

# PUBLIC HEALTH ASSESSMENT

TUCSON INTERNATIONAL AIRPORT AREA  
a/k/a EL VADO RESIDENTIAL PROPERTIES

TUCSON, PIMA COUNTY, ARIZONA

[CERCLIS # AZD980737530](#)

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Prepared by:

Arizona Department of Health Services  
Office of Environmental Health  
Under Cooperative Agreement with the  
Agency for Toxic Substances and Disease Registry

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# PUBLIC HEALTH ASSESSMENT

## TUCSON INTERNATIONAL AIRPORT AREA a/k/a EL VADO RESIDENTIAL PROPERTIES

TUCSON, PIMA COUNTY, ARIZONA

### EXECUTIVE SUMMARY

The [Agency for Toxic Substances and Disease Registry](#) (ATSDR) asked the Arizona Department of Health Services (ADHS), Office of Environmental Health, to conduct a [public health assessment](#) for the off-site residential area located adjacent to the Tucson Industrial Center (TIC), also known as the Three Hangars site, within the larger Tucson International Airport Area [Superfund](#) site (TIAA), in Tucson, Arizona. Previous investigations found that elevated levels of polychlorinated biphenyls (PCBs) in the drainage areas at the TIC site had migrated off-site into residential areas, presenting a health threat to residents. The purpose of this public health assessment was to evaluate if a [public health hazard](#) still existed, since the remediation activities were conducted at the off-site El Vado residential area.

Remediation activities occurred during the period from March through May, 1997. These activities consisted of the removal of contaminated surface soil in the backyards of three residential properties, vacant areas north and west of a church, and a vacant lot, all located west of Highway 89 between El Vado and East Corona Roads. The associated drainages west of the Three Hangars area were also remediated. The soils were replaced with clean fill dirt and were landscaped. In addition, voluntary removal actions conducted by the Tucson Airport Authority (TAA) at the Three Hangars site included removing PCB-contaminated pipe sludge from the inlets to the drain pipes in the Three Hangars area, and plugging the floor drains and other inlets to the drain pipe systems to prevent future surface water flow from entering the pipe systems and facilitating PCB migration to off-site areas.

Results from the 31 confirmatory soil samples taken in these remediated areas were found to be below the Arizona residential Soil Remediation Level (SRL) of 0.66 milligrams/kilograms for PCBs, indicating that all contaminated soil had been removed ([Conestega 1997](#)).

ADHS concluded that no current public health hazard exists as a result of [ingestion](#), [dermal](#), or [inhalation exposures](#) by residents, children, or transients to the remediated soil in the residential areas on El Vado Road. Replacement of the top soil with certified clean soil removed all chance of contact with the soil containing PCBs, thus eliminating any future public health hazard.

### BACKGROUND

The Agency for Toxic Substances and Disease Registry (ATSDR) has asked the Arizona Department of Health Services, Office of Environmental Health, to conduct a public health assessment for the off-site residential area located adjacent to the Tucson Industrial Center (TIC) within the larger Tucson International Airport Area Superfund Site (TIAA), in Tucson, Arizona. Previous investigations found that elevated levels of polychlorinated biphenyls (PCBs) in the drainage areas at the TIC site had migrated off-site into residential areas, presenting a health hazard to residents. The purpose of this public health assessment was to evaluate if a public health threat posed by PCBs still exists, since the off-site remediation activities were conducted at the El Vado residential area.

#### A. SITE DESCRIPTION AND HISTORY

The TIAA Superfund Site has been the site of various aviation, aerospace, and electronic industrial facilities since 1942. In May 1983, the TIAA site was added to the [National Priorities List \(NPL\)](#) after the discovery of a major groundwater [plume](#) containing several organic compounds, including trichloroethylene (TCE), 1,1-dichloroethylene (DCE), trans-1,2-dichloroethylene, chloroform, and chromium ([ADHS 1996](#)). The TIC site, also known as the Three Hangars site, is located on the central western portion of the TIAA site and is zoned as industrial property suitable for several types of manufacturing activities. The Three Hangars area was used for aircraft modification operations from 1954 until 1960. All the time of this public health assessment, it was being used by a number of tenants performing a variety of industrial activities, including general aircraft and vehicle maintenance, synthetic rubber and plastics manufacturing, and charter services. Several other building structures located in this area included small businesses involved in, but not limited to, aircraft maintenance, overhaul and repair, sandblasting, and degreasing of aircraft parts prior to plating.

A remedial investigation (RI) of the Three Hangars site began in 1992. Samples were taken for metals, [volatile organic compounds \(VOCs\)](#), semi-volatile organic compounds (SVOCs), organochlorine pesticides, and PCBs throughout the Three Hangars area, and the adjacent drainage ditch located just east of Highway 89. Elevated levels of PCBs in the drainage ditch area led to additional sampling on the vacant lot west of Highway 89 and the wash areas behind the residences on El Vado Road. In February 1996, an investigation was conducted on the residential properties that had identified PCB concentrations ranging from less than 0.056 milligrams/kilograms to 6.2 mg/kg, posing a health threat to residents, children, and transients ([USEPA, 1996](#)). The waste-related activities at the Three Hangars site consisted of discharging waste fluids directly into floor drains inside Hangar One of the TIC site. These drains were connected to the storm water drain pipe that discharged to the adjacent Highway 89 drainage ditch. A culvert extended under Highway 89 from the drainage ditch, allowing the contaminants in the underlying soils in the drainage ditch to migrate into off-site residential properties ([see Figure 1 in Appendix](#)).

In 1996, voluntary removal actions were conducted by the Tucson Airport Authority (TAA) on the Three Hangars site. These activities included removing PCB-contaminated pipe sludge from the inlets to the drain pipes in the hangar area, and plugging the floor drains and other inlets to the drain pipe systems to prevent future surface water flows from entering the pipe systems and facilitating PCB migration. In March 1997, USEPA conducted soil remediation activities for the off-site residential areas. Contaminated soil on the off-site residential properties and vacant lot was removed and replaced with clean fill dirt and the area was landscaped. Replacement of the top soil with certified clean soil removed all contact with the soil containing PCBs, eliminating any future public health threat.

## **B. SITE VISIT**

The El Vado residential site consists of a vacant lot, the backyards of three residences, and the vacant area north and west of a church, all of which are areas located on the north side of El Vado Road. The residences were built in the 1970s and 1980s.

Site visits were conducted by ADHS on January 7, 1999 and January 20, 1999. Activities included visiting the Three Hangars site and the surrounding residential areas. The following observations were made:

1. The Three Hangars site is being leased to Tucson Industrial Centers, which subleases space to industrial operations (primarily aircraft-related firms). Buildings 24 and 25, which were located to the west of the Three Hangars site, have been torn down, but the foundations are still visible.
2. The drainage outfall areas are located to the west of the Three Hangars site, next to the railroad tracks and Highway 89. They are covered with desert vegetation such as grass, bushes, and small trees. A culvert crosses under Highway 89 into a vacant lot on the west side of the railroad tracks.
3. The off-site properties that were remediated include a vacant lot, the area behind three residences and a church, and an additional vacant lot to the west of the church. Two of the three residential properties are owned by one family. There are a total of three houses located on these two properties. The third residential property, which only has one house on it, is owned by another family. The remediated areas have been appropriately landscaped and successfully blended into the surrounding area.
4. The residential backyards are covered primarily with dirt and gravel. There are horse stables, animal stalls, and a mobile home behind one residence.
5. A church is located in the remediation area. A vacant lot, which was probably used for parking, is to the west of the church and was remediated.

ADHS obtained information about the El Vado site from the Pima County Department of Environmental Quality (PCDEQ), residents who live on El Vado, and from participants attending a community meeting on Wednesday, January 20, 1999. On January 7, 1999, soil data were obtained from the TCE library located at the El Pueblo Clinic. The TCE library collects data and information that is provided by various government and community sources relating to the larger TIAA Superfund Site. This information is available to the public.

## **C. DEMOGRAPHICS, LAND USE, AND NATURAL RESOURCES**

### **Demographics**

The residential site is located on El Vado road directly west of the Three Hangars site, which is located in the central western portion of the larger TIAA Superfund Site. El Vado Road extends westward from Highway 89, which runs north and south. The two vacant lots on the northwest and southwest corners of El Vado and Highway 89 are covered primarily with dirt, gravel, and some grassy areas. Single-family homes are located on the north and south sides of El Vado Road to the west of the vacant lots and are landscaped with typical desert plants and trees. The drainage ditch areas located to the east of Highway 89 have typical native desert brush and trees ([USEPA Memo, September 10, 1996](#)).

### **Land Use and Natural Resources Use**

The major residential area of contamination is located on the north side of El Vado Road. This includes the backyards of three residences, the vacant lot located on the northwest corner of El Vado Road and Highway 89, and the vacant areas north and west of the church. The backyards of the residences were covered primarily with dirt and desert vegetation. There were open spaces, horse stables, animal stalls, a mobile home, and parking areas throughout the remediated areas. Water for the site was supplied by the City of Tucson municipal water system. The climate of Tucson, Arizona is semiarid, with an average of 10 or 11 inches of rainfall annually ([ADHS 1996a](#)).

## **D. HEALTH OUTCOME DATA**

In 1996, ADHS conducted residential serum PCB blood tests for residents who lived adjacent to the Three Hangars site. Results were as follows:

### **Residential Serum PCB Blood Tests**

Upon finding elevated levels of PCBs in the residential area, ADHS was asked to conduct a health consultation to determine the health implications of the possible PCB exposure to the residents. A total of four houses are located on the three residential properties. Three houses are owned and occupied by members of the same family. The fourth house is owned and occupied by members of another family. In May 1996, ADHS staff arranged to have blood tests conducted for serum PCB levels on 16 members of the two families whose yards were found to have elevated levels of PCBs.

Interviews were conducted with the two families living on the properties, as well as the grown children who had lived on the properties during the past 10 years, and had children of their own while living on the site. Several members of one family expressed concerns regarding symptoms experienced over the years that could not be explained by their physicians. The symptoms ranged from severe acne to fainting spells. To address their concerns, ADHS made arrangements to have interviews and blood tests for PCBs conducted on the families ([ADHS, 1996b](#)). ADHS made arrangements with the Pima County Health Department to conduct the blood draw, and with Sonora Labs to perform the blood analysis. Twelve members of one family and four members of the second family were tested for PCBs in their blood. Results of these blood tests are shown in [Table 1](#). Studies by the Centers for Disease Control and Prevention (CDC) have demonstrated that most people without occupational exposure have median blood PCB levels from 5 and 7  $\mu\text{g/L}$ , with approximately 95% of these values being below 20  $\mu\text{g/L}$  ([ATSDR, 1999](#)).

<b>Table 1: Polychlorinated Biphenyl (PCB) Blood Levels in 16 Residents Living Adjacent to the Three Hangars Site (1996).</b>	
Resident Number	PCB Levels in microgram/Liter ( $\mu\text{g/L}$ )
1	Less than 3 $\mu\text{g/L}$
2	Less than 3 $\mu\text{g/L}$
3	Less than 3 $\mu\text{g/L}$
4	Less than 6 $\mu\text{g/L}$ *
5	Less than 6 $\mu\text{g/L}$ *
6	3.4 $\mu\text{g/L}$
7	Less than 3 $\mu\text{g/L}$
8	Less than 3 $\mu\text{g/L}$
9	Less than 3 $\mu\text{g/L}$
10	Less than 3 $\mu\text{g/L}$
11	Less than 3 $\mu\text{g/L}$
12	Less than 3 $\mu\text{g/L}$
13	Less than 3 $\mu\text{g/L}$
14	Less than 3 $\mu\text{g/L}$
15	Less than 3 $\mu\text{g/L}$
16	Less than 3 $\mu\text{g/L}$
* These two results were as accurate as the testing procedure and quality control criteria would allow on the samples submitted.	

## COMMUNITY CONCERNS

During the site visit on January 7, 1999, ADHS staff had the opportunity to speak with members of one of the families whose backyard had been remediated. They said that they were quite pleased with the outcome of the remediation activities and had no complaints or further concerns. They also stated that their neighbors whose backyards were also remediated were very pleased with the results. They showed ADHS staff around the backyards and pointed out the areas that were remediated. The areas had been blended into the natural landscaping, so there was no apparent area of differentiation. The areas are clean and have been well-kept. They were pleased that someone had followed up on the situation.

The following questions were expressed by some of the community residents:

**A. How does USEPA know that all the PCBs have been found?**

Sampling locations are determined by the geography, type of soil, and the contaminant that is being identified. These properties allow USEPA to choose the best sampling plan for a site. During the sampling of the yards at this site, PCBs were found to be concentrated in particular areas. The boundaries of those areas were determined when PCBs did not show up in samples taken further away from the areas. Additional soil sampling depended on how the PCB concentrations presented themselves. USEPA has told all the families that if there is still some concern about the presence of PCBs that might have gone undetected, they should call or write to the USEPA and express their concerns.

**B. Since the blood samples showed that the serum PCB levels were not elevated, and did not present a health threat, why did USEPA clean up the yards?**

The decision to clean up the PCBs was not just to prevent any possible future exposures to the PCBs, but also to meet regulations and prevent further ecological damage. The previous ATSDR health consultation conducted in 1997 stated that, despite the presence of PCBs in the residential yards, no residents had elevated levels of PCBs in their blood. This shows that, even if people were being exposed to the PCBs, it was not enough to show up in the blood. If the blood levels had been high, this would indicate that people were being, or had been, exposed and their health could be affected. USEPA has a responsibility to make sure that any known contamination is below certain standards, and also to address ecological concerns.

# PUBLIC HEALTH ASSESSMENT

## TUCSON INTERNATIONAL AIRPORT AREA a/k/a EL VADO RESIDENTIAL PROPERTIES

TUCSON, PIMA COUNTY, ARIZONA

### ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS

Public Health Assessments evaluate human exposure pathways, provide an assessment of the health implications of those pathways, and make recommendations for appropriate activities to mitigate exposures and provide appropriate follow-up activities.

This public health assessment evaluates whether a public health hazard still exists for off-site residents since the remediation activities were conducted in 1997. The discussion addresses the available data, the methodology used in the identification process, the criteria for selection and determination of the extent and levels of any residual off-site contamination.

At the time this investigation was conducted, the interim June 1995 Arizona residential Health-Based Guidance Levels (HBGLs) were used as comparison values to determine if all the contaminated soil had been removed. Remediation activities continued until all confirmatory samples were below 0.18 mg/kg. Since then, the HBGLs have been replaced by the Soil Remediation Levels (SRLs), which were promulgated in November 1997 and are currently used as comparison values. The HBGL for PCBs is more conservative than the current SRL, which indicates that all the confirmatory soil samples are below the residential SRL for PCBs of 0.66 mg/kg.

Site-specific soil contaminant concentrations are compared to SRLs to determine which soil contaminants will be evaluated further in a public health assessment. SRLs for soil ingestion were calculated by the Arizona Department of Health Services, Office of Environmental Health. SRLs are protective of human health, including sensitive groups, over a lifetime of exposure. Contaminant concentrations in soils that exceed SRLs may not necessarily represent a health risk. Rather, when contaminant concentrations in soil exceed these standards, further evaluation may be necessary to determine whether the site poses an unacceptable risk to human health ([ADHS, 1997a](#)).

The public health implications of exposure to groundwater contamination is not evaluated in this public health assessment because this exposure pathway was the focus of a USEPA private well study conducted in 1994 ([USEPA, 1994](#)).

#### A. ON-SITE CONTAMINATION

This public health assessment does not evaluate the source contamination at the Three Hangars site. This subject will be reviewed in the final ATSDR Public Health Assessment for the complete TIAA site, for which a draft report has already been completed ([ATSDR, 1996](#)).

#### B. OFF-SITE CONTAMINATION

This section reviews the prerediation soil data and remediation confirmatory sample data to verify that remediation activities have eliminated any future health hazard.

#### Results from Prerediation Off-Site Investigations

In 1996, a total of 82 shallow soil samples were collected at grid locations placed throughout the drainage areas, the vacant lot, the backyards of four residential properties, and the area north and west of the church. Aroclor 1260 and 1254 were detected in concentrations exceeding of 0.18 mg/kg. In 1997, an additional 30 samples were taken and results identified Aroclor 1260 concentrations exceeding HBGL for PCBs.

As indicated in the final report of the remedial investigation, the overall pattern of the PCB distribution consisted of a decreasing width of contaminated soils and decreasing concentrations as one moved to the west from the Three Hangars site. This pattern suggested that, most of the PCBs had been deposited in the soils before reaching the property lines. The areas of highest PCB soil concentrations were east of the residential areas ([Daniel, July 2, 1996](#)).

## Post-Remediation Soil Samples

Post-remediation activities occurred from March through May, 1997. It consisted of the removal of surface soils in the backyards of four residential properties, the vacant area north and west of the church, a vacant lot located west of Highway 89 between El Vado and East Corona Roads, and the associated drainages west of the Three Hangars site. The remediation area was divided into five separate sections. These sections are:

- Area A: Drainage area east of Highway 89
- Area B: Vacant lot west of Highway 89
- Area C: Backyard areas of the residences
- Area D1: Vacant area behind the church
- Area D2: Vacant area to the west of the church

A total of 31 confirmatory soil samples were taken in these five areas during the remediation activities. Remediation continued until samples indicated that the interim Arizona HBGL of 0.18 mg/kg PCBs had been achieved. For this public health assessment, the final confirmatory soil samples were compared with, and were found to be, below the PCB residential Arizona SRL of 0.66 mg/kg. Sample results are provided in [Table 2](#) and corresponding diagrams are provided in the [Appendix \(Conestoga, 1997\)](#).

<b>Table 2: Confirmatory Sample Results From Remediated Areas in El Vado Residential Area (Conestoga 1997).</b>					
<b>Remediation Area</b>	<b>Number of Samples</b>	<b>Range of PCB* Concentrations (mg/kg)**</b>	<b>Mean (mg/kg)</b>	<b>SRL*** for PCBs (mg/kg)</b>	<b>Above SRL</b>
<b>AREA A: Drainage Area</b>	12	<0.033 - 0.643	0.32	0.66	No
<b>AREA B: Vacant Lot</b>	9	<0.033 - 0.182	0.100	0.66	No
<b>AREA C: Backyards of Residences</b>	5	<0.033 - 0.122	0.076	0.66	No
<b>AREA D1: Vacant Area North of the Church</b>	3	0.045 - 0.120	0.07	0.66	No
<b>AREA D2: Vacant Area West of the Church</b>	2	0.035 - 0.039	0.037	0.66	No

\*PCB= polychlorinated biphenyls; \*\*mg/kg= milligrams per kilograms; \*\*\*SRL= soil remediation level

## Groundwater Contamination

The leaching rate of PCBs downward through the soil and into the groundwater does not pose a threat to human health and the environment. PCBs generally bind to surface soils and do not leach to groundwater. PCBs have not been detected in the groundwater and have not been detected in soils deeper than one foot below ground surface at the El Vado Road site.

## PATHWAY ANALYSES

To determine whether residents and transients are being, or could be exposed to any remaining soil contaminants, ADHS evaluated the environmental and human components that lead to human exposure. This pathway analysis consists of five elements:

- A source of contamination
- Transport through an environmental medium
- A point of exposure
- A route of exposure, and
- An exposed population

This public health assessment focuses on human populations living on El Vado Road. ADHS categorizes an exposure pathway as a completed, potential, or eliminated pathway. Completed pathways require that the five elements exist and indicate that exposure to a contaminant has occurred in the past, is currently occurring, or will occur in the future. Potential pathways, however, require that at least one of the five elements should be missing. Potential pathways indicate that exposure to a contaminant could have occurred in the past, could be occurring at the present time, or could occur in the future. An exposure pathway can be eliminated if at least one of the five elements is missing and will never be present.

Completed and potential exposure pathways and quality of the accompanying sampling data used to identify the exposure scenarios are discussed below.

## A. COMPLETED EXPOSURE PATHWAYS

### Past Exposure Pathways

Before remediation occurred, dermal, ingestion, and inhalation exposures to contaminated soil were identified for residents and transients. Children would have been exposed to the PCBs while playing in these areas via incidental soil ingestion, inhalation of fugitive soil dust, and dermal exposures. Transients may have been exposed via inhalation and dermal exposures while walking through these areas. The past exposure pathways are summarized in Table 3.

Table 3: Complete Past Exposure Pathways at the El Vado Residential Site Before Remediation.						
Pathway Name	EXPOSURE PATHWAY ELEMENTS					Time
	Source	Environmental Media	Point of Exposure	Route of Exposure	Exposed Pop.	
Surface soil	Three Hangars	Surface soil	Residential backyards, drainage areas, vacant lot	Ingestion, inhalation, dermal	Residents, transients, children	Past

It is estimated that approximately 30 people could have been exposed to the post-remediated soil. This includes the residential families, and people who visited the church for weekly services and activities. A toxicological profile for PCBs is located in the [Appendix](#).

## B. ELIMINATED EXPOSURE PATHWAYS

### Current and Future Exposure Pathways

The contaminated soil that was in the backyards and vacant lot has been removed and replaced with clean replacement soil. All the exposure pathways to the contaminated soil have been eliminated and residents are no longer exposed to the contaminated soil. Concentrations of PCBs in the clean replacement soil have been analyzed to assure that the health threat that was present before the remediation activities has been completely removed.

# PUBLIC HEALTH IMPLICATIONS

## A. HEALTH OUTCOME DATA EVALUATION

In 1996, 16 residents were sampled for blood PCB levels by the ADHS. Thirteen residents had serum blood levels below 3 µg/L, one resident had a level of 3.4 µg/L, and the remaining two residents had blood levels less than 6 g/L. According to population-based studies conducted by the Centers for Disease Control and Prevention (CDC), the average serum PCB levels in the United States range from 5 to 7 µg/L ([ATSDR, 1999](#)). Therefore, we can conclude that the PCB levels detected in these residents were not site-related.

## B. ATSDR'S CHILD HEALTH INITIATIVE

ADHS has prepared this public health assessment under a cooperative agreement with ATSDR. ADHS has included the following information in accordance with ATSDR's Child Health Initiative.

Sub-populations of concern are sensitive receptor populations who may be particularly susceptible to contaminant exposure. This may include infants, the elderly, or individuals with respiratory problems, depending on the COCs and the nature of the exposures. The exposure points for sensitive residents in this case include the backyards of the residences, the vacant areas north and to the west of the church, and the vacant lot. Because

the contamination has been remediated, future exposure to PCBs by children who live and play in the area has been removed.

ATSDR's Child Health Initiative recognizes that the unique vulnerabilities of infants and children demand special emphasis in communities faced with contamination of their water, soil, air, or food. Children are at greater risk than adults from certain kinds of exposures to hazardous substances emitted from waste sites and emergency events. They are more likely to be exposed because they play outdoors and they often bring food into contaminated areas. They are shorter than adults, which means they breathe dust, soil, and heavy vapors close to the ground. Children are also smaller, resulting in higher doses of contaminant exposure per body weight. The developing body systems of children can sustain permanent damage if toxic exposures occur during critical growth stages. SRLs are protective of human health, including sensitive groups, over a lifetime. Residential SRLs are specifically protective of childhood exposure for systemic toxicity. Most importantly, children depend completely on adults for risk identification and management decisions, housing decisions, and access to medical care.

# PUBLIC HEALTH ASSESSMENT

## TUCSON INTERNATIONAL AIRPORT AREA a/k/a EL VADO RESIDENTIAL PROPERTIES

TUCSON, PIMA COUNTY, ARIZONA

### CONCLUSIONS

In summary, ADHS concludes that no current or future public health hazard exists for residents, children or transients as a result of ingestion, dermal, or inhalation exposures to the remediated soil in the residential areas on El Vado Road.

The confirmatory soil samples from the remediated yards, vacant lot, and areas near the church did not contain elevated levels of PCBs when compared to the respective SRLs. This indicates that the public health hazard that had existed prior to the remediation has been eliminated. Therefore, current and future residential exposures via inhalation, ingestion, or dermal exposures to the remediated soil do not pose a health hazard.

Results of the health outcome data suggest that, despite the elevated levels of PCBs before the remediation activities in the residential yards, no significant exposures had occurred. Because the

PCB contamination in the residential areas has now been removed, there is no future threat of exposure. The residents whose yards were remediated are satisfied with the remediation results and have no further concerns regarding exposures to the PCBs.

### PUBLIC HEALTH ACTION PLAN

The Public Health Action Plan (PHAP) for the El Vado Residential Site contains a description of actions taken, to be taken, or under consideration by ATSDR and ADHS at and near the site. The purpose of the PHAP is to ensure that this public health assessment not only identifies public health hazards, but also provides a plan of action designed to mitigate and prevent adverse human health effects resulting from exposure to hazardous substances in the environment. ADHS and ATSDR will follow up on this plan to ensure that actions are carried out.

#### Actions Completed

1. In May 1996, ADHS staff arranged to have blood tests conducted for serum PCB levels on 16 members of the two families whose yards were found to have elevated levels of PCBs.
2. In July 1996, ADHS staff sent letters to the residents explaining test results.
3. In 1996, the ADHS conducted a health consultation addressing the health concerns at the site.
4. In March 1997, USEPA remediated the residential yards at the El Vado Residential site.
5. In January 1999, ADHS staff met with the El Vado residents on a one-to-one basis in order to discuss the public health assessment and to address their concerns and questions. ADHS also attended a public meeting at the Tucson Unified Community Action Board (UCAB) to speak with members about the public health assessment and their concerns.
6. In February 1999, ADHS submitted a public health assessment for El Vado Residential Site to ATSDR.
7. In June 1999, ADHS staff sent out notices to area newspapers and radio stations to announce the public comment period on the public health assessment.
8. In June 1999, ADHS staff was interviewed by a Tucson radio station and a newspaper on the El Vado Site public health assessment.
9. In September 1999, ADHS staff attended the UCAB meeting in Tucson to answer any questions on the El Vado Site. The staff also met with residents at the El Vado site to discuss the results of the public health assessment and to answer any questions.

#### Actions Proposed

1. ADHS will continue to meet with the community residents at the UCAB meetings on a regular basis to inform the residents about the ADHS activities being conducted at the Tucson site.
2. ADHS will conduct health education activities with this community regarding site-related contaminants and physical hazards.
3. ADHS will continue to work with USEPA on any additional health concerns at the El Vado site.

## PREPARERS OF REPORT

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## CERTIFICATION

This Tucson International Airport, El Vado Residential Site Public Health Assessment was prepared by the Arizona Department of Health Services, under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time this public health assessment was begun.

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The Division of Health Assessment and Consultation, ATSDR, has reviewed this public health assessment and concurs with the findings.

Richard Gillig  
Chief, State Program Section, DHAC, ATSDR

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# PUBLIC HEALTH ASSESSMENT

TUCSON INTERNATIONAL AIRPORT AREA  
a/k/a EL VADO RESIDENTIAL PROPERTIES

TUCSON, PIMA COUNTY, ARIZONA

## APPENDIX

### Figures for Confirmatory Soil Remediation Sample Concentrations



Figure 1: Location of Removal Site.



Figure 2: Confirmatory Sample Results - Area A



Figure 3: Confirmatory Sample Results - Area B



Figure 4: Confirmatory Sample Results - Area C



Figure 5: Confirmatory Sample Results - Area D1



Figure 6: Confirmatory Sample Results - Area D2

### Toxicological Profile for PCBs

Dermal and ocular effects in the form of chloracne, skin rashes, and eye irritation have been observed with occupational inhalation exposure to Aroclors. Chloracne is a distinctive acneform eruption manifested by keratinous plugs called comedones and skin-colored cysts. Mild to moderate chloracne was seen in seven of 14 workers exposed to 0.1 mg/m<sup>3</sup> of Aroclors for an average period of 14.3 months. However, PCBs were not the only substance to which workers were exposed. Workers receiving exposures at levels as low as 0.003 mg/m<sup>3</sup> for >5 years had dermal effects which included rashes, pigmentation changes of the skin and nails, and other skin changes. Eye irritations have also been documented with airborne PCB exposure. In these studies, workers received exposure to various Aroclors at concentrations between 0 and 2.2 mg/m<sup>3</sup> for >3 years.

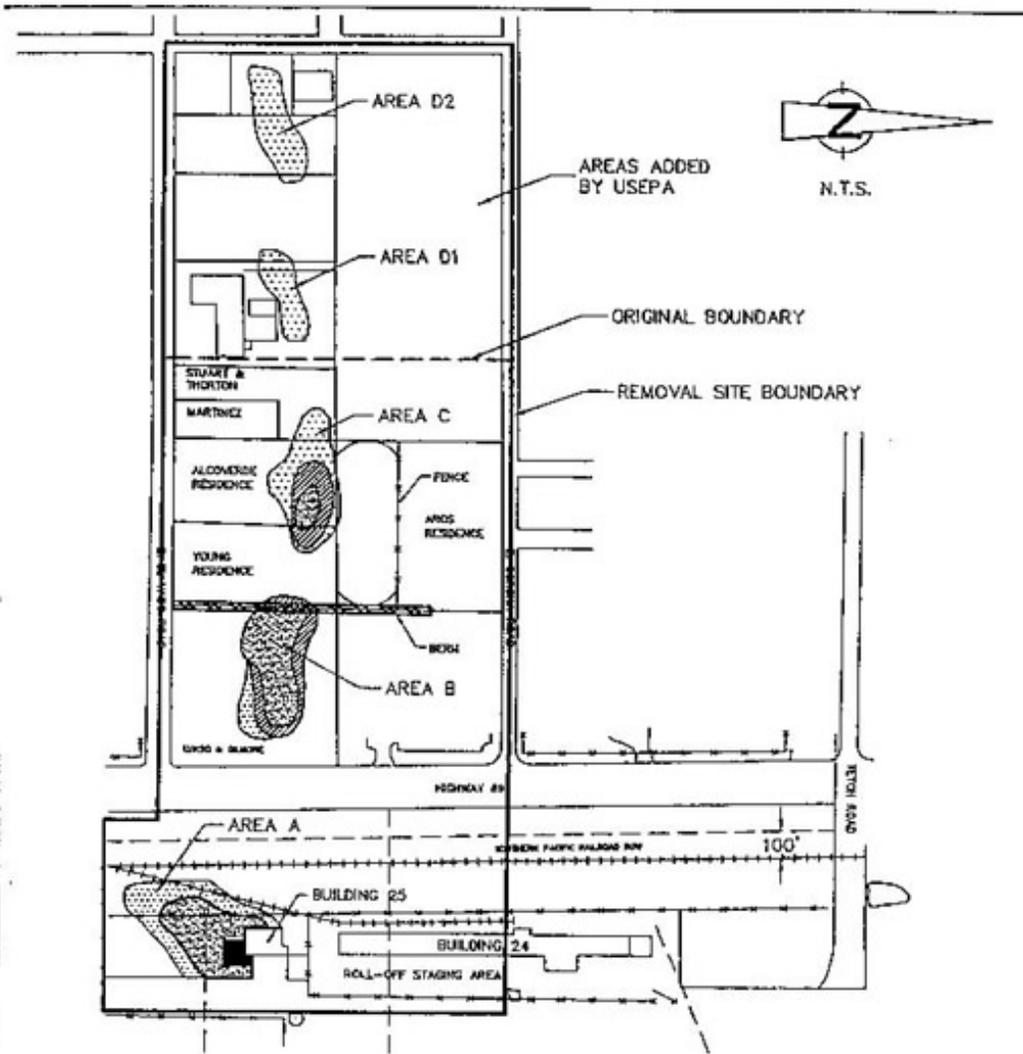
Human health effects have been documented more frequently for inhalation exposure to PCBs than for ingestion and dermal exposures. Respiratory symptoms have been reported for inhalation exposures to Aroclor-exposed workers. Upper respiratory tract or eye irritation, cough, and tightness of the chest were documented for 326 capacitor workers with inhalation exposure levels of 0.007-11 mg/m<sup>3</sup>. Limitations of the study included the absence of a control group, poor definition of cohort, and other factors. Of 243 workers involved in the above study, 14% demonstrated a decline in forced vital capacity (FVC) when compared to the standard values. Of those with a decline in FVC, 80% manifested a restrictive pattern of impairment without radiologic changes. There is limited evidence of neurological effects from inhalation exposure. In one study, almost half of the workers at a capacitor plant receiving exposure to mean concentrations of Aroclors at 0.007-11 mg/m<sup>3</sup> for five years complained of headache, dizziness, depression, fatigue, and nervousness. In addition, switchgear workers exposed to Aroclor 1260 and 1242 at concentrations of 0.00001-0.012 mg/m<sup>3</sup> had a higher incidence of headaches and problems with memory and sleeping compared to unexposed workers.

Neurological effects have been seen in humans but, particularly, in animals with oral exposure to PCB. Farm families who ate dairy products and beef contaminated with PCBs had a 19% prevalence of numbness. Because of the subjectivity of symptoms and the lack of controls, no definitive association could be shown between PCB exposure and the neurological effect. In animals, doses between 0.8 and 3.2 mg/kg-day of Aroclor 1016 in the diet for 20 weeks did not influence the concentrations of noradrenaline, adrenaline, or serotonin in monkey brains. In addition, no histological changes were reported in the brains of rats administered 100 mg/kg-day of Aroclor 1242 by gavage every second day for three weeks. Changes in the neurotransmitter serotonin were documented in several areas of the brain when rats received a mixture of Aroclor 1254 and 1260 at single, high doses of 500 and 1,000 mg/kg.

Animal studies have shown that PCBs containing 60% chlorine by weight are carcinogenic. At an estimated dose of 5 mg/kg-day, Aroclor 1260, fed to female Sherman rats, resulted in the formation of hepatocellular carcinomas. Sprague-Dawley rats formed liver tumors after receiving an estimated 3.45 mg/kg-day of Aroclor 1260 in their diet for 24 months. In a National Cancer Institute study, no treatment-related liver tumors

manifested in Fisher-344 rats receiving estimated doses of 1.25, 2.5 or 5.0 mg/kg-day dietary Aroclor 1254 for 104-105 weeks. However, nonhepatic tumors (i.e. adenocarcinoma of the stomach, jejunum, or cecum) were positively associated to the Aroclor 1254 treatment in male and female rats.

Cancer effects have been seen in workers exposed to PCBs by inhalation. The studies have had limitations resulting in no definitive statement regarding PCB's cancer-causing effects. In one study, an excess risk for cancers of the liver, biliary tract, or gall bladder was detected in 2,588 workers employed in two capacitor factories. The workers had been employed between 1940 and 1976, at least three months, in areas with the most exposure to PCBs. Aroclor 1254 was initially used, then Aroclor 1242 and finally Aroclor 1016. Personal time-weighted average concentrations of Aroclor 1016 in 1977 were 0.024 to 0.393 mg/m<sup>3</sup> at Plant 1 and 0.170 to 1.26 mg/m<sup>3</sup> at Plant 2. There were three cases of liver, gallbladder, and/or biliary tract cancer as compared to 1.07 expected, and four cases of rectal cancer as compared to 1.19 expected. One of the study's limitations was the small number of cases. In another study, increased mortality due to cancer was found in 544 male and 1,556 female workers of a capacitor manufacturing plant in Italy. The workers had been employed between 1946 and 1978 for at least one week. PCB mixtures containing 54% chlorine were in use until 1964 and eventually mixtures of 42% chlorine were in use until 1970. Area samples obtained in 1954 and 1977 revealed PCB air levels of 5.2 to 6.8 mg/m<sup>3</sup> (54% chlorine) and 0.048 to 0.275 mg/m<sup>3</sup> (42% chlorine). Among the findings, deaths from all cancers in males were significantly greater than expected when contrasted to national and local rates (14 observed versus 1.7 national and 2.2 local), and in females contrasted with local rates (12 observed versus 5.3 expected). A significantly higher death rate from gastrointestinal tract cancer was seen in males when contrasted to national and local rates. The study's limitation involved the small number of cases, short minimum exposure, and other factors. In addition, a mortality study of 3,643 workers of a capacitor manufacturing facility revealed some indication of PCB exposure-related malignant melanoma. The mean duration of employment was 4.1 years, while the mean age at hire was 27 years. PCB had been utilized from 1957 - 1977, and this was the period in which the workers had been employed. Aroclor 1242 was utilized until 1970, followed by Aroclor 1016. Area monitoring in 1977 detected mean concentrations of PCBs ranging from 16 to 76 g/m<sup>3</sup>. The workers were also exposed to various other chemicals. A statistically-significant difference was seen for malignant melanoma when the observed cases (8) were contrasted to the expected number of cases (2). The study had a number of limitations, which included the small number of deaths, insufficient monitoring data and other factors.



**LEGEND**

PCB CONCENTRATIONS

(0.18-1.0 mg/kg)

(1.0-1.5 mg/kg)

(>1.5 mg/kg)

(>50 mg/kg)

○ FIRE HYDRANT WITH METER

SOURCE: DANIEL B. STEPHENS & ASSOCIATES.

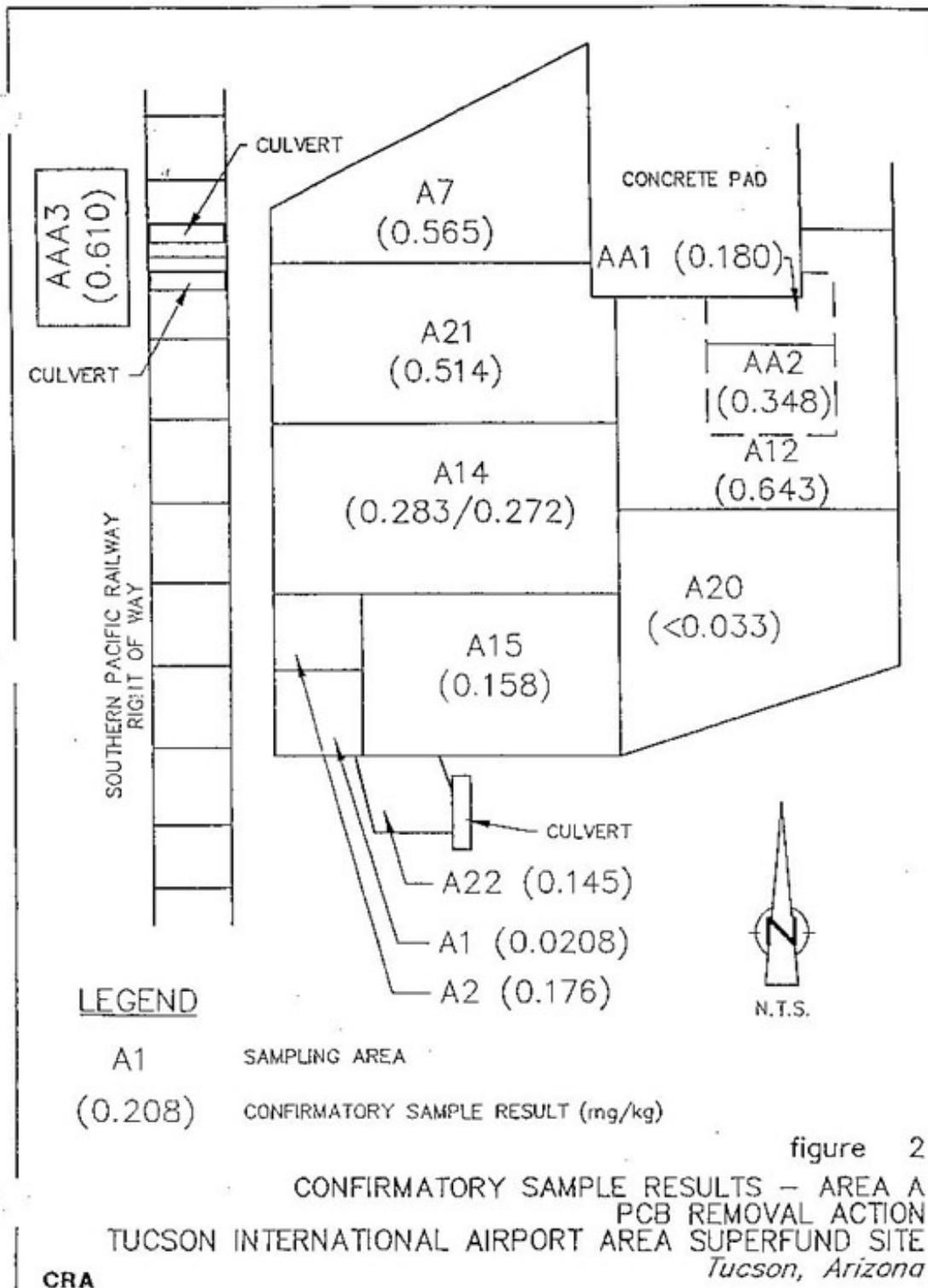
figure 1

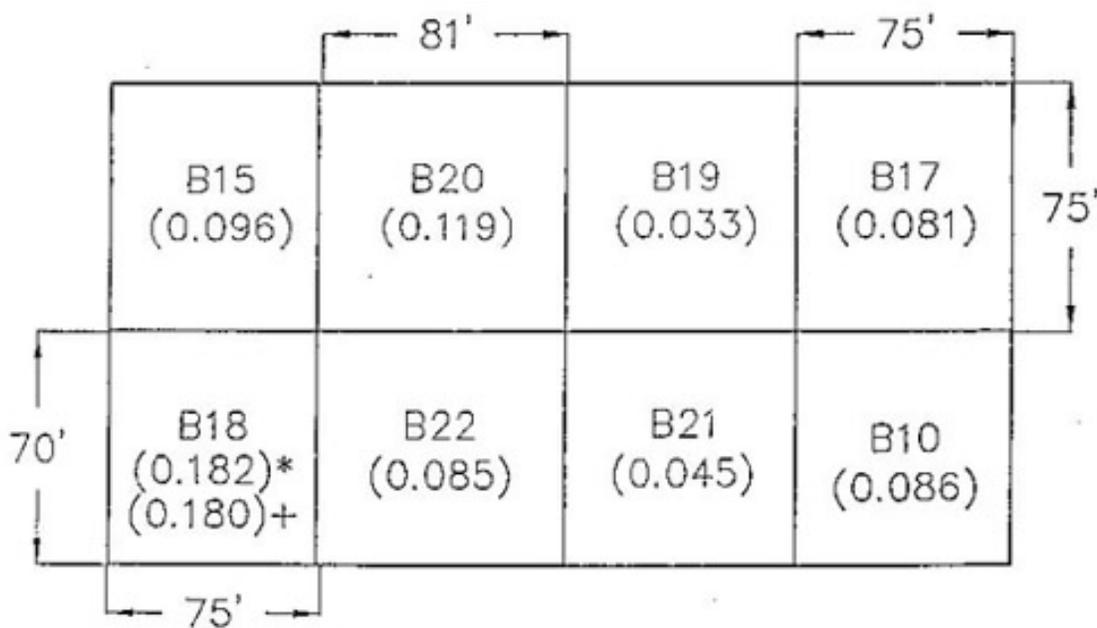
LOCATION OF REMOVAL SITE

PCB REMOVAL ACTION

TUCSON INTERNATIONAL AIRPORT AREA SUPERFUND SITE

Tucson, Arizona



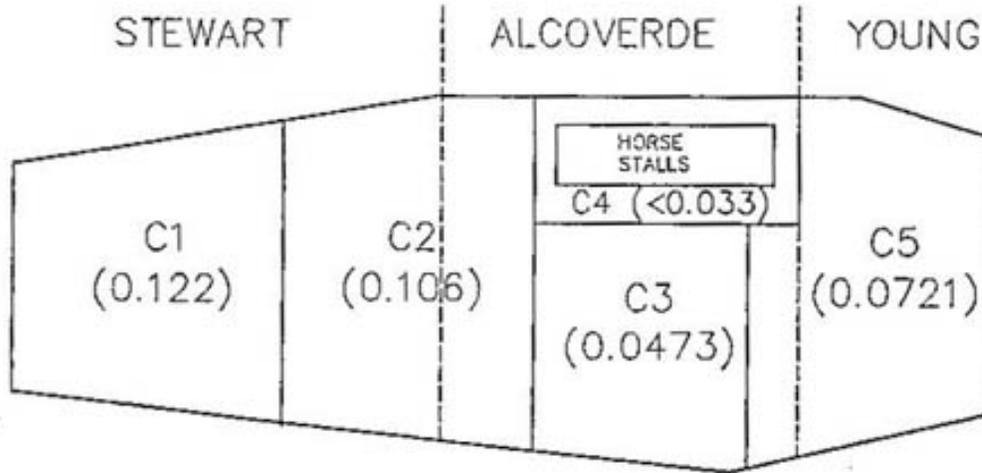


**LEGEND**

- B15 SAMPLING AREA
- (0.096) CONFIRMATORY SAMPLE RESULT (mg/kg)
- \* ACCEPTED AS MEETING HBGL CRITERIA BY USEPA AND ADEQ
- + EPA SPLIT SAMPLE

figure 3  
 CONFIRMATORY SAMPLE RESULTS - AREA B  
 PCB REMOVAL ACTION  
 TUCSON INTERNATIONAL AIRPORT AREA SUPERFUND SITE  
 Tucson, Arizona

CRA



LEGEND

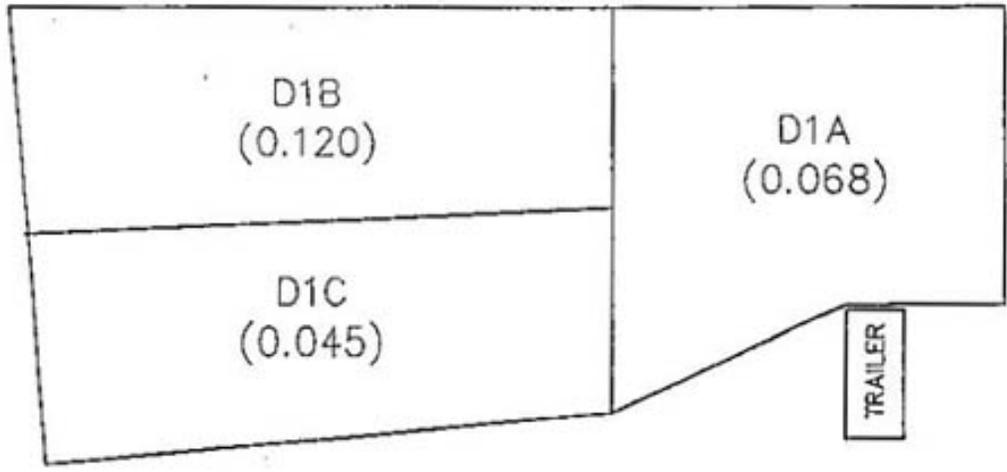
C5                      SAMPLING AREA

(0.0721)                      CONFIRMATORY SAMPLE RESULT (mg/kg)

figure 4

CONFIRMATORY SAMPLE RESULTS — AREA C  
 PCB REMOVAL ACTION  
 TUCSON INTERNATIONAL AIRPORT AREA SUPERFUND SITE  
*Tucson, Arizona*

CRA



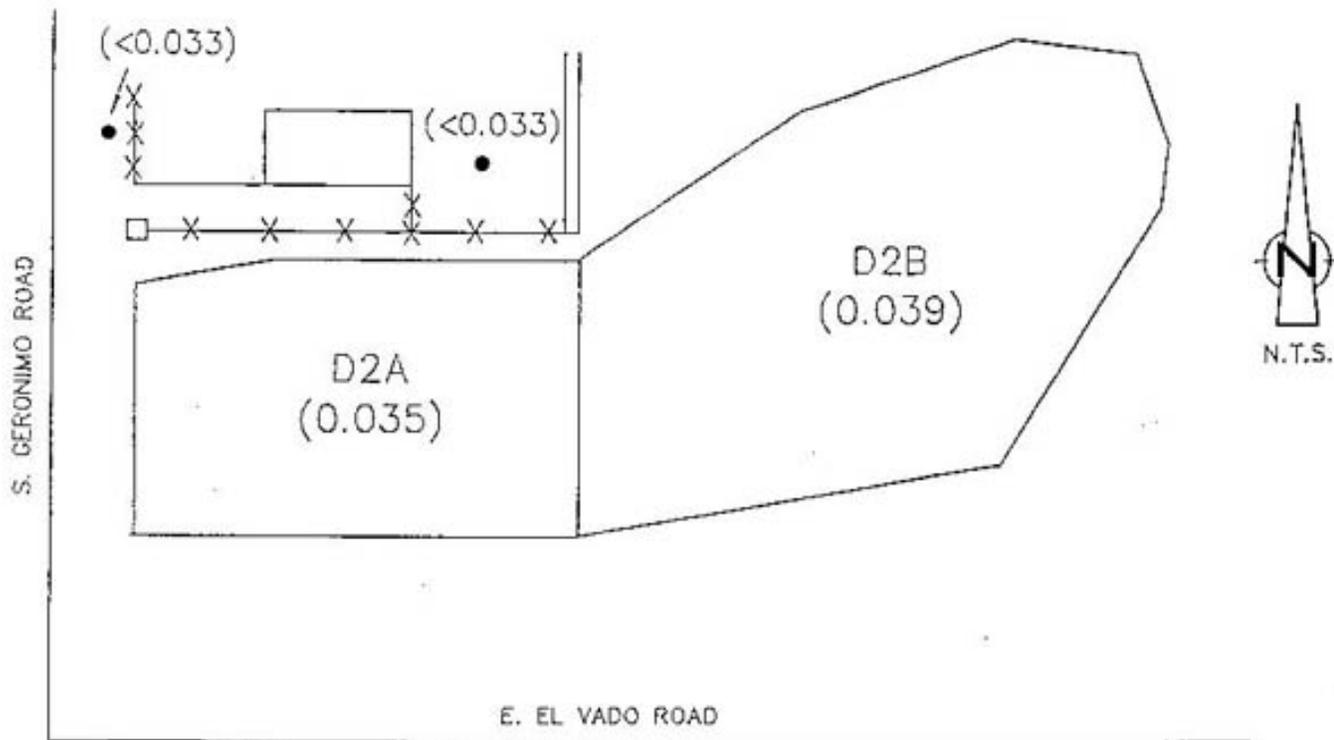
**LEGEND**

- (0.120) SAMPLE PCB CONCENTRATION IN mg/kg
- D1B CONFIRMATORY SAMPLE AREA

figure 5

CONFIRMATORY SAMPLE RESULTS - AREA D1  
PCB REMOVAL ACTION  
TUCSON INTERNATIONAL AIRPORT AREA SUPERFUND SITE  
*Tucson, Arizona*

**CRA**



**LEGEND**

(0.035) SAMPLE PCB CONCENTRATION IN mg/kg

● GRAB SAMPLE LOCATION

D2A CONFIRMATORY SAMPLE AREA

figure 6

CONFIRMATORY SAMPLE RESULTS - AREA D2  
PCB REMOVAL ACTION  
TUCSON INTERNATIONAL AIRPORT AREA SUPERFUND SITE  
Tucson, Arizona

CRA