume of stormwater captured, which is dependent upon average annual precipitation.

Comment 5 *...it is the BIA's position that the Decree enjoins the United States (including BLM) from diverting, taking or interfering with the use and enjoyment of other decreed water rights holders. The United States may presently be enjoined from taking an action which would enable another entity to so divert, take, or interfere. It is the BIA's position that approval by the BLM of the land exchange or the mining plan of operation described in the DEIS, without prior approval of the Federal Court, may result in a violation of the Decree's injunction.*

Response: Refer to Section 1.5.3, which provides guidance from the BLM Field Solicitor and the Gila Water Commissioner regarding BLM's action with respect to the Globe Equity No. 59 Decree.

Comment 6 *As proposed in the DEIS, this land fallowing program fails to accomplish the stated purpose. The Gila River is over-appropriated and to the extent that Phelps Dodge foregoes use of decreed water on lands it owns in the Upper Gila Valley by fallowing such lands, any "savings" in water would be distributed to other decreed water rights holders either in the Upper Gila Valley or downstream. In addition, the Decree does not permit a decreed water rights holder form changing the point of diversion or the purpose of the use of the decreed water right unless such change will not injure the rights of other decreed water rights holders. The BIA does not believe Phelps Dodge can meet this burden, but in order to do so, Phelps Dodges must petition the Federal Court which retains jurisdiction over the Decree.*

Response: See revised Section 1.5.3 of the EIS, in which the Field Solicitor has provided guidance to BLM as to what

actions would be appropriate as they relate to water rights and conformance with the Globe Equity No. 59 Decree.

Regarding the effectiveness of the Alternate Year Fallowing Program in mitigating for reduced river flow, the fallowing program will not only mitigate more than three times the projected maximum impact (480 af/yr annually in perpetuity for a maximum annual impact of 149 af in Year 450), but the proposed mitigation will commence immediately upon groundwater pumping, ahead of any actual impact to the river, and extend indefinitely beyond the point in time when the effects of groundwater pumping are expected to return to nearly pre-mining conditions. That "the Gila River is over-appropriated" (i.e., that other decreed users may use Gila River water) does not negate the mitigation that will be achieved by PD through the Alternate Year Fallowing Program; as a result of their fallowing, there will be a net reduction in consumptive use of Gila River water.

Comment 7 *The BIA does not believe that the DEIS accurately reflects the seriousness of Decree implications associated with the proposed federal action. The BIA's position is that the Decree's injunction provisions prohibit the BLM from taking any action to exchange lands or to approve a mining plan of operation unless and until Phelps Dodge receives from the Federal Court under the Decree a favorable ruling regarding the legal authority for Phelps Dodge to use the groundwater source and intercept the sheet flows which result in diminution of the flow of water to the Gila River. The Decree implications arising out of the DEIS and the proposed federal action are serious and complex. The BIA's comments highlight the issues, but a more detailed discussion of the Decree implications must be undertaken by the BIA, the BLM, the Solicitor's Office and the Department of Justice. The BIA looks forward to coordinating such a discussion early next year.*

Response: See Section 1.5.3, which has been revised with input from the BLM Field Solicitor, regarding the BLM's position on its action with respect to conformance with the Globe Equity No. 59 Decree.

Comment 8 *For purposes of these cumulative impacts, further discussion is necessary regarding future impacts of water usage associated with the Dos Pobres, San Juan, Dos Pobres Sulfide, Lone Star, and Sanchez projects, the Morenci Mine and proposed land exchange, community growth, and agricultural operations.*

Response: The analysis of cumulative impacts completed in Chapter 4 considers the potential effects of the reasonably foreseeable future actions in the region, including the Dos Pobres Sulfide, Lone Star, Sanchez, Morenci Mine, continued agriculture, etc. Analysis of cumulative impacts requires that the best available data be used; it does not allow BLM to speculate about the possible water usage of these potential future projects. To the degree that current conditions reflect the cumulative impacts of past projects, the cumulative impact analysis uses a trend analysis to project the cumulative future impacts of the Project in light of potential impacts from these reasonably foreseeable future projects. See also response 237-32.

Comment 9 *Contrary to the conclusion reached in the DEIS (Chapter 5.2, Environmental Justice), the BIA believes the establishment of mine development, by virtue of the location of the development and surrounding communities, will create a "high and adverse effect" to the surrounding communities. These effects include, but are not limited to: (1) increased probabilities of hazardous material spills and traffic accidents due to an average increase of 100 commercial trucks per day, which includes sulfuric acid tank trucks and other trucks carrying processing materials, not to include employee vehicles and, (2) depletion of available water resources for these communities. Mitigation measures should be identified and implemented to minimize impacts to hazardous materials spills and vehicle accidents to include additional police, fire, and hazardous materials response capabilities and improvement of highway conditions in these communities. Regarding depletion of water resources, this issue, if addressed as discussed previously, would satisfy this environmental justice mitigation requirement.*

Response: BLM has reviewed the impact analysis regarding the potential for spills, traffic accidents, and water usage and stands by its original determination of effects. While the Project would bring additional truck and employee traffic on Highway 70 through the Reservation, this increase is not limited to the Reservation and would also occur on the other roads and highways, such as US 191. This effect is not disproportionately high and adverse on the Reservation; none of the carrying capacities of the roadways are expected to be exceeded; acid spill potential is increased but still minimal; and mitigating factors such as tanker safety design, alkaline soils, avoidance of 8th Avenue Bridge, etc. all serve to minimize the potential for adverse impacts from spills. Regarding impacts to water resources used by the surrounding communities, no community on or off the Reservation currently uses the deep volcanic aquifer that PD proposes to pump as its water source and there are no anticipated unmitigated groundwater or surface water impacts. The mitigation alternatives for potential impacts on groundwater under the San Carlos Apache Reservation is discussed in the FEIS in Section 4.3.6.1. See also General Response No. 10, Indian Trust Resources.

Comment 10 *Cumulative impacts and the consequences to small disadvantaged communities in the area of the DEIS (reference Figure 3-15) must involve additional discussion. We believe this further analysis of cumulative impacts will require the establishment of mitigation measures in the areas of water usage and hazardous materials spills and vehicle accidents.*

Response: See response 237-9 and General Response No. 14, Hazardous Materials.

Comment 11 *Regarding the Land Exchange Alternatives Set, which involves the acquisition of approximately 17,000 acres, not including the existing acreage owned by Phelps Dodge (20,000 acres), in the Gila River Watershed, we believe this alternative is the least desirable since it maintains a greater potential for significant impacts to issues such as water resources, hazardous materials spills and vehicle accidents, and government-to-government relationships.*

Response: The proposed land exchange will not cause or in any way authorize the proposed or foreseeable mining uses of the selected lands (i.e., the proposed Dos Pobres/San Juan Project, or the future potential DP

Sulfide or Lone Star projects). Therefore, the potential impacts associated with the foreseeable mining uses of selected lands are not attributable to the land exchange. If the selected lands become private, government-to-government relationships and environmental analysis under NEPA will still be applicable to actions on those lands requiring federal funds or a federal permit/authorization, such as Clean Water Act or Clean Air Act permits necessary for mining activities. The only difference would be that BLM in particular would not be involved as the lead federal agency in government-to-government consultations or environmental analyses.

Comment 12 *Further analysis of impacts must be conducted regarding the following issues: (1) increased land to be used for the Dos Pobres Sulfide and Lone Star production operations, tailings piles, and support areas.*

Response: See General Response No. 3, Scope of Analysis.

Comment 13 *Further analysis of impacts must be conducted regarding the following issues: (2) increased water usage.*

Response: The analysis of impacts associated with proposed water usage (groundwater pumping) is addressed in Section 4.3.2.5.1. Regarding a cumulative analysis of potential future water usage, see Section 4.5.3.1.2, Groundwater Resources discussion. See also General Response No. 3, Scope of Analysis, as to BLM's approach to analyzing foreseeable uses, including potential future increases in water usage.

Comment 14 *Further analysis of impacts must be conducted regarding the following issues: (3) reduced involvement by the federal government and the Tribe, especially in the area of additional environmental analysis of all impacts associated with the Dos Pobres Sulfide and Lone Star development plans.*

Response: See General Response No. 5, Loss of Federal Oversight; see also response 237-11.

Comment 15 *Further analysis of impacts must be conducted regarding the following issues: (4) the acquisition costs of the Lone Star and San Juan properties and the appraised value of the property wherein the Melody Claims Group holds mineral rights is not explained.*

Response: The entire Lone Star deposit and a portion of the San Juan deposit already belong to PD and are not included in the selected lands; therefore, their costs were not included in the appraised value of the selected lands. Please note also that the public lands whose mineral rights are controlled by the Melody Claims Group have been excluded from the selected lands and would not be acquired by PD if the proposed exchange is approved.

Comment 16 *Further analysis of impacts must be conducted regarding the following issues: (5) the liability associated with the acquisition of property (Tavasci Marsh) located adjacent to a 120-acre area of mine tailings (reference Departmental Manual 602 DM 2.4B).*

Response: See response 203-1.

Comment 17 *Further analysis of impacts must be conducted regarding the following issues: (6) the exchange will provide a negative impact to San Carlos Apache Tribal and the BIA trust resources but does not provide lands to the BIA to hold in trust for the San Carlos Apache Tribe.*

Response: See General Response No. 10, Indian Trust Resources.

Comment 18 *The land exchange would affect all 41 sites identified by tribes and remove them from direct federal oversight responsibilities required by the National Historic Preservation Act (NHPA). It would also remove the consideration extended by the American Indian Religious Freedom Act (AIRFA) for two sites identified by tribes as sacred (4.4.4.2.1, pg. 4-73). Fourteen of the sites would be impacted by future mining. The BIA recommends that a legally enforceable covenant for tribal access to these sites be included in any land transfer and an access protocol or memorandum of agreement be executed among the federal government, Phelps Dodge, and the affected tribes.*

Response: The approved data recovery plan proposes protecting three sacred sites in perpetuity by providing a conservation easement for these sites, with interested tribes given access with reasonable notice and in compliance with Mine Safety and Health Administration safety regulations. PD has sent a letter to the Gila River Indian Community expressing concern for these sites and providing for protection of and access to these and other sites on the project area by Native American tribes.

Comment 19 *Both the Draft EIS and supporting ground-water model may underestimate the impact of the proposed project to flows of the Gila River. The DEIS fails to address the adverse impact to ground-water depletion and springs on the San Carlos Apache Reservation. Surface flows in local washes which are diverted and captured during the development of the mine may also be underestimated and are not adequately addressed in the DEIS. Long term water supply issues are also not addressed, resulting in a need for the DEIS to discuss alternative sources of water. Mitigation measures proposed in the DEIS and the Draft Mitigation and Monitoring Plan are inadequate and do not properly address the adverse impacts that may occur downstream of the proposed project.*

Response: For a discussion of the assumptions underlying the model used for predicting potential impacts of project groundwater pumping, see General Response No. 16, Groundwater Model Review. A discussion of potential impacts of pumping on groundwater under the San Carlos Apache Reservation and the proposed approaches for mitigating such impact are included in the FEIS. See also General Response No. 10, Indian Trust Resources. Hydrologic studies conducted to estimate surface flows in and around the project area are documented in both the DEIS and FEIS. The quantified results of those studies have been documented herein. Alternative sources of water are discussed in Section 2.1.5.2.2 of both the DEIS and the FEIS; see also response 237-22. A detailed plan for mitigating projected effects on surface flow in the Gila River (Alternate Year Fallowing Program) is provided in Appendix F of the FEIS; see also response 237-6 regarding the effectiveness of the Alternate Year Fallowing Program.

Comment 20 *A response (from BLM) to these comments (submitted by the BIA on November 25, 1998) is necessary in*

order to determine the accuracy, use, and limitations of the ground-water model. Based on the currently available data from the model, it is not possible to determine the accuracy of the predicted impacts due to ground-water pumping at the proposed project.

Response: See General Response No. 16, Groundwater Model Review.

Comment 21 *Revisions to the effect of ground-water pumping to surface flow of the Gila River and effects from diversion and retention of local water in the project area should be made to the DEIS document. Permanent loss of ground-water due to evaporation from pit lakes and reduction in subsurface outflow are not addressed in the DEIS. Furthermore, the proposed monitoring and mitigation plan lacks detailed mitigation measures and in some cases does not address all losses to the system due to the proposed project.*

Response: See General Response No. 16, Groundwater Model Review. See also response 237-38 regarding pit lake evaporation. The MMP includes specific processes, threshholds, and criteria for implementing surface flow mitigation measures; the next recalibration of the groundwater model as required by the 3M Program will also include pit lake evaporation.

Comment 22 *The Draft EIS assumes that the proposed production wells will be able to meet the water supply demands during the sixteen year life of the project. Based on the amount of drawdown expected and the uncertainty in hydrogeologic parameters that define aquifer properties in the ground-water model, water supply may be an issue in the future. The Draft EIS should discuss alternative sources of water if the local aquifer at the mine proves to be inadequate to meet future water supply demands.*

Response: Based on extensive aquifer testing and water resource evaluations completed by PD, BLM believes that sufficient water supplies are available to meet the needs of the Project. A supplemental water source (City of Safford effluent) was discussed in Section 2.1.5.2.2 and remains a possible supplemental source for future consideration pending feasibility analysis. Please note that changes to the MPO made since publication of the DEIS have resulted in about a 20% reduction in projected water usage for the Project.

Comment 23 *The size of the proposed stormwater impoundment facility has been increased from 322 acre-feet to approximately 400 acre-feet (personal communication with Phelps-Dodge, BLM, and Dames & Moore, November 12, 1998). The DEIS should include an updated section regarding stormwater impoundment and the reason why it was increased. The construction of this facility should include a gaging station to measure the impoundment of stormwater for mitigation. Two gages are necessary to record water levels in the impoundment facility and discharge to the SX/EW tankfarm. A mass balance of the impoundment facility using the information from these gages will provide the quantity of water that was diverted during storm events.*

Response: The larger impoundment was included as part of the Proposed Action alternative analyzed in the DEIS. The final design capacity of the impoundment was increased as a result of PD using more conservative assumptions in the hydrologic modeling of stormwater and process solution runoff from the leach pad. The current design capacity of the impoundment also reflects the final engineering design of the leach pad and the addition of the excess process solution impoundment.

The stormwater impoundment may periodically contain process solution overflow from the excess process solution impoundment resulting from power outages and other plant upsets. The stormwater impoundment may also periodically contain overflows of combined stormwater and precipitation resulting from extreme rainfall events. Even if there were a reason to quantify the amount of precipitation that falls within the contained leaching and SX/EW process facilities, that amount could not be determined by the use of gauges at the stormwater impoundment. Mitigation for impacts to surface flows from diversions, impoundments, or other project activities and facilities has been included in the calculation of acreage to be fallowed in the Alternate Year Fallowing Program.

Comment 24 *The retention dams listed in Table 2-7 may potentially impound 467.1 acre-feet of water that would normally flow to the Gila River or recharge the ground-water under no project conditions. This section of the report should describe that water impounded behind these dams are either lost to evaporation, recharged to the ground-water system, or used for mining operations.*

Response: The 467.1 af cited in this comment is the total structural capacity of all the planned retention dams. As noted on Table 4-9 of the DEIS, the 94 af/yr that represents the average annual volume of stormwater runoff estimated to be captured as a result of the Project's stormwater management system is considerably less than 467.1 af. This figure is based on an average annual stormwater runoff estimate multiplied by the acreage of the tributary areas between the up-gradient stormwater diversion ditches and the impoundment structures located down-gradient of the various project facilities. Since the stormwater retention dams were sized for extreme storm events (the 100-year/10-day storm event), the total impoundment capacity of the individual dams is not representative of average annual stormwater runoff capture. With the retention dams, impounded water will either seep into the groundwater system or evaporate. PD has no current plans to use water impounded by the retention dams in mining operations. This explanation is also provided in the FEIS in Section 2.1.2.3.2.

Comment 25 *The BLM's August 18, 1998 response to our original comment regarding a possible overestimate of recharge from Bonita and San Simon Basin indicates that their estimates of inflow are higher than Freethey and Anderson (USGS, 1986). It also appears that their estimate of inflow is higher than that suggested by Turner (1941). Based on the BLM's response and comparison to previously published data, estimated inflow to the study area is greater than that suggested by other studies. Overestimating inflow may potentially reduce the impact of ground-water pumping at the project site on surface flow of the Gila River.*

Response: See General Response No. 16, Groundwater Model Review.

Comment 26 *Ground-water pumping in Safford Valley appears to be underestimated. The BLM's August 18, 1998 response to our original comment indicates that ground-water pumping was calculated based on the difference between surface flow diversion and consumptive use by crops. The DEIS's methodology allows for return flow from pumping, but not from surface diversions.*

Records of surface diversions provided by the Gila River Water Commissioner indicate that the average annual surface diversion was 97,500 acre-feet for the period 1946 through 1995. Annual ground-water pumping for the same period averaged 110,000 acre-feet (USGS Open File Report 94-476, and unpublished USGS data). Historical data indicates that ground-water pumping was greater than surface diversions for this 50 year period. This data should be reflected in the DEIS.

Groundwater discharge from phreatophytes occurs throughout the model domain, but is not described in this section of the report. Turner and others (1946) reported 70,000 acre-feet of evapotranspiration due to naturally occurring phreatophytes in Safford Valley. Personal communication with Phelps Dodge, Dames & Moore, and BLM (November 12, 1998) suggested that phreatophytes within the model domain in the Safford Valley have largely been eradicated since the 1946 report by Turner. Evidence of existing phreatophytes in the Safford Valley would suggest otherwise. This section of the DEIS, which discusses the affected environment, should address evapotranspiration by phreatophytes.

Response: See General Response No. 16, Groundwater Model Review.

Comment 27 *Estimates of average annual runoff presented in Table 3-15 do not agree with estimates of average annual runoff presented in Tables 4-4 and existing runoff presented in Table 4-9. These values should be consistent throughout the DEIS document.*

Response: The variation in existing runoff presented in Tables 3-15 and 4-9 in the DEIS was caused by re-evaluation of watershed boundaries or slight variations when the watershed areas were measured each time. The estimates in Table 4-9 are the more recent, and Table 3-15 has been corrected in the FEIS to conform to those estimates. Please note there was a typographical error in Table 4-9 in the DEIS; Talley Wash should have read 119 af/yr rather than 19 af/yr. This also has been corrected in the FEIS. Table 4-4 has significantly different values for existing runoff because areas capturing sheet flow (precipitation falling directly on mine facilities) were omitted.

Comment 28 *Although legal issues are outside the scope of these comments, the total impact to downstream water rights holders is estimated at 94 acre-feet per year, of which 54 acre-feet has been estimated to be sheet flow.*

Response: Comment noted. See Tables 4-4 and 4-9 and see Section 4.3.1.6.1, footnote no. 1 in the EIS.

Comment 29 *Changes to recharge and fault conductances are requested in order to substantiate the accuracy of predicting a streamflow reduction of 35.4 acre-feet/year. The following are specific comments to the Draft EIS regarding the ground-water model developed by Dames & Moore:*

1. The HFB package should be used to simulate faults in order to prevent inadvertent representation of excess storage in the model.

2. The use of the river package for Bonita Creek inadvertently established a constant head boundary which prevents representation of dry stream segments potentially caused by the project operation during dry hydrologic cycles.

Response: See General Response No. 16, Groundwater Model Review.

Comment 30 *The USGS estimates the average annual ground-water diversion in Safford Valley to be 110,000 acre-feet for the period 1946 to 1995. Based on reported values from the Water Commissioner, the average annual surface diversion for the same period was 97,500 acre-feet. Given a total consumptive water use of 153,000 acre-feet per year, the return flow value from both surface and groundwater use is estimated to be 26%. Considering the irrigation practice of flooding fields from diversion of storm flows, the return flow value for groundwater use may be somewhat less than the return flow value of surface water use.*

Response: See General Response No. 16, Groundwater Model Review.

Comment 31 *The DEIS should quantify the acceptable limits, as defined by the BLM, of observed versus simulated drawdown for the transient model. A correlation coefficient, similar to the methodology applied to quantify the accuracy of the steady-state model, should be provided for the steady-state model. Figure 4-11 provides little insight regarding the accuracy of the transient simulation.*

Response: See General Response No. 16, Groundwater Model Review.

Comment 32 *The model represents a maximum ground-water pumping of 5,000 gallons per minute, including water for mining, crushing and handling, SX/EW operations, potable and miscellaneous, dust suppression, and evaporation. The ground water model fails to account for cumulative effects from other possible wells in the area. Impacts from ground-water pumping for mining operations at the Dos Pobres Sulfide, Lone Star, and Sanchez deposits, or other existing or future mine sites, should be simulated in the model. ...Ground-water stresses to the aquifer from additional pumping at the Dos Pobres Sulfide, Lone Star, and Sanchez projects may have a detrimental impact to ground-water pumping at the Dos Pobres/San Juan project. Additional pumping at these other sites may impact the ability to meet water supply needs from the existing wells at the Dos Pobres/San Juan project. Whether or not water supply can be met from the existing wells on the Project site, the DEIS should discuss alternative water supplies.*

Response: The groundwater model was not used as a predictive tool for cumulative impacts for the reasons stated

below:

a) The Lone Star and Dos Pobres Sulfide projects have been identified as reasonably foreseeable future uses of the selected lands and the potential impacts of these uses have been analyzed in the EIS, both as part of the Land Exchange alternative and as reasonably foreseeable future actions in the Cumulative Effects section, using the best available data (see CEQ 40 Questions, No. 1.8).

B) BLM has disclosed that any possible future development of the Lone Star and Dos Pobres Sulfide projects on the selected lands would likely result in additional water usage for mining, but at this time, it would be pure speculation as to what this usage, or the source(s), may be. Therefore, BLM believes it is inappropriate to model future impacts (direct or cumulative) on such speculation, especially given that these reasonably foreseeable future actions (which would be of a scale that could potentially affect flows in the Gila River) would be subject to federal permit requirements (Section 404 of CWA) and environmental review under NEPA.

Regarding alternative water supplies, see response 237-22.

Comment 33 *The model predicts impact to the Gila River will be at a maximum of 35.4 acre-feet/year at year 416. Based on sensitivity analyses of recharge and fault conductance, the maximum impact to the river could be quantified as a range of values. A range of values would allow for flexibility of mitigation measures outlined in Appendix F.*

Response: See General Response No. 16, Groundwater Model Review. Please note that the 3M Program described in Appendix F is inherently flexible as mitigation measures will be indexed to model results from future recalibrations that may be triggered by actual well data collected as part of the required 3M Program.

Comment 34 *Figure 4-12 indicates that drawdown of the regional aquifer will extend beneath springs located north of Butte Fault. The DEIS states that these springs will not be impacted by the Project's drawdown of groundwater. The DEIS should contain more specific information why these springs will not be adversely affected by future pumping.*

Based on field reconnaissance with Phelps Dodge, Dames & Moore, Dr. McNish, BLM, BIA, and Stetson Engineers on December 15, 1998, it is inconclusive as to whether the springs in the area will be affected by ground-water pumping operations for the mine. Appendix F should contain a monitoring program for Bryce, Hackberry, Cottonwood, and Walnut springs so that any future impacts that may occur on the San Carlos Apache Reservation may be first observed in these areas.

Response: The four springs are in an elevation range of 4,200 to 4,300 feet, more than 1,100 feet higher than the water levels in the graben. In addition, the springs are on the northeast side of the Butte Fault, whose low permeability is indicated by the precipitous change in water levels that occurs at the fault. For the mine pumping to affect the springs, the hydrologic conditions required would be that (1) the springs have a direct hydrologic connection to the graben aquifer, and (2) the transmissive capabilities of the aquifer through which water escapes from the graben must be smaller than the transmissive capabilities of the hydraulic connection between the springs and the graben aquifer.

With the steep hydraulic gradients between the springs and the graben aquifer, and the gentle gradients in the area of outflow from the graben, it would appear that the second condition is highly unlikely. The existence of steep vertical gradients in the area northeast of the Butte Fault that is evident in wells drilled to different depths, and the expectation that horizontal hydraulic conductivities are greater than vertical hydraulic conductivities in these layered volcanic rocks, argues against there being a direct and highly transmissive connection between the springs and the graben.

Visits to the springs in March and December 1998 revealed dramatic differences in flow, as would be expected for springs that are fed from local sources that wax and wane with the size and frequency of storms. Separating mine pumping effects (which would be very subtle) from naturally occurring, strong fluctuations in flow would be impractical, if not impossible. However, the monitoring plan includes annual monitoring of Groups 4 and 5 wells, located between the pits and the San Carlos Apache Reservation boundary, to provide "advance warning" of potential drawdown on the Reservation as a result of groundwater pumping. The use of these wells for monitoring is a much more realistic method of assessing the effects of mine pumping to the northwest of the graben, as these wells are open to a substantial saturated section that includes much of the same elevation range as the graben aquifer. The monitoring program also includes annual isotope, water chemistry, and flow sampling of Hackberry, Bryce, Cottonwood, and Walnut springs to assist in determining whether or not the springs are tied to the regional groundwater system.

Comment 35 *The DEIS estimates that surface flow of the Gila River will be adversely impacted by 94 acre-feet/year, of which 50 acre-feet/year is incidental sheet flow. Although the DEIS is attempting to provide an annual average value, impacts to the Gila River may be greater during wet years and less during drier hydrologic cycles. The DEIS should provide the maximum and minimum impacts to surface flows so they may be accounted for in the Monitoring and Mitigation Plan (Appendix F). Maximum impact may occur during the 100 year - 24 hour event, the basis for sizing the diversion and impoundment facilities.*

Response: See General Response No. 16, Groundwater Model Review.

Comment 36 *Estimates of existing runoff presented in Table 4-9 do not agree with estimates of average annual runoff presented in Tables 3-15 and 4-4.*

Response: See response 237-27.

Comment 37 *The DEIS does not adequately address the possibility of an accidental spill of process solution or sulfuric acid. The potential exists for the surface release of process solution, accidental spill of sulfuric acid during transport, and release of other hazardous materials from the mine and processing site. The monitoring and mitigation plan does not address any of these potential adverse impacts to the environment. The DEIS states that any release would be neutralized by the alkaline soils existing in the tributary washes.*

The DEIS should provide the necessary data substantiating the ability of the soils to neutralize hazardous material during both storm events and non-storm events. The DEIS should also address the potential impacts due to the accidental spill of sulfuric acid during transport on or near the Gila River. If these data are included in either the 401 or 402 permits, proper references should be provided.

Response: Refer to General Response No. 14, Hazardous Materials, regarding the possibility of an accidental acid spill. Regarding accidental release of process solution or other hazardous materials from the mine site, see Section 2.1.2.3.5 regarding storage and containment of hazardous materials. The secondary containment systems for fuels, sulfuric acid, diluent, reagents and other petroleum products, in conjunction with the comprehensive stormwater management system designed to meet EPA's "zero-discharge" standards for Section 402 permitting (see Sections 2.1.2.3.2 through 2.1.2.3.8), will ensure that any such spills will be contained on-site. The statement that alkaline soils in the project vicinity have the capacity to neutralize potential spills refers only to sulfuric acid.

Comment 38 *The DEIS fails to account for evaporation from the pit lakes, or use of the water from the pits, as loss from the system. The DEIS estimates that long-term inflow of groundwater into the San Juan Pit will average about 50 gallons per minute (gpm) and 150 gpm into the Dos Pobres pit. Given that these values of inflow balance evaporation from the lake surface, it can be estimated that approximately 80 acre-feet/year will be lost from the San Juan pit and 240 acre-feet/year will be lost from the Dos Pobres pit.*

In order to account for, and mitigate evaporative losses from the pit lakes, surface area, precipitation, and evaporation rates should be calculated for each pit. Inflow of groundwater to these lakes represents a permanent loss of water that would have eventually added to, contributed, and supported streamflow of the Gila River.

Response: See General Response No. 16, Groundwater Model Review.

Comment 39 *The stress on the aquifer from additional mine sites should be simulated in the model in order to estimate the cumulative impact of additional mining operations on water resources. See comments to 4-19 paragraph 2 (Comment # Stetson 14).*

Response: See response 237-32.

Comment 40 *The DEIS should contain analysis of cumulative impacts from the ground-water pumping at the Dos Pobres Sulfide, Lone Star, and Sanchez deposits. See comment 4-19 paragraph 2 (Comment # Stetson 14).*

Response: See response 237-32.

Comment 41 *The loss of groundwater that would normally add to, contribute, and support the flow of the Gila River, as well as potential impacts to springs, should be included in the subcategory Groundwater Quantity in Table 4-41. In addition, evaporation loss of groundwater discharge to the pit lakes should also be addressed in this section.*

Response: As the loss of groundwater that would normally contribute to and support the flow of the Gila River is to be replaced by the Alternate Year Fallowing Program, it is not applicable to Table 4-41. Potential impacts to the springs are discussed above in response 237-3. The effect of pit lakes has been included in subsequent model reruns, as discussed in Appendix F. See also response 237-38.

Comment 42 *The reduced surface water flow may be greater than 94 acre-feet per year as defined by the subcategory Surface Water Quantity in Table 4-41.*

Response: Comment noted. BLM considers the methodology used to calculate this volume to be adequate (see Dames & Moore 1998e).

Comment 43 *The mitigation measures do not address the permanent evaporation loss of groundwater from the pit lakes.*

Response: The effects of evaporation of water that accumulates in the pits after mine closure on Gila River surface flows were considered in the 2002 Rewetting Model run and are included in the revised surface flow mitigation amounts to be achieved through the Alternate Year Fallowing Program.

Comment 44 *The Groundwater Quantity subcategory should discuss permanent evaporative loss of groundwater from the pit lakes.*

Response: See response 237-38 and 237-41.

Comment 45 *RE: Draft Mitigation and Monitoring Plan. The model estimates a drawdown of over 35 feet on the San Carlos Apache Reservation, but does not provide for monitoring of springs between the Reservation and the mine supply wells. Additional monitoring wells may be needed near these springs to establish cause and effect relationships.*

Response: In their review of the 3M Program, USGS recommended additional groundwater monitoring wells; subsequently, three new wells north of the Butte Fault and south of the San Carlos Apache Reservation Bounday (Group 5 wells) have been included in the 3M Program.

Comment 46 *RE: Draft Mitigation and Monitoring Plan. The DMMP does not mitigate for decreased subsurface outflow from the model area towards the Reservation.*

Response: See General Response No. 10, Indian Trust Resources.

Comment 47 *RE: Draft Mitigation and Monitoring Plan. The DMMP does not account for or allow monitoring or mitigation of evaporation losses from the pit lakes.*

Response: See response 237-38 and 237-41. The amount of mitigation calculated in the current Alternate Year Fallow Program includes 21 af/yr of pit lake evaporation, even though this impact will not occur until after mining stops. The next recalibration of the hydrological model under the 3M Program will also consider evaporation of pit lakes and, subsequently, the amount of required surface flow mitigation will account for this permanent loss to the system.

Comment 48 *RE: Draft Mitigation and Monitoring Plan. The DMMP does not specify post mine monitoring, mitigation, or reclamation measures.*

Response: Monitoring and post-mine mitigation for the Project's water resources impacts are described in the MMP (Appendix F); other post-mine monitoring and reclamation provisions are described in Section 2.1.2.4

Comment 49 *The Pre-Mining Monitoring Well Calibration should record data for a minimum of two years in order to establish base-line conditions.*

Response: Substantial water level and water quality baseline data have already been collected for many of the monitoring wells (in Groups 2-4) in the project area. A minimum of two additional years of water data will be collected prior to mine operation. Table 3.1 in the revised 3M Program includes USGS-recommended monitoring frequencies for the various wells that will provide actual data on the response of the groundwater system to pumping. Groundwater quality monitoring is addressed through the APP program.

Comment 50 *Develop an Annual Hydrologic Report.*

Response: The reporting component of the 3M Program includes an annual report of the well monitoring data to be collected, including actual pumpage and monitoring well water levels; see Appendix F.

Comment 51 *Springs in the vicinity of the proposed project should be monitored on a quarterly basis.*

Response: See Section 3.3.2 in Appendix F for a description of the monitoring program for Watson Wash flowing well and other springs.

Comment 52 *Ground-water level, spring flow data, and other hydrologic data should be reported to the State of Arizona for public record.*

Response: Results of the groundwater monitoring program, as outlined in the 3M Program, will be made part of the public record with annual reports filed as required by the Mitigation and Monitoring Plan as a condition of the CWA Section 404 permit, if issued. Additionally, groundwater monitoring data that PDSI will be required to report regularly to ADEQ under the Aquifer Protection Permit will also be available as public record.

Comment 53 *A schedule regarding the recalibration of the ground-water model should be established prior to project start-up.*

Response: See General Response No. 16, Groundwater Model Review.

Comment 54 *The DMMP lacks specific schedules and timing of mitigation flows from fallowed lands.*

Response: The 3M Program described in the MMP (see Appendix F) has been significantly revised since first proposed in the DEIS. Notable changes to the Alternate Year Fallowing Program include using five years of actual annual consumptive use data to determine benefits and a significant increase in the acreage of lands encumbered by the Alternate Year Fallowing Program.

Comment 55 *The DMMP does not specify post mine monitoring, mitigation, or reclamation measures.*

Response: Monitoring and post-mine mitigation for the Project's water resources impacts are described in the MMP (Appendix F); other post-mine monitoring and reclamation provisions are described in Section 2.1.2.4

Comment 56 *Comments # 10 and # 11 of our November 25, 1998 submittal to the BLM requests that additional model runs be performed to determine the accuracy of the model. These model runs are required to evaluate the accuracy and sensitivity of mountain front recharge and fault conductance presently used in the existing model. A third model run is requested to show zero impact to ground-water depletion on the San Carlos Apache Reservation. This additional run would require adjusting ground-water pumping at the proposed project site so there was no ground-water storage depletion on the Reservation.*

Response: See General Response No. 16, Groundwater Model Review.

Comment 57 *Table 5-1 indicates that the river depth and river conductance are identical for both Bonita Creek and the Gila River. Considering that the sensitivity analysis suggests that these parameters are sensitive to the model, the choice of these parameters should be explained.*

Response: See General Response No. 16, Groundwater Model Review.

Comment 58 *Data from the model suggests that underflow to the Safford Valley is approximately 32,800 acre-feet/year. Turner (1941) suggests that in 1939 and 1940 underflow from all tributary washes was about 9,200 acre-feet/year. The methodology used to estimate underflow for the model should be discussed in detail.*

Response: See General Response No. 16, Groundwater Model Review.

Comment 59 *The model assumes constant hydrologic conditions over the next 500 years. The model should address and discuss possible variations in hydrology, such as prolonged drought periods, and how that variability may affect adverse impacts to groundwater and surface water.*

Response: See General Response No. 16, Groundwater Model Review.

Letter 238 Commentor Michael Smith of Bureau of Indian Affairs, San Carlos Agency

Comment 1 *There is little data contained in the EIS which addresses the San Carlos Apache Indian Reservation, its human and natural resources; this should be addressed throughout the entire EIS, including affects to surface/subsurface water quality/quantity, soil, plants, air, animal and man; in other words, address what exists now and what would be affected.*

Response: The project area includes the private and federal lands proposed for exchange as well as the private and federal lands proposed for use in the Mine Plan of Operations. No part of the San Carlos Apache Reservation is included in the project area. Under the MPO alternatives, the EIS discloses the Project's potential impacts on surface and groundwater quality and quantity (Section 4.3.2.5 and 4.3.2.6), soils (Section 4.3.2.4), vegetation (Section 4.3.3.1), air quality (Section 4.3.2.2), wildlife and special interest species (Sections 4.3.3.2 and 4.3.3.3), and cultural and socioeconomic resources (Sections 4.3.4 and 4.3.5). The EIS also discloses the Project's impacts from the land exchange alternative on these resources (see Section 4.4 in its entirety). To the degree that these resource impacts for all alternatives extend on to the Reservation or may affect Indian Trust Assets (Sections 4.3.6 and 4.4.6) directly, indirectly, or cumulatively, such impacts have been disclosed in the EIS.

Comment 2 *We note that the proposed alternative lies approximately one to two miles south of the southeastern Reservation Boundary, and that there exists several washes at the proposed alternative site that drain into the Gila River (see attached plats 1 & 2 in letter) which flows through Bylas, which lies within the San Carlos Apache Indian Reservation.*

The EIS should include base-line data of what contaminants if any, exist now, what they mean and their probable source. We would also like to see health data obtained on families residing within the Bylas area of the Reservation.

Response: The issue of water quality in the Gila River was addressed in Section 4.5.2.4. Also, Table 4-40 in the Cumulative Impacts section provides a trend analysis of surface water quality at two locations along the Gila River, including at Calva about five miles downstream of Bylas, and at the San Francisco River near Clifton. Water quality constituents such as arsenic, chromium, copper, lead, and manganese are included in this table. As discussed in Section 4.5.2.4, the trend data reflect the cumulative effects on river water quality of historic activities in the entire Gila River watershed, including but not limited to, irrigation practices including return flows, ranching, historic and current mining activities, and urban runoff from land development and roadways.

Collection of existing health data on residents of the Bylas area, which is 30 to 50 miles away from the project area, is beyond the scope of analysis for this project.

Comment 3 *We recommend that an independent firm oversee monitoring the status of the existing and future environment, and that all data be provided to the Tribe and BIA. If contaminants increase, there should be a system in place to provide for immediate corrective action and reporting on a priority basis, by Phelps Dodge to the Tribe and BIA.*

Response: Compliance with myriad environmental laws applicable to the proposed mining operations (see Table 1-1), whether on public or on private lands, is the responsibility of the permitting agency. Any member of the public, including the Tribe or the BIA, can review the compliance status of agency authorizations and permits during normal business hours.

Letter 239 Commentor Joe Sparks of Sparks, Tehan & Ryley, P.C.

Comment 1 *What is the total amount of water, regardless of source, that operation of the San Juan and Dos Pobres Mines will require in a year?*
a) How was this amount be determined?
b) If this amount is an underestimate, what will prevent Phelps Dodge from using two or three times this amount or whatever amount necessary to keep the mines operating?

Response: The estimated water demand (total and by year) for the life of the Project is provided in Table 2-3. As stated in Section 2.1.2.2.1, these projections were determined based on production estimates given in Table 2-2 and from known water uses at other Phelps Dodge SX/EW operations. To a large degree, the capacity of the volcanic aquifer Phelps Dodge intends to use provides a limitation on the water available for use in mining.

Comment 2 *Will water located under the boundaries of the San Carlos Apache Reservation be impacted at any time in the future as a result of the San Juan and Dos Pobres Mines?*

Response: The groundwater model currently predicts an impact of nearly zero on groundwater resources beneath the San Carlos Apache Reservation. See also Section 4.3.2.5.1 and General Response No. 10, Indian Trust Resources.

Comment 3 *What is the cumulative impact of runoff from the San Juan and Dos Pobres Mines following closure when combined with runoff from all other copper mines upstream of the proposed mine, on the Gila River or any of its tributaries?*

Response: Compliance with the applicable water quality permit regulations and the post closure reclamation requirements of ADEQ and EPA will ensure that the Dos Pobres/San Juan Mine, and other active mine projects upstream of the proposed project will not result in significant adverse cumulative effects. This is supported by the ADEQ data presented in the cumulative effects analysis which summarize the water quality information and trends for the Gila River system, including the cumulative effects of mning operations within its watershed. See also Section 4.5.2.5.

Comment 4 *If the Arizona Supreme Court modifies the law regarding impacts of groundwater withdrawal on federal reservations, wouldn't a supplemental EIS for San Juan and Dos Pobres Mines be required?*

Response: The U.S. District Court has stayed action on a lawsuit filed by the U.S. government, Gila River Indian Community, and the San Carlos Apache Tribe challenging whether certain wells in the Gila River basin are pumping waters of the Gila River (United States, et al. v. Gila Valley Irrigation District). If a decision is made on this lawsuit before the BLM issues its decision on this Project, the BLM would determine at that time whether a supplemental EIS is necessary.

Comment 5 *What will be the impacts from the mining operations to the Gila River, Springs and Bonita Creek?*

Response: This comment has been addressed in the summary of impacts to Surface Water in Table 2-14.

Comment 6 *Are not some of the selected lands located within the boundaries of the San Carlos Apache Reservation as described in the Executive Order of November 9, 1871?*

Response: See response 250-18.

Comment 7 *Will the BLM expressly require Phelps Dodge to obtain an order from the Globe Equity Court approving the withdrawal of water from the Gila River prior to BLM approval?*

Response: Section 1.5.3 of the EIS addresses this question.

Comment 8 *Does a baseline finding for contaminants and heavy metals in the Gila River from Safford down to the Reservation exist? Will continued monitoring be required for water quality in the Gila River as required mitigation?*

Response: See Table 4-40 which provides a trend analysis for a variety of water quality constituents for various segments of the Gila River. Under the ADEQ's Section 402 (AZPDES) permit authority, the Project will be constructed and operated as a zero-discharge facility. However, should a discharge from the site occur, ADEQ's Aquifer Protection Permit (APP) would require monitoring of surface water. The APP also requires monitoring of groundwater on a routine basis to ensure compliance with state water quality standards. Points of compliance for monitoring wells are located around the leach pad, solution collection pond, and at other site components defined by the APP as discharging facilities. These points of compliance are located several miles upstream of the Gila River. No water quality monitoring of the Gila River itself is included in the 3M Program or as part of ADEQ requirements.

Comment 9 *Will Phelps Dodge be required to perform a yearly study detailing all impacts on groundwater and surface water on the San Carlos Reservation including withdrawal of hydrostatic groundwater support and interception of surface flows?*

Response: No, no such studies are warranted by the results of the groundwater model nor are they legally required at this time.

Comment 10 *Will BLM supply to the Tribe two copies of Phelps Dodge's Mining Plan of Operation for the San Juan and Dos Pobres Mines for review in conjunction with the Draft Environmental Impact Statements?*

Response: BLM provided a copy of PD's MPO during tribal coordination efforts in 1996. The Dos Pobres/San Juan Project MPO that PD has filed with the BLM is available for public review during BLM's normal business hours. Also, a descriptive summary of the MPO is provided in the EIS in Section 2.1.2 in Chapter 2, under the Proposed Action alternative.

Comment 11 *Are the BLM Safford Field office files regarding the Safford Land Exchange open for review by the Tribe and its representatives?*

Response: The case file for Dos Pobres/San Juan Project is available for public review during BLM's normal business hours by any member of the public, including the Tribe and its representatives. Project records are kept in both the Safford Field Office and at the Arizona State Office (ASO) of the BLM. The documentation pertaining to the land exchange is maintained at the ASO, while the Safford Field Office keeps documents pertaining to the Mine Plan of Operations.

Comment 12 *What is the accuracy of the Dames & Moore groundwater computer model used by Phelps Dodge to Predict Groundwater Impacts?*

Response: See General Response No. 16, Groundwater Model Review.

Comment 13 *Will BLM provide copies of all Section 7 Consultation Materials between BLM and U.S. Fish and Wildlife under the Endangered Species Act for Tribal review? When?*

Response: See General Response No. 6, Endangered Species Act Compliance.

Comment 14 *Isn't one alternative to the exchange retention by BLM and actual control over Phelps Dodge operations under the Section 3809 Mining Regulations?*

Response: Yes. The Mine Plan Alternatives Set describes two alternatives under which the selected lands would remain under public ownership and within BLM administrative jurisdiction. Mining or mine-support activities on the public lands would be subject to provisions of a BLM-approved MPO and all pertinent federal and state statutes and regulations governing activities related to mining, including 43 CFR 3809 regulations.

Comment 15 *Were any impacts to endangered species considered outside of the boundaries of the selected lands?*

Response: Yes, see Section 4.3.3.3 and General Response No. 6, Endangered Species Act Compliance.

Comment 16 *Does BLM intend to issue a record of decision on this proposed action, before Phelps Dodge obtains permits under Section 402 and Section 404 of the Clean Water Act?*

Response: See General Response No. 2, NEPA Process, regarding the sequence of decision-making by the BLMand

COE relative to their respective authorizations and other permits required to implement the proposed mining activities.

Comment 17 *How many springs and at what locations will these springs be impacted?*

Response: See Section 4.3.2.5.1, Potential Impacts on Area Springs and Potential Impacts on the Watson Wash Artesian Well.

Comment 18 *Does the BLM understand that all springs are sacred to the San Carlos Apaches?*

Response: Through earlier consultations with the San Carlos Apache Tribe, BLM is aware that all springs are considered sacred to the Tribe. BLM followed up on this concern with tribal elders and tribal staff, but none of the consulted parties assigned any special values to springs on the project area or relayed that they considered them sacred. Consequently, BLM is not treating the springs in or near the project area as sacred. They are being considered as natural or physical resources and potential impacts to springs are addressed in the groundwater resources analysiss in Section 4.3.2.5 and in mitigation measures described in Appendix F.

Comment 19 *Won't the Gila River suffer from groundwater contamination during mining operations and following closure of the mines for the next hundreds of years?*

Response: As a result of groundwater protection measures required by the ADEQ APP permit and both federal and state post-mining reclamation standards, no impacts to existing groundwater quality at or beyond the points of compliance are expected during or after mining operations. Therefore, the Gila River, which lies several miles beyond/downstream from the points of compliance, is not expected to suffer from groundwater contamination from the mine, either during operations or after closure. See Section 4.3.2.5.2, Groundwater Quality.

Comment 20 *Did BLM request any information from Phelps Dodge regarding probabilities of leakage from heap leach mining following closure?*

Response: With regard to protection of groundwater, BLM defers to ADEQ's APP program requirements. As documented in PD's APP application, the probability of leakage from the pad after closure is negligible for the following reasons: the leach pad will be rinsed and drained and the top surface of the pad will be compacted and sloped inward to route stormwater toward clay-lined impoundments, which will serve to collect and evaporate stormwater. These measures will inhibit infiltration of stormwater into the pad and thus eliminate potential for accumulation of water within the pad that could lead to leakage during a storm event. Additionally, post-closure monitoring required under ADEQ's APP program will include groundwater monitoring at points of compliance.

Comment 21 *What measures has BLM imposed to pay for remediation of impacts 20 years from the closure of the mines and thereafter?*

Response: Neither the reclamation bonding required by BLM under 3809 regulations nor the financial assurance mechanisms required by both ADEQ for the APP and by the Arizona State Mine Inspector's Office for post-mining reclamation can be released until the applicant has demonstrated that applicable closure or reclamation requirements have been met. Any remediation necessary after mining ceases would be included in that required demonstration.

Comment 22 *What measure of cumulative impacts did the BLM determine for the mining and mining related actions used in Table 4-37 of the San Juan and Dos Pobres Mines EIS? Was any cumulative impact actually measured and quantified? If so, how?*

Response: Where possible, baseline conditions or trends were established for each resource from existing sources of information. This information was then supplemented by input from the ID Team based upon their experience and expertise. These data were presented in both quantitative and qualitative formats, as available, within the cumulative effects discussion. Data were provided for the land tenure adjustments that have been completed historically in Arizona based upon published GAO documentation and for the Gila River water quality data which were based upon ADEQ information and reports. For some of the analyses, qualitative assessments of effect were used to bound cumulative effects. Determination of the specific methods and analysis techniques used followed CEQ and BLM guidelines and are provided in the text of the EIS. The cumulative effects analysis has provided BLM with sufficient information to make reasonable, informed decisions regarding the effects of the proposed action and alternatives.

Comment 23 *Did BLM do any independent analysis on the need for increased copper proposition versus the negative impacts on the San Carlos Apache Tribe as a minority community?*

Response: Analysis of the need for additional copper production is beyond the scope of analysis for this project; however, BLM is required by current laws to analyze the impacts of their actions on minority communities, including the San Carlos Apache Tribe; see Section 5.2, Environmental Justice, for this analysis.

Comment 24 *Has Phelps Dodge provided compensation or expense money for BLM employees or BLM consultants who worked on the San Juan/Dos Pobres Draft Environmental Impact Statement and, if so, under what authority?*

Response: Yes, see General Response No. 15, Conflict of Interest.

Comment 25 *Will the groundwater contamination from San Juan and Dos Pobres have an adverse impact on waters of the United States?*

Response: As explained in Section 4.3.2.5.2 of the EIS, both the Proposed Action and the Partial Backfill alternatives include groundwater protection measures designed to meet prescriptive BADCT standards (i.e., a zero-discharge facility) ; therefore, neither alternative is expected to impact groundwater quality at or beyond the points of compliance identified in PD's APP permit application. As a result, post-Project groundwater

quality is expected to continue to meet drinking water quality standards. No contamination of waters of the U.S. from groundwater sources is expected under either alternative either during or after mining.

Comment 26 *Does BLM intend to require Phelps Dodge to have all necessary Federal and State permits identified in the DEIS issued and in effect before BLM issues a record of decision?*

Response: No, see General Response No. 2, NEPA Process, regarding the sequence of decision-making by the BLM and COE relative to their respective authorizations and other permits required to impelement the Project.

Comment 27 *Will Phelps Dodge be transporting hazardous, toxic or corrosive materials through the Reservation?*

Response: Approximately one-quarter of all tanker truck deliveries, about 18 trucks per day on average, will be routed on Highway 70, from Globe to Safford and will traverse that part of the San Carlos Apache Reservation. Some of these trucks will be transporting sulfuric acid, diluent, fuel, and other chemicals used in the mining operations. Note that all truck deliveries must meet federal regulations for the transport of such chemicals on public roadways.

Comment 28 *Did BLM consult with the San Carlos Apache Tribe concerning plans for water quality standards to be imposed on the Gila River by the San Carlos Apache Tribe and the impacts on the proposed mining activity?*

Response: See Chapter 5 for a discussion of coordination and consultation with the San Carlos Apache Tribe; see also General Response No. 10, Indian Trust Resources.

Comment 29 *Is BLM aware that the San Carlos Apache Tribe has determined that the efforts made by the BLM to identify cultural and religious sites important to the Tribe is inadequate?*

Response: BLM received similar comments during the Tribe's review of the cultural resources inventory report for the selected lands. Our response to the Tribe at that time was that BLM believed that the Tribe did not fully understand the procedures being followed to conduct the inventory and that BLM believes the inventory is in compliance with requirements of Section 106 of the National Historic Preservation Act. In addition to the cultural resources inventory, BLM also conducted extensive consultations with tribal staff and elders to identify places of traditional importance. BLM also requested to meet with the San Carlos Tribal Council on numerous occasions and wase denied each request. Tribal representatives have said that tribal elders have pointed out traditional cultural places within the project area; however, no one from the Tribe has offered any specific information, such as location, concerning these places. In their review comments on the consultation report, the Elders' Cultural Advisory Council did not identify any places of traditional importance.

Comment 30 *Is BLM aware that the United States and Phelps Dodge are specifically enjoined under the Globe Equity 59 Decree from any activity interfering with or depleting surface water flow in the Gila River?*

Response: BLM is aware of this; see revised Section 1.5.3 of the EIS.

Comment 31 *What are the total impacts on the Gila River from all Phelps Dodge mining operations including the Morenci and the proposed Dos Pobres/San Juan Mines? Did BLM ever quantify the cumulative impacts of all Phelps Dodge mining activity on the Gila River?*

Response: The impacts of the Morenci Mine operation to the Gila River, if any, are reflected in the baseline conditions of the river as we see it today. As demonstrated in the MMP (see Appendix F), the Model, Monitor and Mitigate Program (3M Program), coupled with the mitigation commitment of the Alternate Year Fallowing Program, ensure that at a minimum there will be no net negative impact to the river from the Dos Pobres San Juan Project. Based upon the modeled projections of mine effects to the groundwater system, implementation of the Alternate Year Fallowing Program will have a net beneficial effect on the Gila River (see Figure 4-12). See also response to comment 239-32.

Comment 32 *What adverse impacts upon air quality on the San Carlos Apache Reservation will the proposed mining activity have? Is Phelps Dodge required to obtain a permit under the Clean Air Act?*

Response: Air dispersion modeling conducted for the Final Air Impact Analysis included evaluation of impacts at the San Carlos Apache Reservation (Table 4-8a). The results indicate that air quality impacts will be very low and well below applicable National Ambient Air Quality Standards (NAAQS).

In accordance with Clean Air Act requirements, PD must receive a Class II permit under Title 18 of the Arizona Administrative Code before construction and operations can begin. PD's application for a Class II permit is on file with the ADEQ ("Application for a Class II Permit, Phelps Dodge Safford, Inc., Dos Pobres/San Juan Facility, Safford, AZ, November 9, 1998"). Additionally, the facility will be subject to certain federal and Arizona standards that will be enforced through the Class II permit.

Finally, under requirements of the Federal Land Policy and Management Act, all BLM authorized activities must comply with all applicable local, state, tribal and federal air quality laws, statutes, regulations, standards, and implementation plans.

Comment 33 *Does the San Juan/Dos Pobres Draft Environmental Impact Statement include mine development and operation for the Loan Star ore bodies?*

Response: The EIS addresses the impacts of the foreseeable uses of the selected lands, which include potential future development of the Lone Star deposit, to the degree that information is available. Because the Lone Star project is conceptual only, the EIS does not speculate as the specific impacts that may occur. See also General Response No. 3, Scope of Analysis.

Letter 240 Commentor Don Steuter of Sierra Club, Palo Verde Group

Comment 1 *...we do not agree with the process of appraising land involved in these exchanges. Since no open bidding is conducted for minerals on our public lands, it is really impossible to assign these lands a proper monetary value. Mining lands, which are usually already degraded by previous mining activity, consequently have little or no potential for higher uses, and instead are appraised based on limited existing uses, usually grazing. As a result, the lands are appraised extremely low. ...If these 17,000 acres were exchanged or leased under competitive bidding circumstances (federal law allowing), in a period of high copper demand, the public could realize a far greater return than the 11 parcels of land it now stands to receive.*

Response: See General Response No. 7, Appraisals.

Comment 2 *The Final EIS should explain the appraisal process used for the selected lands and include how the value of known ore deposits were figured into the appraisal (note the limited description in Vol. 1, 1-17).*

Response: See General Response No. 7, Appraisals.

Comment 3 *The DEIS also fails to explain the need for such a large amount of land selected in the exchange by Phelps Dodge. Of the 17,000 acres, 13,000 would be for "intermittent uses for spatial, safety, and site security buffers." Only about 2,000 acres of BLM land would actually be used for mining. (Vol. 1, S-9)*

Response: This issue was addressed in the EIS in Section 2.2.4.1, Alternative Configurations of Selected and Offered Lands, and in the purpose and need statement in Section 1.4. See also General Response No. 4, Alternatives.

Comment 4 *The DEIS states that limited information is available to prepare a MPO and determine project feasibility for the Lone Star deposit--"the mine project is conceptual only" (Vol. 1, 2-33). If the economic feasibility of this deposit is unknown, why is the BLM looking to trade away these lands to Phelps Dodge? The FEIS should explain the relationship of the Lone Star deposit to the Dos Pobres / San Juan Project and the legality of the BLM to consider a MPO or an exchange when an economical orebody may not exist at this time.*

Response: This comment has been addressed in General Response No. 4, Alternatives.

Comment 5 *The DEIS states that the purpose and need for the proposed action is to "develop the mineral resources to meet a continuing demand for copper" (Vol. 1, S-1). Due to a weak global demand and overproduction, the world is currently experiencing a glut of copper, and prices for the mineral has dropped to near historic lows when adjusted for inflation. The FEIS should re-evaluate if a Land Exchange or consideration of a Mining Plan of Operations under current and predicted market conditions for copper satisfies the National Environmental Policy Act's intent as to Purpose and Need for Action.*

Response: The Project's purpose and need is to enable PD to achieve its expressed interest in developing the mineral resources associated with the Dos Pobres and San Juan copper ore deposits to produce copper to meet a continuing national and worldwide demand. If BLM decides that an Action alternative best achieves the Project's purpose and need, BLM will choose the MPO, Partial Backfill, or the Land Exchange alternative. PD will then decide when to initiate the proposed operation and BLM is not in a position to speculate on what role market conditions at such time will play in PD's decision. Moreover, BLM is not authorized under any statute, regulation, or agency policy to automatically reject an MPO based solely on the market price of copper or any other resource.

Comment 6 *The DEIS states that the Sanchez site does not suffice as an off-site alternative as that mine is "not practicable due to various technological considerations requiring the need for further evaluation of the current engineering design, metallurgical data, and economic potential" (Vol. 1, 2-33).*

The FEIS should explain how this is possible when BLM issued its FEIS and Record of Decision which assumes an economically viable orebody exists and that technological and engineering considerations have been adequately resolved. It would seem that either the Sanchez orebody is a valid off-site alternative or the 1992 Sanchez FEIS is a flawed document and the Record of Decision and associated permits were issued in error. The Dos Pobres / San Juan FEIS should show why the Sanchez site presently does not constitute an ecologically safe and economical deposit to develop, and why a land exchange or approval of another MPO is necessary for Phelps Dodge to mine leachable copper ore in the Gila mountains.

Response: Developing the Sanchez orebody is not a practicable alternative for this project for the reasons stated in Appendix A and Section 2.1.5.2.3 of the EIS. Practicability is defined in terms of technical, logistic, and economic considerations. Therefore, a practicable alternative for one mining proponent (AZCO) is not necessarily practicable for another (PDSI). Assessing the validity of NEPA compliance for the Sanchez project and subsequent permitting is beyond the scope of this EIS.

Comment 7 *The FEIS should also explore the alternative of diverting additional copper from the waste stream before it reaches landfills in order to increase the amount of recycled copper and reduce the need for destroying our natural landscapes.*

Response: Diverting additional copper from the waste stream before it reaches landfills in order to increase the amount of recycled copper is not considered a reasonable alternative because it does not meet the project's Purpose and Need.

Comment 8 *We appreciate the alternative to partially backfill the San Juan pit to slightly reduce the height of the waste rock dumps (Vol. 1, 2-30). It is difficult to understand, however, that with two pits only 2 miles apart, that a*

MPO could not be devised that would completely fill at least one pit. The visual impacts of this mine will be enormous, with mesa-like dumps and a leach pad 400 feet high some four miles across the base of the Gila Mountains (Vol. 1, 4-10). If an economical mine cannot be devised now that fully backfills at least one pit, perhaps mining this area is premature. The FEIS should elaborate as to why complete backfill of one pit is not feasible, and why mining could not be deferred until such time that it is.

Response: Due to the economics of mine phasing (which is dependent upon the distribution of ore in the pit), completely backfilling the San Juan pit is not economically practicable because it would require hauling a large proportion of the development rock twice, first to a development rock stockpile for temporary storage while the San Juan pit was being excavated, then to the ultimate pit. Under the Partial Backfill alternative, mine phasing allows a portion of the development rock to be hauled to the upper benches in the mined-out west side of the San Juan pit directly from both the Dos Pobres pit and the eastern side of the San Juan pit. No legal basis exists to prevent PD or any other mining proponent from developing their mining claims or exercising their mineral rights until or unless they agree to completely backfill a pit.

Comment 9 *Treated effluent from the city of Safford was considered but eliminated because necessary technical information was not available (Vol. 1, 2-33). This water source could be further explored as the only other source appears to be groundwater pumping which will lower water tables in the area for a prolonged period.*

Response: As mentioned in Section 2.1.5.2.2, use of treated effluent from the City of Safford was considered but eliminated from further consideration in the EIS as an alternative source to supplement groundwater pumping. Although the City of Safford's wastewater treatment plant is now operational, the feasibility of delivering and using the treated effluent has not been determined (i.e., Is the quality of the water compatible with the SX/EW process? Is the volume of effluent available sufficient to make the cost of delivery feasible? Etc.). PD is continuing to evaluate this option pending receipt of more data on this potential supplemental water source.

Comment 10 *The DEIS lacks discussion regarding a smaller exchange. As the viability of the Lone Star orebody is unknown, a smaller land exchange should have been analyzed that could eliminate this area until its potential is certain, as well as the possibility of eliminating some of the 17,000 acre "intermittent use" area.*

Response: The factors contributing to the configuration of the selected lands in the Land Exchange Alternatives set were discussed in Section 2.2.4.1 of the DEIS. This comment has been also addressed in General Response No. 4, Alternatives.

Comment 11 *The lack of a secured water supply and the uncertainty of resolving water rights issues on the Gila in the near future raises obvious questions that should be addressed in the FEIS: why are we considering a land exchange or a MPO if Phelps Dodge still is unable to mine once the lands are privatized or the plan of operations is approved? Is the land exchange in the public interest as defined by the Federal Land Management Policy Act (production of copper, jobs, etc. are a benefit) when the future of the mine is in doubt due to lack of water. In the arid southwest where we are spending taxpayers money to bank water underground, what is the value of existing groundwater for future generations compared to the production of copper today? What about the effects on tribal groundwater?*

Response: Consideration of an exchange is a discretionary action by the BLM, and the ability of the exchange proponent to implement the foreseeable uses, whatever they might be (e.g., mining, recreation, grazing, etc.), is not one of the public interest criteria to be met under FLPMA. On the other hand, consideration of an MPO proposal is NOT a discretionary action for the BLM. BLM, therefore, must take action to evaluate an MPO regardless of mining proponent's ability to secure all the necessary local, state, and federal approvals and authorizations. Consideration of whether a proposed land exchange meets public interest criteria focuses on the foreseeable uses and benefits of acquiring the offered lands and disposing of the selected lands. The potential benefits of the foreseeable uses of the selected lands are not a consideration under FLPMA, as these uses are out of BLM's control once the land becomes privately owned.

Regarding the effects of the proposed mining on tribal groundwater, please see discussions in Sections 1.5.3; 4.3.2.5.1; 4.3.6; and response 237-2.

Comment 12 *Only 22 samples were obtained to analyze the acid generating potential of 861 acres of waste rock that will be piled 400 feet high (Vol. 1, 2-10). Acid generation from waste rock can be difficult to predict ("Golden Dreams, Poisoned Streams," Mineral Policy Center, 1997). Additional sampling should be considered and examined for the FEIS.*

Response: The materials characterization study for development rock given to ADEQ by PD and summarized in Section 2.1.2.1.6 must and did satisfy requirements for obtaining an APP permit.

Comment 13 *Mining of the deeper sulfide ore at the Dos Pobres pit and its potential impacts to the environment is not considered in this DEIS - Phelps Dodge is apparently deferring this for another project. NEPA, however, mandates a hard look be given to the impacts of a project and connected actions examined as well. The FEIS should speculate as to the impacts of an expanded Dos Pobres pit and the likelihood of acid generating waste and how that waste might be contained and monitored.*

Response: The potential future mining of the Dos Pobres Sulfide orebody was considered in the Cumulative Effects analysis in Section 4.5. See also General Response No. 3, Scope of Analysis.

Comment 14 *The DEIS makes no attempt to analyze the connected actions of eventual groundwater pumping for the sulfide deposits at Dos Pobres, and oxide ores at Lone Star and Sanchez and the cumulative effects of pumping on water tables and flows in the Gila.*

Response: See response 237-32.

Comment 15 *No analysis is found regarding existing shafts and adits under the leach pad site that might affect liner stability.*

Response: There are no shafts or adits within the footprint of the proposed leach pad to potentially affect the stability of the leach pad liner.

Comment 16 *No analysis regarding possible ground subsidence from extensive groundwater pumping is found in the DEIS, nor is information found regarding the likelihood of earthquakes affecting liners or dams.*

Response: An analysis of geologic hazards, including seismicity, of project facilities was completed as part of the APP submittal (Dames & Moore 1998, APP, Appendix F of Report H). Pseudostatic stability analyses were performed to evaluate the performance of the leach pad under seismic conditions. The pseudostatic analysis simulates an equivalent horizontal acceleration directed out of the slope face. The leach pad facilities met these criteria by virtue of the fully drained conditions within the pad and the competent pad foundation conditions. Stability analyses (static and pseudostatic factors for safety) met minimum BADCT requirements. Considering the nature of the facilities and the very low probability of a major seismic event occurring nearby over the relatively short design life of the project, it can be concluded that seismic-induced failure within the surficial ore materials would be rare and any subsequent remedial action would be minimal (Dames & Moore 1998, September APP submittal). Furthermore, no significant subsidence has been known to result from groundwater pumping from consolidated fractured rock, such as planned by PD for the Dos Pobres/San Juan Project (D. Bartlett, Clear Creek Assoc., pers. comm. 1999).

Comment 17 *Were the pump tests for the four wells conducted individually or concurrently (Vol. 1, 3-24)?*

Response: The pump tests were run concurrently on the four wells, as well as individually.

Comment 18 *Pit lake quality problems at San Juan is discussed but not for Dos Pobres (Vol. 1, 3-26). Pit lake quality after sulfide mining occurs should be examined.*

Response: There is no existing pit lake at the Dos Pobres mine. Post-mining pit lake water quality after potential sulfide mining occurs would be examined as part of the scope of analysis for such a project if and when it is proposed.

Comment 19 *The anticipated pH of the heap leach pad after closure is not discussed.*

Response: The pH and chemical parameters of potential effluent from the leach pad after closure are expected to meet Aquifer Water Quality Standards (Dames & Moore October 2, 1998, APP application). Given that the leach material is acid-consuming and that any acid remaining in the leach circuit after mining is through would be consumed by the stockpile, copper and other metals are not expected to be mobilized after closure. Furthermore, as mentioned in the EIS, the proposed closure strategy for the leach pad as submitted to ADEQ for PD's APP permit consists of leaving the leach pad in place and taking actions to reduce the potential for discharge, such as installing an infiltration-control cap and/or detoxifying the facility (i.e., rinse the pad with fresh water). The top of the stockpile will be lightly graded and stormwater containment berms will be constructed along the outside perimeter of the top surface of the pad and benches to contain all stormwater and promote infiltration and the rinsing process.

Comment 20 *The bottom of the pits are projected to be at about the same elevation as the Gila River, and can be expected to continually fill and evaporate as water table levels slowly recover after mining. Is this loss through evaporation included in modeling regarding surface flows in the Gila?*

Response: See response 237-38.

Comment 21 *Are there anticipated effects to wildlife using farmlands in the Gila River bottom if fields are left fallow on alternate years?*

Response: Expected impacts to wildlife from fallowing fields on alternate years would be minimal since when one field is left fallow, the other one is being farmed. Therefore, farmland resources used by wildlife would still be available and it is expected that the benefits of reduced consumptive use of Gila River flows on wildlife will outweigh any potential, limited impacts to wildlife use from fallowing lands.

Comment 22 *Noise from blasting is expected to be audible on Mt. Graham 15 air miles away. Are impacts to wildlife expected from blasting?*

Response: Impacts to wildlife from noise vibrations due to blasting would be minimal. Few, if any, game and non-game wildlife species would be expected near the blasting or active mining areas due to the intensive human activity in these areas.

Comment 23 *Just 20% of the leach pad surface is to be revegetated. What is the success rate of such revegatation efforts?*

Response: PDSI has revised its reclamation plan to include revegetation of 100% of the top of the leach pad. Given use of a 12-inch growth media layer consisting of stockpiled topsoil native to the project site and a native seed mix, revegetation is expected to successfully re-establish upland plant communities typical of the area over time, providing wildlife habitat, some degree of mitigation for visual impacts, and erosion control.

Comment 24 *Air quality impacts to people in the Safford area can be expected and possible impacts to Class 1 areas (Vol. 1, 4-13, Vol. 2, Fig. 3-5). Are any health effects anticipated?*

Response: Air dispersion modeling conducted for the Final Air Impact Analysis included evaluation of impacts in the Safford area and mandatory Federal Class I areas within 100 kilometers of the project location (Table 4.4). The results indicate that air quality impacts will be minimal and well below applicable NAAQS. Since the NAAQS are health-based standards, no health effects are anticipated.

Comment 25 *The FEIS should explain the list of financial assurance mechanisms used for bonding (Vol. 1, S-8) and provide further evidence that the bond amount of $8 million is sufficient to reclaim the mine (Vol. 1, 2-29).*

Response: It is beyond the scope of the EIS to fully explain the various possible financial assurance mechanisms, such as surety bonds, certificates of deposit, and trust funds with pay-in periods. There are any number of other sources, including banks, that can explain how these mechanisms work.

The final amount of the bond must conform to the 43 CFR 3809 regulations, which stipulate that the project proponent must furnish an estimate of the reclamation cost of its operation assuming that an independent third party contractor is hired to perform the work. The estimate must include the cost to perform all the elements of reclamation as they are stated in the approved reclamation plan, including the cost for mobilization and demobilization from the nearest population center where a contractor capable of doing the work can be located. The cost estimate must be based on industry standard operating cost indicies such as those provided by Western Mine Engineering, the Caterpillar Performance Handbook, or the Contractor's Equipment Cost Guide. Labor wage rates must be the current wage rates paid to workers employed under federal contracts as required by the provisions of the Davis-Bacon Act. Complete bond amounts must contain sufficient funds to cover such items as profit, insurance premiums, performance, and payment bonds and the cost for BLM contract administration. In all instances BLM must be furnished the exact source of the data used in preparing the estimate together with all relevant maps, design specifications, and calculations.

Comment 26 *We appreciate Phelps Dodge's efforts to construct a virtual zero discharge facility using retention basins to accommodate 100 year, 24 hr. storm events.*

Response: See General Response No. 1.

Comment 27 *BLM's 3809 regulations governing hard rock mining are currently being revised which will likely include tougher standards that define "undue degradation." Implementation of these standards, however, have been delayed by Congress. Is it prudent to consider a such a large land exchange or MPO when regulations governing such mining are soon subject to change? Would the new standards apply if issued in the near future?*

Response: As discussed in Chapter 1, the regulations at 43 CFR 3809 were revised effective January 20, 2001, and effectively revised again. All phases of reclamation for this project, including post-mine closure, will be bonded in compliance with the current regulations as described in 3809.552 and 3809.400. All other aspects of the project are grandfathered under the 1980 regulations which are quite similar to the current regulations (see Chapter 1). It was recognized by the BLM in the revision of the regulations that if a draft EIS for an MPO had already been prepared and issued to the public by January 20, 2001, as in the case of the Dos Pobres/San Juan Project, then the MPO would not be subject to the new mining plan content requirements or performance standards. This provision is based on the practical consideration that both the BLM and the project proponent have expended substantial time and resources toward developing the MPO and satisfying legal requirements under the previous regulations. Section 1.5.1, Regulatory Framework and Authorizing Actions, has been updated accordingly to reflect this information.

Comment 28 *If the land exchange is approved, the DEIS argues that the mine operators will still need several permits from various agencies before mining can commence (Vol. 1, S-1, 1-3…1-7). It would be helpful if the FEIS could elaborate as to the public participation process allowed by law as to each permit issued by the different agencies.*

Response: Please see revised Section 1.5; also see General Response No. 2, NEPA Process.

Letter 241 Commentor Don L. Weesner of Gila Water Commissioner

Comment 1 *Section 1.5.3 of the draft EIS, entitled Water Rights Authority, contains several statements which are not considered to be accurate. First, the Gila River is characterized as an intermittent stream. This is not considered to be a correct characterization. It is true that the Gila River is over-appropriated and that, at times, in periods of low flow- usually during the summer months-- due to diversions in the Duncan-Virden and Safford valleys, the Gila River flows intermittently, But this is because of 'diversions' not because of natural flow in the river. It would be more accurate to characterize the Gila River as a perennial stream which, due to the, diversions during periods of low flow, becomes an intermittent stream.*

Response: Please see revised Section 1.5.3.

Comment 2 *...Section 1.5.3 states, on page 1-9, that Article XIII of the Gila Decree prohibits "all parties holding decreed rights from diverting, taking, or interfering with the use and enjoyment of 'other holders of decreed water rights to the Gila River'" (emphasis provided). The Gila Decree is such a complex document that it is important not to paraphrase it which is what the, above statement does.*

Article XIII of the Gila Decree, insofar as it is pertinent hereto, provides as follows:

"That each and all of the parties to whom rights to water are decreed in this cause their assigns and successors in interest are hereby perpetually restrained and enjoined form diverting, taking or interfering in any way 'with the waters of the Gila River or any part thereof,' (emphasis provided) so as in any manner to prevent or interfere with the diversion, use or, enjoyment of said waters (emphasis provided) by the owners of prior or superior rights therein as defined and established by this Decree"

Therefore, as can be seen from Article XIII, it is the 'waters' of the Gila River that are protected by the Gila Decree. Furthermore, the Gila Decree sets forth, in Article V thereof, the lands to which waters of the Gila River have been decreed and the priority diversion rights of such lands.

It has been the historical position of the Office of the Gila Water Commissioner that before the powers of enforcement can be exercised, it must be established 'that waters of the Gila River' are being interfered

with by someone holding a decreed water right under Article V of the Decree.

In accordance with this position, the Gila Water Commissioner has decided that it is not within the authority of his office to take action against persons diverting waters of a 'tributary' of the Gila River, even if that diversion might be by someone holding a water right under Article V of the Decree, at least until the United States District Court has ordered him to do so.

Response: Thank you for this information. Please see revised Section 1.5.3.

Comment 3 *The trial on the pumping issues raised by these complaints has not yet been held, and, in fact, has been stayed by the United States District Court until certain issues have been resolved by the courts of the State of Arizona. When the stay of the District Court will be lifted is not known at this time. In any event, it is clear to the Gila Water Commissioner that he does not, until the United States District Court has so ruled, have any jurisdiction over the pumping planned by Phelps Dodge in connection with its proposed mining project, and he would decline to approve or disapprove such proposed pumping. Furthermore, he does not believe he can take any action to restrict or regulate the use of surface waters that might flow into the Gila River, at least until the United States District Court has issued its order for him to do so.*

Response: This comment has been addressed by revising Section 1.5.3 of the EIS.

Letter 242 Commentor H.M. Conger

Comment 1 *My comments today are in support of the mining operations proposed. I strongly support the Land Exchange as the preferred alternative identified by the federal agencies.*

Response: See General Response No. 1.

Comment 2 *In Section 1.5.3, the BLM states that the Final EIS cannot be approved "until it is determined whether and to what extent such action might be precluded by the Globe Equity Decree." The Globe Equity Decree does not regulate the use of groundwater in the Safford Valley but rather regulates the use of surface water extracted from the Gila River and its use on agricultural lands established as part of the Decree. The BLM needs to correct the statement that it cannot approve the Final EIS without approval of the Court that has jurisdiction over the Globe Equity Decree.*

Response: This comment has been addressed by revising Section 1.5.3 of the EIS.

Comment 3 *Based upon the BLM's evaluation of the potential impacts to flow in the Gila River, it is estimated that groundwater flow to the Gila River could be reduced by up to 35.4 acre- feet per year. From input I received at the public meeting on the Draft EIS, it is my understanding that the projected reduction in groundwater flow to the river does not occur until 416 years after closure of the mining operations. A reduction in flow of 35.4 acre-feet per year is not measurable; therefore, the BLM should discuss the significance of this presumed reduction in flow within the river.*

Response: Please see revised Section 4.3.2.6.1, Surface Water Quantity, in which BLM discusses the total projected 149 af/yr of impact to surface flows of the Gila River as an extremely small proportion of the river's average annual flow. Although this volume, or the 34 af/yr portion of it that represents impacts from groundwater pumping, is not likely to be measurable, the significance of this projected impact is tied to the ongoing adjudication of water rights to the Gila River under the Globe Equity No. 59 Decree.

Comment 4 *The BLM also states that "it is incumbent on Phelps Dodge Inc. to obtain approval from the Gila Valley Water Commissioner, and the United States District Court, that the proposed mitigation plan of changes in point of diversion and changes in the use of that water from agricultural to mining use is permissible under the Globe Equity No. 59 Decree." The Draft EIS states that the proposed water source for the operations proposed by Phelps Dodge will be from groundwater wells developed at the mine site, which is outside of the Globe Equity Decree.*

Response: The quotation is in reference to the surface water involved in implementing the Alternate Year Fallowing Program. The reader is correct in stating that groundwater wells developed at the mine site are currently not subject to the Globe Equity No. 59 Decree.

Comment 5 *The Draft EIS incorrectly references that groundwater pumping cannot begin until it is assured that the proposed mitigation plan will be effective in resolving the complex legal questions regarding the proposed mining operations. The mitigation plan addresses direct and indirect impacts to jurisdictional waters and mitigates those impacts. The mitigation plan also provides for mitigation to any perceived impacts to threatened and endangered species habitat along the Gila River. The benefit from the mitigation plan on the issue of water rights and flow in the Gila River is a side benefit. The BLM should review this section of the Draft EIS and make the necessary corrections in the Final EIS.*

Response: This comment has been addressed by revising Section 1.5.3 of the EIS.

Comment 6 *...a true comparison of the reclamation regulations in Arizona requires a discussion on the criteria found in the Aquifer Protection Permit Program. The BLM states in Table 4-27 that "water management standards are covered the Aquifer Protection Permit Program" where in fact, the Program addresses closure and post closure monitoring requirements. Closure requirements address soil as well as water quality standards. Post closure monitoring criteria is can extend for several following completion of reclamation and closure requirements. This should be highlighted in the Final EIS informing the public that the mining industry is a highly regulated industry, especially with respect to environmental regulations.*

Response: See response 210-6.

Comment 7 *The partial backfill alternative does not appear to create significant benefits with reducing impacts associated with the Section 404 Permit process to warrant this alternative to be evaluated in further detail in the Final EIS.*

Response: See General Response No. 1.

Comment 8 *The economic benefits of not backfilling the San Juan Pit allowing potential access to undefined copper reserves in the future appear to outweigh the potential benefits of the reduction in stockpile height of 50 feet. If further evaluation of the partial backfill alternative is made in the Final EIS, details regarding the benefits of maintaining access to mineral values compared to benefits of reduced impacts to jurisdictional waters under Section 404 of the Clean Water Act should be addressed.*

Response: See General Response No. 1.

Comment 9 *RE: Boundary Dispute. The BLM's evaluation of the boundary dispute with the San Carlos Apache Tribe adequately addresses the history of this issue. The federal government has reviewed this issue several times in the past and has consistently came to the same conclusion. In addition, the San Carlos Apache Tribe received significant payment from the United States for disputes over reservation boundary. This issue should not be carried forward in the Final EIS evaluation. The BLM cannot resolve the San Carlos Apache Tribe's continued dispute regarding this subject.*

Response: See General Response No. 1.

Comment 10 *For the future of Arizona and our children, the Dos Pobres Project should go forward as outlined in the draft EIS.*

Response: See General Response No. 1.

Letter 243 Commentor Lee Wilkening

Comment 1 *I am writing this letter in support of the Phelps Dodges' Dos Pobres/San Juan Mining Project. Furthermore, I support the BLM's preferred alternative for the proposed land exchange outlined in the Draft Environmental Impact Statement (DEIS).*

Response: See General Response No. 1.

Letter 244 Commentor Daniel J. Dempsey

Comment 1 *I am writing to express my support for the Land Exchange Alternative.*

Response: See General Response No. 1.

Letter 245 Commentor Bill Richardson

Comment 1 *I support Phelps Dodge's Dos Pobres / San Juan Project and the BLM's preferred alternative of the land exchange.*

Response: See General Response No. 1.

Letter 246 Commentor John Bonefas

Comment 1 *Please accept this letter of support of the Phelps Dodge Dos Pobres/San Juan Project. In addition I have reviewed, and fully support BLM's preferred alternative of the land exchange noted on page 2-44 of the Draft EIS.*

Response: See General Response No. 1.

Comment 2 *As a citizen, I feel the Bureau of Land Management has done an exceptional job relevant to boundary issues between BLM and the San Carlos Apache Tribe. The materials noted on 1-16 clarifies the history of the issue and I support the decision not to carry forth this topic.*

Response: See General Response No. 1.

Letter 247 Commentor David M. Martin of Arizona Chapter Associated General Contractors

Comment 1 *I would like to register my support in the official record for this project.*

Response: See General Response No. 1.

Letter 248 Commentor C. Allison Lombard of Arizona Builders' Alliance

Comment 1 *The Southern Division of the Arizona Builders' Alliance is in support of the Phelps Dodge Corporation Dos Pobres/San Juan mining project North of Safford.*

Response: See General Response No. 1.

Letter 249 Commentor Van Talley of City of Safford

Comment 1 *Safford believes the alternate year fallowing program described in the EIS constitutes an innovative means of providing mitigation which strikes a proper balance between important environmental concerns and other important social and economic values in the Safford and Duncan-Virden Valleys. There are numerous water-related issues in the Upper Valleys, unrelated to the Project, solutions for which will require hard work, imagination and innovation on the part of all of us who live here. We view the mitigation measure described in the EIS as an example of how some of these issues can be addressed.*

Response: See General Response No. 1.

Comment 2 *Safford reiterates its support for the Project and for the Land Exchange alternative preferred by the BLM, and urges its expeditious approval. This support is further evidenced by the enclosed Council resolution.*

Response: See General Response No. 1.

Letter 250 Commentor David J. Farrel of U.S. Environmental Protection Agency

Comment 1 *We have rated this DEIS as EC-2--Environmental Concerns--Insufficient Information. (See the enclosed "Summary of Rating Definitions and Follow-up Action"). Our rating reflects concerns over potential impacts to air resources, water resources and quality, and water-related biologic resources. Some section of the DEIS do not provide sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment. We expect that additional mitigation measures or clarification of planned mitigation and monitoring, and inclusion of other additional requested information in the FEIS may alleviate or reduce these concerns.*

Response: Since publication of the DEIS, BLM has received information pertinent to PD's compliance with Title V of the Clean Air Act, clarified regulatory authority issues for water rights, and concluded Section 7 consultation with the USFWS regarding potential impacts from groundwater pumping on listed species and designated critical habitat. BLM has made an effort to address all comments and concerns expressed during the DEIS comment period and has revised the EIS accordingly.

Comment 2 *We commend BLM for an overall job well done in integrating the various aspects and potential effects from the presented alternatives into one comprehensive document.*

Response: See General Response No. 1.

Comment 3 *EPA has serious concerns about the proposed project based on its potential impacts to air quality, as predicted by the results of the air quality modeling. According to the DEIS (page 4-14), emissions from the project would result in maximum PM10 levels of 34.4 micrograms/m3 (24-hour average). This value exceeds the maximum allowable increase over the baseline concentration (increment) for Class II areas of 30 micrograms/m3 (24-hour average).*

Response: Since the DEIS was published, the emissions inventory for the Project has been revised to reflect refinements to the mining plan, as well as recetnly revised emission factors. The modeling analysis has also been revised to account for the new emission inventory and several modifications to the original modeling methodology. The results of the revised modeling analysis, along with a discussion addressing PSD increment consumption, are included in Section 4.3.2.2.1.

Comment 4 *...BLM should provide assurances that with channel modification none of the proposed construction would be in a 100 year flood plain. Additionally, in the FEIS BLM should explain how the proposed land exchange alternative would be consistent with the requirements of Executive Order 11988, "Floodplain Management," and explain any potential use restrictions in the event of land disposal to private parties, as required by Section 3(d) of the Executive Order.*

Response: See General Response No.13, 100-year Floodplains.

Comment 5 *...we recommend that BLM include maps and cross sections showing the distribution of potential sulfide zones, and locations of the samples. BLM should also present the data in terms of the ratio of Acid Neutralization Potential to the Acid Generation Potential (ANP:AGP) and explain the common conventions in determining whether a particular material presents a potential problem. While the samples collected may be representative of rock types, the large size of the proposed pits and the limited number of test samples poses the potential that "pockets" of material of higher sulfide contents could be found as excavation proceeds, particularly toward the latter project phases. In the FEIS, BLM should discuss whether any permit requirements include ongoing waste rock characterization (testing/monitoring) during mine life, and whether PDSI would develop a contingency plan to deal appropriately with any unexpected sulfidic material as part of any permit conditions, or otherwise.*

Response: Both the oxide and sulfide ore deposits are low pyrite systems which do not contain material classified as massive sulfides. Based on over 400,000 feet of drilling, PDSI has determined that zones containing significant non-copper bearing sulfide mineralization (pyrite) are extremely unlikely to be present in either ore deposit. Material containing secondary copper sulfide mineralization in appreciable amounts will be classified as ore and routed to the lined leach pad. PD expects to encounter minor amounts of primary sulfide copper mineralization near the bottom of the Dos Pobres pit; however, this material was accounted for in the characterization studies conducted for the development rock stockpiles. Based on those studies, the amount of material having high acid neutralization potential that will be placed in the stockpiles would likely negate any potential impacts, even if unexpected sulfidic material were to occasionally be placed in the stockpiles. Therefore, BLM does not believe that ongoing characterization or development of a contingency plan is necessary.

Comment 6 *...we recommend that the water quality monitoring well network be designed to include sampling of groundwater downgradient of the waste rock piles. From conversations with ADEQ personnel, it is our understanding that because of potentially changing groundwater flow regimes due to de-watering activities it will be challenging to select a fixed set of monitoring wells that would effectively monitor groundwater quality over time. The FEIS should discuss the tentative locations of proposed monitoring wells, note whether potential leachate from the waste rock piles would be monitored, and include any available information from the required Aquifer Protection Program (APP) permit... ...we ask BLM to explain where these compliance points would be, and how the overall groundwater monitoring network would allow early detection of any unexpected adverse groundwater discharges, especially since a leak detection liner system is not required by Arizona or any Federal laws.*

Response: Based on extensive characterization studies, ADEQ has made a determination that the development rock stockpiles are inert and that groundwater quality monitoring is not necessary or required for those stockpiles .

During the APP permitting process, ADEQ agreed to specific proposed locations for monitoring wells

around the leach pad and ponds. A total of nine wells will be located around these facilities, three each on the northwest and southeast sides of the leach pad, and three more downgradient of the leach pad and ponds.

Alert levels are set below Aquifer Water Quality Standards and trigger contingency actions prior to exceedance of the AWQS, thereby serving as an early warning system.

Comment 7 *EPA is concerned about the long term water quality of the pit lakes, in part because of the degree to which the possible effect on the human environment involves unknown risks (CEQ Regulations at 40 CFR 1508.27(b)(6)). EPA has been working with BLM and PDSI in the investigation of potential adverse pit lake chemistry. We are agree with BLM that the expected water quality of the pit lake, in the near term, would most likely be good. However; very long term water quality (such as 400 to 2000 from now), at the least, will include high total dissolved solids (TDS) and possible exceedence of certain aquatic standards due to effects of evapoconcentration. In the FEIS, BLM should explain what agency would be responsible for overseeing potential water quality problems associated with the developing pit lakes, once mining has ceased and reclamation has been completed. As the DEIS states, there are uncertainties associated with long term modeling attempts. These uncertainties include such factors as climatic variability. We also suggest, based on our review of project data, that such variables as ultimate pit wall surface area (potential for increase in surface area due to landslides), amount of oxygen available in fractured wallrock, heterogeneities in the facture-controlled aquifer, and potential warm water inputs--all contribute to uncertainties about the ultimate pit lake chemistry. For these reasons, EPA recommends that assumptions of the Pit Lake modeling be re-visited at the end of mine life, based on final pit configuration, water quality of groundwater entering the pit, etc., and be included as part of the Mitigation and Monitoring Plan. The assessment of final, pre-lake, pit conditions should include a contingency remediation plan, because there are a variety of chemical treatments available for developing pit lakes with potentially adverse chemistry.*

Response: Pit lakes are not regulated by the State of Arizona, per se; however, ADEQ regulates impacts to groundwater quality. PDSI must comply with state groundwater quality and federal surface water quality statutes and regulations, in addition to various regulations concerning the protection of wildlife.

The best available scientific information indicates that the pit lake water will be of good quality, comparable to other natural waterbodies in the state. Additionally, ADEQ has indicated to PDSI that pit lakes will have to be addressed at the end of mine life as part of the closure and post-closure plans under the APP.

Comment 8 *...BLM should provide more specific details on the frequency and mechanism of monitoring, to ensure that monitoring is rigorous and meaningful. We recommend that PDSI seek consultation on the technical aspects of the proposed monitoring program with the appropriate wildife agencies.*

Response: Please see revised Appendix F, Mitigation and Monitoring Plan. In addition to USGS involvement in revising the 3M Program, USFWS considered the effects of the Alternate Year Fallowing Program in the Section 7 Consultation for this Project when it issued its Biological Opinion concurring with BLM's determinations of may affect but unlikely to adversely affect listed species and designated critical habitat.

Comment 9 *This figure (Figure 4-11) is very hard to read. ...we recommend either adding color or expanding the figure scale and contour symbols of the figure.*

Response: Figure 4-11 has been deleted from the FEIS because the revised 2001 Rewetting Model did not generate comparable information.

Comment 10 *The FEIS should include a spring monitoring program and contingency mitigation in the event that springs are impacted.*

Response: Please see Appendix F regarding monitoring and contingency mitigation measures for potential impacts to springs.

Comment 11 *...BLM should clarify the capacity of the stormwater containment units--will each unit be capable of containing the volume of water resulting from the 100-year, 24-hour storm on top of the 100-year, 10-day storm? Please explain the difference between the two storm events, because a 100-year, 10-day storm does not appear to be standard reference event. How many hours is the 100-year, 10-day storm, and how does it relate to, for example, the 500-year storm event, in terms of water quantity?*

Response: The stormwater retention dams were conservatively designed with sufficient capacity to retain stormwater runoff resulting from the 100-year, 10-day storm event, a larger capacity than if the dams were sized to contain runoff from the 100-year, 24-hour storm. The 100-year, 24-hour and 100-year, 10-day storm events represent extreme rainfall events of different duration and are statistically derived using existing rainfall data from the local area. For the project area, the 100-year, 24-hour storm event was estimated to be 3.7 inches of rain; the 100-year, 10-day storm event was estimated to be 5.2 inches and 5.7 inches of rain for areas below and above 4,000 feet elevation, respectively. Although the 100-year, 10-day storm event resulted in a more conservative design capacity for the stormwater retention dams, the 100-year, 24-hour storm may be more conservative when sizing facilities that incorporate pumping systems, depending on site-specific parameters such as pumping rates.

Comment 12 *BLM should add the following additional language/clarification to the FEIS. In addition to requiring discharges of mine drainage to meet technology-based effluent limitations (40 CFR Part 440), all discharges into waters of the U.S. must also comply with state water quality standards, which are often more stringent than the technology-based effluent limitations. In the development of a permit, EPA evaluates the technology-based effluent limitations against the applicable water quality standards and selects the most stringent limitation for each parameter of concern.*

Response: Section 1.5.1 of the EIS has been revised to include this information.

Comment 13 *Although the description of the requirements for the Clean Water Act Section 402 permit is accurate, it would be helpful to the public for BLM to add language in the FEIS to clarify how various discharges are regulated. In summary, allowable discharges from mining facilities can generally be clasified as either storm water or mine drainage. In addition to the definition of mine drainage included in the DEIS, mine drainage also includes drainage from pits or adits, process water mixed with storm water, and storm water which comes into contact with any materials used in the mining process. Storm water includes runoff from waste rock piles, snow melt runoff, and surface drainage that does not come into contact with raw materials, product, or mine drainage. Discharges of mine drainage are subject to the technology-based effluent guidelines described at 40 CFR Part 440. Facilities discharging storm water are not subject to technology-based guidelines but are required to prepare a storm water pollution prevention plan. BLM should acknowlege in the FEIS that a stormwater pollution prevention plan would be included as part of the APP permit.*

Response: Section 1.5.1 has been revised to include this information.

Comment 14 *The FEIS should clearly state that prior to issuance of a final Clean Water Act Section 402 permit, a draft permit will be circulated to the public for a minimum 30-day public comment period.*

Response: See General Response No. 2, NEPA Process.

Comment 15 *In the FEIS, BLM should include a summary of its (BLM or Department of Interior) environmental justice strategy, as required by implementation of the "Environmental Justice Executive Order," Number 12898.*

Response: Section 5.2 in the EIS outlines BLM's strategy for compliance with EO 12898 on environmental justice. BLM follows the same strategy as outlined in the Council for Environmental Quality (CEQ) guidelines for addressing environmental justice and as well as the outline included in "Overview of BLM's NEPA Process - Arizona BLM Desktop Reference" dated March 1998.

Comment 16 *On p. 4-47 of the DEIS, BLM provides assurances that expected impacts on surface flows in the Gila River would be mitigated by implementing an alternate year fallowing program. This information appears to conflict with information presented on page 1-9 of the DEIS where it states that "leaving decreed agricultural lands fallow may or may not increase the amount of water in the Gila River" In the FEIS, these two disparate statements should be made to agree with one another.*

Response: Section 1.5.3 has been revised to address this comment.

Comment 17 *We therefore recommend that in the FEIS, BLM fully analyze any potential disproportionate impacts to potentially affected tribes by loss of federal land status of the selected lands. This analysis should include discussion of other applicable laws, regulations and executive orders as they apply to Tribes. In this context, BLM should describe, in the FEIS, how the proposed land exchange would comport with its environmental justice strategy.*

Response: In the EIS, BLM fully analyzes the effects of the proposed exchange for compliance with Executive Order (EO) 12898. Environmental justice is "The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or a socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local and tribal programs and policies." The BLM's strategy for environmental justice compliance is to identify where minority and low income populations exist in relation to the proposed action and alternatives and then determine whether effects are disproportionately high and adverse. BLM has adhered to its strategy for environmental justice and has followed the requirements of EO 12898. The EIS identifies minority and low income populations in the surrounding area to determine how far these populations are from the proposed action and alternatives. The nearest Native American populations are located in the communities of Bylas and Peridot, which are 30 and 50 miles away, respectively. See Section 3.2.5.1.1. BLM also completed further consultation and coordination with Native American tribes to identify their issues and concerns and address them in the EIS; see Sections 5.1.4 and 5.2. Listed in Table 1-1 are the applicable laws, regulations and executive orders as they apply to the Federal and State Regulatory Requirements for the Mining Plan of Operations and the Land Exchange for the Dos Pobres/San Juan Project. Table 5-2 lists the Summary of Adverse Impacts of the Action Alternatives for the Dos Pobres/San Juan Project Environmental Justice Analysis. BLM has added Executive Order 13007, Indian Sacred Sites, to Table 1-1. See also response 250-18.

Comment 18 *In the FEIS, BLM should discuss how the treatment of the boundary dispute issue, as related to the proposed land exchange, is consistent with its environmental justice strategy and, in the context of BLM's environmental justice compliance role, how the EIS is consistent with the goal of fair treatment of potentially effected minority or low-income communities.*

Response: The issue of the boundary dispute was raised earlier during the scoping process and in the appeal filed by the San Carlos Apache Tribe on the Morenci Land Exchange, an earlier exchange proposed and completed with the BLM by PD.

As described in Section 1.6.2.2.1 in the EIS, BLM fully considered the tribal boundary dispute in their evaluation of impacts to land use and land ownership. Because documents show the Tribe accepted fair compensation for any outstanding land disputes and the Tribe has not provided any new information to the contrary, BLM considers this issue satisfactorily resolved. Therefore, exchanging the selected lands for the offered lands was not considered to be an adverse impact that would create disproportionately adverse effects on the Tribe or any other minority or low-income group, as required by Executive Order 12898 on environmental justice. The BLM's efforts to consider, research, analyze, and disclose this important issue in the EIS are consistent with the objectives of EO 12898.

Comment 19 *We recommend that BLM work with PDSI, the potentially affected Tribes, and the State Historic Preservation Office, to investigate the possibility of additional project proponent initiated studies, as a potential way to mitigate for archaeological impacts of the proposed mine development.*

Response: See General Response No. 9, Cultural Resources Mitigation.

Comment 20 *Despite the seeming complexities of an EIS with a land exchange identified as BLM's preferred alternative, and a Proposed Action, a mining project--we want to make it perfectly clear to the public that the underlying driving force of the document preparation was the Purpose and Need expressed by PDSI to develop the Dos Pobres/San Juan project. As such, BLM has appropriately identified the foreseeable uses of the land exchange to be nearly identical to those of the Proposed Action and has appropriately chosen to analyze indirect and cumulative impacts (40 CFR 1502.16, 1508.7). Regardless of semantics, the end result, unless both a land exchange and an MPO are not approved, would be the likely development of a mining project with nearly identical environmental impacts. EPA does not intend to imply that the land exchange does not have merit. We recognize that a land exchange may satisfy BLM's agency goals and also provide various tangible benefits to the public.*

Response: Thank you for your comment. The appropriateness of BLM's analysis approach with regard to impacts of foreseeable future mining under a Land Exchange alternative was affirmed in the appeal decision for the Morenci Land Exchange (IBLA 97-299, 97-311, 98-142, 98-173, May 21, 1999).

Comment 21 *...pages 2-38, through pages 2-41, the future status of mineral entry is described in somewhat confusing terms. ...In the FEIS, BLM should clearly identify in the section on Offered Lands and their Foreseeable Uses which properties would not be available to mineral entry.*

Response: See response 210-8.

Comment 22 *The FEIS should state whether the exchange of the 12 acres at Sanchez would in any way enable or accelerate mine startup at that property.*

Response: Approval of the proposed land exchange, which includes 12 acres of federal lands on which the Sanchez office building sits, would not enable mining activity on the Sanchez property, nor would it accelerate startup of that mine. PD intends to use the building for ongoing mine planning.

Comment 23 *BLM notes that levels of arsenic and chromium at this offered site (Tavasci Marsh) has exceeded standards. In the FEIS, we recommend that BLM discuss any potential environmental liabilities that the public may be acquiring, with respect to any future site remediation that may be necessary.*

Response: In their comment letter (no. 203), the National Park Service identified a potential for ecological risk to aquatic organisms from levels of metals in the sediments of Tavasci Marsh. To address these concerns, further testing was completed by URS Greiner Woodward Clyde and a report entitled "Tavasci Marsh Supplemental Sampling Report" was submitted to BLM. The report showed that levels of metals in the sediment of Tavasci Marsh, with one exception, are below benchmarks that would indicate a risk to the organisms in the marsh. The one exception is in a single sediment sample in which arsenic exceeds the benchmark. This exception is, in itself, not indicative of an unsuitable habitat. Tests for the toxicity of the sediment and surface water further suggest that conditions in the marsh are not adversely affecting aquatic life. In their letter to BLM regarding these studies, NPS stated "... there would be no need for Tuzigoot National Monument to undertake clean up of the Marsh or to actively manage the habitat to prevent ecologic exposure...we look forward to the acquisition of Tavasci Marsh and its inclusion into the land base of Tuzigoot National Monument" (letter from Glen Henderson, Supt., Tuzigoot National Monument (now retired) to William T. Civish, Field Office Manager, Safford Field Office of the BLM, October 7, 1999).

Comment 24 *...the FEIS should note whether the listed bond monies would be adjusted for future inflation, and how adjustments to the required bonding are made (both by BLM and by the State). The FEIS should also contain a description of any bonding provisions the State or the Federal Government may have for contingency pit lake remediation in the event modeling predictions do not hold.*

Response: BLM regulations state that BLM will periodically review the estimated cost of reclamation and require increased funding, if necessary. Financial assurance must must also be adjusted when changes are made to plans of operations that affect reclamation costs. Under Arizona regulations, operators are required to submit an annual status report identifying any changes in surface disturbances and areas reclaimed. State regulations also require the State Mine Inspector to adjust the amount of financial assurance every five years or more often as necessary to adjust for new areas of surface disturbances or inflation or to reflect changed costs resulting from modifications to the reclamation plan.

Under the Land Exchange alternative, the Dos Pobres pit lake would be located on PD patented land and not subject to BLM oversight. A portion of the San Juan pit lake may be located on land that is currently managed by the BLM; however, no bonding provisions for the pit lake are currently anticipated because available scientific information indicates that pit lake water is expected to be of good quality. Pit lakes are not regulated under Arizona's mine reclamation program; however, ADEQ regulates impacts to groundwater quality. PDSI's proposed mine operations must comply with state groundwater quality and federal surface water quality statutes and regulations during and after mining.

Comment 25 *RE: microsites. In the FEIS, BLM should provide additional background information on the success record of such an approach (case studies) and what criteria, with respect to re-vegetation, are used to determine release of bonds.*

Response: PDSI has revised their reclamation plan to include placement of soil/growth medium over the entire surface area of the tops of the leach pad and the development rock stockpiles rather than using micro-sites. Existing on-site sources of growth medium-soil include unmineralized Gila Conglomerate within the Dos Pobres pit, as well as soils in the areas to be cleared for the leach pad, development rock stockpiles, the

SX plant, etc. Arizona does not have a set standard for success criteria regarding revegetation; determination of success (and release of bond) is based on whether the operator achieves the goals identified in the approved reclamation plan. As a general rule, the mine operator must demonstrate that the revegetation is self-sustaining for a reasonable period such that it is obvious that the vegetation is surviving without irrigation. Specifically, A.R. S. 27-996 states that "After the reclamation measures have been performed, the remaining financial assurance shall be released, except that ten percent shall be retained for the costs of care, monitoring and one reseeding, if necessary, or areas that have been revegetated. The Inspector shall release the retained monies after a perior of not more than three growing seasons after the supplemental management or other man-induced inputs have been finally removed or as otherwise provided in 27-992, Subsection B." Also, it should be noted that revegetation efforts normally attempt to achieve similar plant densities as the adjacent undisturbed areas.

Comment 26 *EPA questions whether the possible post-mining use of the area as an "industrial complex" is compatible with other uses such as wildlife habitat. We also question how formation of large pit lakes would be compatible with future mineral development. BLM should discuss these topics in the FEIS.*

Response: The facilities that could be used as an industrial complex post-mining would be the truck shop complex. While the immediate vicinity of the facilities may not be suitable as wildlife habitat, particularly for game species, the juxtaposition of such uses is compatible as part of an overall plan for post-mining land uses within the 3,400-acre mine site.

Regarding pit lakes and future mineral development, if the Dos Pobres sulfide project is determined to be feasible, it would likely occur immediately after mining of the oxide ores at the Dos Pobres pit (this Project), assuming all necessary permits and authorizations were secured. Water infiltrating into the pit would continue to be pumped out until the mining of sulfide ores was completed. The ultimate pit lake would then be within the pit resulting from that future potential project.

Comment 27 *EPA recommends that all soil and growth medium stockpiles are guarded against erosion and physically labeled in the field to avoid inadvertent uses of the materials for other purposes during mine life.*

Response: Plans to do this are described in Section 2.1.2.1.7, Soil and Growth Medium Stockpiles, of the EIS.

Comment 28 *...BLM should discuss the relative potential for ground subsidence to occur as a result of mine de-watering activities. Any significant subsidence or differential subsidence along faults, under the proposed heap leach facilities, could lead to liner tears and potential groundwater contamination.*

Response: Subsidence is caused by the dewatering of unconsolidated sediments resulting in the compaction of typically fine-grained sediments occurring below the water table. The upper (northeast) portion of the leach pad is located on volcanic rock units, rather than sediments. The lower portion of the leach is located on lower basin fill, a sediment unit, which increases in thickness to approximately 200 feet near the southwest end of the pad. The lower basin fill in the area of the pad is not saturated, as evidenced by the location of the potentiometric surface several hundred feet below the basin fill in the volcanic units. Since the sediments in the area of the pad are of relatively small thickness and are not saturated, conditions that could contribute to subsidence do not exist. Potential pad settlement, due to the weight of the constructed leach pad, was analyzed as part of PDSI's APP application. This study concluded that the maximum design height of ore placement will not adversely affect the integrity of the pad liner.

Comment 29 *...BLM should discuss slope stability between the north end of the proposed heap leach pad and the highwall of the proposed Dos Pobres and potential deep (sulfide) Dos Pobres Pit. Based on provided data, we estimate that only about 300 feet would separate the edge of an expanded Dos Pobres pit and the reclaimed leach pile. Our concerns are based on the potential for long term impacts, after mine abandonment, and the potential resulting public safety and/or water quality impacts.*

Response: PDSI's current plans regarding pit slope angles and pit slope stability are based on pit slope studies conducted by independent consultants using geologic and geomechanical data obtained from oriented-core drilling, rock quality determinations (RQD data), rock strength testing, surface mapping and cell mapping. These studies were used to determine that current pit slope designs provide appropriate levels of safety and stability. Although PDSI has provided setbacks between current Dos Pobres pit limits and the leach pad, the adequacy of the setback distance would be reviewed prior to any expansion of the Dos Pobres pit, such as the potential sulfide pit. As the mine pits are developed, the pit wall geology will be exposed and will allow for the development of additional detailed information that PDSI will incorporate into future pit slope/stability studies.

Comment 30 *Re: shipment of acid via tanker trucks. ...BLM should state what the carrying capacity of each truck would be. We also ask that the BLM discuss the feasibility of transporting the acid in a potentially more benign form, such as a solid. The FEIS should also discuss the most likely source of the sulfuric acid and discuss potential for adverse environmental impacts along any of the proposed transport corridors, outside of the immediate Safford area, should accidental spillage occur (e.g, would this increased truck traffic pass any other heavily populated areas or areas with sensitive environmental attributes, and would it pass through any Indian Country?)*

Response: Section 2.1.2.3.6, Sulfuric Acid Storage and Transport, has been revised to include information on the capacity of trucks, the most likely source location of sulfuric acid, and the feasibility of transporting acid in solid form. Regarding the potential for spills, potential imacts, and mitigating factors, see General Response 14, Hazardous Materials.

Comment 31 *Reference to Figure 1-1, made on page 3-5, top paragraph, of the DEIS, should actually be made to refer to Figure 1-2.*

Response: The reference to Figure 1-1 in the first paragraph of Section 3.2.1.2.1, Access, is incorrect and has been changed to "Figure 1-2."

Letter 251 Commentor David L. Harlow of U.S. Fish and Wildlife Service

Comment 1 *We believe the purpose and need statement has been too narrowly defined and the alternatives analysis has inappropriately identified avoidance and minimization efforts as project alternatives and not adequately analyzed true alternatives to the proposed action. ...We believe this statement (the purpose and need) encompasses both the proposed action and the purpose of and need for that action. We believe the development of the Dos Pobres and San Juan copper deposits is the proposed action. The underlying purpose of and need for the proposed action is to mine copper to meet a continuing demand for copper. We recommend the purpose and need statement be modified accordingly.*

Response: This comment was addressed by revising the Purpose and Need statement of the EIS. The purpose of and need for the Proposed Action, and other action alternatives including the Land Exchange alternatives, is for PD to develop the Dos Pobres and San Juan ore deposits, including PD's mining claims to those deposits currently located on public lands. A continuing demand for copper underlies PD's expressed desire to implement the proposed mining project and their proposed MPO and Land Exchange alternative address this purpose and need. See also response 240-5.

Comment 2 *We believe efforts to minimize impacts should be considered as mitigation measures and not as project alternatives. We recommend this discussion be removed from the alternatives analysis and placed in a section which addresses actions which could be taken to mitigate impacts of the proposed project.*

Response: See General Response No. 4, Alternatives.

Comment 3 *We believe that different mine plan configurations represent mitigation measures and not proposed action alternatives. The off-site mine alternative section should be expanded and more fully analyzed, as we believe it represents a true alternative course of action, different from the proposed action, which would still meet the underlying purpose of and need for the action.*

Response: See General Response No. 4, Alternatives.

Comment 4 *This section (Section 2.2) does not describe alternative courses of action that could meet the underlying purpose of and need for the proposed action, but rather describes a different regulatory pathway by which to approve the proposed action. For the purposes of NEPA compliance, we believe acquisition of the offered lands more accurately represents mitigation measures for impacts resulting from the proposed project.*

Response: As indicated in Section 1.4, the purpose and need for the Project is the development of PD's mineral resources at the Dos Pobres and San Juan ore deposits. BLM agrees and has stated in Section 1.4 that, while the primary purpose of the land exchange is the acquisition of private lands for public lands to achieve improved management of federal lands and acquisition of lands containing important resource values, the exchange is also an alternative that is consistent with the purpose and need for the mining project.

BLM disagrees that the exchange more accurately represents mitigation for impacts of the proposed mining. While it is understandable that some may consider public acquisition of the resources on the offered lands as "compensating for the impact [e.g., of mining] by replacing or providing substitute resources or environments" (see definition of mitigation at 40 CFR 1508.20[e]), this presumes that BLM will select the exchange alternative to compensate for the mining impacts that would occur under the COE's and ADEQ's approval of CWA permits necessary to implement the Dos Pobres/San Juan Project. However, the public must clearly understand that the relationship between the impacts of the proposed mining and the acquisition of the offered lands is NOT a causal one. For the BLM, the MPO and the land exchange are mutually exclusive alternatives to achieve the purpose and need. For the COE and ADEQ, approval of their respective CWA permits in no way requires nor causes BLM to select the land exchange (see Figure 1-3). Therefore, because the impacts of mining on the selected lands could occur with OR without the exchange, the exchange cannot and should not be considered as mitigation for mining impacts to public lands resources.

Comment 5 *Furthermore, we believe the loss of 17,000 acres of BLM administered lands to satisfy a project that would only require 1,935 acres of BLM land unnecessarily complicates the regulatory process by including land that could later be developed as a separate yet-undescribed project and may not be in the public interest. For the land exchange alternative we recommend BLM only consider exchanging those selected lands which would be necessary to complete the Dos Pobres/San Juan project.*

Response: See General Response No. 4, Alternatives.

Comment 6 *We disagree with the statement that impacts associated with the foreseeable land uses are not directly or indirectly caused by the land exchange. We believe the impacts associated with the proposed project, as well as the future land uses, would be direct consequences of the land exchange. If BLM chooses to implement a land exchange, we believe the potential impacts resulting from actions on the entire 17,000 acres of selected lands should be assessed before the exchange occurs, including the impacts of future projects.*

Response: See General Response No. 3, Scope of Analysis and response 251-4.

Comment 7 *We are concerned these sections may not have adequately addressed potential impacts to springs and seeps located along the riverfront, such as Cold springs and Bylas springs, which support populations of endangered fish species.*

Response: The hydrologic model addresses the issue of the cone of depression, which does not encompass these springs. However, if the monitoring wells indicate that the cone of depression is more extensive than anticipated, these springs would be monitored for adverse impacts. Cold Springs and Watson Wash are

presently monitored quarterly by BLM.

Comment 8 *We are also concerned the hydrologic analysis may not provide an accurate representation of potential impacts on the Gila River or Bonita Creek. The DEIS states that predictions of the hydrologic model do not account for changes in climate, population growth, water use, and other land uses that may affect the regional groundwater system. We believe this approach is inappropriate as it does not consider the cumulative affect of interrelated and interdependent projects. Also, we understand that BIA hydrologists disagree with the assumption regarding permeability of the geologic fault identified as existing beween the mine and the river (Cathy Wilson, BIA, personal communication). We recommend potential impacts to riverfront springs and the cumulative effect of interrelated and interdependent projects be more thoroughly assessed, and the hydrologic model be circulated for independent peer review by other agencies' experts.*

Response: The hydrologic model has been subject to extensive outside independent peer review (see General Response No. 16, Groundwater Model Review). The conclusion of those reviews are that the model provides a reasonable estimate of project impacts. This peer review has also correctly reaffirmed that no model is without uncertainty. Considering this uncertainty, the BLM ID Team has required that the MMP for the project (see Appendix F) contain a program to monitor the model's predictions against actual effects and adjust mitigation as necessary. This program is called the Model, Monitor, and Mitigate (3M) Program and its implementation will ensure that predicted and actual impacts to the Gila River are adequately mitigated. See also General Response No. 16, Groundwater Model Review.

Comment 9 *Please note that the Plan (HMMP) itself has the potential to impact listed species through the removal of salt cedar. We recommend these potential impacts be assessed.*

Response: The BLM and COE coordinated with the USFWS regarding this specific concern and modified the implementation plan in the mitigation and monitoring program to avoid these potential effects. See revised Appendix F. Additionally, in light of these changes, the Biological Opinion issued by USFWS in June 2002 states that "while there are temporal setbacks to the suitability of the habitat patch at the Pima mitigation site for flycatchers [as a result of salt cedar eradication], the proposed MMP is expected to result in net beneficial environmental effects" (p. 30) and "the Service does not anticipate the proposed action will incidentally take southwestern willow flycatcher" (p. 32).

Comment 10 *Because of the loss of BLM jurisdiction that would occur under a land exchange, the Service believes it is imperative that the total impacts of the foreseeable land uses on the entire acreage of selected lands be assessed prior to exchange.*

Response: This analysis is included in the EIS. Impacts of the land exchange, including impacts of both the proposed mining at Dos Pobres/San Juan and the foreseeable uses of the selected lands, are quantified and disclosed in Chapter 4. Impacts of foreseeable uses associated with development of the Dos Pobres sulfide and Lone Star deposits are not analyzed in the same level of detail as impacts attributable to the MPO for reasons explained in General Response No. 3, Scope of Analysis.

Comment 11 *We disagree with the statement that the only effect of the proposed land trade on federally listed, proposed, or candidate plant species would be a change in required consultation procedures for proposed actions. We believe any on-the-ground effects to listed species resulting from mining operations would be a result of the land exchange.*

Response: See General Response No. 3, Scope of Analysis, regarding the non-causal relationship between physical impacts from foreseeable mining activities on the selected lands and the proposed exchange; see also response 251-4.

Comment 12 *...the DEIS does not state how long the fallowing program would be performed. This is important because of the time discrepancy inherent in this approach. Mitigation would begin a year after project initiation, but impacts to the Gila River would not occur for over 400 years. If the fallowing program is not implemented at the time groundwater pumping actually affects the river, the program would fail to mitigate impacts to the river. Also, we understand that BIA questions the viability of the fallowing program due to provisions and requirements of the Federal Globe Equity Decree (Cathy Wilson, BIA, personal communications). We recommend this section identify alternative mitigation plans in the event the fallowing program is unable to be implemented. We further recommend this section include monitoring of riverfront springs and Bonita Creek and identify potential mitigation measures if appropriate.*

Response: Through deed restriction, the Alternate Year Fallowing Program would be implemented in perpetuity. The program would begin when groundwater pumping for mine development is initiated. Initial mitigation amounts would be based upon the maximum predicted impact to the river and therefore, would initially overcompensate for those potential effects. The Alternate Year Fallowing Program, as proposed, is legally and technically achievable and the actions are verifiable through review of Gila River Water Commission's annual reports and for any given year, visual inspection to verify compliance. The 3M Program outlined in the MMP (see Appendix F) provides detailed, specific contingency measures that ensure that proposed mitigation efforts are adequate to address actual effects associated with the project; additional contingency measures are not necessary.

See response 251-7 regarding riverfront springs.

Monitoring of the modeled impacts to groundwater systems that would potentially cause impacts to Bonita Creek is provided by the 3M program. Further, as indicated in the BIA's hydologic consultant's report (Stetson Engineers letter to Cathy Wilson, BIA, dated May 17, 1999, p. 3), "Even if the model results [for the predicted depletion of Bonita Creek of a maximum impact of one acre-foot per year] are low by a factor of five, this amount of flow is not likely to be measurable, even during dry periods."

Comment 13 *...the Section 404 draft mitigation plan only mitigates for impacts to jurisdictional waters of the United*

States. We believe mitigation prepared pursuant to NEPA should address the totality of project related impacts. Additional mitigation measures for potential impacts occurring to upland biotic communities should be identified. The BLM may wish to identify acquisition of the offered lands as partial mitigation for project impacts.

Response: The Mitigation and Monitoring Plan was initially prepared to address impacts to jurisdictional waters of the United States, such as the Gila River, and will be included as a condition of the Corps' Section 404 permit, if issued. Additional mitigation proposed for the project has been identified in Table 4-42 of the EIS. BLM does not consider acquisition of the offered lands as mitigation for impacts resulting from the proposed mine plan of operations. The resource values associated with these properties are considered, in conjunction with the resource values of the selected lands, during the BLM public interest review of the proposed exchange.

Letter 252 Commentor Janine Blaeloch of West. Land Exch. Project & Brian Segee of Center for Biodiversity (was SW Cent. for Biodiv.)

Comment 1 *The Southwest Center and WLXP have numerous objections to all of the action alternatives for this proposal. However, we are adamantly opposed to the Land Exchange Alternative.*

Response: See General Response No. 1.

Comment 2 *...the "improved management" that would follow public acquisition of the offered lands is marginal, and, as the DEIS notes, the mining operation will occur whether or not the proposed land exchange is completed. Thus, the public interest rationale offered by the BLM in the DEIS is flimsy, at best, and collapses completely when the adverse consequences of the exchange are considered.*

Response: See General Response No. 8, Public Lands Management.

Comment 3 *The Amado and Curtis properties, along with the other 13 inholdings within the Gila Box, should be the subject of a vigorous quest by the BLM to obtain money for purchase from the Land and Water Conservation Fund.*

Response: This comment has been addressed in General Response No. 4, Alternatives.

Comment 4 *Re: Musnicki property. Further grazing and ORV use do not constitute "improved management" as the BLM asserts.*

Response: See General Response No. 1.

Comment 5 *It is unclear how its (Schock property) acquisition would improve public land management.*

Response: See General Response No. 8, Public Lands Management.

Comment 6 *...if the National Park Service believes acquisition of this land (Tavasci Marsh) is critical, the agency should be aggressively lobbying for funds from the Land and Water Conservation Fund.*

Response: This comment has been addressed in General Response No. 4, Alternatives. See also response 198-3.

Comment 7 *It is unclear how acquisition of this property (Freeland and Butler Borg) would improve public land management.*

Response: See General Response No. 8, Public Lands Management.

Comment 8 *Re: Fuelner property: This property is also contained within the Empire-Cienega LTMA. Like the Schock property, Fuelner will remain open to livestock grazing and will leave very diverse ownership patterns within Empire-Cienega.*
Re: Norton: This parcel would continue to be grazed.
Re: Clyne I and Clyne II: These lands, also within the Empire-Cienega LTMA, lie in the foothills of the Whetstone mountains. Like the other properties, grazing would continue and mixed ownership patterns would remain.

Response: See General Response No. 8, Public Lands Management.

Comment 9 *...this land exchange will facilitate an open pit copper mine which will have disastrous impacts on both people and wildlife, many of which are addressed in the land exchange regulations at 43 CFR 2200.6(b):*

'Fish and Wildife Habitats/Watersheds:' Both mines will consume enormous amounts of surface and ground water, resulting in reduced instream flows in the already beleaguered Gila River. Less water means less chance for recovery of populations of endangered species dependent on the river, such as the Gila topminnow and Southwestern willow flycatcher.

'The needs of State and local residents, San Carlos Apache:' ...the San Carlos Apache reservation holds senior water rights that will be directly impacted by the Dos Pobres/San Juan project.

'The need of State and local residents, Labor:' Dos Pobres/San Juan will not benefit union workers.

'The needs of State and local economies/expansion of communities:' ...mining projects only perpetuate the boom and bust cycle that has devastated the state's natural heritage and assured the instability and marginality of its rural communities.

'Fulfillment of public needs:' ...opening yet more open pit copper mines is failing to fulfill any public needs, is creating an even more volatile and unstable industry, and is actually hurting the public by unnecessarily driving copper prices even lower.

'Conflict with Indian trust land objectives:' ...the BLM is allowing a land exchange to go forward with great potential to do enormous harm to Indian trust objectives in direct violation of land exchange implementing regulations.

Response: See General Response No. 8, Public Lands Management.

Comment 10 *While we strongly believe that the agency's practice of withholding private land values should cease, the short-term solution is for private parties to land exchanges to open appraisal records to the public as soon as appraisals are complete.*

Response: The total value of the offered (private) lands was provided in the EIS, in Table 2-13 and the process for developing the appraisals was described in Section 1.6.2.2.3 in Chapter 1. See also General Response No. 4, Appraisals.

Comment 11 *...we are very concerned that the federal government is not entering into a fair and equal as required by Federal Land Policy and Management Act regulations at 43 C.F.R. 2200.6c. Specifics pointing to this include:*

-The fact that over 4 acres of public land are being given away for each private acre received.

-The selected lands are highly consolidated while the offered lands are scattered throughout five counties in Arizona. Continguous property has a higher market value than isolated property. Is this consideration reflected in the appraisal?

-...With the exception of one parcel within the San Juan block which has a high potential, the presence or absence of mineral potential has not been determined to any meaningful degree of certainty.

-...What has been determined to be the highest and best use of the selected land? Does this appraisal take into account the millions of dollars that Phelps Dodge will save by acquiring this land?

Response: See General Response No. 4 Appraisals and Section 1.6.2.2.3 in Chapter 1 regarding the BLM's appraisal process and considerations in developing appraisals for the selected and offered lands.

Comment 12 *...the Western Land Exchange Project learned last year that the salaries of Arizona BLM land exchange staff (including those assigned to this project) are paid by Phelps Dodge and the other private parties working on land exchanges within the agency. At the very least, this creates the appearance of conflict of interest, as staff may have a built-in incentive to decide in the interest of the private party funding their positions.*

Response: See General Response No. 15, Conflict of Interest.

Comment 13 *Rather than treat the [LWCF] Fund as a lost cause, the BLM should actively promote it as an alternative to land swaps.*

Response: With regard to the LWCF as an alternative to the proposed land exchange, see General Response No. 4, Alternatives. See also Section 1.6.2.2.1 regarding use of the LWCF as an alternative to the land exchange.

Comment 14 *...neither this table (Table 1-1) nor any other section in the DEIS confronts directly the environmental effects created by the land exchange--most important, the removal of protection found in BLM's mining regulations at 43 CFR 3809. Even a cursory comparison of these regulations with Arizona's state mining regulations demonstrates that such effects will be significant.*

Response: See General Response No. 5, Loss of Federal Oversight, as well as Section 1.6.2.2.4 and Section 4.4, Land Exchange Alternatives Impact Analysis, which discuss impacts of the alternatives with regard to loss of BLM management of the selected lands.

Comment 15 *...the land exchange would affect application of the following laws:*

-Section 7 consultation under the Endangered Species Act would not be required.

-The National Historic Preservation Act would not apply.

-Clean Water Act permits would not have to contain as much detail.

It is clear that the land exchange would fundamentally shift the legal framework surrounding mining operations at Dos Pobres/San Juan, and that the DEIS' repeated assertions that impacts would be the same with an exchange as they would be without are false.

Response: See Section 1.6.2.2.4 regarding regulatory requirements under the land exchange scenario and see General Response No. 5, Loss of Federal Oversight.

Comment 16 *...none of the environmental effects of using state rather than federal mining regulations are discussed in the DEIS. This failure constitutes a serious violation of NEPA.*

Response: Certain state regulations, such as the Aquifer Protection Permit program, pertain to mining activities on both public and private lands, however, reclamation would be overseen by the State Mine Inspector rather than by BLM under an exchange scenario. Because the reclamation measures proposed by PD will meet, and would be implementable, under both BLM's 3809 regulations and Arizona Mined Land Reclamation regulations, there are no environmental effects resulting from any real or perceived differences between state and federal reclamation requirements for this Project. This is discussed in Section 4.4.1.1.

Comment 17 *All told, the DEIS devotes 6 pages to these issues (biological resources) in the "environmental consequences" section. This analysis is obviously inadequate when one remembers that Dos Pobres/San*

Juan will consist of two open-pit copper mines and ancillary facilities sprawling over thousands of acres, using and creating highly toxic materials, and extracting nearly 3 billion pounds of copper during its existence.
An example of the DEIS's failure in this respect may be seen in the "wildlife resources" section . Here it is stated that "some wildlife, including game species such as mule deer, javelina, mountain lions, doves, and quail" will be affected. Yet nowhere is it explained how these species will be affected. ...A similar lack of attention is given to threatened, endangered, and BLM sensitive species. The FEIS must be amended to provide meaningful analysis of this project's effects on wildlife.

Response: Section 4.3.3.2 of the EIS in its entirety discusses the potential impacts on wildlife, including game species, from the proposed mining. Section 4.3.3.3 discusses impacts on sensitive and listed species. These sections have been revised to discuss impacts in more detail.

Comment 18 *Finally, in addition to the NEPA violation associated with this dearth of analysis, it appears that the BLM has failed to conduct a Section 7 Endangered Species Act, consultation with the U.S. Fish and Wildlife Service concerning the effects of this action of federally-listed threatened and endangered species.*

Response: See General Response No. 6, Endangered Species Act Compliance, for a description of BLM's extensive Section 7 Consultation process, efforts, and results.

Comment 19 *Consistent with Executive Order No. 11988, when trading away land within a 100 year floodplain, the BLM must consider including in the deed of conveyance a requirement to preserve the beneficial aspects of the floodplain. ...This requirement has not been met in the Dos Pobres/San Juan DEIS.*

Response: See General Response No. 13, 100-year Floodplains.

Letter 253 Commentor Robert E. Yount of Arizona State Land Department, Nat'l Res. Division

Comment 1 *Project uses of surface water are not regulated under the Globe Equity Decree. This decree regulates diversions of water from the Gila mainstem for agricultural purposes. The Project will use surface waters several miles distant from the river. These new uses must be authorized; however, the permitting authority is the State of Arizona, not the Federal District Court as Decree administrator. It is not incumbent on Phelps Dodge to obtain approval from the court before initiating new uses pursuant to state law. Assertions to the contrary in the Draft EIS are mistaken.*

Response: Please see Section 1.5.3 of the EIS, which has been revised.

Comment 2 *Project uses of groundwater are not regulated under the Globe Equity Decree.The Draft EIS erroneously asserts that the District Court has authority to regulate groundwater pumping several miles distant from the Gila River channel. Under Arizona law, groundwater pumpers may not take subflow from a stream in disregard of established diversion rights. No other limitations presently exist in this area of the state.*

Response: Please see Section 1.5.3 of the EIS, which has been revised.

Comment 3 *Project uses of surface and groundwater are minimal. It is possible to speculate, as do the authors of the Draft EIS, concerning possible changes in law that might limit Phelps Dodge's future ability to develop water sources for the Project....However, the combined downstream effect of its planned surface and groundwater uses (75 a/f/a) appears to have no practical adverse consequences for any holder of prior diversion rights. Moreover, mitigation seems feasible should some harm occur....It appears, from the Draft EIS, that proposed Project water uses pose no significant threat to existing appropriators. The Bureau of Land Management need not delay or condition approval based on perceived uncertainty regarding water rights.*

Response: See General Response No. 1, Expression of Personal Opinions.

Letter 254 Commentor Kenneth E. Travous of Arizona State Parks

Comment 1 *Review of the Draft EIS has revealed no adverse effects to State Parks' operations in the region of the state where the Dos Pobres project is proposed.*

Response: Your comment has been noted. Thank you.

Comment 2 *...State Parks views the transfer of Tavasci March part of the land exchange as a desirable enhancement to recreational access and activities in the Verde River Valley near Cottonwood and Clarkdale.*

Acquisition of the Tavasci Marsh property by Tuzigoot National Monument will allow partnership in development activities between the National Park Service and State Parks-Verde River Greenway.

Response: See General Response No. 1.

Letter 255 Commentor Mary Thomas of Gila River Indian Community

Comment 1 *GRIC suggests that BLM review those regulations applicable in the State of Utah and other states that may require a double synthetic liner system to determine whether such a system would be required under the circumstance present here. In that manner BLM can more adequately investigate and report on whether the project presents unnecessary or undue risk of environmental degradation.*

Response: Regarding use and specifications of a liner system in the MPO, BLM defers to the requirements of the ADEQ's Aquifer Protection Program (APP). PD must comply with the requirements of this program in order to secure an APP permit, which is necessary to commence mining regardless whether the land exchange is approved or not. The leach pad will be lined, but the development rock stockpiles do not warrant liners, as indicated by ABA studies of the development rock material.

Comment 2 *GRIC would like assurance that plans for zero discharge will not be changed or altered if the land exchange takes place. Again, if such changes are possible, GRIC finds it difficult to understand how BLM*

can adequately determine whether or not the land exchange will or will not result in undue degradation to the environment, including those related to cultural resource issues.

Response: PD has designed and engineered the Dos Pobres/San Juan mine facilities to meet EPA's zero-discharge standards for NPDES permitting under Section 402 of the Clean Water Act. EPA is a cooperator on this EIS and will make a permit decision on the application submitted by PD, regardless of whether mining occurs under an MPO or after a land exchange.

While BLM or even EPA cannot provide assurance that PD will not alter its permit application (if the land exchange occurs or even if an MPO is approved), BLM assures the Gila River Indian Community that PD must meet and comply with EPA's standards and requirements for NPDES to implement mining at Dos Pobres/San Juan. Any changes to its permit application or to the permit if it is issued would require additional EPA review for compliance and authorization. For federal or state environmental resources under other agencies' jurisdiction, BLM can make a determination that no undue degradation of the environment would occur if a proponent, PD in this case, adequately demonstrates compliance with the agencies' standards and requirements for resource protection.

Comment 3 *GRIC has not independently reviewed the modeling techniques but anticipates that, to the extent possible, actual withdrawal, impact to the aquifer and to the surface water flow of the Gila River (if measurable) will be available for public review. If not, this should be a condition of any permit to the maximum extent allowed by law.*

Response: The BIA's hydrological consultant, Stetson Engineers, undertook a lengthy and exhaustive review of the groundwater model, its input parameters, and output. Their report and conclusions are available to the Gila River Indian Community and to any other members of the public through the BIA during regular business hours.

To assure technical adequacy, a qualified third-party hydrologist will review monitor well data collected during the 3M Program, including the recalibrated model projection if warranted, and submit a report of findings to the COE. This report will be available to the public if release by the COE is requested under the Freedom of Information Act (FOIA) of 1966 as amended.

Comment 4 *To the extent that the proposed mitigation compensates for the loss of waters in the Gila River Watershed, GRIC is supportive of PD's decision to offer mitigation, of its approach to that mitigation, and its commitment to meeting is obligations by avoiding those potential losses. To the extent that the models described in draft form at Appendix F of the DEIS are accurate in predicting the Project's impact on the Gila River, PD's efforts should mitigate the loss of waters to the Gila River.*

Response: See General Response No. 1.

Comment 5 *GRIC is concerned that the land exchange alternative will remove those protection and policy considerations, making the sites and areas less accessible, subject to damage and/or destruction, and more difficult to use for prayer and other matters. Although Indian people may have quit using certain sites for a period of time after being restricted to reservations, having their religious practices made criminal acts, and having thereby lost knowledge of the sites' locations, that does not diminish the sites' significance.*

Response: See General Response No. 9, Cultural Resources Mitigation.

Comment 6 *If those laws and policies [pertaining to protection of cultural resources on public lands] are to be abandoned with respect to the TCPs identified on the federal lands by the execution of a land exchange agreement, it is critically important that BLM take appropriate steps to ensure that measures are taken prior to or contemporaneous with the land exchange in order to ensure that the TCPs are protected for the benefit of the tribes and the tribal people.*

Response: See General Response No. 9, Cultural Resources Mitigation. BLM considers loss of federal protection of cultural resources, including of TCPs, to be an impact of the land exchange and, as such, mitigation measures will be required if that alternative is selected.

Comment 7 *BLM can partially meet its obligations (under NAGPRA, and EO 13007) by either altering the MPO with respect to the location of the East Development Rock Pile, which will otherwise adversely impact the use of Site No. AZ CC:2:211, or, with respect to the land exchange alternative, by either transferring certain lands to the tribes, the Secretary of the Interior for the benefit of the tribes or by including restrictive and prescriptive covenants in the deed to the lands to provide for those items.*

Response: See General Response No. 9, Cultural Resources Mitigation.

Comment 8 *GRIC also believes that the issue of "ownership" of the numerous petroglyphs needs to be addressed. Either ownership of the petroglyphs should be established in the tribes prior to a land exchange agreement or any land exchange agreement should incorporate a provision describing the tribes' ownership of the items and sites.*

Response: See General Response No. 9, Cultural Resources Mitigation.

Comment 9 *GRIC is concerned that the section 5.2, addressing environmental justice concerns, is lacking in discussion and in addressing potential impacts of the Project. It must be noted that Environmental Justice includes disproportionate adverse environmental impacts in regard to cultural resources. Here, both approval of the Project MPO and approval of the land exchange would have that result. The tribes will suffer in a significant manner. GRIC also notes that this item may also be considered as a "cumulative impact" consideration. Increasingly, tribal people have seen their important traditional sites and objects destroyed or otherwise disappear.*

Response: Executive Order 12898 on environmental justice addresses disproportionate human health, environmental, and economic effects on minority and low-income populations from the proposed facilities. While places of traditional importance to cultural groups and communities, including Indian tribes, are part of the environment, such places are identified, evaluated, considered, and mitigated under the provisions of the National Historic Preservation Act of 1966. This includes traditional cultural properties (TCPs) as described in National Register Bulletin No. 38. Archaeological sites to which eight Indian tribes ascribe traditional importance are identified in Chapter 3, Affected Environment, Section 3.2.4.2, and potential impacts to these sites are analyzed in Chapter 4, Environmental Consequences, Section 4.3.4.2.1.

In Table 5-2, BLM provides a Summary of Adverse Impacts of the Action Alternatives for the Dos Pobres/San Juan Project: Environmental Justice Analysis. Section 4.8.1.1 describes the unavoidable adverse impacts and discusses the impacts to archaeological sites, 23 of which may potentially be eligible for listing on the National Register of Historic Places as Traditional Cultural Properties (TCPs). The BLM's consultations with Indian tribes included tribal review and input regarding the data recovery plan. The cumulative effects discussion in Section 4.5 has been expanded in the FEIS to address potential cumulative impacts to cultural resources.

Letter 256 Commentor Peter Lahm of USDA, Forest Service

Comment 1 *Use of Safford PM10 background values should be re-considered. Were the values recorded in the Montezuma background representative in terms of meteorology and other pertinent factors? The EIS should additionally cite nearby air quality analyses that established precedence for Montezuma Castle PM10 background values. Background for NO2 needs to be re-assessed. Other air quality permit modeling analyses located in rural sites are not using zero background values. Receptors should be placed at nearby Class III Wilderness areas,. Why wasn't an evaluation of meteorology included? Where is the description of current visibility conditions?*

Response: Each part of this multi-part comment is addressed separately below.

Montezuma Castle Data: The Final Air Impact Analysis followed the modeling protocol (provided in Appendix A of that report) developed for the Dos Pobres/San Juan Project Class II permit application. This protocol was approved by ADEQ. As explained in the response to Comment 15-1 above, PM10 data collected at the suburban Safford site were considered but further review indicated that the measured PM10 concentrations are not characteristic of the background levels that would be expected near the rural Dos Pobres/San Juan Project location. In selecting the Montezuma Castle site, the rural setting and general elevation of the Montezuma Castle were compared to the Dos Pobres/San Juan Project area and were found to be very similar. In ADEQ's response to the above referenced modeling protocol, ADEQ stated that Montezuma Castle is one of three PM10 background monitors in the state used to demonstrate background in minimal impact areas. ADEQ approved use of the rural Montezuma Castle data after reviewing the meteorological data used in the dispersion modeling. The ADEQ also established precedence for use of the Montezuma Castle data in ADEQ's approved air impact analysis conducted for the rural Sanchez Copper Project, located approximately 12 kilometers southeast of the Dos Pobres/San Juan project area.

Gaseous Background Values: Gaseous background concentration values were revised for the Final Air Impact Analysis. The background concentrations used, and justifications for their use, were as follows.

Background NO2: According to the latest air quality data published by the ADEQ (Air Quality Report, Appendix I to the 1998 Annual Report, which summarizes 1997 data) NO2 monitoring was conducted in St. Johns, Springerville, Page, Phoenix, Scottsdale, Palo Verde, Alomas Way (Bullhead City), and Tucson. These monitoring sites are close to major NOx emission sources such as electric power generating stations or metropolitan areas. Therefore, use of maximum monitoring data obtained at these sites to represent rural background conditions would be very conservative is not appropriate. For that reason, the lowest NO2 concentration measured at these sites was used (2 =B5g/m3 from the Springerville monitoring site located 4 miles northeast of town).

Background CO: No rural CO monitoring sites exist. Consequently, use of monitoring data obtained from any of the CO monitoring sites to represent background conditions would be very conservative. Thus, the monitoring site with the lowest measured CO concentrations, Casa Grande, was used to represent background conditions. During 1997, the highest 1-hour and 8-hour CO concentrations measured at the Casa Grande site were 1,714 micrograms/m3 (1.5 ppm) and 1,486 micrograms/m3 (1.3 ppm), respectively. These values were conservatively used as rural background CO concentrations in the modeling analysis.

Background SO2: There are a number of SO2 monitoring sites located throughout the state. As with the NO2 monitoring sites, however, many of these monitoring sites are located near electric power plants or metropolitan areas, while the others are located near smelters. These sites will provide unrealistically high estimates for background SO2 concentrations in the rural project area.

Consequently, background concentrations were conservatively represented by the lowest 3-hour, 8-hour, and annual SO2 concentrations measured from the less developed Springerville site during 1997. These values, recorded from the Springerville monitoring site located 4 miles northeast of town, are 55 micrograms/m3, 13 micrograms/m3, and 1 micrograms/m3, respectively.

Receptors: Although receptors were not placed in specific Class II Wilderness Areas, special receptors were placed in the mandatory Federal PSD Class I Gila and Galiuro Wilderness Areas, in the San Carlos Apache Reservation, in downtown Safford, at the Safford Airport, and at the nearest residence. In addition, the general receptor grid used in the modeling extended outward approximately 4 kilometers from the process area boundary. The modeling results indicate impacts decrease rapidly with increasing distances from the project area. Potential impacts at distant Class II wilderness areas would be much less than the maximum values reported in Table 4.1 of the Final Air Impact Analysis, and can be interpolated from the modeling results for other receptor locations.

Meteorology: A detailed evaluation of the meteorological data is included in Section 3.3 of the Final Air Impact Analysis.

Visibility: As reported in Section 5 of the Final Air Impact Analysis, the background visibility conditions assumed in both mandatory Federal PSD Class I areas was 110 kilometers, a value much cleaner (more clear) than would be expected under the meteorological assumptions applied in the Level 1 and Level 2 visibility screening analyses. In addition, at the request of the U.S. Forest Service, the Secondary Air Impact Analysis for the Environmental Impact Statement for the Dos Pobres/San Juan Project Based Upon

an Alternative Emissions Inventory, October 4, 1999, also examined potential visibility impacts at both mandatory Federal PSD Class I areas assuming the very clean (clear) background of 238 kilometers. Regardless of the background assumptions applied, emissions from the Dos Pobres/San Juan Project would not cause visibility impacts in either the Galiuro or Gila wilderness mandatory Federal PSD Class I areas.

Comment 2 *Simple maximum impact (not modeling) of VOC in terms of ozone formation should be conducted. VOC analysis and calculation of emissions should be conducted using similar conservative methods used in Carlotta Project EIS July 1997. The EIS needs a comprehensive emission inventory of the sources including citation of AP-42 calculation methods used. Any emission reduction credit through the use of mitigation measures should be specifically cited along with criteria for use. The rate and standard/criteria for application of water and/or palliatives used on haul roads should be specified. What are the total uncontrolled and controlled emissions for the alternatives?*

Response: The Final Air Impact Analysis contains an evaluation of VOC emissions with respect to Arizona Ambient Air Quality Guidelines (AQGs). Moreover, VOC emissions are expected to be extremely low, much less than the major source thresholds, as well as ADEQ significant emission rates. Generally, the effect of such low VOC emissions on ozone formation is negligible, and ozone modeling for this proposed source was not required by ADEQ.

The Final Air Impact Analysis also contains a complete emissions inventory with an associated section on calculation methodology. All assumptions are explained and all AP-42 methods are cited (including control and capture efficiencies). Site and process flow diagrams are also included. The Final Air Impact Analysis also contains a complete explanation of the dispersion modeling methodology including explanations and justifications for the various modeling approaches and techniques that were used.

Comment 3 *The visibility analysis has no basis for review since there are no emissions, example model runs with inputs or sample outputs provided. The analysis indicates that the Galiuro Wilderness required a Level 2 analysis indicating that impacts were found in the Level 1 step. Is this true? What background visual range values were used and from what sites. What seasons were used. Why were the current visibility conditions omitted from a description of current condition? Was the 90th percentile visibility condition the basis of the analysis? What criteria were used to indicate "no impacts to visibility" in the Class I areas? ...What screening values were used?*

Response: The Final Air Impact Analysis contains a revised visibility impact analysis complete with a full explanation of the methodology that was used and inclusion of modeling input and output files. The visibility impact in the Final Air Impact Analysis follows the EPA guidelines for conducting such analyses.

To address U.S. Forest Service concerns regarding default visibility impact screening criteria, a separate visibility analysis was conducted and submitted to the BLM as part of the document: Secondary Air Impact Analysis for the Environmental Impact Statement for the Dos Pobres/San Juan Project, Based Upon an Alternative Emissions Inventory, October 4, 1999. The visibility impact analysis contained in this report is based on the more stringent U.S. Forest Service screening criteria.

Comment 4 *Since no emissions were provided in the draft EIS, how can the statements made in this section be supported? Were haul road mileages changed? This type of conclusion requires documentation including a map which shows the sources and how they change between alternatives.*

Response: As stated in response 256-2, the Final Air Impact Analysis contains a complete emissions inventory with an associated section on calculation methodology, along with all the proper documentation and references for the critical assumptions that were made. Maps showing source locations and tables listing source parameters are also included. All necessary documentation to support the stated conclusions is included in the Final Air Impact Analysis.

Comment 5 *The proponent has several mining holdings in the area which if run simultaneously and are potentially adjacent to each other may have significant enough emissions to move beyond minor source classification. How are these other areas and operations being considered? The Sanchez Project is already permitted and not considered in any cumulative analysis or linked to these adjacent proposed facilities. The role of the ADEQ air permit and its role in enforceable conditions needs to be discussed. The concept of how maximum production rates relates to the emissions calculated and air quality impact analysis needs discussion. Will there be a production cap in the air quality permit to ensure the public that emissions from this action will not exceed the stated emissions in the EIS? This concept should be seriously considered as an element in the permit and Plan of Operations.*

Response: The Dos Pobres/San Juan Project is considered a separate, stand-alone facility, or stationary source, for purposes of air permitting and air impact analysis. While the undeveloped Sanchez Copper Project has an air permit, it is not adjacent or contiguous to the Dos Pobres/San Juan Project since the Sanchez mine is located approximately seven miles southeast of the San Juan mine. Any significant changes in project facilities or operating rates resulting in higher potential emission rates of the Dos Pobres/San Juan Project would be subject to modifications to the air quality permit. Additionally, potential future development by PDSI of other mineral resources in the area would result in ADEQ review to determine whether such development would be considered separate or whether it is adjacent and/or contiguous to the Project requiring treatment as an expansion to the permitted stationary source.

The air quality impact analysis for the Dos Pobres/San Juan Project incorporated emission rates (potential to emit) based on maximum daily and annual production rates. ADEQ is responsible for protecting National Ambient Air Quality Standards (NAAQS) through appropriate permit conditions and limitations to limit project emissions to those quantities used in the air impact analysis that demonstrated protection of

the NAAQS. As ADEQ has not yet issued their permit to PDSI, BLM does not know what specific permit conditions, limitations, or combination thereof the agency will require to ensure protection of NAAQS.

Letter 257 Commentor Charles Vargas of Future San Carlos Chamber Commerce

Comment 1 *...there is no discussion throughout the DEIS of San Carlos Apache issues pertaining to social impacts, economic, above and underground water issues as well as soil / land issues and what environmental effects the operation would have on surrounding lands including the San Carlos Apache Reservation.*

Response: To the degree that they may occur, impacts to the San Carlos Apache people and the San Carlos Apache Reservation were identified and disclosed throughout Chapter 4 of the DEIS.

See response 238-1.

Comment 2 *...there is no effective mitigation plan for the control of hazardous materials that the Apache Community will see increasing with the proposed project passing through our boundaries. With depressed economic conditions that exist on the reservation there is no Hazardous Materials Task Force proposed or even considered. Given the Apache People will be subjected to the increased possibility of having a Hazardous Materials accident there should be some plan for emergency circumstances as well as equipment and personnel in the area.*

Response: See General Response No. 14, Hazardous Materials.

Comment 3 *All water resource data sited are questionable by BIA's understanding and USGS confirmation as what ground water recourses are in the Gila basin. To base formulas and projections of water use from this nonfactual information is questionable to say the least but should raise a serious question to BLM of water resource uses and trust responsibilities to not only the U.S. taxpayer but the San Carlos Apache Tribe. These problem areas we are vary concerned with as they will impact our future ground water needs and possible uses in our economic development. No in-depth mitigation plan was covered for possible ground water contamination and possible effects to the Gila River flow, which feeds San Carlos Lake.*

Response: A significant amount of the water resources data used for the purposes of the EIS was obtained from USGS and published USGS Water Resources Data reports. Additional data were obtained from published literature on the hydrogeology of the Safford area, which is generally recognized by the scientific community at large. Furthermore, the model underwent rigorous scientific review by BLM's review hydrologist Dr. Robert MacNish of the University of Arizona, BLM and USGS hydrologists, and by BIA's hydrology contractor, Stetson Engineers. The discrepancies in model results identified by Stetson Engineers' in their review/rerun of the model are not significant and within expected levels of error for the model. A detailed plan for mitigation of projected effects on surface flow in the Gila River is provided in Appendix F of the EIS; no surface water quality effects are predictd for the Gila River therefore no mitigation has been proposed. See also General Response No. 16, Groundwater Model Review.

Comment 4 *We oppose any steps forward toward the development of the Dos Pobres/San Juan project. Citing lack of effective mitigation plans for water and hazardous waste control and concerning all aspects of impacts to our community and lack of involvement in planning such a project with potential great impact to our people we do not agree with any land trades between the BLM and the Phelps Dodge Corporation.*

Response: See General Response No. 1.

Letter 258 Commentor Gail Hansous of Future San Carlos Chamber Commerce

Comment 1 *...there is no discussion throughout the DEIS of San Carlos Apache issues pertaining to social impacts, economic, above and underground water issues as well as soil / land issues and what environmental effects the operation would have on surrounding lands including the San Carlos Apache Reservation.*

Response: See response 238-1.

Comment 2 *...there is no effective mitigation plan for the control of hazardous materials that the Apache Community will see increasing with the proposed project passing through our boundaries. With depressed economic conditions that exist on the reservation there is no Hazardous Materials Task Force proposed or even considered. Given the Apache People will be subjected to the increased possibility of having a Hazardous Materials accident there should be some plan for emergency circumstances as well as equipment and personnel in the area.*

Response: See General Response No. 14, Hazardous Materials.

Comment 3 *All water resource data sited are questionable by BIA's understanding and USGS confirmation as what ground water recourses are in the Gila basin. To base formulas and projections of water use from this nonfactual information is questionable to say the least but should raise a serious question to BLM of water recource uses and trust responsibilities to not only the U.S. taxpayer but the San Carlos Apache Tribe. These problem areas we are vary concerned with as they will impact our future ground water needs and possible uses in our economic development. No in-depth mitigation plan was covered for possible ground water contamination and possible effects to the Gila River flow, which feeds San Carlos Lake.*

Response: See response 257-3. See also General Response No. 16, Groundwater Model Review.

Comment 4 *We oppose any steps forward toward the development of the Dos Pobres/San Juan project. Citing lack of effective mitigation plans for water and hazardous waste control and concerning all aspects of impacts to our community and lack of involvement in planning such a project with potential great impact to our people we do not agree with any land trades between the BLM and the Phelps Dodge Corporation.*

Response: See General Response No. 1.

Letter 259 Commentor Richard Begay of The Navajo Nation

Comment 1 *The Navajo Nation does not have any concerns regarding this project; however, we thank your office for making a commitment to consulting with Native American people who may have an interest in the area.*

Response: Thank you for your comment.

Comment 2 *RE: Appendix D. In our work we have found that archaeological sites are often eligible for protection under more than one criteria, especially if they have been found to be a TCP. Navajo TCPs are usually associated with deities as well as signficant events and archaeological sites are often TCPs.*

Response: See General Response No. 9, Cultural Resources Mitigation.

Letter 260 Commentor Amy J. Hurt of Ingersoll-dresser Pump Company

Comment 1 *I am writing in order to show my support for the permitting of the planned Phelps Dodge Safford Project.*

Response: See General Response No. 1.

Letter 261 Commentor Thomas & Carole Aston of Gold Tooth Mine

Comment 1 *IS ANY PORTION OF Section 7 and 8 of T17N,R3E G&SRB&M IN YAVAPAI COUNTY, ARIZONA aka "Packard Ranch" at Sycamore Creek & Verde River in the USDA Prescott & Coconino National Forest EFFECTED BY THE PROPOSED LAND EXCHANGE?*

Response: No, the Tavasci Marsh parcel as described in the EIS (legal description is provided in Appendix B) is the only property in the Verde Valley involved in the proposed land exchange.

Comment 2 *DO ANY CURRENT POWER TRANSMISSION LINE TRAVERSE ANY PORTION OF THE PHELPS DODGE CORPORATION LANDS OFFERED IN THIS EXCHANGE? ...CAN POWER TRANSMISSION LINES BE UP GRADED TO CURRENT STANDARDS after an exchange takes place?*

Response: No power lines cross the offered lands. As stated in the DEIS, a buried telephone line of the Valley Telephone Cooperative (VTC) is located on the Musnicki property, although VTC does not have a formal right-of-way or other easment. Section 3.3.1.2.1 of the FEIS has been revised to disclose this fact. Since there are no power lines crossing the offered lands, it is beyond the scope of this analysis to determine whether transmission lines can be upgraded to current standards if the exchange is selected.

Letter 262 Commentor Jim Slawson of National Marine Fisheries Service

Comment 1 *The National Marine Fisheries Service has reviewed the following Public Notice (from the COE) and does not object to the issuance of a permit for the proposed activities.*

Response: See General Response No. 1.

Letter 263 Commentor Jack A. Henry

Comment 1 *I am in support of the project and believe it is in the best interests of the community overall and for the State of Arizona.*

Response: See General Response No. 1.

Letter 264 Commentor David P. Kimball, III

Comment 1 *I would like to register my support in the official record for this project.*

Response: See General Response No. 1.

Letter 265 Commentor Peter D. Shumway

Comment 1 *I am writing in support of the Phelps Dodge Dos Pobres/San Juan Project. I'm particularly supportive of the prefered land exchange alternative outlined in the Draft Environmental Impact Statement (Draft EIS).*

Response: See General Response No. 1.

Letter 266 Commentor Phillip H. Downing of Projects West, Inc.

Comment 1 *I am writing in support of the Phelps Dodge Dos Pobres/San Juan Project. ...I write in support of the preferred land exchange alternative outlined in the Draft Environmental Impact Statement (Draft EIS).*

Response: See General Response No. 1.

Comment 2 *...I think the BLM deserves recognition for their thorough review of the issues associated with the development of the mine.*

Response: See General Response No. 1.

Letter 267 Commentor E. Michael Schern of Phelps Dodge Safford, Inc.

Comment 1 *The document adequately describes the procedural steps that were taken by BLM once Phelps Dodge submitted the Mine Plan of Operations (MPO); however, the text does not adequately explain why the change (MPO submittal) was made and why that change affected the scope of NEPA analysis.*

...The BLM should note in the document that submittal of the MPO by Phelps Dodge and the resulting change in course of the NEPA process was not simply a convenience to the project proponent, but provided the agency decision makers and the public additional information and analysis of the foreseeable uses of the selected lands.

Response: This comment has been addressed by revising Section 1.3.

Comment 2 *This section (Section 1.5.3) incorrectly states, on page 1-9, that Phelps Dodge, through its fallowing plan, is changing use of water rights on lands it owns that are subject to the Decree in Globe Equity No. 59, that it is changing its points of diversion for these water rights, and that it is changing the place of use of these water rights. From these factually incorrect assumptions, the draft then incorrectly concludes that Phelps Dodge must obtain the Decree Court or the Gila Water Commissioner's approval of Phelps Dodge's fallowing plan.*

Phelps Dodge is not proposing to change the point of diversion, the type of use, or the place of use of any of its water rights on agricultural lands that it owns that are subject to the Decree in Globe Equity No. 59.

Response: This comment has been addressed by revising Section 1.5.3 of the EIS.

Comment 3 *...the suggestion in the fourth paragraph on page 1-9 that Phelps Dodge must seek the Globe Equity Court's or the Gila Water Commissioner's approval of a fallowing program is legally incorrect, particularly since the fallowing program does not involve any change in place or type of use or any change in diversion points. Any landowner with water rights under Globe Equity No. 59 may fallow its land at any time, without the approval of the Court or the Gila Water Commissioner. There is no provision in the Decree either requiring such approval or authorizing either the Gila Water Commissioner or the Court to grant approval for a landowner to fallow land.*

Response: This comment has been addressed by revising Section 1.5.3 of the EIS.

Comment 4 *...to the extent that ephemeral flows in washes which are tributary to the Gila River were to be diverted and retained at the mine site for environmental purposes, these diversions would not be "waters of the Gila River" because they have not reached the Gila River. The diversion of such flows is no more subject to the jurisdiction of the Court in Globe Equity than are diversions of appropriable water on the upstream tributaries of the Gila River…*

Response: This comment has been addressed by revising Section 1.5.3 of the EIS.

Comment 5 *...BLM does not have the authority to withhold administrative action on either of the proposed actions until such time as the Globe Equity Court or some other court deals with water rights issues associated with the mine. ...as a matter of law, withholding action on a ROD until a (relatively minor) mitigation measure is approved is inappropriate.*

Response: This comment has been addressed by revising Section 1.5.3 of the EIS.

Comment 6 *...BLM should include text to fully describe the insignificant nature of the potential impacts to flows in the River that may result from project activities. As mentioned above, the mitigation plan will likely reduce an already insignificant impact to no impact.*

Response: The discussion of water rights authority in the first chapter of the EIS addresses issues pertaining to the regulatory authorities under which BLM must consider the Proposed Action. BLM has revised this section to summarize the projected environmental impacts to waters of the Gila River and refer readers to Chapter 4. The last sentence of the Proposed Action alternatives analysis in Section 4.3.2.6.1 characterizes the magnitude of the potential impacts to flows in the River as less than one percent of the river's lowest annual mean flow.

Comment 7 *The Gila River is not an intermittent stream. It is a perennial stream which, at certain times, is diverted in its entirety.*

Response: This comment has been addressed by revising Section 1.5.3 of the EIS.

Comment 8 *Re: Page 1-8, second paragraph. The second paragraph does not adequately describe the projected impact, i.e., that the maximum project groundwater impact of 35.4 acre-feet per year may occur only after 416 years. The paragraph should recognize that projected groundwater impacts are within the margin of error of the groundwater model which projects the impact. The paragraph also does not deal with the capture of sheet flows at the project.*

Response: This comment has been addressed by revising Section 1.5.3 of the EIS.

Comment 9 *Re: Page 1-8, third paragraph. The third paragraph does not fully describe the fallowing program, particularly the fact that the program will result in lower diversions during the high-flow winter months, when priority demands are low, which will allow water to flow in the River that would otherwise have been diverted by Phelps Dodge. At a minimum, the paragraph should contain cross-references to Section 4.9 of the draft EIS and to Appendix F, in which the fallowing plan is more fully described.*

Response: This comment has been addressed by revising Section 1.5.3 of the EIS. Also, the Alternate Year Fallowing Program described in the MMP (Appendix F) has been enhanced since publication of the DEIS.

Comment 10 *Re: Page 1-9, second paragraph. The paragraph incorrectly implies that because Phelps Dodge owns agricultural lands that are subject to the Globe Equity Decree, all of Phelps Dodge's activities, even those outside the Decree area, are subject to the Decree. ...The paragraph also incorrectly implies that Phelps Dodge is proposing to change its point of diversion or the type or place of use of its decreed water rights, which is not the case. Phelps Dodge intends to leave its existing Globe Equity water rights in place and to exercise those rights, on an alternating year basis, for agricultural purposes.*

Response: This comment has been addressed by revising Section 1.5.3 of the EIS.

Comment 11 *Re: Section 1.6.2.2.4, Regulatory/Permitting, Aquifer Protection Permit. Under this section, the statement is made that "the ADEQ requires quarterly monitoring of wells…". Phelps Dodge's APP application, submitted on October 2, 1998, does not specify a sampling frequency. Monitoring requirements, including the frequency of monitoring, will be specified in the permit to be issued by the ADEQ.*

Response: This section has been corrected to reflect this information.

Comment 12 *No Indian water rights "pertain" to the Project. Rather, the Gila River Indian Community and the San Carlos Apache Tribe have water rights which are located in the general vicinity or area of the Project.*

Response: This statement has been revised in the EIS.

Comment 13 *Re: Section 4.3.1.6.1, Surface water rights. The second paragraph is in error in that proposed water usage at the mine site is legal under current law, which allows groundwater to be pumped for reasonable use. In addition, the capture of sheet flows of water, i.e., water which has not entered a water course, which will occur at the mine site, is permissible under State law and is not subject to the rights of appropriators. Finally, to the extent that the Project captures ephemeral flows in normally dry stream beds to avoid the discharge of contaminants, the capture of such water is unlikely to interfere in any unlawful manner with the rights of senior appropriators, for a variety of reasons. It is incorrect to characterize water uses at the mine site as "illegally" taking higher priority water rights.*

Response: This comment has been addressed by revising Sections 1.5.3 and 4.3.1.6.1 of the EIS.

Comment 14 *Re: Section 4.3.2.6, Surface Water/Surface Water Quantity. ...the third sentence should be changed to read "It will take more than 2,000 years for the total volume of water captured from the Gila River to approach the total volume of water to be pumped by the mine (MacNish 1998), about 68,347 af.*

Response: The 2002 groundwater model run extended for a period of 3000 years into the future. Extrapolating from the model results, it appears that the total volume of water captured from the Gila River will approach the total volume of water to be pumped for the mine approximately 8000 years into the future. This revised information is reported in the EIS.

Comment 15 *Re: Section 4.3.5.3.3, Schools. This section should be revised to reflect the fact that the school district boundary bisects the project area and the Solomon School District will also benefit from increased property taxes to be paid by Phelps Dodge.*

Response: This comment has been addressed by revising Section 4.3.5.3.3.

Comment 16 *Re: Section 4.4.6.1.1, Selected Lands. The paragraph incorrectly assumes that these impacts, if they occur, are unlawful. The impacts, if they occur, are lawful even if unmitigated, for the reasons stated in the comment to Section 4.3.1.6.1 and to Section 1.5.3 above.*

Response: Nowhere does this paragraph assume or imply that impacts to Indian Trust Resources are unlawful. Rather, this paragraph simply states that if impacts to Gila River flows are unmitigated, there would be impacts to Indian water rights, a trust resource.

Letter 268 Commentor L. Anthony Fines of Gila Valley and Franklin Irrigation Districts

Comment 1 *Since the District Court Ninth Circuit Court of Appeals elected to wait for the decision from the state courts, apparently those courts have rejected the interpretation the Draft Environmental Impact Statement that the Decree prohibits more than interference with the subflows and surface flows of the Gila River.*

Response: This comment has been addressed by revising Section 1.5.3 of the EIS.

Comment 2 *...under the Draft Environmental Impact Statement, the BLM, ignoring rulings by the District Court, proposes to preemptively impose its interpretation of the Decree on Phelps Dodge. ...The BLM should leave the interpretation of federal decrees to the courts, especially when those decrees do not deal with environmental issues and when, as here, the issue of interpretation has been presented to the court and is awaiting decision. ...it is respectfully urged that the portions of the Draft Environmental Impact Statement that purport to interpret the Decree in Globe Equity 59 and which require steps by Phelps Dodge to comply with the Decree be omitted from the final Environmental Impact Statement.*

Response: This comment has been addressed by revising Section 1.5.3 of the EIS.

Letter 269 Commentor Don Higgins

Comment 1 *I believe that the Draft E.I.S. on the Safford Project does not adequately address the impacts on the nighttime environment in regard to light pollution.*

Response: See General Response No.12, Nighttime Lighting.

Comment 2 *Hauling and stockpiling at night, with dust illuminated by spotlights, may create a canopy of light pollution over the project that will be visible for miles as "sky glow". Perhaps there is an option for use of switches or motion sensors on these "safety lights" to activate the fully-shielded spot lights when trucks are present?*

Response: See General Response No.12, Nighttime Lighting.

Comment 3 *Impacts of 24-hour operations on the astronomical observatory at Discovery Park, on the high ground on the south side of Safford, are not mentioned in the EIS.*

Response: See General Response No.12, Nighttime Lighting.

Comment 4 *Impact of increased light pollution on the astonomy program at Eastern Arizona College in Thatcher is not addressed in the E.I.S..*

Response: See General Response No.12, Nighttime Lighting.

Comment 5 *The phrase, in section 4.3.1.8, that "night time operations of the project are not expected to effect astronomical observations on Mt. Graham" is an undocumented assertion that needs to be verified with Mt. Graham astonomers. ...no indication of discussions with nighttime neighbors is documented in support of PD's assumptions.*

Response: See General Response No.12, Nighttime Lighting.

Comment 6 *...why would any night lights at the project be visible from Safford? Why should any light be in tresspass off the mine site? Why should the "truck shop" and "SX/EW plant" be visible at night from miles away in the Gila Valley?*

Response: See General Response No.12, Nighttime Lighting.

Comment 7 *No mention is made of long-term effects [of lighting] on citizens of the Gila Valley, including Safford, who live in closer proximity to the project.*

Response: See General Response No. 12, Nighttime Lighting.

Comment 8 *Please re-write Section 3.2.1.8.5 to clarify the message therein. Surely PD is not suggesting that because of massive light pollution from the prison, the few existing lights at Site # 2 are inconsequential? What does this section address, in simple language? Pre-existing conditions? I trust that it does not imply that because the east side is already impacted by light pollution, that PD's project won't matter much. Light pollution effects are cumulative, not self-correcting.*

Response: See General Response No. 12, Nighttime Lighting.

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GLOSSARY

Access. Permission, liberty, or ability to enter, approach, communicate with, or pass to and from; freedom or ability to obtain or make use of. Legal access to property indicates a legally conferred right of access via public property or road, or access across private property via right-of-way or easement.

Acre-feet (af). The volume of liquid or solid required to cover one acre to a depth of one foot, or 43,560 cubic feet; measured for volumes of water, reservoir rock, etc.

Activity Plan. A more detailed BLM plan of actions to implement planning decisions over a specified time period; e.g., allotment management plans; recreation area management plans; habitat management plans; or cultural resource project plans.

Adit. A nearly horizontal passage in an underground mine, driven from the surface, by which a mine may be entered, ventilated, and/or dewatered.

Agglomerate. A volcanic breccia formed by disruption of a solidified crust or hardened plug of lava. Blocks may fit together as a loose mosaic or be completely disordered.

Agreement to Initiate a Land Exchange (ATI). A legal document that outlines the agreement between the BLM and a proponent regarding the initiation of a proposed land exchange.

Airshed. The contributing three-dimensional space in which air quality can be evaluated.

Allopatric. Being geographically separate, or nearly so, from another population of the same species.

Allotment. A land area where one or more operators graze their livestock. The allotment generally consists of public land but may include parcels of private and state-owned lands. The number of livestock and season of use are stipulated for each allotment by the landowner.

Alluvial Fan. Made of soil and sand left by rivers or floods.

Alluvium. Unconsolidated or poorly consolidated gravel sands and clays deposited by streams and rivers on riverbeds, flood plains, and alluvial fans.

Andesite. A dark colored, fine-grained extrusive rock that, when porphyritic, contains phenocrysts composed primarily of zoned sodic plagioclase and one or more of the mafic minerals, with a ground mass composed generally of the same minerals as the phenocrysts; the extrusive equivalent of diorite.

Animal Unit Month (AUM). The amount of forage needed to sustain one cow or its equivalent for one month.

Annual (Ephemeral) Plant. A plant that completes its life cycle and dies in one year or less. (Range Term Glossary Committee 1974.)

Appraisal. Act of placing an estimated value on an asset or assets.

Aquifer. A body of rock that is sufficiently permeable to conduct groundwater and to yield economically significant quantities of water to wells and springs.

Area of Critical Environmental Concern (ACEC). An area of public land where special management attention is required to protect important historic, cultural, or scenic values, fish and wildlife or natural systems or processes, or to protect life and safety from natural hazards.

Arizona Mined Land Reclamation Act. Legislative act passed in 1994 by the Arizona Legislature; established the State of Arizona as the administrator of reclamation regulations for private land within the state and provided statutory authority to the Arizona State Mine Inspector for the development and adoption of Mined Land Reclamation Rules. It requires that metalliferous mining and exploration operations that create surface disturbances greater than five acres must meet the State reclamation regulations.

Artesian Well. A well in which water rises under pressure from a permeable stratum overlaid by impermeable rock.

Artifact. Any object showing human workmanship of modification, especially from a prehistoric or historic culture.

Backfill. Earth, overburden, mine development rock, or imported material used to replace ore or other material removed during mining.

Bajada. Spanish word meaning "step" that refers to a gradually sloping alluvial area of mountains.

Basalt. A dark-colored igneous rock, commonly extrusive, composed primarily of calcic plagioclase and pyroxene; the fine-grained equivalent of *gabbro*. The plagioclase is normally zoned and usually ranges in composition from byrownite to labradorite; augite, pigeonite, and hypersthene are the common pyroxenes. Apatite and magnetite are almost always present, and olivine is common.

Best Available Demonstrated Control Technology (BADCT). Processes, structures, operating methods, or other alternatives developed by EPA and in Arizona, ADEQ, used to design, construct, and operate a facility so as to ensure the greatest degree of discharge reduction achievable, including, where practicable, a technology permitting no discharge of pollutants.

Biome. A climax community that characterizes a particular natural region; esp. A particular type of vegetation, climatically bounded, which dominates a large geographic area.

Bosque. Spanish word for "forest" used to describe a riparian plant association typically found in floodplains and usually dominated by one species, e.g., mesquite.

Cienega. A marshy area where the ground is wet due to the presence of seepage or springs, often with standing water and abundant vegetation. The term is commonly applied in arid regions such as the southwestern U.S.

Clean Water Act (CWA). The Federal Water Pollution Control Act of 1972, as amended.

Code of Federal Regulations (CFR). The compilation of federal regulations adopted by federal agencies through a rule-making process.

Colluvium. General term applied to loose and incoherent deposits, usually at the foot of a slope or cliff (e.g., talus and cliff debris) and brought there chiefly by gravity.

Community Type. A group of plants living in a specific region under relatively similar conditions.

Compactible Soil. A property of a sedimentary soil that permits it to decrease in volume or thickness under load; it is a function of the size, shape, hardness, and brittleness of the constituent particles.

Concentrator. Facility where ore is crushed, ground, and separated to produce a highly concentrated ore.

Cone of Depression. The depression of heads around a pumping well caused by the withdrawal of water.

Cretaceous. The final period of the Mesozoic era (after the Jurassic and before the Tertiary period of the Cenozoic era), thought to have covered the span of time between 135 and 65 million years ago; also, the corresponding system of rocks.

Critical Habitat. Defined in Section 3(5)(A) of the Endangered Species Act as: "(I) the specific areas within the geographic area occupied by a species...on which are found those physical or biological features (I) essential to the conservation of the species, and (II) that may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed ... upon a determination by the Secretary that such areas are essential for the conservation of the species."

Cultural Resources. Those fragile and nonrenewable remains of human activity, occupation or endeavor, reflected in district, sites, structures, building, objects, artifacts, ruins, works of art, architecture and natural features that were of importance in past human events. These resources consist of: 1) physical remains, 2) areas where significant human events occurred, even though evidence of the event no longer remains, and 3) the environment immediately surrounding the actual resource.

Cumulative Impact. The impact on the environment which results from incremental impact of the action when added to other past, present, and reasonably foreseeable future actions; cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Delist. To remove a species from the federal list of endangered and threatened species, thereby removing protection of the Endangered Species Act.

Development Rock. Also called overburden or wasterock; nonmineralized rock or rock of low economic value that is removed during mining operations. It is typically stockpiled and used to construct roads, yards, building pads, dams, and embankments.

Dike. 1. A tabular body of igneous rock that cuts across the structure of adjacent rocks or cuts massive rocks. 2. A wall or embankment built around a low-lying area to prevent flooding.

Dip (pertaining to a fault). The angle that a stratum or any planar feature makes with the horizontal, measured perpendicular to the strike and in the vertical plane.

Direct Impact. Effects that are caused by the action and that occur at the same time and place.

Discharge. The volume of water flowing past a point per unit time, commonly expressed as cubic feet per second (cfs), gallons per minute (gpm), or million gallons per day (mgd).

Disposal. Transferring of land out of federal ownership by various methods such as exchange, sale, Recreation and Public Purposes Act, and/or state indemnity selection.

District. A former BLM administrative area composed of one or more resource areas; recently replaced by “field office.”

Downlist. To move from top priority to a lower priority of the list.

Drawdown. The lowering of the water level in a well as a result of withdrawal; the reduction in head at a point caused by the withdrawal of water from an aquifer.

Ecotone. The transition zone between two major ecological communities where one does not merge gradually into the other, for example, that between grassland and woodland.

Effects. “Effects” include a) Direct effects, which are caused by the action and occur at the same time and place. b) Indirect affects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems. Effects and impacts as used in these regulations are synonymous. Effects includes ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial.

Electroshocking. Field method for assessing fish populations within a body of water.

Electrowinning. The process of electrolytically depositing metals, or separating them from their ores or alloys.

Endangered or Threatened Species. Any species in danger of extinction throughout all or a significant portion of its range. This definition

excludes species of insects that the Secretary of the Interior determines to be pests and whose protection under the Endangered Species Act would present an overwhelming and overriding human risk. A threatened species is any species likely to become endangered within the foreseeable future throughout all of a significant part of its range.

Eocene. An epoch of the Tertiary period, after the Paleocene and before the Oligocene, covering a span of time from about 55 to 35 million years ago.

Environmental Impact Statement (EIS). A detailed statement required by the National Environmental Policy Act (NEPA) when an agency proposes a major federal action significantly affecting the quality of the human environment. There is usually a Draft EIS followed by a Final EIS.

Equal Monetary Value. The dollar value of the selected and offered lands must be within 25 percent of each other.

Ephemeral Stream. A stream or portion of a stream that flows briefly in direct response to precipitation in the immediate vicinity, and whose channel is at all times above the water table.

Erosion. The wearing away of soil and rock by weathering, mass wasting, and action of streams, glaciers, waves, wind and underground water.

Evaporation. The portion of precipitation returned to the air in the form of vapor.

Evapotranspiration. An amount of water lost to the atmosphere that is consumptively used by plants through transpiration and water evaporated from bare soils.

Exploration. The search for economic deposits of minerals, ore, and other materials through practices of geology, geochemistry, geophysic, drilling, and/or mapping.

Fault. A fracture in rock units along which there has been displacement.

Field Office. BLM's geographic and administrative divisions within a state; formerly BLM Districts.

Flaked Stone. Debitage resulting from lithic tool manufacture.

Fluvial. Of or pertaining to rivers; growing or living in a stream or river; produced by the action of a stream or river.

Form. The mass of shape of an object or objects which appear unified, such as a vegetative opening in a forest, a cliff formation, or a water tank.

Fugitive Emissions. Hydrocarbon emissions released into the atmosphere from any point other than a stack, chimney, vent, or other functionally equivalent opening (EPA Region IX).

Gila Box Riparian National Conservation Area (RNCA). A special management area designated by Congress to conserve, protect, and enhance the riparian and related natural and cultural resource values of the Gila River and Bonita Creek.

Graben. An elongate, relatively depressed trough or basin that is bounded by high-angle, normal faults on its long sides.

Granitoid. A granitic rock.

Groundwater Gradient. Direction of flow of groundwater.

Groundwater Table. The surface between the zone of saturation and the zone of aeration; that surface of a body of unconfined ground water at which the pressure is equal to that of the atmosphere.

Growth Media. A substance or material that promotes or supports vegetation.

Hohokam. Prehistoric people inhabiting southern and south-central Arizona and Northern Mexico that primarily lived along the banks of the Gila, Salt, and Santa Cruz rivers.

Holocene. An epoch of the Quaternary period, from the end of the Pleistocene, approximately 10 thousand years ago, to the present time.

Hydraulic Conductivity. The capacity of a rock to transmit water. It is expressed as the volume of

water at the existing kinematic viscosity that will move in unit time under a unit hydraulic gradient through a unit area measured at right angles to the direction of flow.

Hydraulic Gradient. Change in head per unit of distance measured in the direction of the steepest change.

Hydrothermal. Of or pertaining to hot water, to the action of hot water, or to the products of this action, such as a mineral deposit precipitated from a hot aqueous solution; also, said of the solution itself.

Igneous. Rock or mineral that solidified from molten or partly molted magma; processes relating to or resulting from the formation of such rocks.

Impact. A modification in the status of the environment brought about by the action.

Indirect Impact. Effects caused by the action and are later in time or are farther removed in distance but are still reasonably foreseeable; indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate and related effects on air and water and other natural systems, including ecosystems.

Infrastructure. The basic framework or underlying foundation of a community, or project including road networks, electric and gas distribution, water and sanitation services, and facilities.

Institutional Controls. Controls including deed restrictions to protect public safety, fencing district, and physical control of access.

Interdisciplinary (ID) Team. A group of agency resource specialists with various backgrounds who are responsible for preparation and review of the NEPA document for a proposed federal action.

Lacustrine. Pertaining to, produced by, or inhabiting a lake or lakes.

Laramide Age. A time of deformation, typically recorded in the eastern Rocky Mountains of the U.S., whose several phases extended from the late Cretaceous period until the end of the Paleocene epoch.

Leaching. Extracting a soluble metallic compound from an ore by selectively dissolving it in a suitable solvent, such as weak sulfuric acid.

Leasable Minerals. Those minerals or materials designated as leasable under the Minerals Leasing Act of 1920. They include coal, phosphate, asphalt, sulphur, potassium, sodium, oil, and gas. Geothermal resources are also leasable under the Geothermal Steam Act of 1970. Development of these minerals on public lands requires that a royalty be paid to the U.S. government.

Line. The path, real or imagined, that the eye follows when perceiving abrupt differences in form, color, or texture. Within landscapes, lines may be found as ridges, skylines, structures, changes in vegetative types, or individual trees and branches.

Lithic Artifact. Pertaining to, or made of stone.

Lithologic Unit. A unit of rock that can be described on the basis of such characteristics as color, mineralogic composition, and grain size.

Locatable Minerals. Any mineral that can have a mining claim filed on it under the Mining Law of 1872 as amended, e.g. copper, gold, silver.

Long-Term Management Area (LTMA). A designation used by the BLM Safford Field Office for geographic areas within the district as identified in the amended RMP in which the BLM seeks to retain or acquire lands in order to maintain its long-term management presence.

Mafic. Said of igneous rocks rich in dark-colored iron and magnesium minerals.

Mano. Stone tool used for grinding.

Metamorphic Rock. Any rock derived from pre-existing rocks by mineralogical, chemical, and/or structural changes, essentially in the solid state, in response to marked changes in temperature, pressure, shearing stress, and chemical environment, generally at depth in the earth's crust.

Metate. A flat stone with a depression for holding maize or other grains to be ground.

Mineral Entry. Authority to enter public lands for the purposes of developing minerals in an orderly, organized manner.

Mineralized Area. An area that has exposures or sub-surface deposits of potentially valuable minerals.

Mineralizing Unit. A lithological unit responsible for introducing economic minerals into adjacent rocks.

Mining Activity. Any activity directly involved in mineral exploration, development or production at or on an exploration operation or mining unit.

Mining District. A section of country, usually designated by name, that has described or understood boundaries where minerals are found and mined under rules and regulations prescribed by the miners, consistent with the Mining Law of 1872.

Mining Notice of Intent (NOI). Similar to a Mining Plan of Operations but applies only to activities involving no more than five acres of surface disturbance of federal lands.

Mining Plan of Operations (MPO or also Plan of Operations). As required by 43 CFR 3809; Operators submit plans of operation to the BLM that outline the name and address of the operator; location of the proposed area of operation; and information sufficient to describe the type of operation proposed, the type and standards of roads, the means of transportation to be used, the period when the proposal will take place, and measures to be taken to meet the requirements for environmental protection.

Miocene. An epoch of the Tertiary period, after the Oligocene and before the Pliocene covering a span of time from about 23 to 5.5 million years ago.

Mitigation. Mitigation includes a) avoiding the impact altogether by not taking a certain action or parts of an action, b) minimizing impacts by limiting the degree or magnitude of the action and its implementation, c) recertifying the impact by repairing, rehabilitating, or restoring the affected environment, d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action, e) compensating for the impact by replacing or providing substitute resources or environments.

National Environmental Policy Act (NEPA). Legislative act passed in 1969 as the national charter for analysis of impacts of federal actions upon the quality of the human environment. NEPA establishes policy, sets goals, and provides means for carrying out the policy. Regulations from 40 CRF 1500-1508 implement the act.

National Historic Preservation Act (NHPA). An act that provided the administrative and legislative power to carry out the spirit and intentions of the Historic Sites Act of 1935 and expand its policies to include protection and preservation of significant historic properties.

National Pollutant Discharge Elimination System (NPDES). A water quality management program overseen by the Environmental Protection Agency involving permitting for point source dischargers to waters of the United States.

National Register of Historic Places (NRHP). A list, kept by the Secretary of the Interior, of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, and culture.

Native Species. Organisms that originated in the area in which they are found, i.e., they naturally occur in that area.

Normal Fault. A fault in which the hanging wall appears to have moved downward relative to the floorwall. The angle of dip is usually 45-90 degrees.

Notice of Decision (NOD). A formal notification of an agency decision published in the Federal Register; e.g., the agency decision in the realty process regarding the disposal or acquisition of lands.

Notice of Exchange Proposal (NOEP). Notification of a realty action, a proposed land exchange, that is published in the federal register per the requirements of FLEFA and FLPMA.

Notice of Intent (NOI). First formal step in the EIS process, consisting of a notice published in the Federal Register that an Environmental Impact Statement will be prepared and considered for a proposed action.

Offered Lands. The privately owned lands that are being offered in exchange for public lands in a land exchange; cf. "selected lands."

Oligocene. An epoch of the Tertiary period, after the Eocene and before the Miocene covering a span of time from about 35 to 23 million years ago.

Operator. Any person who directs mining activity at an exploration operation mining unit.

Ore. A mineral deposit of high enough quality to be mined at a profit.

Overburden. Rock and soil cleared away before mining.

Overstory. The upper most layer of vegetation.

Paleocene. The first epoch of early Tertiary period, after the Cretaceous period and before the Eocene epoch, covering a span of time from about 65 to 55 million years ago.

Partial Pit Backfill. Placing development rock in a mined-out pit to less than the capacity of the pit.

Patent. A document conveying title to land from the U.S. government to private ownership.

Patented Claims. Federal mineral claims that have become private lands secured from the U.S. government by a private entity through compliance with the Mining Law of 1872.

Petroglyph. Literally, a rock carving; it usually excludes writing and therefore is of prehistoric of protohistoric age.

pH. The measure of the acidity or basicity of a solution.

Pictograph. A painting or drawing on a rock wall or the like by ancient or prehistoric peoples.

Pleistocene. An epoch of the Quaternary period, after the Pliocene and before the Holocene. It began about two million years ago and lasted until the start of the Holocene some 10,000 years ago.

Pliocene. An epoch of the Tertiary period, after the Miocene and before the Pleistocene, covering a span of time from about 5.5 to 2 million years ago.

Polychrome Sherd. Multicolored pottery fragmentation.

Precambrian. All geologic time, and its corresponding rocks, before the beginning of the Cambrian period of the Paleozoic era (about 570 million years ago); it is equivalent to about 90% of geologic time.

Pregnant Leach Solution (PLS). Solution from the leaching process that contains dissolved metals.

Prill. Ammonium nitrate in bead form; used in the ore blasting process.

Priority Species. Animal and plant species and habitats having special significance for management. These include endangered, threatened, and special status species; species of high economic or recreational value; and aquatic, wetland, and riparian habitats. Also included are populations of animals or plants recognized as significant for one or more factors such as density, diversity, size, public interest, remnant character, or age.

Project Alternatives. Alternatives to the proposed project developed through the NEPA process.

Pyroclastic. Pertaining to clastic rock material formed by volcanic explosion or aerial expulsion from a volcanic vent; also, pertaining to rock texture of explosive origin. It is not synonymous with the adjective "volcanic".

Quartz Monzonite-Granadiorite Porphyry. A granitic rock in which quartz comprises 10-50% of the felsic constituents, and in which the alkali feldspar/total feldspar ratio is between 35% and 65%; the approximate intrusive equivalent of rhyodacite.

Quaternary. The second period of the Cenozoic era, consisting at the Pleistocene and Holocene epochs. Following the Tertiary; also, the corresponding system of rocks. It began two to three million years ago and extends to the present.

Reclamation. Measures that are taken on surface disturbances at exploration operations and mining units to achieve stability and safety consistent with postmining land use objectives specified in the Reclamation Plan.

Record of Decision (ROD). A public document that reflects the agency's final decision on a proposed project, rationale behind that decision, and commitments to monitoring and mitigation.

Refugia. An area, usually more or less isolated, which with respect to fauna and flora, has remained relatively unchanged in contrast to surrounding areas which have been markedly affected by environmental changes; a refuge

Reserves. Identified resources of mineral-bearing rock from which the mineral can be extracted profitably with existing technology and under present economic conditions.

Resource Conservation Area (RCA). A management designation that provides management consideration to areas with special resource values.

Resource Management Plan (RMP). A planning document developed by the BLM that provides guidelines and direction for making land tenure decisions for short-term and long-term management of public lands and resources within a district.

Rhyolite. An extrusive igneous rock; the extrusive equivalent of granite.

Right-of-way (ROW). A legal right to use, occupy or access land or water areas for specified purposes.

Riparian. Plant communities occurring in association with any spring, lake, river, stream, creek, wash, arroyo, or other body of water or channel having banks and bed through which waters flow at least periodically to perennially. These habitats are generally characterized or distinguished by a difference in plant species composition or an increase in the size and/or density of vegetation as compared to upland areas.

Riprap. Large fragments of broken rock. Thrown together irregularly (as offshore or on a soft bottom) or fitted together (as on the downstream face of a dam). Its purpose is to prevent erosion by water and thereby preserve a surface, slope, or underlying structure. It is used for irrigation channels, river-improvement works, spillways at dams, and sea walls for shore protection.

Roadfill. Fill material used to bring the roadbed to a level elevation.

Runoff. That part of precipitation that appears in surface streams; precipitation that is not retained on the site where it falls and is not absorbed by the soil.

Sacred Site. Any specific, discrete, narrowly delineated location on federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such as site.

Salable Minerals. Common variety minerals used mostly for construction projects (e.g. sand and gravel). These are disposed of by the government either through sales or special free-use permits to non-profit organizations.

Salada. A term used in the southwestern U.S. for a salt-covered plain where a lake has evaporated.

Scope. Scope consists of the range of actions, alternatives, and impacts to be considered in the Environmental Impact Statement.

Scoping. The process of involving potentially interested and/or affected parties in identifying the issues of concern that will be addressed in the EIS.

Section. A one-square-mile area (640 acres) forming one of the 36 subdivisions of a township.

Seining. To fish using a seine (vertical net).

Selected Lands. The publicly owned lands that have been selected by the project proponent for acquisition in a land exchange; cf. "offered lands".

Sensitive species. Those species designated by a BLM State Director, in cooperation with a state agency responsible for managing the species, as sensitive. Sensitive species are those species (1) under status review by the Fish and Wildlife Service/National Marine Fisheries Service; (2) whose numbers are declining so rapidly that federal listing may become necessary; (3) with typically small and widely dispersed populations, or; (4) inhabiting ecological refuge or other specialized or unique habitats.

Shaft. A vertical opening to an underground mine.

Sherd. A fragment of prehistoric pottery.

Silicic. Said of a silica-rich igneous rock or magma (not a mineral).

Sill. A tabular igneous intrusion that parallels the planar structure of the surrounding rock.

Solution Extraction. Also called solvent extraction. The processing of the pregnant leach solution to produce raffinate and copper-loaded organic.

Solution Extraction/Electrowinning (SX/EW). A process to extract practically pure copper from sulfuric acid solution that has been percolated through stockpiles of copper-bearing rock. The process consists of four steps: leaching stockpiles with acid, extracting copper from leaching solution to produce "loaded organic," mixing electrolyte with loaded organic to produce "rich electrolyte," and passing electric current through rich electrolyte to winnow out the pure copper. This process replaces the need for a smelter for oxidized ores.

Special status species. A grouping of wildlife species that includes proposed species, threatened and endangered species, candidate species, state listed species, and sensitive species.

Species. A group of individuals of common ancestry that closely resemble each other structurally and physiologically, and in nature interbreed producing fertile offsprings.

Stability. The condition of land with respect to its erosion potential and ability to withstand seismic activity.

Stock. Term generally referring to cattle, as in livestock.

Stockpile. An accumulation of ore, stone, or other mined or quarried material, which provides a steady source of supply for the processing plant.

Storativity. The volume of water that is either stored or discharged from a saturated aquifer per unit surface area per unit change in head.

Stratification. The layered structure of sedimentary rocks.

Sub-grade. Underlying surface upon which facilities such as leach pads, rock stockpiles, roads, etc. are constructed.

Submergent Plant. A plant growing in water. The entire plant remains below the surface of the water.

Substation. A facility in an electrical transmission system with the capacity to route control electrical power and to transform power to a higher or lower voltage.

Surfactant. A chemical that modifies the surface tension of a liquid, changing the way bubbles form and burst.

Surge Pile. Stockpile used to temporarily store excess crushed ore.

Tailings. The remains of milled ore that are regarded as too poor to be treated further.

Texture. The visual manifestations of the interplay of light and shadow created by the variations in the surface of an object or landscape.

Threatened Species. Any species of plant or animal that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

Total Dissolved Solids (TDS). Total amount of dissolved material, organic or inorganic, contained in a sample of water.

Total Suspended Solids (TSS). Amount of undissolved particles suspended in liquid.

Traditional Cultural Property (TCP). A physical property that may be eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community.

Transmissivity. The amount of water that can flow horizontally through the entire saturated thickness of the aquifer under a hydraulic gradient of 1 m/m.

Tuff. General term for all consolidated pyroclastic rocks.

Understory. Lower-most vegetation layer of an area.

Unmineralized. Lacking economic mineral content.

Unnecessary or Undue Degradation. As defined at 43 CFR 3809.5, conditions, activities, or practices that (1) fail to comply with the performance standards in 3809.420, the terms and conditions of an approved plan of operations, operations described in a complete notice, and other federal and state laws related to environmental protection and protection of cultural resources; (2) are not reasonably incidental to prospecting, mining, or processing operations; (3) fail to attain a stated level of protection or reclamation required by specific laws in areas such as the California Desert Conservation Area, Wild and Scenic Rivers, BLM-administered portions of the National Wilderness System, and BLM-administered National Monuments and National Conservation Areas.

Uplands. Areas outside riparian zones.

Valid Existing Rights. Legal interests attached to land or mineral estate that cannot be divested from the estate until that interest expires or is relinquished.

Visual Resource Management (VRM) Classes. Classification containing specific objectives for management of visual resources, including the kinds of structures and modifications acceptable to meet established visual goals.

Visual Resources. The visible physical features on the landscape (land, water, vegetation, and structures); scenery.

Volatile Organic Compounds (VOCs). Organic compounds which participate in atmospheric photochemical reactions except for those designated by the EPA Administrator as having negligible photochemical reactivity.

Waters of the U.S. A term from Section 404 of the Clean Water Act referring to water bodies such as lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds. The use, degradation, or destruction of these waters could affect interstate or foreign commerce and is under the jurisdiction of the U.S. Army Corps of Engineers.

Watershed. The geographic region from which water drains into a particular stream, river, or body of water. A watershed includes hills, lowlands, and the body of water into which the land drains. Watershed boundaries are defined by the ridges or divides separating them.

Water Table. The level in the saturated zone at which the pressure is equal to the atmospheric pressure.

Wetlands. Areas that are inundated by surface or ground water with a frequency sufficient to support (and under normal circumstances do or would support) a prevalence of vegetation or aquatic life that required saturated or seasonally saturated soil conditions for growth and reproduction.

Wild and Scenic River. A river designated under the authority of the National Wild and Scenic Rivers Act of 1968 to preserve the free-flowing character of the river and its outstandingly remarkable natural and cultural resource values.

Wild and Scenic Rivers Act. Act passed by Congress in 1968 to preserve in free-flowing condition and to protect for the benefit and enjoyment of present and future generations certain selected rivers of the Nation which possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values.

Wilderness. An area formally designated by Congress as part of the National Wilderness Preservation System. A wilderness, in contrast with those areas where people and their works dominate the landscape, is recognized as an area where the earth and its community of life are untrammeled, where people visit but do not remain. It is an area of undeveloped land retaining its primeval character and influence, without permanent improvements or human habitation, that is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by forces of nature, with the imprint of human's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least 5,000 acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired conditions; and (4) may also contain ecologic, geologic, or other features of scientific, education, scenic, or historical value.

Xeroriparian. Riparian habitats generally associated with an ephemeral water supply. These communities typically contain plant species also found in upland habitats; however, these plants in xeroriparian habitats are typically larger and/or occur at higher densities than in adjacent uplands.

GLOSSARY G-1

ACRONYMS AND ABBREVIATIONS

3M	Model, Monitor, and Mitigate
AAC	Arizona Administrative Code
ACEC	Area of Critical Environmental Concern
ADEQ	Arizona Department of Environmental Quality
ADOT	Arizona Department of Transportation
ADWR	Arizona Department of Water Resources
af	acre-feet
af/yr	acre-feet per year
AGFD	Arizona Game and Fish Department
ANFO	Ammonium nitrate and fuel oil
APP	Aquifer Protection Program
AQCR	Air Quality Control Region
ARS	Arizona Revised Statutes
ASM	Arizona State Museum
ATI	Agreement to Initiate a Land Exchange
AUM	Animal Unit Month
AWQS	Arizona Water Quality Standards
AZPDES	Arizona Pollutant Discharge Elimination System
BADCT	Best Available Demonstrated Control Technology
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
cfs	cubic feet per second
CO	carbon monoxide
COE	Corps of Engineers
CAA	Clean Air Act
CWA	Clean Water Act
DEIS	Draft Environmental Impact Statement
DOI	Department of Interior
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FIRE	Finance, Insurance, and Real Estate
FLEFA	Federal Land Exchange Facilitation Act
FLPMA	Federal Land Policy and Management Act
gal	gallon(s)
gpd	gallons per day
gpm	gallons per minute
HDPE	High-density polyethylene
H_2SO_4	sulfuric acid
IBLA	Interior Board of Land Appeals
ID Team	Interdisciplinary Team
kV	kiloVolt
LOS	Level of Service
LTMA	Long-Term Management Area
LUST	Leaking Underground Storage Tanks
LWCF	Land and Water Conservation Fund
: g/m^3	micrograms per cubic meter
MPO	Mining Plan of Operations
MSHA	Mine Safety and Health Administration
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection & Repatriation Act
NCA	National Conservation Area, including RNCAs
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NM	National Monument
NO_2	nitrogen dioxide
NO_x	unspecified form of nitrogen oxide
NOA	Notice of Availability
NOD	Notice of Decision
NOI	Notice of Intent to Prepare an EIS
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resource Conservation Service
NSR	New Source Review
OSHA	Occupational Safety and Health Administration
PD	Phelps Dodge (parent corporation)
PDSI	Phelps Dodge Safford, Inc.
PILT	Payment in Lieu of Taxes
PLS	Pregnant Leach Solution
PM	Particulate Matter
PM_{10}	Particulate Matter of 10 microns or less in aerodynamic diameter
$PM_{2.5}$	Particulate Matter of 2.5 microns or less in aerodynamic diameter
PMLU	Post-mining land use
PSD	Prevention of Significant Deterioration
RCA	Resource Conservation Area
RCRA	Resource Conservation and Recovery Act
RMP	Resource Management Plan
RNCA	Riparian National Conservation Area (subset of NCA)
ROD	Record of Decision
ROM	Run-of-Mine
ROW	Right-of-way
SCS	Soil Conservation Service (now NRCS)
SO_2	sulphur dioxide
SPCC	Spill Prevention Control and Countermeasure Plan
SX/EW	Solution Extraction/Electrowinning
TCP	Traditional Cultural Property
tpd	tons per day
USC	United States Code
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
UST	Underground Storage Tanks
W&SR	Wild and Scenic Rivers
WQARF	Arizona Water Quality Assurance Revolving Fund (WQARF) site
WSCA	Wildlife Species of Concern in Arizona
VOC	Volatile Organic Compound
VRM	Visual Resource Management
zipACIDS	Arizona CERCLA Information and Data System sorted by postal zip code