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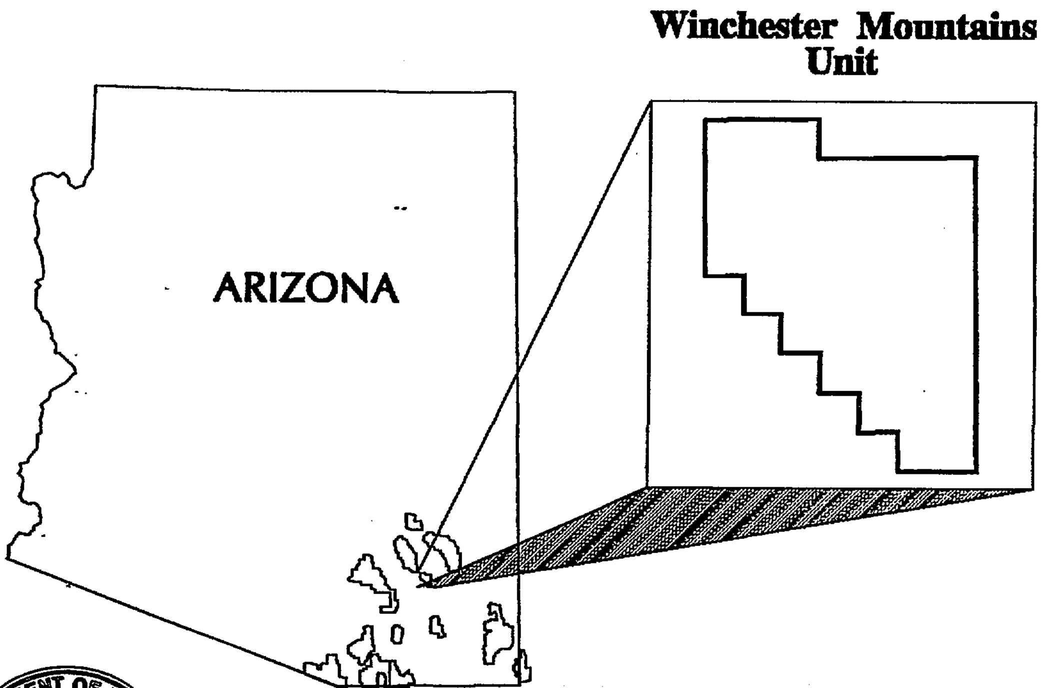
Mineral Land Assessment
Open File Report/1993

MINERAL APPRAISAL OF CORONADO NATIONAL FOREST, PART 3

Winchester Mountains Unit
Cochise County, Arizona



BUREAU OF MINES
UNITED STATES DEPARTMENT OF THE INTERIOR

MINERAL APPRAISAL OF THE CORONADO NATIONAL FOREST

PART 3, WINCHESTER MOUNTAINS UNIT, COCHISE COUNTY, ARIZONA

by

Robert C. Armstrong and S. Don Brown

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Intermountain Field Operations Center,
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16. Abstract (Limit: 200 words)

The Bureau of Mines conducted a mineral investigation of the Winchester Mountains part of the Coronado National Forest to appraise the mineral resources and to identify and describe areas with past mining activity.

No mineral production has occurred within the Winchester Mountains Unit. Only limited production, less than 300 st of ore, has come from the Winchester mining district.

The investigation found no evidence of metallic mineral resources in the Forest, only trace amounts of gold were detected in the southern part of the Forest.

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PREFACE

A January 1987, Interagency Agreement between the U.S. Bureau of Mines, U.S. Geological Survey, and U.S. Forest Service describes the purpose, authority, and program operation for the forest-wide studies. The program is intended to assist the Forest Service in incorporating mineral resource data in forest plans as specified by the National Forest Management Act (1976) and Title 36, Chapter 2, Part 219, Code of Federal Regulations, and to augment the USBM's mineral resource database so that it can analyze and make available minerals information as required by the National Materials and Minerals Policy, Research and Development Act (1980). This report is based on available data from literature and a field investigation.

This open-file report summarizes the results of part of a Bureau of Mines forest-wide study of the Coronado National Forest. The report is preliminary and has not been edited or reviewed for conformity with the U.S. Bureau of Mines editorial standards. This study was conducted by personnel from the Resource Evaluation Branch, Intermountain Field Operations Center, Denver Federal Center, Building 20, Denver, Colorado, 80225.

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UNIT OF MEASURE ABBREVIATIONS USED IN THIS REPORT

ft	foot
in.	inch
mi	mile
mi^2	square mile
ppb	parts per billion
ppm	parts per million
%, pct	percent
lb	pound
st	short ton, 2000 pounds
oz	troy ounce
oz/st	troy ounce per short ton

MINERAL APPRAISAL OF THE CORONADO NATIONAL FOREST, PART 3, WINCHESTER MOUNTAINS UNIT, COCHISE COUNTY, ARIZONA

SUMMARY

Between 1988 and 1992, the Bureau of Mines studied the mineral resources of the Coronado National Forest to appraise and determine types and locations of deposits that could be mined economically, both under current conditions and for those of the foreseeable future. The study included a comprehensive field examination to find, examine, and inventory any mine or prospect sites. This report covers the work done in the Winchester Mountains management unit of the Forest.

No mineral production has occurred within the Winchester Mountains Unit. Only limited production, less than 300 st of ore, has come from the nearby Winchester mining district. Commodities produced were gold, silver, copper, and lead.

A Second Roadless Area Review and Evaluation (RARE II) study was done in 1981. That report concludes that the mineral resource potential is low.

The current study has found no conclusive evidence to contradict the RARE II evaluation. Northwest-southeast trending silicified structures, located in the southern part of the Forest, contain trace gold at the surface. Limited core sampling at depth may confirm the presence or absence of higher gold values.

INTRODUCTION

For purposes of the Bureau of Mines field investigations, the Coronado National Forest is divided into 13 study units. The Winchester Mountains Unit encompasses 28,090 acres, or 1.6 percent of the total acreage in the Coronado National Forest. Of these, 9,132 acres, or 32.5 percent, are state or privately owned. The Winchester

Roadless Area consists of 14,100 acres, or approximately 1/2 of the Winchester Mountains Unit (plate 1).

The term "Winchester Mountains Unit," as used in this report, refers to the area of the Winchester Mountains which lies within the Forest boundary. "Winchester Mountains" refers to the entire mountain range, and "Winchester mining district" refers to the commonly recognized area of mining intensity. "Winchester Roadless Area" refers to the RARE II study area. See plate 1 for the location of these areas.

Geographic Setting.

The Winchester Mountains Unit includes 28,090 acres (44 mi^2) of the Coronado National Forest, in northwest Cochise County, southeastern Arizona (fig. 1). Of this area, about 9,132 acres is state or privately owned. The nearest major communities to the range include Pima, Thatcher, and Safford to the northeast, Willcox to the southeast, Benson to the southwest, and Mammoth and San Manuel to the northwest. Sulphur Springs Valley is on the east and northeast side of the range and the San Pedro Valley is west of the range. Elevations inside the Forest range from 4600 ft on the northeast edge to 7631 ft at Reiley Peak.

Interstate Highway 10 is south and east of the Forest, U.S. Highway 666 is east and northeast of the Forest, State Highway 266 is to the northeast, and an unnamed all weather road parallels the west side of the Forest. From these highways and roads, several dirt roads provide access to and near the Forest. Some of those roads cross private land.

Previous investigations

Two geologic studies have covered at least part of the Winchester Mountains. Cooper and Silver (1964, p. 33-34, 88-92, 161) did an extensive study of the geology

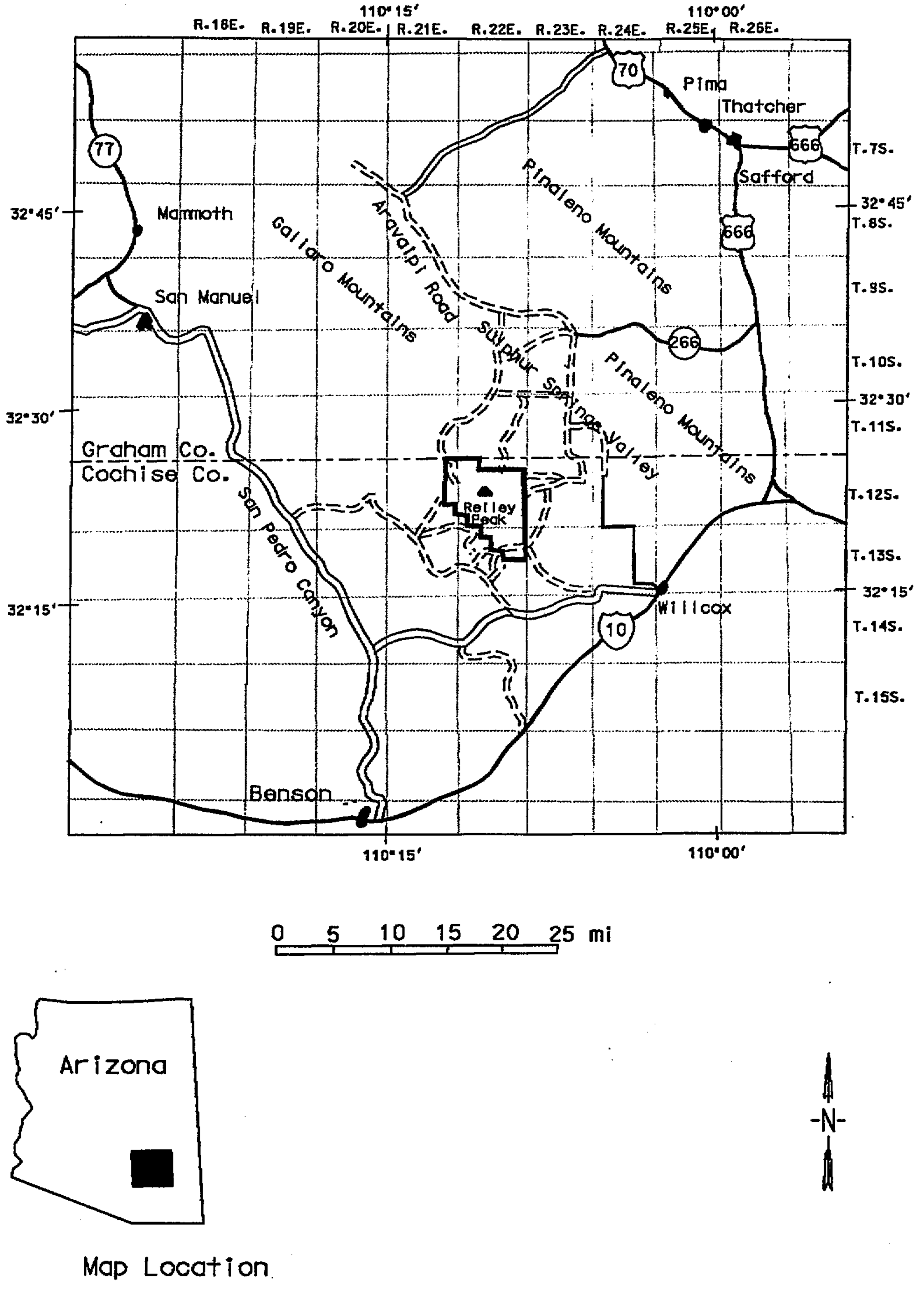


Figure 1.-- Index Map of the Winchester Mountains unit, Coronado National Forest, Cochise County, Arizona

and ore deposits of the Dragoon 15 minute quadrangle area, which includes the southern part of the Winchester Mountains. Their results have provided background information for this study. Drewes (1981, p. 71-72) studied tectonic activity in southeastern Arizona, including the Winchester Mountains. He suggests that thrust faulting in an area which includes the mining district is part of a major left-lateral strike-slip fault zone.

In addition, an area of the Winchester Mountains was studied jointly by the U.S. Geological Survey (USGS) and U.S. Bureau of Mines (USBM) in 1981 as part of the Second Roadless Area Review and Evaluation (RARE II). The study (Keith and others, 1982, p. 1) consisted of a) field checking and modification of the existing geologic maps of the area by the USGS, b) field examination of all mines, prospects, and mineralized areas in and adjacent to the Winchester Roadless Area by the USBM, c) sampling for geochemical analysis by the USGS, and d) examination and interpretation of available aeromagnetic and gravity data by the USGS.

USGS sampling consisted of geochemical analysis performed on rock, stream sediment, and panned-concentrate samples at 28 sites, for 33 elements. Sampling performed by the USBM included 11 panned-concentrate samples taken in or near the Winchester Roadless Area. Geochemical analysis for 40 elements was done. Results of this study are discussed in the Mineral Appraisal section below. Assay results from USBM samples are given in Table 4. Assay results from USGS samples were not available.

Methods of investigation.

The present investigation included research of geologic literature, including Arizona Department of Mines and Mineral Resources (ADMMR) files. BLM mining claim records were also examined; no current claims were found.

Field examination of mines, prospects, and mineralized outcrops, and laboratory analyses of rock-chip samples were also conducted. Reconnaissance field work of 1989 and 1990 was supplemented by additional sampling in 1992, and a total of 16 rock-chip samples were taken within the Forest boundary (plate 1). Pulp samples were prepared from the rock-chip samples. Each pulp sample was analyzed by a) 34 element instrumental neutron activation analysis (INAA) performed by Bondar-Clegg, Inc, and b) 32 element inductively-coupled plasma spectrometry (ICP) performed by Chemex Labs, Inc. A second split of each sample pulp was archived. Results of the analyses are given in Tables 2 and 3.

Geologic setting

Three Tertiary volcanic units make up the majority of rock cropping out inside the Forest boundary (Cooper & Silver, 1964, p. 88-92; Keith and others, 1982, p. 3). The two lower members are part of the Galiuro Volcanics formation. The latite member is the lower of the two, and consists of up to 300 ft of latitic and rhyolitic ash flow tuffs and lava flows. An unconformity separates these rocks from the overlying rhyolite member. This consists of up to several hundred feet of rhyolitic ash flow tuffs, lava flows, dikes, and sills. Capping these two members is a unit of black, vesicular lava flows, up to 1,200 ft in thickness. The remainder of outcrops includes weakly consolidated alluvium, including the Gila conglomerate, of Tertiary to Quaternary age.

South of the Forest area, Paleozoic carbonate units crop out, which contain mineralized ore bodies. The possibility that such units extend into the study area, and may contain ore bodies, exists; however, that assumption has not been confirmed. The great thickness of Tertiary volcanics burying them may preclude their importance. As they are included in the area of the Winchester mining district, they are briefly described in appendix A.

A generalized geologic map of the Winchester Mountains Unit is shown in figure 2.

Mining history

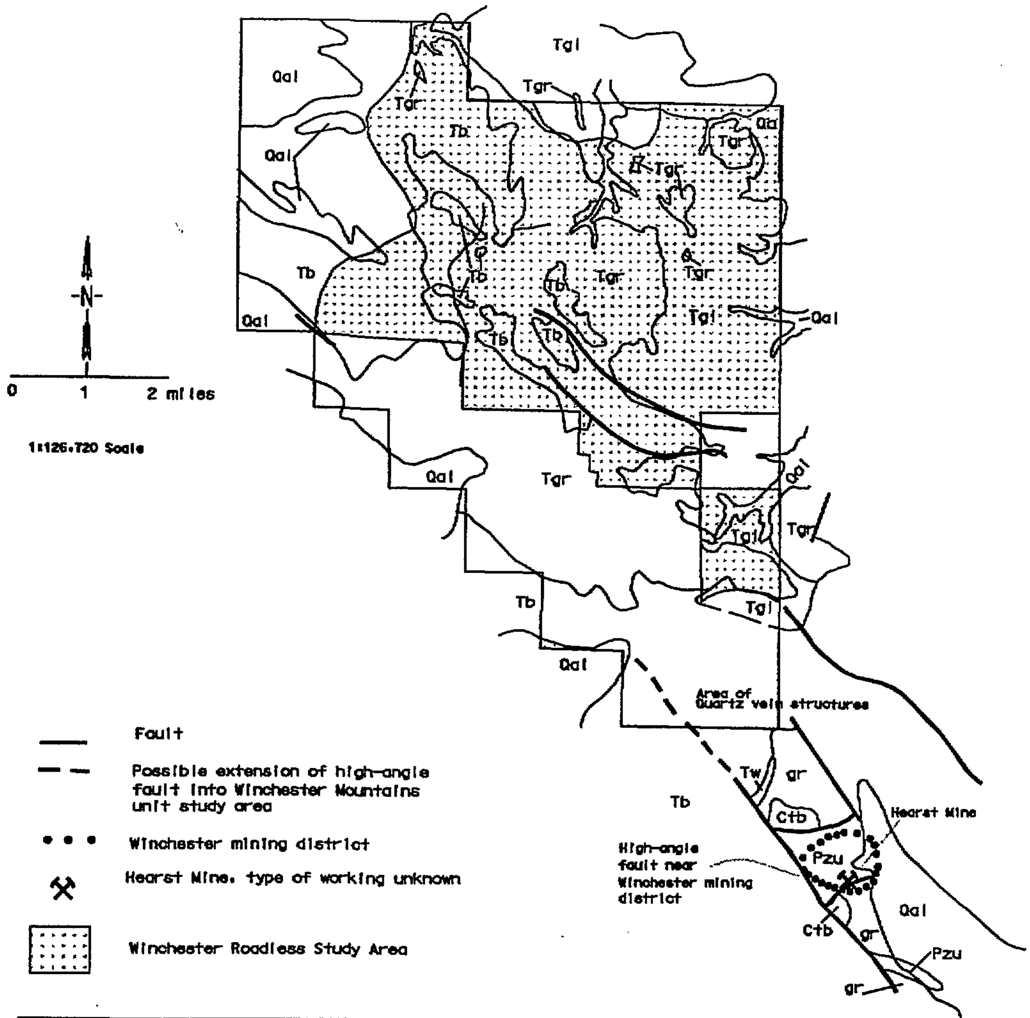
The Winchester Mountains Unit contains only one mine working, a small adit in upper Rockhouse Canyon, west of Reiley Peak. It has been blocked with a concrete dam, and has apparently been used as a water source for a nearby cattle tank. No other mine workings are known within the Forest area, and there is no record of any past mine production.

The Winchester mining district lies entirely outside the Forest. The history of this area is briefly explained in appendix A.

There is no current mineral exploration or production within the Forest boundary.

MINERAL APPRAISAL

No mineral resources were identified as a result of this study. However, trace gold found in silicified structures may merit further investigation, and is discussed below. Also discussed in this section are a summary of other samples taken, results



Qal	Quarternary	Alluvium (Holocene and Pleistocene) — Poorly sorted silt, sand, and gravel. Locally includes colluvial and fanglomerate deposits; areas shown by Creasy et al may contian Gila conglomerate
Tb	Tertiary	Black vesicular basalt lava flows shown by Creasy et al may be more andesitic in composition and/or may contain fragmental material.
Tgr	Tertiary	(Miocene) Rhyolite member of Galiuro Volcanics-rhyolitic ash flow tuffs, lava flows, dikes, and sills.
Tgl	Tertiary	(Miocene) Latite member of Galiuro Volcanics-latitic and rhyolitic ash flow tuffs and lava flows.
Tw	Tertiary ?	Whitetail conglomerate- Chiefly unconsolidated to consolidated gravels derived from local sources.
Pzu	Mississippian	Naco, Escabrosa, and Martin formations, undifferentiated
Ctb	Cambrian	Troy and Bolsa quartzites.
gr	Precambrian	Older quartzose granitic rocks- includes granite? quartz monzonite, and grandiorite

Note: Creasey et al describe a unit Tr, which apparently includes the units Tgr and Tgl, and is given the same age as Tb.

Figure 2. — Generalized geologic map of the Winchester Mountains unit study area and Winchester mining district. After Keith and others (1982, p. 4,5) within the Winchester Roadless Study Area, and Creasy and others (1961) elsewhere.

of the RARE II study, and a discussion of the relation of Winchester mining district mineralization to this study. Complete sample analysis results are presented in tables 2 and 3. Table 5 summarizes descriptions of the rock-chip samples.

Trace gold in silicified structures

A series of structures, which are quartz vein and/or silicified breccia, was investigated by rock-chip samples WI008-WI016. Two of these (WI010, WI012) are samples of the host rock (the latite member of the Galiuro Volcanics) and were taken for background; the others were taken across the structures. No specific reference to these structures was noted in the literature. These structures have a N. 55° W., 80°-85° SW. attitude, but form a N. 30° W. trend, possibly in an en echelon fracture system. Their width is typically 10 ft. The structures are semi-contiguous, being separated in places by alluvial cover, but with lengths of 100 ft or more at the locations sampled. The observed extent of the structure system, along the general trend, was about 1.1 mi.

None of these samples exhibited any anomalous metallic or other concentrations. However, they did tend to show slightly higher (greater than one standard deviation from the mean) concentrations of gold, arsenic, antimony, and bromine than samples taken from the rhyolite or latite member rocks (tables 2 and 3). Maximum concentrations were 97 ppb, 42 ppm, 183 ppm, and 10 ppm, respectively, for these elements (table 2). By way of further explanation, 34.3 ppm is equivalent to 1 oz/st. A gold content of 97 ppb, therefore, is approximately 0.003 oz/st.

Interpretation of silicified structures

A model for the mineralization of these structures is as follows: High-angle faulting in the Winchester mining district extends into the Winchester Mountains unit, as speculated by Keith and others (1982, p. 3) and Drewes (1981, p. 71). During the period of Basin and Range orogeny, such faults are reactivated as suggested by Drewes (1981, p. 72), and faulting is extended through the Tertiary volcanic tuff units. Brecciation may occur along faults. Faulting might be concurrent with or shortly after deposition of the tuff. The weakness zones created serve as pathways for mineralization caused by continued volcanic activity in the area.

Although this model is speculative, the presence of a quartz vein system with trace gold, and geophysical and tectonic information presented by the RARE II study (below), make this silicified zone worthy of further consideration and possible exploration.

Summary of other samples taken

The other samples taken for the present investigation, WI001-WI007, were either a) general reconnaissance samples, or b) samples taken to investigate a small adit.

These samples are in the effusive volcanics (Tr) unit described by Creasey and others (1961). They also fall in the areas remapped by Keith and others (1982, p. 4) to be the latite and rhyolite members (Tgl and Tgr, respectively) of the Galiuro Volcanics described by Cooper & Silver (1964, p. 88-92). Complete unit descriptions and abbreviations are given in fig. 2.

Although they may tend to represent the more silicified areas of the study area (excluding those discussed above), only one of these samples showed notable metallic concentration. Sample WI006, a selected sample of quartz float, had 50 ppb gold (table 2). However, it had no anomalous amounts of arsenic, antimony, or bromine.

A rock-chip sample at the portal and a grab sample of the dump of a small adit (WI001 and WI002) show no notable metallic concentrations.

RARE II study results

Anomalous concentrations of lanthanum, niobium, lead, and tin found in panned-concentrate samples during the RARE II study (Keith and others, 1982, p. 3) were not considered significant. They were explained as being either from minerals weathering out of the Galiuro Volcanics, or from human contamination, and were dismissed as not relating to potential resources. The present investigation was unable to confirm the anomalous concentrations for lanthanum, lead, and tin. Assaying for this report did not include niobium.

The lower detection limits available for the RARE II study, for precious or base metals or indicator elements (e.g. gold, silver, lead, arsenic, antimony), were one to four orders of magnitude higher than those used for the present investigation. This lower resolution lessens the usefulness of the geochemical results from this study, as these elements are only present in trace concentrations.

Available geophysical data included results of gravity, magnetic, and audio-magnetotelluric surveys. These indicate that a northwest trending fault, buried by the Tertiary volcanic units, exists just south of the roadless area and may extend into the roadless area (fig. 2). The report speculates on the connection of this postulated fault to the steeply dipping and northwest trending fault which partially bounds the Paleozoic limestone blocks of the Winchester mining district (appendix A). However, examination of geophysical data revealed no conclusive evidence that might relate to the presence of mineral deposits.

The RARE II study concludes that the potential for the occurrence of metallic or nonmetallic resources is low.

Winchester district mineralization relation to study area.

Mineralization in the Winchester mining district was primarily jasperoid replacement of Paleozoic limestones, with some minor quartz veining. Although it is possible that the carbonates extend into the study area, and contain mineralized replacement bodies, there is no clear evidence that this is so, and that assumption has not been made. If such mineralization did extend into the Winchester Mountains unit, it would be buried under at least several hundred feet of Tertiary volcanic rock. Although the Winchester mining district has yielded a small production, it is difficult to predict the size and grade of similar hypothetical mineralization in the study area. Considering the amount of country rock overburden, mineralization of similar size and grade to that of the Winchester mining district would not constitute a resource.

CONCLUSIONS

Mineral resource evaluations by Keith (1973, p. 15) and Keith and others (1982, p. 6) conclude that the potential for mineral resources in the Winchester Mountains Unit is poor and low, respectively. No conclusive evidence to the contrary has been found during the course of the present investigation. However, silicified structures in the southern portion of the Winchester Mountains Unit contain trace gold at the surface. Limited core sampling at depth in these northwest-southeast trending structures may confirm the presence or absence of higher gold values. This would be the recommended course of further study, if any.

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APPENDIX A

WINCHESTER MINING DISTRICT

APPENDIX A

WINCHESTER MINING DISTRICT

The Winchester mining district comprises about 575 acres, and lies about 2 mi southeast of the National Forest area (Plate 1). Mineralization is reported to be early Tertiary-age vein and replacement type deposits with gold, silver, copper, and lead (Keith and others, 1983, p. 54-55; Keith, 1973, p. 91).

The gold and silver deposits are primarily jasperoid replacement lenses in Paleozoic limestone of the Naco, Escabrosa, and Martin formations. Blocks and wedges of these units are brought into contact with both the older basement rock and younger volcanics by various high angle and strike-slip faults (Drewes, 1981). Cooper and Silver (1964, p. 161) report that these lenses are about 100 ft wide and 1000 ft long. Assay values reportedly contain silver in concentrations of 1 to 40 oz/st, and gold at generally 0.05 oz/st or less. Irregular quartz veins cut the limestone in the northern part of the district (Cooper and Silver, 1964, p. 161; Keith, 1973, p. 91). These veins have spotty and weak base-metal sulfide mineralization, although little relation between the content of base and precious metals was seen.

Basement units consist of Cambrian (Bolsa and Troy units) and Precambrian quartzites and other quartzose granitic rocks.

The principal mine in the district is the Hearst mine, located in NE. 1/4 section 31, T. 13 S., R. 23 E. Extensive underground work was done in the 1890's (Keith, 1973, p. 91). Mineral products included silica flux, and some silver and gold. About 200 to 260 st of silica flux from the dump were shipped in 1924. The Hearst Mine and other small prospects continued to ship a small amount of ore, probably of base metals, through the 1940's. Table 1 gives an account of ore production.

Table 1.--Production for the Winchester mining district (primarily Hearst Mine) (after Cooper and Silver, 1964, p. 161).

Year	Ore (st)	Gold (oz)	Silver (oz)	Copper (lb)	Lead (lb)
1924	200	*	*	*	*
1935	1	2.60	32	133	----
1936	5	0.4	175	22	65
1941	1	----	31	200	----
1949	8	----	32	300	400

* Production in this year is reported as "siliceous silver ore". Keith (1973, p. 91) reports this amount as 260 st.

APPENDIX B

SAMPLE DATA TABLES FOR THE WINCHESTER MOUNTAINS UNIT, CORONADO NATIONAL FOREST, COCHISE COUNTY, ARIZONA

Table 2. Neutron activation multi-element analytical data for samples analyzed by Bondar-Clegg and Company Ltd.

3. Inductively coupled plasma-atomic emission spectroscopy multi-element analytical data for samples analyzed by Chemex Labs, Inc.

4. Data for samples taken from the Winchester Mountains Unit.

5. Analytical data for panned-concentrate samples taken by the Bureau during the RARE II study, 1981.

Table 2.--Neutron activation multi-element analytical data for samples analyzed by Bondar-Clegg & Company Ltd.

[<, less than lower detection limit (some elements have elevated lower detection limits due to interference from other elements)]

Sample No.	Ag (Ppm)	As (Ppm)	Au (Ppb)	Ba (Ppm)	Br (Ppm)	Cd (Ppm)	Ce (Ppm)	Co (Ppm)	Cr (Ppm)	Cs (Ppm)	Eu (Ppm)	Fe (Pct)	Hf (Ppm)	Ir (Ppb)	La (Ppm)
WI 01	< 5	1	< 5	1300	< 1	< 10	120	24	93	2	2	5.2	9	< 100	64
WI 02	< 5	2	< 5	1200	< 1	< 10	110	24	120	< 1	< 2	4.8	7	< 100	60
WI 03	< 5	8	< 5	980	< 1	< 10	110	< 10	64	9	< 2	1.8	9	< 100	64
WI 04	< 5	3	< 5	330	< 1	< 10	110	< 10	75	6	< 2	< 0.5	6	< 100	61
WI 05	< 5	6	5	220	< 1	< 10	46	< 10	150	4	< 2	< 0.5	3	< 100	27
WI 06	< 5	7	50	250	< 1	< 10	70	< 10	130	8	< 2	< 0.5	3	< 100	39
WI 07	< 5	3	< 5	340	< 1	< 10	81	< 10	130	6	< 2	1.0	5	< 100	46
WI 08	< 5	20	12	160	6	< 10	15	< 10	98	2	< 2	1.3	< 2	< 100	< 5
WI 09	< 5	39	33	820	8	< 10	67	< 10	110	10	< 2	3.1	< 2	< 100	30
WI 10	< 5	5	< 5	1200	< 1	< 10	130	10	70	14	< 2	6.0	6	< 100	57
WI 11	< 5	42	60	410	10	< 10	26	< 10	140	3	< 2	2.3	< 2	< 100	12
WI 12	< 5	6	7	1300	< 1	< 10	120	16	80	10	< 2	4.0	6	< 100	53
WI 13	< 5	17	< 5	< 100	5	< 10	< 10	< 10	180	2	< 2	1.0	< 2	< 100	< 5
WI 14	< 5	17	19	290	4	< 10	21	< 10	160	5	< 2	1.9	< 2	< 100	10
WI 15	< 5	11	50	750	2	< 10	57	< 10	100	13	< 2	2.2	4	< 100	28
WI 16	< 5	13	97	380	4	< 10	26	< 10	170	4	< 2	1.5	< 2	< 100	10

Sample No.	Lu (Ppm)	Mo (Ppm)	Na (Pct)	Ni (Ppm)	Rb (Ppm)	Sb (Ppm)	Sc (Ppm)	Se (Ppm)	Sm (Ppm)	Sn (Ppm)	Ta (Ppm)	Tb (Ppm)	Te (Ppm)	Th (Ppm)	U (Ppm)	W (Ppm)	Yb (Ppm)	Zn (Ppm)	Zr (Ppm)
WI 01	< 0.5	< 2	2.40	< 50	76	0.3	12.0	< 10	10.0	< 200	1	1	< 20	16.0	1.8	< 2	< 5	< 200	1100
WI 02	< 0.5	3	2.50	< 50	88	0.4	12.0	< 10	8.9	< 200	< 1	1	< 20	14.0	2.7	< 2	< 5	< 200	< 500
WI 03	< 0.5	3	1.00	< 50	400	2.5	5.7	< 10	8.3	< 200	2	2	< 20	26.0	6.9	2	< 5	< 200	700
WI 04	< 0.5	4	2.40	< 50	250	1.3	3.4	< 10	6.7	< 200	2	1	< 20	27.0	6.4	< 2	< 5	< 200	< 500
WI 05	< 0.5	3	0.42	< 50	150	1.4	2.0	< 10	1.5	< 200	< 1	< 1	< 20	16.0	9.2	< 2	< 5	< 200	< 500
WI 06	< 0.5	5	0.82	< 50	240	2.3	2.8	< 10	3.3	< 200	2	< 1	< 20	22.0	7.8	< 2	< 5	< 200	< 500
WI 07	< 0.5	2	1.90	< 50	280	2.6	3.1	< 10	3.6	< 200	2	< 1	< 20	26.0	8.3	< 2	< 5	< 200	< 500
WI 08	< 0.5	3	0.06	< 20	41	104.0	0.7	< 10	0.4	< 200	< 1	< 1	< 20	< 0.5	< 0.5	11	< 5	< 200	< 500
WI 09	< 0.5	< 2	0.26	< 20	710	128.0	5.6	< 10	4.5	< 200	< 1	< 1	< 20	8.3	3.5	32	6	< 200	< 500
WI 10	< 0.5	< 2	3.10	76	840	1.6	13.0	< 10	6.0	< 200	1	< 1	< 20	13.0	2.8	4	< 5	< 200	610
WI 11	< 0.5	< 2	0.13	< 20	220	183.0	3.1	< 10	1.5	< 200	< 1	< 1	< 20	2.3	< 0.5	32	< 5	< 200	< 500
WI 12	< 0.5	< 2	2.50	42	710	5.5	10.0	< 10	7.1	< 200	< 1	< 1	< 20	13.0	3.2	5	< 5	< 200	< 500
WI 13	< 0.5	< 2	< 0.05	< 20	65	93.7	1.0	< 10	0.6	< 200	< 1	< 1	< 20	< 0.5	< 0.5	7	< 5	< 200	< 500
WI 14	< 0.5	< 2	0.06	< 20	210	75.0	2.9	< 10	1.4	< 200	< 1	< 1	< 20	3.1	0.8	5	< 5	< 200	< 500
WI 15	< 0.5	< 2	0.17	53	580	31.5	5.1	< 10	3.8	< 200	< 1	< 1	< 20	7.3	1.9	3	< 5	< 200	< 500
WI 16	< 0.5	< 2	0.06	38	200	60.9	2.6	< 10	1.6	< 200	< 1	< 1	< 20	3.2	0.9	3	< 5	< 200	< 500

Table 3.--Inductively coupled plasma-atomic emission spectroscopy multi-element analytical data for samples analyzed by Chemex Labs, Inc.

[<, less than lower detection limit (some elements have elevated lower detection limits due to interference from other elements)]

Sample No.	Ag (Ppm)	Al (Pct)	As (Ppm)	Ba (Ppm)	Be (Ppm)	Bi (Ppm)	Ca (Pct)	Cd (Ppm)	Co (Ppm)	Cr (Ppm)	Cu (Ppm)	Fe (Pct)	Ga (Ppm)	Hg (Ppm)	K (Pct)
WI 01	3.4	2.53	< 5	120	< 0.5	< 2	1.53	< 0.5	26	55	73	4.64	< 10	< 1	0.34
WI 02	2.0	1.67	< 5	90	< 0.5	6	1.42	< 0.5	19	62	54	4.02	< 10	< 1	0.22
WI 03	0.2	0.59	< 5	70	< 0.5	< 2	0.16	< 0.5	2	39	2	1.40	< 10	< 1	0.29
WI 04	0.2	0.45	< 5	200	< 0.5	< 2	0.10	< 0.5	1	40	16	0.72	< 10	< 1	0.25
WI 05	0.2	0.77	< 5	140	< 0.5	< 2	0.33	< 0.5	1	122	6	0.67	< 10	< 1	0.38
WI 06	0.4	0.24	< 5	100	< 0.5	< 2	0.05	< 0.5	< 1	76	6	0.59	< 10	< 1	0.24
WI 07	0.2	0.34	< 5	60	< 0.5	< 2	0.06	< 0.5	1	74	9	0.77	< 10	< 1	0.23
WI 08	< 0.2	0.11	6	50	< 0.5	< 2	0.04	< 0.5	1	62	14	0.91	< 10	< 1	0.03
WI 09	0.4	0.54	20	160	< 0.5	< 2	0.09	< 0.5	2	50	17	2.31	10	< 1	0.28
WI 10	1.2	1.03	26	130	< 0.5	< 2	0.37	< 0.5	16	46	100	2.79	10	< 1	0.32
WI 11	0.8	0.25	18	130	< 0.5	< 2	0.07	< 0.5	2	68	25	1.50	< 10	< 1	0.10
WI 12	0.4	1.07	16	280	< 0.5	2	0.47	< 0.5	10	42	45	2.82	10	< 1	0.30
WI 13	< 0.2	0.10	< 2	70	< 0.5	< 2	0.06	< 0.5	1	61	19	0.72	< 10	< 1	0.03
WI 14	0.4	0.25	< 2	120	< 0.5	2	0.12	< 0.5	2	78	19	1.28	< 10	1	0.11
WI 15	0.6	0.40	6	110	< 0.5	< 2	0.22	< 0.5	6	51	20	1.63	10	< 1	0.23
WI 16	1.6	0.45	2	140	< 0.5	< 2	0.23	< 0.5	5	77	18	1.15	< 10	2	0.10

Sample No.	La (Ppm)	Mg (Pct)	Mn (Ppm)	Mo (Ppm)	Na (Pct)	Ni (Ppm)	P (Ppm)	Pb (Ppm)	Sb (Ppm)	Sc (Ppm)	Sr (Ppm)	Ti (Pct)	Tl (Ppm)	U (Ppm)	V (Ppm)	W (Ppm)	Zn (Ppm)
WI 01	60	1.08	770	4	0.31	34	1670	8	5	10	400	0.50	< 10	< 10	80	< 10	78
WI 02	50	0.92	510	5	0.44	25	1730	12	5	8	132	0.36	< 10	< 10	53	< 10	70
WI 03	40	0.15	170	1	0.02	8	340	18	5	1	14	0.05	< 10	< 10	23	< 10	24
WI 04	30	0.05	270	3	0.08	3	120	26	5	1	60	0.04	< 10	< 10	7	< 10	32
WI 05	20	0.12	340	4	0.06	5	150	24	5	< 1	40	0.02	< 10	< 10	8	< 10	16
WI 06	20	0.06	545	1	0.04	4	80	26	5	< 1	15	0.02	< 10	< 10	6	< 10	24
WI 07	20	0.07	225	< 1	0.06	3	90	24	5	1	7	0.03	< 10	< 10	8	< 10	24
WI 08	< 10	0.01	75	1	0.01	7	160	12	46	< 1	7	< 0.01	< 10	< 10	9	< 10	4
WI 09	20	0.09	120	1	0.01	13	480	24	96	3	21	0.03	< 10	< 10	44	10	16
WI 10	30	0.84	315	< 1	0.07	36	970	38	< 2	7	14	0.18	< 10	< 10	57	< 10	66
WI 11	< 10	0.04	170	1	0.02	10	400	18	82	1	21	0.02	< 10	< 10	27	20	8
WI 12	40	0.89	305	< 1	0.06	35	1090	20	< 2	6	36	0.15	< 10	< 10	56	< 10	68
WI 13	< 10	0.01	130	1	0.01	4	140	6	36	< 1	9	< 0.01	< 10	< 10	6	< 10	6
WI 14	10	0.02	205	2	0.01	12	370	12	18	1	8	0.03	< 10	< 10	21	< 10	8
WI 15	20	0.07	145	1	0.01	17	630	14	< 2	2	15	0.01	< 10	< 10	24	< 10	22
WI 16	10	0.12	530	1	0.01	13	470	10	< 2	1	15	0.02	< 10	< 10	18	< 10	16

Table 4.--Data for samples taken from the Winchester Mountains Unit.

[xx, not applicable]

Number	Type	Length	Remarks
WI001	Chip	3 ft	Across portal of adit; aphanitic, gray-purple rhyolite.
WI002	Select	xx	Dump material from WI001 adit; heavily iron-stained rock, which forms a small part of the dump.
WI003	Select	xx	Outcrop rock forming small knob; silicified and veined latite?.
WI004	Select	xx	Same as sample WI003.
WI005	Select	xx	Float, rare in canyon; throat? breccia with stretched pieces of red/brown rhyolite and porphyritic latite matrix.
WI006	Select	xx	Float, rare in canyon; brown rhyolite cut by 3 in. multiphase quartz/chalcedony veins with quartz-filled cavities.
WI007	Select	xx	Float, rare in canyon; dense rhyolite agglomerate with variety of angular to sub-angular fragments.
WI008	Select	xx	In footwall of quartz structure (N. 55° E. 80° SW.); 85% white quartz vein rock; 15% iron- and silica-filled quartz breccia taken over area of intersecting quartz veins about 20 ft by 40 ft; latite porphyry country rock.
WI009	Chip	15 ft	Hematite-filled and silicified, intensely fractured red/purple latite between, and not including, vein material sampled in WI008.
WI010	Select	xx	Gray/purple quartz latite porphyry, moderately fractured, with fine biotite, orthoclase, quartz phenocrysts; taken for background.
WI011	Chip	8 ft	Includes 40% white massive quartz, 40% silica-filled breccia of vein quartz; 20% siliceous wallrock with sparse quartz veins; across quartz vein and structure (N. 55° W. 85° SW.).

Table 4.--Data for samples taken in the Winchester Mountains Unit.--Continued

Number	Type	Length	Remarks
WI012	Select	xx	Purple/gray quartz latite porphyry, with fine biotite, orthoclase, quartz phenocrysts; taken for background 100 ft N. 60 E. of WI011.
WI013	Chip	8 ft	Includes 85% white quartz, 15% quartz breccia with red/brown siliceous matrix; across near-vertical vein and structure averaging N. 55° W.
WI014	Chip	8 ft	White quartz in vein; quartz breccia with red/pink matrix; across structure (N. 55° W. 80° SW.); some open spaces with fine quartz crystals; country rock is gray/purple quartz latite.
WI015	Chip	6 ft	70% brown silicified latite country rock, 30% white quartz vein; across quartz vein; open spaces with quartz to 1 in.
WI016	Chip	10 ft	Includes 35% white quartz vein, 35% white quartz filled breccia, 30% latite with white quartz filling in fractures; local limonite coating; quartz-filled voids to 1 in.

Table 5.--Semiquantitative optical emission spectrographic analyses of panned-concentrate samples taken in the Winchester Rare II study, 1981.

[<, less than lower detection limit (some elements have elevated lower detection limits due to interference from other elements); >, greater than]

Sample No.	Ag (Pct)	Al (Pct)	As (Pct)	Au (Pct)	B (Pct)	Ba (Pct)	Be (Pct)	Bi (Pct)	Ca (Pct)	Cd (Pct)	Co (Pct)	Cr (Pct)	Cu (Pct)	Fe (Pct)	Ga (Pct)	K (Pct)	La (Pct)	Li (Pct)	Mg (Pct)	Mn (Pct)
W1	<0.006	>2.0	<0.009	<0.002	<0.003	0.02	0.002	<0.01	<0.2	<0.0005	<0.001	<0.002	<0.0006	10.0	<0.0004	5.0	<0.01	<0.002	0.5	>2.0
W2	<0.004	>3.0	<0.009	<0.002	<0.005	0.02	0.002	<0.1	<0.1	<0.0005	<0.001	0.15	0.0006	10.0	<0.002	4.0	<0.01	<0.002	0.7	>3.0
W3	<0.005	>4.0	<0.02	<0.002	<0.008	0.05	0.0009	<0.04	3.0	<0.0005	<0.001	0.07	0.0009	10.0	<0.0007	7.0	<0.01	<0.002	2.0	>2.0
W4	<0.003	>3.0	<0.009	<0.004	<0.003	0.04	0.002	<0.01	<0.2	<0.0005	<0.001	<0.002	<0.0006	>10.0	<0.001	6.0	<0.01	<0.002	0.5	>3.0
W5	<0.002	>4.0	<0.02	<0.002	<0.008	0.05	0.001	<0.01	1.0	<0.0005	<0.001	0.04	<0.0006	10.0	<0.0003	10.0	<0.01	<0.002	0.6	0.75
W6	<0.01	>3.0	<0.01	<0.002	<0.005	0.03	0.002	<0.01	<0.2	<0.0005	<0.001	<0.0008	<0.0006	>10.0	0.002	4.0	<0.01	<0.002	0.4	>2.0
W7	<0.002	>4.0	<0.03	<0.002	0.009	0.1	0.001	<0.04	1.0	<0.0005	<0.001	0.06	<0.0006	10.0	<0.0002	10.0	<0.01	<0.002	0.7	0.7
W8	<0.007	>4.0	<0.02	<0.002	<0.006	0.06	0.002	<0.02	0.4	<0.0005	<0.001	0.008	<0.0006	10.0	<0.0009	8.0	<0.01	<0.002	0.8	>3.0
W9	<0.002	>3.0	<0.009	<0.002	<0.003	0.02	0.0009	<0.02	1.0	<0.0005	<0.001	0.04	<0.002	>10.0	<0.0006	> 2.0	<0.01	<0.002	1.0	>2.0
W10	<0.01	>3.0	<0.01	<0.002	<0.006	0.02	0.002	<0.3	4.0	<0.0005	<0.005	0.4	<0.03	>10.0	<0.002	> 2.0	<0.01	<0.002	2.0	>3.0
W11	<0.004	>4.0	<0.009	<0.002	<0.004	0.06	0.001	<0.3	1.0	<0.0005	<0.001	0.5	<0.001	>10.0	<0.0003	8.0	<0.01	<0.002	1.0	0.7

Sample No.	Mo (Pct)	Na (Pct)	Nb (Pct)	Ni (Pct)	P (Pct)	Pb (Pct)	Pd (Pct)	Pt (Pct)	Sb (Pct)	Sc (Pct)	Si (Pct)	Sn (Pct)	Sr (Pct)	Ta (Pct)	Te (Pct)	Ti (Pct)	V (Pct)	Y (Pct)	Zn (Pct)	Zr (Pct)
W1	<0.0001	<0.3	<0.01	<0.004	<2.0	<0.002	<0.0001	<0.003	<0.2	<0.0004	>10.0	<0.002	0.0002	<0.03	<0.05	2.0	0.03	<0.0009	0.1	0.2
W2	<0.0001	<0.3	<0.01	<0.008	<0.7	<0.003	<0.0001	<0.002	<0.2	<0.0004	>10.0	<0.005	0.001	<0.04	<0.05	1.0	0.04	<0.0009	0.1	0.07
W3	<0.0001	1.5	<0.02	0.008	<0.7	<0.002	<0.0001	<0.001	<0.1	<0.0004	>10.0	<0.005	0.02	<0.02	<0.04	1.0	0.02	<0.0009	0.1	<0.003
W4	<0.0001	<0.7	<0.01	<0.0004	<0.2	<0.003	<0.0001	<0.003	<0.2	<0.0004	>10.0	<0.003	0.0002	<0.03	<0.05	2.0	0.03	<0.0009	0.1	0.2
W5	<0.0001	3.0	<0.01	<0.0007	<1.0	<0.002	<0.0001	<0.0008	<0.1	<0.0004	>10.0	<0.0006	0.006	<0.02	<0.04	0.6	0.01	<0.0009	0.07	0.006
W6	<0.0002	<0.8	<0.02	<0.003	<3.0	<0.005	<0.0001	<0.004	<0.2	<0.0004	5.0	<0.0006	0.0002	<0.05	<0.05	3.0	0.05	<0.0009	0.07	0.1
W7	<0.0001	3.0	<0.01	<0.002	<0.7	<0.002	<0.0001	<0.0009	<0.1	<0.0004	>10.0	<0.001	0.007	<0.02	<0.04	0.7	<0.01	<0.0009	0.06	0.005
W8	<0.0001	<0.3	<0.01	<0.004	<0.7	<0.002	<0.0001	<0.003	<0.2	<0.0004	>10.0	<0.006	0.001	<0.02	<0.04	2.0	0.03	<0.0009	0.07	0.1
W9	<0.0001	<0.3	<0.01	<0.002	<1.0	0.1	<0.0001	<0.001	<0.2	<0.0004	>10.0	<0.03	0.002	<0.02	<0.04	1.0	0.03	<0.0009	0.06	<0.003
W10	<0.0001	<1.0	<0.03	0.04	<3.0	0.03	<0.0001	<0.007	<0.2	<0.0004	>10.0	<0.006	0.002	<0.05	<0.1	3.0	0.1	<0.0009	0.08	0.03
W11	<0.0001	<0.5	<0.01	<0.01	<2.0	<0.002	<0.0001	<0.002	<0.1	<0.0004	>10.0	<0.0006	0.006	<0.02	<0.04	2.0	0.04	<0.0009	0.1	<0.003