



CONTACT INFORMATION  
Mining Records Curator  
Arizona Geological Survey  
3550 N. Central Ave, 2nd floor  
Phoenix, AZ, 85012  
602-771-1601  
<http://www.azgs.az.gov>  
[inquiries@azgs.az.gov](mailto:inquiries@azgs.az.gov)

The following file is part of the Walter E. Heinrichs, Jr. Mining Collection

#### **ACCESS STATEMENT**

These digitized collections are accessible for purposes of education and research. We have indicated what we know about copyright and rights of privacy, publicity, or trademark. Due to the nature of archival collections, we are not always able to identify this information. We are eager to hear from any rights owners, so that we may obtain accurate information. Upon request, we will remove material from public view while we address a rights issue.

#### **CONSTRAINTS STATEMENT**

The Arizona Geological Survey does not claim to control all rights for all materials in its collection. These rights include, but are not limited to: copyright, privacy rights, and cultural protection rights. The User hereby assumes all responsibility for obtaining any rights to use the material in excess of "fair use."

The Survey makes no intellectual property claims to the products created by individual authors in the manuscript collections, except when the author deeded those rights to the Survey or when those authors were employed by the State of Arizona and created intellectual products as a function of their official duties. The Survey does maintain property rights to the physical and digital representations of the works.

#### **QUALITY STATEMENT**

The Arizona Geological Survey is not responsible for the accuracy of the records, information, or opinions that may be contained in the files. The Survey collects, catalogs, and archives data on mineral properties regardless of its views of the veracity or accuracy of those data.



## WALLABY ENTERPRISES INCORPORATED

TUCSON OFFICE: P.O. BOX 5964 - TUCSON, ARIZONA 85703 - 800 WEST GRANT ROAD - PHONE: (602) 623-0579

PRESCOTT OFFICE: GENERAL DELIVERY - PRESCOTT VALLEY, ARIZONA 86301 - 72 FLORENTINE ROAD - PHONE: (602) 772-6408

Report of Investigations  
at the Cave Mine Area  
Hartford Mining District,  
Cochise Co., Arizona

by Richard J. Lundin  
Mineral Exploration Consultant  
& President, Wallaby Enterprises  
June 1, 1981



# WALLABY ENTERPRISES INCORPORATED

TUCSON OFFICE: P.O. BOX 5964 - TUCSON, ARIZONA 85703 - 800 WEST GRANT ROAD - PHONE: (602) 623-0579

PRESCOTT OFFICE: GENERAL DELIVERY - PRESCOTT VALLEY, ARIZONA 86301 - 72 FLORENTINE ROAD - PHONE: (602) 772-6408

## Table of Contents

Figure 1 - Location Map	
Introduction	Pg. 1
Property Description	Pg. 1
History & Past Production	Pgs. 1-2
General Geology	Pgs. 2-4
Economic Geology	Pgs. 4-15
Geochemical & Geophysical Survey Results	Pgs. 15-16
Recommendations & Conclusions	Pgs. 16-17
Appendix A	
Figure 2: Geologic Map of Study Area	
Figures 3-6: Geologic Plan Maps and Cross-Sections through Cave and Yaejer-Western Mine Workings	
Appendix B	
Assays	
Appendix C	
Bibliography	
Appendix D	
Cross Sections 1-4	
Overlays 1-4	



# WALLABY ENTERPRISES INCORPORATED

TUCSON OFFICE: P.O. BOX 5964 - TUCSON, ARIZONA 85703 - 800 WEST GRANT ROAD - PHONE: (602) 623-0579

PRESCOTT OFFICE: GENERAL DELIVERY - PRESCOTT VALLEY, ARIZONA 86301 - 72 FLORENTINE ROAD - PHONE: (602) 772-6408

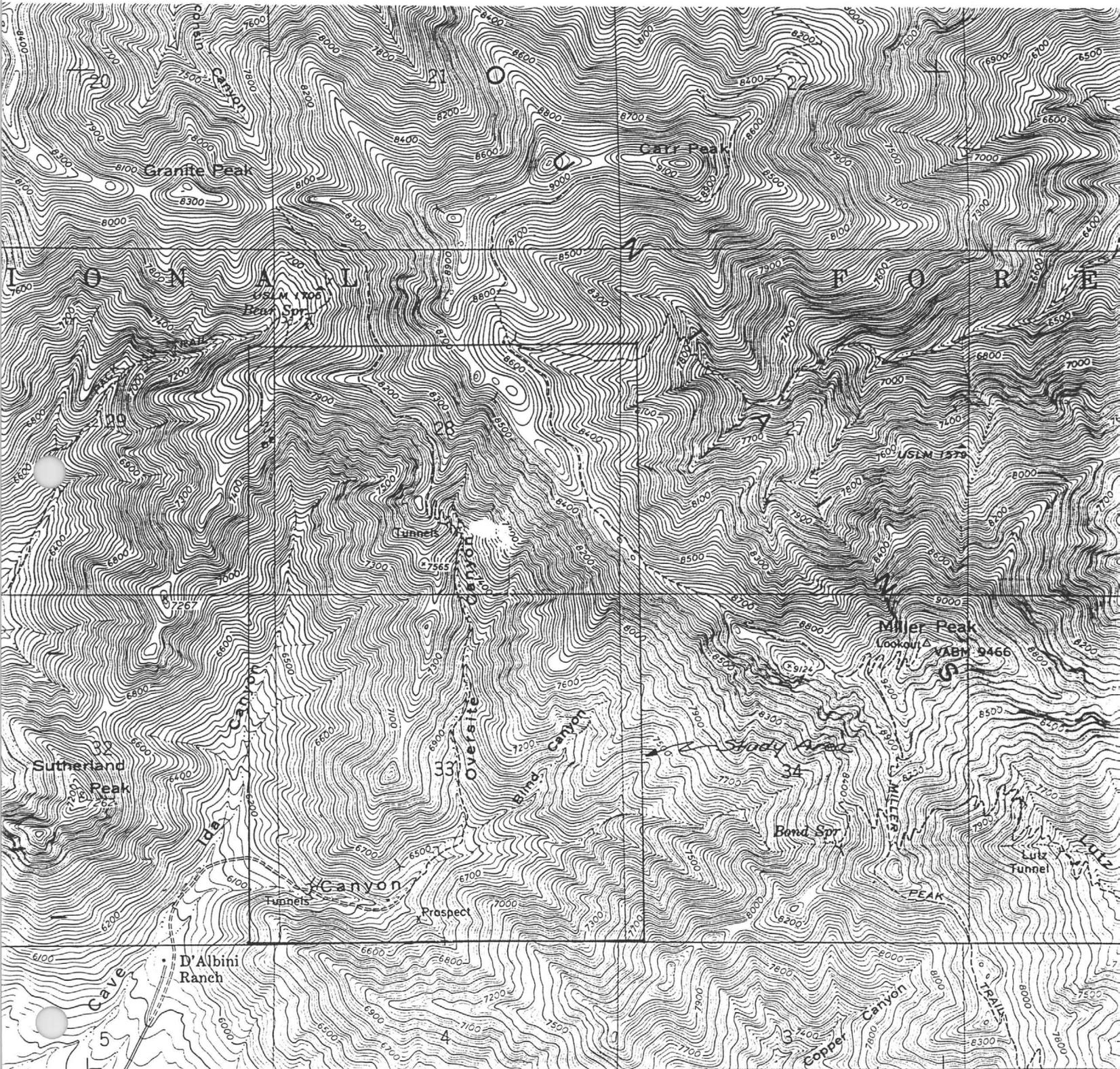


Figure 1  
Location Map of Study Area



## WALLABY ENTERPRISES INCORPORATED

TUCSON OFFICE: P.O. BOX 5964 - TUCSON, ARIZONA 85703 - 800 WEST GRANT ROAD - PHONE: (602) 623-0579

PRESCOTT OFFICE: GENERAL DELIVERY - PRESCOTT VALLEY, ARIZONA 86301 - 72 FLORENTINE ROAD - PHONE: (602) 772-6408

### INTRODUCTION

At the request of Mr. Cooper Shields of 5012 Camino Aliso, Tucson Arizona, a program of examination, evaluation and general technical direction was initiated on the 21st of March, 1980 and has continued to the present. The purpose of this program was to aide Mr. Shields in the development of this property and to ascertain it's potential.

#### Property Description

The property consists of 70 unpatented lode claims (MG Nos. 1-60, Glenda, Charlotte, Emma, Toloc, Cy Nos. 1-10) in Twp. 23 S, 24 S, Range 20 E, Sections 4, 5, 28, 29, 32 and 33, Hartford Mining District, Cochise County, Arizona. These claims are held by location and lease and are duly recorded and registered with the Cochise County Recorder's Office and the Bureau of Land Management. (For the location of these claims see figure 1)

#### History and Past Production

The current holdings include numerous shafts, pits and adits. Two of the workings are thought to have been significant past producers. These are: Cave Mine: (See figures 3 - 4)

According to Arizona Bureau of Mines Bulletins (Wilson, E.D., 1934; and Keith, S.B., 1978). The mine was active during the period (1946-1947) and produced 388 tons of ore containing 73,716 pounds of zinc, 50,281 pounds



## WALLABY ENTERPRISES INCORPORATED

TUCSON OFFICE: P.O. BOX 5964 - TUCSON, ARIZONA 85703 - 800 WEST GRANT ROAD - PHONE: (602) 623-0579

PRESCOTT OFFICE: GENERAL DELIVERY - PRESCOTT VALLEY, ARIZONA 86301 - 72 FLORENTINE ROAD - PHONE: (602) 772-6408

of lead, 3,938 pounds of copper and 285 ounces of silver. This ore was hand sorted and averaged 2.5% Zn, 6.5% Pb, .5% Cu, .79 ozs. Ag per ton. During the 1950's and 60's there was intermittent exploration, development and mining activity. The current owners of the Cooke claim group (Glenda, Charlotte, Emma, and Toloc claims) located their claims on open and abandoned ground in 1972. These claims were held by the performance of annual assessment work until July of 1980 when they were leased to Mr. Shields.

Ida Canyon Copper-Silver Mine: (See figures 5 - 6)

This property was probably active during the 1940's and 1950's and was, primarily, a copper and silver producer. There are no available production figures on this property but it is estimated from the extent of the workings that between 5,000 and 10,000 tons were mined. This property was found abandoned during our efforts in the area and was sampled and, subsequently, relocated.

Other Workings:

Numerous pits, adits and shafts have been encountered during the course of our work in the area. None of these have had any recorded production but most of these workings were probably active during the period from 1880-1945. (For the location of these workings, see figure 2)

### General Geology

According to Arizona Bureau of Mines Bulletin (Wilson, E.D., 1934) the rocks outcropping in the Huachuca Mtns. consist of:



## WALLABY ENTERPRISES INCORPORATED

TUCSON OFFICE: P.O. BOX 5964 - TUCSON, ARIZONA 85703 - 800 WEST GRANT ROAD - PHONE: (602) 623-0579

PRESCOTT OFFICE: GENERAL DELIVERY - PRESCOTT VALLEY, ARIZONA 86301 - 72 FLORENTINE ROAD - PHONE: (602) 772-6408

"Bolsa quartzite...upon pre-Cambrian granite and... overlain by limestones and shales of Cambrian, Devonian, Mississippian, Pennsylvanian and Permian ages. Above the Permian is a thick succession of conglomerate, sandstone, quartzite, shale and interbedded volcanic flows of Lower Cretaceous age. These beds are unconformably overlain by Tertiary (?) volcanic rocks in the northwestern part of the range.

Intruding the Cretaceous and older rocks is a northwestward-trending stock of quartz monzonite which crops out over an area 7 miles long by 2½ miles wide in the southern part of the range, between Montezuma Canyon and Carr Peak. Associated with it are dikes of andesite and quartz latite porphyry."

Rock units outcropping on the property include:

1. A sequence of fossiliferous limestones, quartzites and shales that have been selectively metasomatically altered to marble-tactite, metaquartzite-siliceous hornfels and quartz-rich shales and hornfels.
2. Latite and latite porphyry dikes that intrude the sedimentary sequence and may be related to the Carr Peak quartz monzonite stock.
3. Rhyolite porphyry and rhyolite dikes that cut the Latitic units.
4. Quartz veins and "blowouts" that cut across all other stratigraphic units.



## WALLABY ENTERPRISES INCORPORATED

TUCSON OFFICE: P.O. BOX 5964 - TUCSON, ARIZONA 85703 - 800 WEST GRANT ROAD - PHONE: (602) 623-0579

PRESCOTT OFFICE: GENERAL DELIVERY - PRESCOTT VALLEY, ARIZONA 86301 - 72 FLORENTINE ROAD - PHONE: (602) 772-6408

According to the existing geologic coverage of the area, the sedimentary sequence is probably of Cambrian-Mississippian age (Weber, R.H., 1950). From correlation to other intrusives in the region, it appears that the latite-latite porphyry dikes are of Laramide (75-45 mybp) age. The rhyolitic dikes appear similar to others that have been classified as Tertiary (28-45 mybp) in other parts of the state. Since the quartz veining clearly post-dates the rhyolitic units, a reasonable age for this event might be from 28-15 mybp.

Two other units outcrop within the claim group that are enigmatic as far as an age relationship:

1. A coarse grained granite that appears to underly the sedimentary sequence and may either be a more felsic equivalent of the Carr Peak quartz monzonite or a Precambrian intrusive.

2. An andesite-andesite porphyry dike that intrudes a series of hornfels-shale and limestone in the vicinity of the Ida Canyon Copper-Silver Mine. This unit appears to be pre-Tertiary but may be related to andesitic volcanism of the Lower Cretaceous.

### Economic Geology

Mineralization encountered within the Cave Mine Area consists of five distinct types as described below in order of economic importance:

1. Skarn-replacement deposits of copper, silver, lead, zinc, manganese and gold along the contacts between favorable host beds of the sedimentary sequence (shalely limestones, fossiliferous limestones and calcarenitic quartzites) and latite porphyry dikes and sills. Ore minerals associated



## WALLABY ENTERPRISES INCORPORATED

TUCSON OFFICE: P.O. BOX 5964 - TUCSON, ARIZONA 85703 - 800 WEST GRANT ROAD - PHONE: (602) 623-0579

PRESCOTT OFFICE: GENERAL DELIVERY - PRESCOTT VALLEY, ARIZONA 86301 - 72 FLORENTINE ROAD - PHONE: (602) 772-6408

with these deposits include: pyrite, galena, chalcopyrite, sphalerite, malachite, azurite, chrysocolla, smithsonite, cerrusite, tenorite, pyrolusite, psilomelene, rhodochrosite, native silver and gold. Accessory and gangue minerals associated with the deposits include: marble, diopside, tremolite, garnet, secondary calcite & low temperature quartz, siderite-ankerite, magnetite and chlorite. Examples of this type of deposit are the Cave Mine and numerous prospects along the upper and lower areas of Cave, Blind and Oversight Canyons. These deposits are small and very irregular along the contacts and are entirely dependant on the occurrence of favorable horizons within the sedimentary sequence. They can be extremely rich with ore grade values in lead, zinc, copper and silver. Considerable oxidation of these deposits has occurred in the more carbonate and non-silicified portions of the ore bodies with the resulting enrichment at either current or a series of paleo water tables. Unfortunately, this makes for an ore that is manganiferous and is composed of mixed oxides & sulphides and, as such, is hard to mill or leach using conventional cyanidation techniques.

Ore deposits of this type are usually small (100,000 - 10,000,000 tons) but relatively, high grade in comparison to, say, porphyry copper deposits. Some of these have been worked in the past (Leatherwood, San Xavier, Arivaipa, Bisbee, Magma, Christmas, Glove) with great success, and deposits of this type are being actively sought by major mining companies. The potential for this type of deposit in the Cave Mine Area appears good as there is a rather persistent outcrop of this type of mineralization throughout Cave, Oversight and



## WALLABY ENTERPRISES INCORPORATED

TUCSON OFFICE: P.O. BOX 5964 - TUCSON, ARIZONA 85703 - 800 WEST GRANT ROAD - PHONE: (602) 623-0579

PRESCOTT OFFICE: GENERAL DELIVERY - PRESCOTT VALLEY, ARIZONA 86301 - 72 FLORENTINE ROAD - PHONE: (602) 772-6408

Blind Canyons that has not been adequately tested closer to the presumed source of the latite porphyry dikes.

2. Copper-Silver-Lead-Zinc deposits along the contact between hornfels-shaley limestone units and intrusive andesite dikes. Ore minerals associated with these types of deposits include: chrysocolla, azurite, malachite, tenorite, pyrite, chalcopyrite, native silver (?), argentite, minor galena and sphalerite. Accessory and gangue minerals associated include: siderite, calcite and low temperature quartz. The best developed deposit of this type is the Jaeger Mine in Ida Canyon (see figures 3 to 5). This deposit has produced approximately 5,000 - 10,000 tons of copper-silver ore from an irregular deposit within the andesite and along the andesite-hornfels-shaley limestone contact. The mineralization appears to be restricted to this particular contact-reactive assemblage. Surface exposure of the mineralization is limited to a discontinuous outcrop of approximately 150-200' along strike with the mineralized zone varying from 2-4 feet in width. The mineralization occurs as a replacement-manto and is plunging to the west. Underground investigation of the accessible workings has determined that the mineralization is persistent at depth but changes character, in that, within the existing workings, more quartz veins are encountered in the lower workings than are apparent from the surface outcrops. These veins are very apparent in the lowest accessible workings and are characterized by being composed of quartz, calcite, siderite pyrite, chalcopyrite and galena.



## WALLABY ENTERPRISES INCORPORATED

TUCSON OFFICE: P.O. BOX 5964 - TUCSON, ARIZONA 85703 - 800 WEST GRANT ROAD - PHONE: (602) 623-0579

PRESCOTT OFFICE: GENERAL DELIVERY - PRESCOTT VALLEY, ARIZONA 86301 - 72 FLORENTINE ROAD - PHONE: (602) 772-6408

Oxidation was found to extend to the flooded lower levels of the workings with malachite, azurite, brochantite and chrysocolla mineralization occurring commonly on walls and fracture surfaces. The ore appears, due to its oxide character, to be amenable to cyanide or acidic solution leaching technology for recovery of the copper and silver values. No testing of this ore has been done at this time to absolutely ascertain the amenability of these extraction procedures.

The potential for other deposits of this type or for significant down dip or along strike extensions of this deposit is unknown at this time. As was noted, the mineralization appears consistent throughout the existing workings and might continue for a considerable distance (500-1,000 feet) further downdip and with possible extensions along strike under cover for 100-500 ft. These dimensions would place a possible ore deposit of this type in the 150,000-500,000 ton range.

There are other andesite dikes within the study area that do not have similar associated mineralization but might be worth further study.

### 3. Gold-bearing quartz vein deposits:

These veins are found to cut all rock types within the study area and are probably the source of the placer gold deposits that were found and worked in Oversight and Cave Canyons during the 1890 - present period. The gold is dendritic, free milling and associated with vein intersections with rhyolitic and quartz latitic intrusives. The gold geochemical response of these unit types is strongly anomalous in comparison to the sometimes adjacent skarn-tactite zones where other mineralization occurs. The veins have locally



## WALLABY ENTERPRISES INCORPORATED

TUCSON OFFICE: P.O. BOX 5964 - TUCSON, ARIZONA 85703 - 800 WEST GRANT ROAD - PHONE: (602) 623-0579

PRESCOTT OFFICE: GENERAL DELIVERY - PRESCOTT VALLEY, ARIZONA 86301 - 72 FLORENTINE ROAD - PHONE: (602) 772-6408

contained up to 5.250 ozs. Au/ton in small pods and fracture coatings (sample CS-0010 RL-80). Material taken from apparently barren low temperature quartz veins had values ranging from .002 to .340 ozs. Au/ton (samples CS-005-009 RL-80). Rock chip geochemical values of this type of material ranged from .07 to .31 ppm Au.

It is apparent that there is significant potential for deposits of this type within the study area. These deposits, by the nature and distribution of quartz veins, will have small tonnage potential (1-10,000 ton range) but might be relatively high-grade and easy to mill using gravity separation techniques. The exact distribution of these deposits throughout the study is unknown due to the fact that there are numerous quartz veins and "blowouts" that have not been sampled and others that have been found barren after preliminary, reconnaissance sampling.

#### 4. Quartz-tungsten vein deposits:

These types of deposits are known from the literature (Dale, V. B. et al, 1960 and U.S.B.M. file data) and one such deposit, the Western Tungsten Mine, is thought to be located on Mr. Shield's claims in the south-center of section 28 or, possibly, is the Ida Canyon deposit. According to Dale et al the ore occurs in:

"...small lenses of quartz deposited along a low-angle thrust fault that strikes N. 20° E. and dips 33° NW. Crushed material, 16 to 24 inches wide, lies along the fault. The hanging wall is limestone and the footwall



## WALLABY ENTERPRISES INCORPORATED

TUCSON OFFICE: P.O. BOX 5964 - TUCSON, ARIZONA 85703 - 800 WEST GRANT ROAD - PHONE: (602) 623-0579

PRESCOTT OFFICE: GENERAL DELIVERY - PRESCOTT VALLEY, ARIZONA 86301 - 72 FLORENTINE ROAD - PHONE: (602) 772-6408

is calcareous shale.

An inclined shaft has been sunk along the fault to a depth of about 200 feet, with the inclination flatter than the dip of the vein. Short crosscuts were driven from the shaft to the vein on four levels.

It is reported that a small amount of high-grade silver ore was shipped from this shaft, and that a little copper carbonate ore, mined at the surface, was shipped during the First World War. Pieces of quartz from a small pile of ore in the lowest level contain some silver-bearing galena and a very little chalcopyrite. These pieces showed a considerable amount of scheelite when examined with the violet ray lamp."

The above description might refer to the Ida Canyon Mine and, as such, would add tungsten potential to that deposit or it might refer to the workings in section 28, which we have not examined as of this date.

The nature of tungsten deposits in the Huachuca Mts. is best described by Dale et al below:

### Huachuca Mountains Area

"Records of scheelite ores being mined in the Huachuca Mountains start during the First World War. The first authentic date of record is 1916. However,



## WALLABY ENTERPRISES INCORPORATED

TUCSON OFFICE: P.O. BOX 5964 - TUCSON, ARIZONA 85703 - 800 WEST GRANT ROAD - PHONE: (602) 623-0579

PRESCOTT OFFICE: GENERAL DELIVERY - PRESCOTT VALLEY, ARIZONA 86301 - 72 FLORENTINE ROAD - PHONE: (602) 772-6408

many of the scheelite mines were worked for gold and silver in the 1800's. According to reports, the Tungsten Reef mine was worked for gold in the 1870's. The Lucky Strike, Jack Wakefield, Harper, Van Horn, Zaleski, and Arrow groups of claims were worked for gold and silver before any scheelite ores were mined.

The Huachuca Mountains are in the southwestern corner of Cochise County, southeastern Arizona. The intersection of N. Lat.  $21^{\circ} 25'$  and W. Long.  $110^{\circ} 20'$  is about the center of the range, which extends a few miles into Mexico.

The Benson-to-Douglas branch of the Southern Pacific Railroad serves the region. Hereford, a station on the line, is 16 miles by road east of the Tungsten Reef mine. A spur line from the Benson-to-Douglas branch line enters Fort Huachuca at the northern end of the mountains. Another spur connects Fairbank, Elgin, Sonoita, and Patagonia through Babocomari Wash, a few miles north of the range.

Blacktop highways traverse the eastern and northern sides of the range. Maintained dirt roads go around the east side and the Montezuma Pass road runs through the range near the international boundary. Figure 10 shows major and minor access roads and trails.



## WALLABY ENTERPRISES INCORPORATED

TUCSON OFFICE: P.O. BOX 5964 - TUCSON, ARIZONA 85703 - 800 WEST GRANT ROAD - PHONE: (602) 623-0579

PRESCOTT OFFICE: GENERAL DELIVERY - PRESCOTT VALLEY, ARIZONA 86301 - 72 FLORENTINE ROAD - PHONE: (602) 772-6408

The scheelite mines range in altitude from 5,400 feet to 7,200 feet. With one exception the mine properties have ample timber for mining purposes. A sizeable lumber industry on the east side of the Huachuca Mountains furnished mine timbers and lumber for construction to the mining camps of Bisbee and Tombstone during the late 1880's and early 1900's.

There has been a sizeable production of scheelite ores from the Huachuca Mountains area. There are records that show that about 170 tons of concentrates containing from 60 to 78 percent  $WO_3$  has been produced. There are no records of production from the Lucky Strike, Emerald, Western, and Arrow claim claims, nor from the ores taken surreptitiously from the Fort Huachuca Military Reservation. This production has come from local concentrations of high-grade scheelite ore in quartz veins through Paleozoic sediments and through granite. No extensive tactite deposits of scheelite ore were noted.

The scheelite ores of the Huachuca Mountains are relatively pure. The ores can be concentrated by gravity methods to better than 70 percent  $WO_3$ . Interfering minerals noted were hematite and galena. The hematite is



## WALLABY ENTERPRISES INCORPORATED

TUCSON OFFICE: P.O. BOX 5964 - TUCSON, ARIZONA 85703 - 800 WEST GRANT ROAD - PHONE: (602) 623-0579

PRESCOTT OFFICE: GENERAL DELIVERY - PRESCOTT VALLEY, ARIZONA 86301 - 72 FLORENTINE ROAD - PHONE: (602) 772-6408

removed by electromagnetic methods, but concentrates sometimes are penalized for very small amounts of galena.

Known and indicated reserves of ore in the mines are small. This is not because the deposits are depleted, but because the shoots and pockets of ore have been extracted as they were encountered. In only one mine did it appear that the limits of the ore body had been reached. Nearly all of the scheelite ores extracted have occurred on or near the surface. With two exceptions, none of the scheelite deposits have been investigated more than 100 feet below the surface. There are about 21,000 tons of indicated ore at  $\pm 1$  percent, and 62,000 tons of inferred ore at less than 1 percent,  $WO_3$  in the Huachuca Mountains. No ore on the military reservation was considered in making this estimate."

### 5. Porphyry Cu-Mo Deposits:

In the actual study area there is little evidence for a classic, altered-intrusive "porphyry copper" system. There is evidence to indicate the potential for a roof pendant skarn-replacement mineralized system at some intermediate depth that might have a size and tonnage potential equivalent in tonnage to a small porphyry deposit. Such deposits as Marble Peak, Twin Buttes, Pima,



## WALLABY ENTERPRISES INCORPORATED

TUCSON OFFICE: P.O. BOX 5964 - TUCSON, ARIZONA 85703 - 800 WEST GRANT ROAD - PHONE: (602) 623-0579

PRESCOTT OFFICE: GENERAL DELIVERY - PRESCOTT VALLEY, ARIZONA 86301 - 72 FLORENTINE ROAD - PHONE: (602) 772-6408

Johnson Camp, Santa Rita and Hanover might be examples of these types of deposits.

Eight miles east of this study area is the State of Texas Mine, a skarn-replacement roof pendant deposit of the type that could possibly be found at some depth in the Cave Mine study area. The characteristics of this type of deposit are described by Wilson, E. D., 1934 below:

"Geology: The State of Texas mine is on the north side of Montezuma Canyon, at an altitude of approximately 5,700 feet. From top to bottom this side of the canyon shows the following sequence of rocks: (1) Granite rock, classified as quartz monzonite by Weber, forming large mass of ridge; (2) marble, approximately 60 feet thick; (3) impure dark-gray limestone, approximately 40 feet; (4) porphyry sill, 5 to 20 feet; and (5) reddish-brown shale, sandstone, and quartzite, to bed of canyon.

The marble and limestone resemble portions of the Carboniferous Escabrosa and Naco formations, and the underlying shale-sandstone series is probably Cretaceous; low-angle and steep reverse faulting has thrust the older rocks over the younger rocks. The porphyry sill was intruded along a low-angle fault, and presumably the larger masses of quartz monzonite came in along zones of



## WALLABY ENTERPRISES INCORPORATED

TUCSON OFFICE: P.O. BOX 5964 - TUCSON, ARIZONA 85703 - 800 WEST GRANT ROAD - PHONE: (602) 623-0579

PRESCOTT OFFICE: GENERAL DELIVERY - PRESCOTT VALLEY, ARIZONA 86301 - 72 FLORENTINE ROAD - PHONE: (602) 772-6408

reverse and shear faulting. In places renewed fault movement occurred along the contacts; for example, a fault zone, dipping 80 degrees northward and locally marked by copper stain, separates the marble from the intrusive mass north of the mine. The marble and limestone south of this fault form a belt approximately 350 feet wide and several hundred feet long from east to west. Their beds in general dip 15 to 20 degrees northward, but in places they have been deformed by flexures and faults.

Workings and mineralization: The zinc-lead workings in the State of Texas mine are about 200 feet southeast of the old Mitchell vertical shaft. They consist of an adit with about 250 feet of drifts and an irregular stope about 80 feet in maximum length and breadth by 5 to 15 feet high.

The ore consists essentially of sphalerite and galena together with local pyrite and a little chalcopyrite. It occurs associated with garnet and other silicates, minor quantities of willemite (?), calcite, and quartz.

According to Miss Sparkes, production during 1943-47 totaled 1,791 tons, which was sent to the Shattuck



## WALLABY ENTERPRISES INCORPORATED

TUCSON OFFICE: P.O. BOX 5964 - TUCSON, ARIZONA 85703 - 800 WEST GRANT ROAD - PHONE: (602) 623-0579

PRESCOTT OFFICE: GENERAL DELIVERY - PRESCOTT VALLEY, ARIZONA 86301 - 72 FLORENTINE ROAD - PHONE: (602) 772-6408

Denn custom mill at Bisbee. This ore yielded essentially all of the output of recoverable zinc (330,000) credited to the Hartford district for the years 1943-46. Also, it contained from 1.0 to 6.65 per cent lead and 0.2 to 1.12 per cent copper, together with 2.75 to 11.0 ounces of silver and generally less than 0.1 ounce of gold per ton. It commonly ranged from 10 to 19.65 per cent in zinc content."

### Geochemical and Geophysical Survey Results:

Two rock chip geochemical traverses were made across various mineralized structures on the property. These two traverse lines A-B and C-D are represented on cross-sections 1-4 and overlays 1-4. Information plotted on the cross-sections and overlays included: geology, radiometrics, structure and geochemical results plotted at a true scale of 1" = 50' horizontal & vertical.

The information obtained guided a limited drilling program that, for all intents and purposes was totally unsuccessful due to USFS restrictions and poor drilling conditions.

The chief benefits obtained from the geochemical-geophysical program are listed below:

1. Established the geochemical and radiometric signatures of the various rock types and alteration-mineralization zones.



## WALLABY ENTERPRISES INCORPORATED

TUCSON OFFICE: P.O. BOX 5964 - TUCSON, ARIZONA 85703 - 800 WEST GRANT ROAD - PHONE: (602) 623-0579

PRESCOTT OFFICE: GENERAL DELIVERY - PRESCOTT VALLEY, ARIZONA 86301 - 72 FLORENTINE ROAD - PHONE: (602) 772-6408

2. Established the continuity of skarn-tactite mineralization for 1800-2500 ft. of strike length from the Cave Mine Workings.
3. Established that some of the gold mineralization was a part of a later, quartz-rich phase of mineralization that preferentially mineralized rhyolite and other intrusive igneous bodies.
4. Established the validity of radiometrics in detecting buried felsic intrusives and skarn-tactite Pb-Zn-Ag mineralization.

### Recommendations and Conclusions:

The mineralization occurring within the study area is varied and holds much promise for intermediate to small size mines (500 - 100 tpd operations) exploiting Pb, Zn, Ag, Cu ores. The ores are probably not of sufficient value to be directly shipped to a local smelter. This being the case, a thorough geological, geophysical and drilling program will have to be carried out to firmly fix the amount of proven reserves in both the known Cave and Ida Canyon mines and in the numerous unknown or poorly exposed deposits. Once this is done, a full feasibility study would have to be completed so as to ascertain if the mineralization could support the considerable cost of a milling facility.

It may be that the reserves will not prove adequate for such a facility. If that is the case, it is our recommendation, that the dumps of the Ida Canyon Mine be considered for a heap leaching operation so as to recoup the cost of the investment up to this point.



## WALLABY ENTERPRISES INCORPORATED

TUCSON OFFICE: P.O. BOX 5964 - TUCSON, ARIZONA 85703 - 800 WEST GRANT ROAD - PHONE: (602) 623-0579

PRESCOTT OFFICE: GENERAL DELIVERY - PRESCOTT VALLEY, ARIZONA 86301 - 72 FLORENTINE ROAD - PHONE: (602) 772-6408

As to the progress of this program, it is our recommendation that no further work be done in this area until a full understanding is worked out with the U.S.F.S. over such matters as road access and construction and mine waste disposal. These were the factors that hindered our efforts in the area and were a potential threat to future mining & milling operations.

In conclusion, we feel there is sufficient potential in the area for Au, Ag, Pb, Zn, Cu and W ores to warrant large scale exploration efforts by a seasoned and experienced mining group.

  
 Richard J. Lundin  
 Mineral Exploration  
 Consultant, & President,  
 Wallaby Enterprises, Inc.

Approved:  
 Walter E. Heinrichs, V.P. Geophysics  
 Geol. Engr. - Geop.  
 P.E. & C.P.G.

