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

The following file is part of the Cambior Exploration USA Inc. records

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.

Graham Cty, AZ

NICOR Mineral Ventures, Inc.
2659-G Pan American Freeway, N.E.
Albuquerque, New Mexico 87107

The geology of, and known mineral occurrences within, Wilderness Study Areas 4-14 and 4-16 Fishhook - Day Mine

by
Susan R. Calder
Research Assistant

contract to: Dr. Stephen J. Reynolds
Arizona Bureau of Geology and Mineral Technology
Geological Survey Branch
845 N. Park Ave.
Tucson, Arizona 85719

contractor:
U.S. Dept. of Interior
Bureau of Land Management
Safford District Office
425 East 4th. Ave.
Safford, Arizona 85546
(Mr. Ron Loomis)

March 1, 1982

contents:

Brief summary of geological features and known mineral occurrences

Wilderness Study Areas 4-14, 4-16
Fishhook - Day Mine

1) The Fishhook - Day Mine areas are underlain by middle - to - upper Tertiary age volcanic flows, breccias, and tuffs, and by late Tertiary-Quaternary basin-fill deposits, primarily of alluvial and lacustrine origin (sands, gravels, etc.);

2) The WSA's do not contain any known base or precious metal occurrences;

3) Secondary copper mineral deposits have been reported from fissure veins in middle Tertiary volcanic rocks along the western and southern borders of the WSA's. Other copper deposits are located several miles to the south of WSA 4-16. No production has been recorded from exploration prospects in these areas;

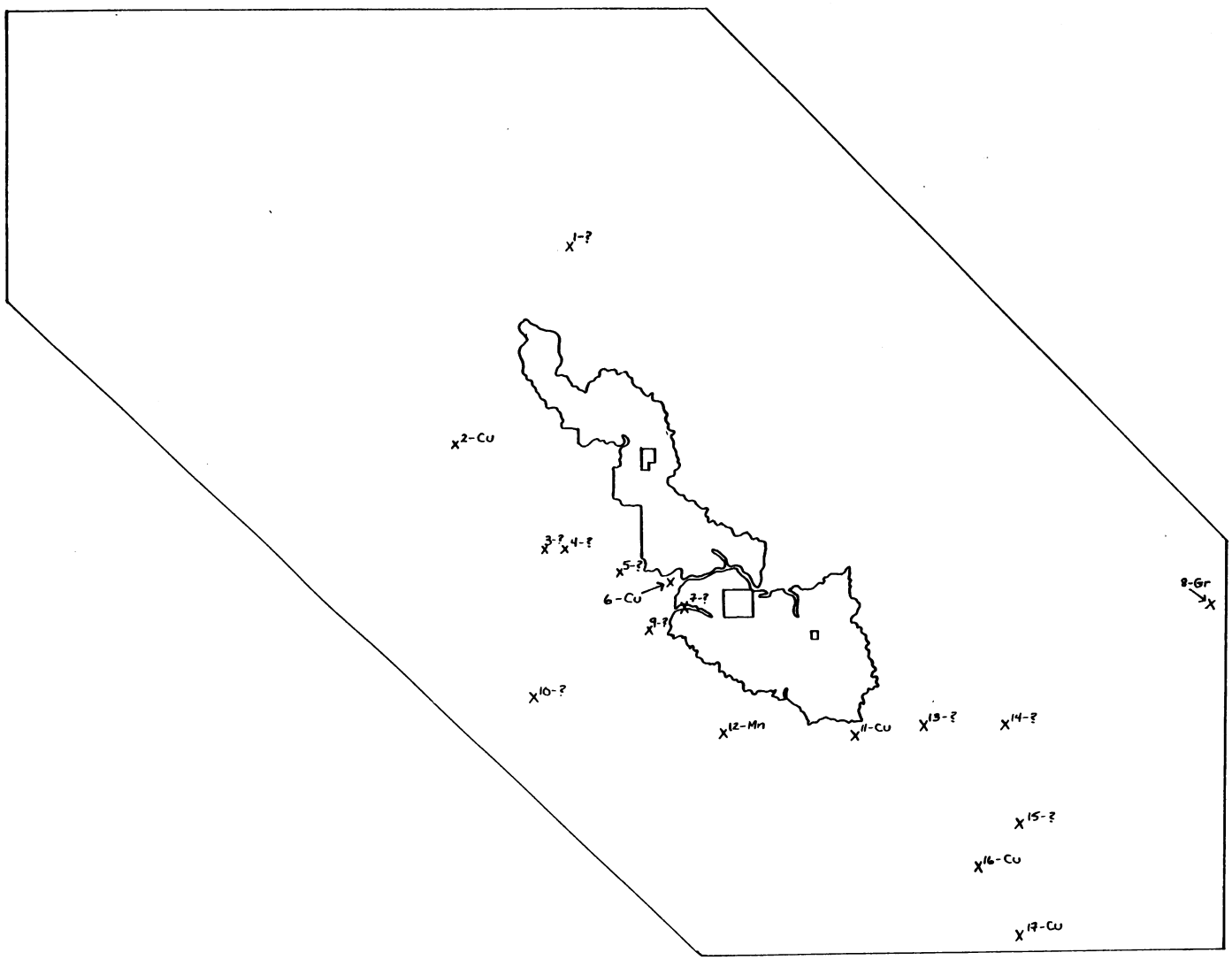
4) Minor occurrences of gold, silver, lead, zinc, and molybdenum are associated with the copper deposits. Mining claim reports indicate that mineral amounts are insufficient to be of economic value;

5) One known occurrence of manganese is located to the south of WSA 4-16 in middle Tertiary volcanic rocks. There are no reports of production;

6) Information concerning mineral types, claim development, and ore production is unavailable for other prospects in this region;

7) The Safford - Lone Star Mining District, to the south of the WSA's, has been actively mined and prospected since the late 1800's. Porphyry copper and related vein deposits of the Safford region are associated with granodiorite plutons (late Cretaceous-early Tertiary; 67-52 m.y.), located in ENE-trending shear zones that transect Cretaceous-Tertiary volcanic flows and breccias. Data on mining activity and production are largely non-existent for the many small mines that operated between 1900 and the late 1940's.

For additional discussions of the mineral potential of the Gila Mountains and vicinity, see Bromfield and Shride (1956) and Robinson and Cook (1966).



MINERAL OCCURRENCES IN THE FISHHOOK- DAY MINE AREA
GILA MOUNTAINS
(4-14/4-16)

EXPLANATION

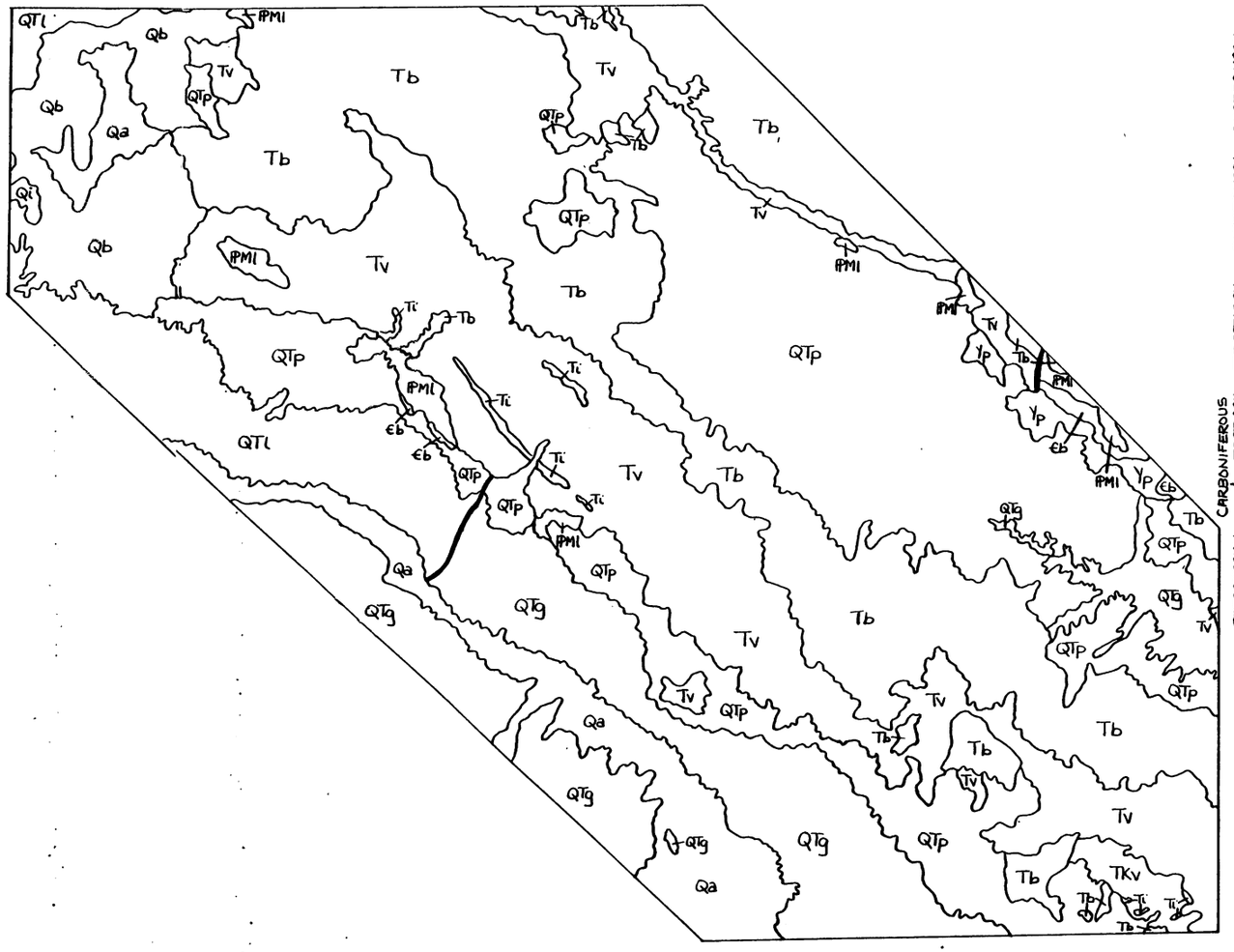
Known mineral occurrences are located by map number, followed by type of mineral deposit. See accompanying table of mineral occurrences.

x^{Cu} copper

x^{Mn} manganese; psilomelane, manganite

x^{Gr} gravel and sand

$x^{?}$ unknown



EXPLANATION

QUATERNARY

- Qa — Younger alluvium; unconsolidated silt, sand, and gravel on active flood plains and in stream channels.
- Qb — Basalt flows interbedded with, and overlying, Gila Conglomerate type sedimentary rocks.
- Qi — Basaltic dikes and plugs.

QUATERNARY-TERTIARY

- QTg — Weakly- to well-indurated conglomerate, fanglomerate, and breccia capping low terraces and ridges.
- QTl — Lake-deposited silt, sand, and limey sediments.
- QTp — Older alluvium and colluvium; coarse gravel, sand, and silt of older valley fill.

TERTIARY

- Tv — Rhyolite welded ash-flow tuff and coarse-grained porphyritic andesite flows.
- Tb — Basalt and basaltic andesite flows and pyroclastic deposits.
- Ti — Intrusive rocks, including granitic plutons and aphanitic to porphyritic dikes and plugs.

TERTIARY-CRETACEOUS

- TKv — Flows, tuffs, breccias, and volcanic conglomerates of andesitic to rhyolitic composition.

CARBONIFEROUS

- PMl — Fine-grained fossiliferous limestone; Horquilla and Escabrosa formations.

CAMBRIAN

- €b — Bolsa Quartzite; orthoquartzite and grit with basal conglomerate unit.

PRECAMBRIAN

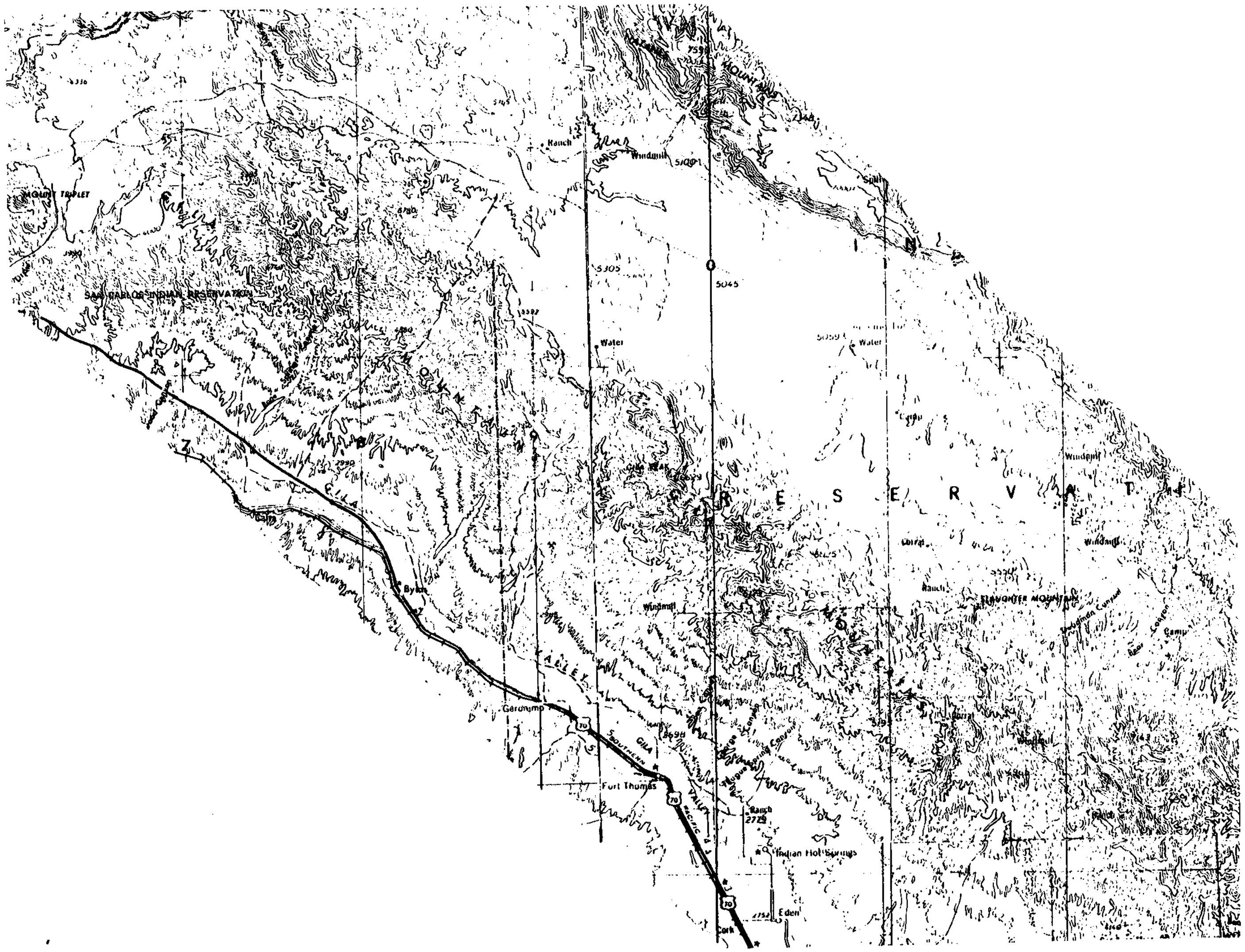
- Yp — Coarse-grained porphyritic quartz monzonite, locally chloritized and foliated.

contact

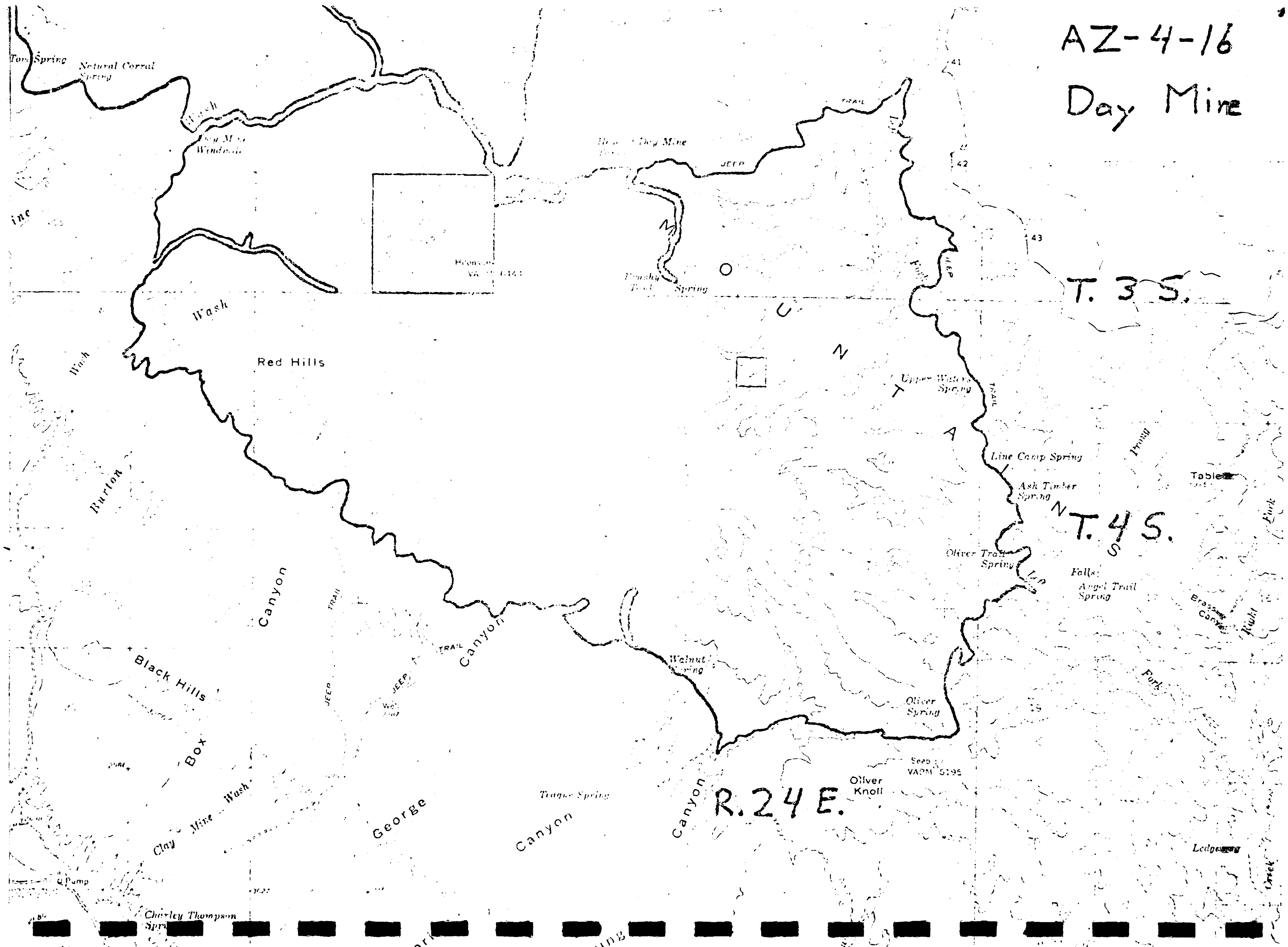
fault

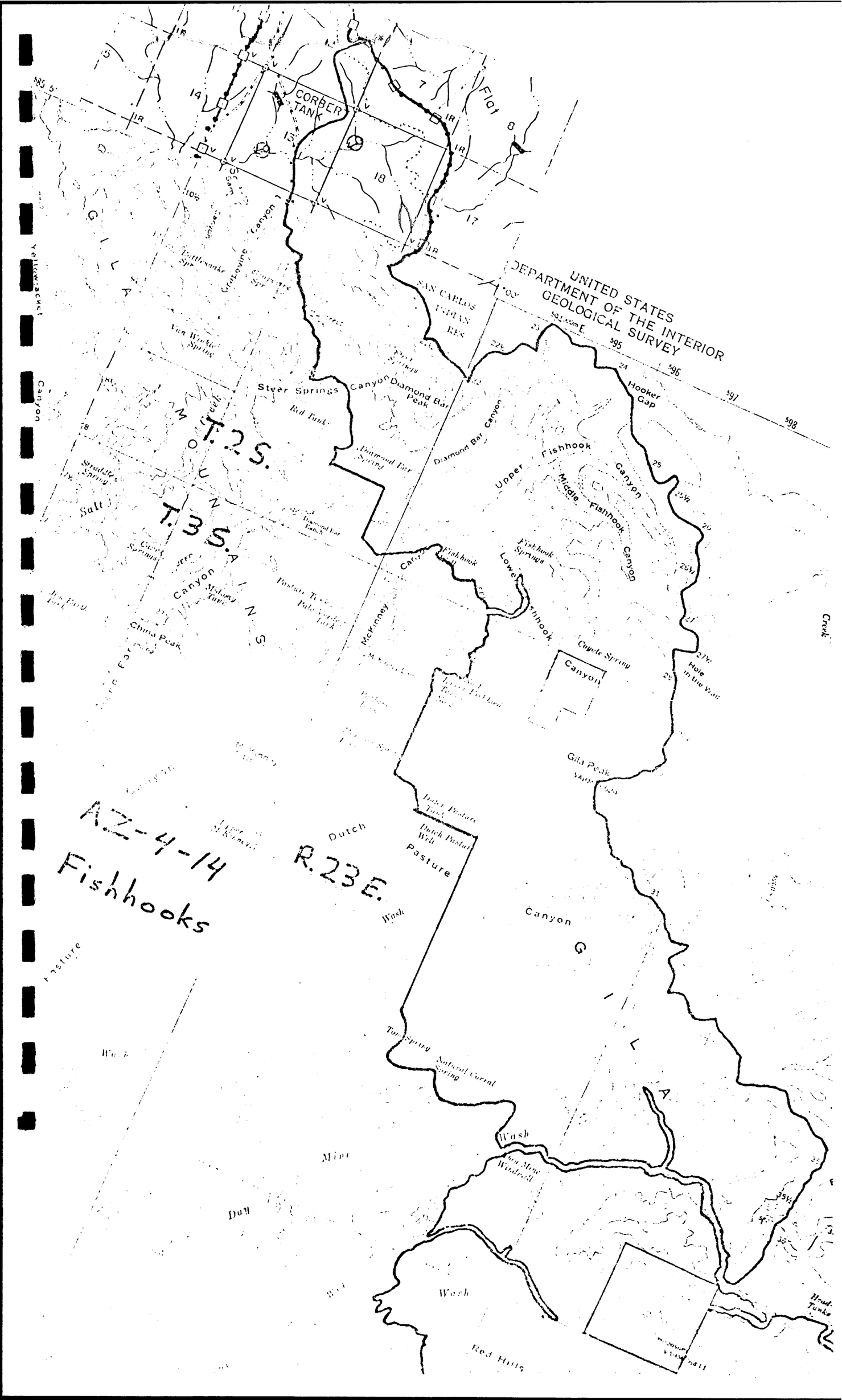
Sources of information include:
Wilson, E.D., and R.T. Moore, 1958

GEOLOGY OF THE FISHHOOK - DAY MINE AREA GILA MOUNTAINS (4-14/4-16)



SAN CARLOS INDIAN RESERVATION
MOUNT TRIPLET
Ranch
Windmill
Water
R E S E R V A T
Windmill
Ranch
Bylas
Geronimo
GILA
SOUTHERN PACIFIC
Fort Thomas
Ranch
2725
Indian Hot Springs
Eden
Cork


AZ-4-16
Day Mine
T. 3 S.
T. 4 S.
R. 24 E.
Natural Corral Spring
Wash
Red Hills
Burton
Canyon
Black Hills
Box
Clay Mine Wash
George
Canyon
Canyon
Canyon
Charley Thompson Spring
Pump
JEEP
TRAIL
Walnut Spring
Oliver Spring
Oliver Knoll
Tongue Spring
Line Camp Spring
Ash Timber Spring
Oliver Trail Spring
Upper Waters Spring
Falls
Angel Trail Spring
Prong
Fork
Fork
Table
Ledge
M O U N T A I N S
41
42
43


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
CORBER TANK
Flat
SAN CARLOS INDIAN RES
Steer Springs
Red Tank
Diamond Bar Canyon
Diamond Bar Peak
Diamond Bar Spring
Hooker Gap
Upper Fishhook Canyon
Middle Fishhook Canyon
Lower Fishhook Canyon
Fishhook Springs
Coyote Spring Canyon
Hole in the Wall
Gila Peak
McKinney
China Peak
Dutch Pasture Tank
Dutch Pasture Well
Pasture
Canyon
Wash
Natural Corral Spring
Red Hills
T. 2 S.
T. 3 S.
R. 23 E.
AZ-4-14
Fishhooks

KNOWN MINERAL OCCURRENCES

FISHHOOKS / DAY MINE AREA (4-14 / 4-16)

Copper and Manganese Deposits

The Gila Mountains are composed of middle-to-upper Tertiary age volcanic flows, breccias, and tuffs. Pyroclastic rocks, including basalts, rhyolites, andesites, and rhyolitic tuffs and breccias of middle Tertiary age are separated from late Tertiary-Quatermary vesicular basalt flows by a structural unconformity. About 1000 feet of these older flows and tuffs overlie exposed Paleozoic rocks in the Gila Range. Well-indurated conglomerate, fanglomerate, breccia, and coarse gravel cover terraces and low ridges sloping down to the Gila Valley on the southwest and the alluvium-filled Ash Flat - Bonita Creek basin on the east.

Secondary copper minerals are contained in fissure vein systems cutting andesitic and basaltic flows (map numbers 6, 16, 16). To the north of the Gila Range, copper sulfides and carbonates occur in a fissure vein transecting Paleozoic sedimentary rocks (map number 2). Minor amount of gold, silver, lead, zinc, and molybdenum have been reported from these vein deposits.

Map number 12 contains a manganese deposit. Psilomelane and manganite occur in irregular veins in sheared andesite (middle Tertiary). There are no records of production from these deposits.

Map numbers 1-5, 7, 9-11, and 13-15 represent exploration prospects with unknown mineral types. Information concerning development and production is unavailable.

MAP NO. 4-14/16 - 1

Mine Borrow Pit

Location T.01S R.23E Sec. 18 Cen. Lat. 33-19-16N Log. 109-59-32-W Elev. 5100 ft.

Geology Prospect located in middle-upper Tertiary basalt flows interbedded with, and overlying, Gila-Conglomerate - type sedimentary deposits. Near contact between basalt flow to west and Quaternary alluvium of Ash Flat to east. Basalt flows in region are generally flat-lying and have been little disturbed.

Mineral Products Unknown.

Development and Production Surface exploration, extent of development unknown.

References

USBM Files, Borrow Pit
USGS Tule Tubs Quad (1:24000)
Wilson and Moore, 1958
Bromfield and Shride, 1956, p. 627-628

MAP NO. 4-14/16 - 2

Mine Tribal Claim

Location T.02S Sec. 33 Lat. 33-13-00N
R.22E Cen. Long. 110-05-45W
Elev. 3200 ft.

Geology Secondary copper minerals in weakly metallized vein paralleling fault that separates Cambrian quartzite to south. From Devonian-Carboniferous limestone to north. Fault strikes N75W and dips 75°NE; vein exposed along fault for distance of about 200 ft. Malachite associated with calcite, specular hematite, and minor amounts of fine-grained pyrite.

Mineral Products Copper sulfides and carbonates: malachite, chalocite, azurite; gold; silver

Development and Production Surface exploration prospect; not known production. Claims located in 1920 by J. Stevens, W. Stevens, R. Bylas, and J. Rope. Development included 3 shallow cuts along vein.

References

USBM Files, Tribal Claim
USAEC, 1954, A-P-381
Bronfield and Shride, 1956, p. 636
USGS Crib Data, 1979
USGS Bylas Quad (1:62500)

MAP NO. 4-14/16-3

Mine Shaft

Location T.03S Sec. 18 Lat. 33-10-25N
R.23E Cen, W½ Long. 110-02-05W
Elev. 3280 ft.

Geology Workings located in Carboniferous - Devonian limestone exposed between main andesitic flows of Gila Mountains and alluvial terraces of Gila River. Gray, thin - to - thick-bedded, fine- grained fossiliferous limestone of either the Horquilla Limestone (Pennsylvanian) or Escabrosa Limestone (Devonian-Mississippian) formations. Similar limestone deposits to NW (see: Tribal Claims) contain secondary copper minerals in fissure vein systems.

Mineral Products Unknown.

Development and Production Underground exploration prospect; extent of development unknown.

References

USBM Files, Shaft
Simons, 1964, p. 26, 31
Wilson and Moore, 1958
USGS Bylas Quad (1:62500)

MAP NO. 4-14/16 - 4

Mine Shaft

Location T.03S Sec. 17 Lat. 33-09-57N
R.23E SW Long. 110-00-48W
Elev. 3520 ft.

Geology Workings located in Carboniferous-Devonian limestone; see map No. 3 for geologic information.

Mineral Products Unknown.

Development and Production Underground exploration prospect; extent of development unknown.

Reference

USBM Files, Shaft
USGS Bylas Quad (1:62500)
Wilson and Moore, 1958
Simons, 1964, p. 26,31

MAP NO. 3-14/16 - 5

Mine Natural and Unnatural Claims

Location T.03S Sec. 22 Lat. 33-09-25N
R.23E Long. 109-58-25W
Elev. 4000 ft.

Geology Claims situated on faulted, middle Tertiary volcanic flows. Pyroclastic rocks in region include basalts, rhyolites, andesites, and rhyolitic tuffs and breccias. Copper, lead, zinc, and molybdenum minerals occur in andesitic flows on adjacent HWR Claim Property.

Mineral Products [illegible]

Development and Production Exploration prospects; extend of development unknown. Claims extend into Sec. 14, 15, 21, 23, 26, 27, 34, and 35, (1.035S, R.23E); adjacent to HWR Claim Group and Carrasco Claims.

References

USBM Files, Natural and Unnatural Claims
BLM Mining Claims Lead File 74063, July 1980
USGS Ft. Thomas Quad (1:62500)
Wilson and Moore, 1958

MAP NO. 4-14/16-6

Mine HWR Claim Group

Location T.03S Sec. 25 Lat. 33-08-35N
R. 23E Long. 109-56-17W
Elev. 4200 ft.

Geology Mineral deposits in fissure veins in middle Tertiary andesite flow and prophyritic andesite rocks.

Mineral Products Copper
Lead
Zinc
Molybdenum

Development and Production Exploration prospect; extent of development unknown. Claims extend into Sections 24, 26, 35, 36 (T.03S, R.23E) and Sections 19, 30, 31 (T.03S, R, 24E)

References

USBM Files, HWR Claim Group
ADMR HWR Claim Group File
BLM Unpatented Claims Lead File 44315, July 1980
Wilson and Moore, 1958
USGS Ft. Thomas Quad (1:62500)

MAP NO. 4-14/16-7

Mine Carrasco Claims
(Unpatented Claims - Loma Linda, High Noon)

Location T.03S Sec. 35 Lat. 33-07-40N
R.23E E½ Long. 109-57-15W
Elev. 4000 ft.

Geology Claims located on fissure veins in middle Tertiary andesite flow and porphyritic andesite rocks. Near contact between Tertiary volcanics and well-indurated Quaternary sediments which include conglomerate, fanglomerate, and breccia in shallowly dipping to flat-lying beds. Copper, lead, zinc, and molybdenum minerals found to north on HWR Claims.

Mineral Products Unknown.

Development and Production Exploration porspect; extent of development unknown. Claims extend into Sections 26 and 35, W½ (T.03S, R.23E).

References

USBM Files Carrasco Claims
BLM Unpatented Claims Lead File 90007, July 1980
USGS Ft. Thomas Quad (1:62500)
Wilson and Moore, 1958

MAP NO. 4-14/16-8

Mine Gravel Pit

Location T.03S Sec. 29 Lat. 33-09-22W
R.22E W½ Long. 109-36-04W
Elev. 5360 ft.

Geology Weakly to well-indurated conglomerate, fanglomerate, breccia, and coarse gravel in shallowly dipping to flat-lying beds, in SE portion of Ash Flat. Near contact between Quarternary alluvium and exposed basaltic flow to south of workings; separated by an erosional unconformity.

Mineral Products Gravel

Development and Production Surface workings; recent producer.

References

USBM Files, Gravel, Pit
USGS Bryce Mountain Quad (1:625000)
Wilson and Moore, 1958

MAP NO. 4-14/16 - 9

Mine Prospect

Location T.04S Sec. 02 Lat. 33-07-07N
R.23E NE Long. 109-57-09W
Elev. 3900 ft.

Geology Prospect located in faulted middle Tertiary andesitic flow. Copper prospects in vicinity.

Mineral Products Unknown.

Development and Production Exploration prospect.

References

USBM Files, Prospect
WSGS Ft. Thomas Quad (1:62500)
Wilson and Moore, 1958

MAP NO. 4-14/16 - 10

Mine Prospect

Location T.04S Sec. 18 Lat. 33-05-31N
R.23E Cen, N½ Long. 109-55-28W
Elev. 2640 ft.

Geology Prospect located in Quaternary - Recent alluvium of the Gila River drainage. Unconsolidated silt, sand, and gravel forms low-lying terraces, overflow channels, and lowland plain supporting the Gila River.

Mineral Products Unknown

Development and Production Exploration prospect.

References

USBM Files Prospect
USGS Bylas Quad (1:62500)
Wilson and Moore, 1958
Knechtel, 1938, p. 200

MAP NO. 4-14/16 - 11

Mine Poteet Claims (Marla L., Rams, unpatented claims - Farout, Big Square, Osolomio)

Location T. 04S Sec. 26 Lat. 33-03-01N
R. 24E E½ Long. 109-51-00W
Elev. 3600 ft.

Geology Secondary copper minerals occur in middle Tertiary andesitic flow and porphyritic andesite rocks. Andesite beds generally trend NE; mineral deposits found in fault and fissure vein systems. Claims extended to south and east, into Quaternary-Recent, unconsolidated to well-indurated fanglomerates and gravels, copping low-lying ridges and terrace of the Gila River Valley.

Mineral Products Copper

Development and Production Exploration; no record of production. Claims extend into Sec. 25, 33, 34, 35 (T.04S, R.24E). Sec. 1, 12, 13 (T.05S, R.24E); Sec. 26, 27, 30, 31, 35, 36 (T.04S, R.25E)' Sec. 19, 20, 21, 28, 29, 30, 33 (T.05S, R.25E).

References

USBM Files Poteet Claims
BLM Mining Claims Lead File 50456, 50528, 76551, 34486; July 1980
UGSG Ft. Thomas Quad (1:62500)
USGS Thatcher Quad (1:62500)
USGS Bryce Mountain Quad (1:62500)
Wilson and Moore, 1958

MAP NO. 4-14/16 -12

Mine Voelckel Claims

Location T.04S Sec. 30 Lat. 33-03-47N
R.24E NE of NE Long. 109-55-00W
Elev. 3800 ft.

Geology Small, low-grade manganese deposit in porphyritic andesite (middle Tertiary) within faulted, steeply dipping volcanic rocks composed primarily of rhyolite, andesite, obsidian and interbedded yellow tuffs. Deposit consists of narrow and irregular veins striking NE through sheared andesite and seams that cement andesite breccia. Maximum vein length is 30 ft. Manganese oxides associated with calcite.

Mineral Products Manganese: psilomelane, manganite

Development and Production Exploration prospects; no known production. Claims located in 1914 by Louis Voelckel; development included one 30-ft. tunnel. Assay values (early 1900's) averaged 18-20% MN.

References

ADMR Voelckel Claims File
USBM Files, Voelckel Claims
Jones and Ransome, 1920, p. 129-130
USGS CRIB Data, 1979
USGS Ft. Thomas Quad (1:62500)

MAP NO. 4-14/16 - 13

Mine Bryce Brothers Claims

Location T.04S Sec. 21 Lat. 33-03-52N
R. 25E SW Long. 109-47-06W
Elev. 4400 ft.

Geology Prospect located at or near contact between middle Tertiary andesite flow and middle-late Tertiary porphyritic basalt. Copper prospects in vicinity.

Mineral Products Unknown.

Development and Production Exploration prospect.

References

USBM Files, Bryce Bros. Claims
BLM Mining Claims Lead File 40072, July 1980
USGS Ft. Thomas Quad (1:62500)
Wilson and Moore, 1958

MAP NO. 4-14/16 - 14

Mine Robin Claims
(Orbit, Orbitter)

Location T.04S Sec. 25 Lat. 33-03-15N
R.25E W½ Long. 109-44-20W
Elev. 4800 ft.

Geology Claims located on faulted, middle Tertiary andesitic flow and porphyritic andesite rocks. Adjacent Poteet Claims to north and south report copper deposits.

Mineral Products Unknown.

Development and Production Exploration prosepct; extent of development unknown. Property borders Poteet Claim Group.

References

USBM Files, Robin Claims
BLM Mining Claims Lead File 76436, July 1980
USGS Bryce Mountain Quad (1:62500)
Wilson and Moore, 1958

MAP NO. 4-14/16 - 15

Mine Quarry

Location T.05S Sec. 12 Lat. 33-00-45N
R.25E Cen., E½ Long. 109-43-38W
Elev. 4360 ft.

Geology Quarry located on or near contact between middle Tertiary andesitic flow and north and middle-late Tertiary porphyritic basalt to south. Andesite beds regionally trend NE and dip fairly steeply, while basaltic flows and interbedded sedimentary rocks are generally flat-lying.

Mineral Products Unknown.

Development and Production Surface workings; extent of development unknown.

References

USBM Files Quarry
USGS Bryce Mountain Quad (1:62500)
Bromfield and Shride, 1956, p. 626-630
Wilson and Moore, 1958

MAP NO. 4-14/16 - 16

Mine Peck Claims

Location			
	T.05S	Sec. 23	Lat. 32-59-00N
	R.25E	W½	Long. 109-45-20W
			Elev. 3600 ft.

Geology Secondary copper minerals occur along fault zones in middle-late Tertiary basaltic flows interbedded with, and overlying, Gila Conglomerate-type sedimentary rocks (Pliocene-Pleistocene).

Mineral Products Copper

Development and Production Exploration prospect. Unpatented claims extend into Sec. 13, 14, 26, 27 (T.05S, R.25E).

References

USBM Files, Peck Claims
BLM Mining Claims Lead File 1705, July 1980
USGS Thatcher Quad (1:62500)
Wilson and Moore, 1958

MAP NO. 4-14/16 - 17

Mine Mardi Gras Claims

Location			
	T.05S	Sec. 35	Lat. 32-57-30N
	R.25E	N½	Long. 109-45-15W
			Elev. 3360 ft.

Geology Copper minerals occur along fault zones in middle-late Tertiary basaltic flows interbedded with, and overlying, sedimentary rocks similar to Gila Conglomerate Formation (Pliocene-Pleistocene).

Mineral Products Copper

Development and Production Underground exploration prospect; extent of development unknown. Unpatented claims extend into Sec. 13, 23, 24, 25, 26 and 36 (T.05S, R.25E)

References

USBM Files, Mardi Gras Claims
BLM Mining Claims Lead File 4107, July 1980
USGS Thatcher Quad (1:62500)
USGS Safford Quad (1:62500)
Wilson and Moore, 1958

REFERENCES CITED

(references used in compiling information on WSA's 4-1A, 4-8, 4-14, 4-16, 4-22/23/24 A and B, 4-48, 4-60, 4-65, and the appealed area east of Turtle Mountain)

Allen, M.A. and G.M. Butler, 1921,
Vanadium; Arizona Bureau of Mines Bulletin 115, 23 pp.

ABGMT Clippings
Arizona Bureau of Geology and Mineral Technology newspaper clippings file, Tucson

ABGMT CRIB Data
Arizona Bureau of Geology and Mineral Technology, Computerized Resources Information Bank Data, 1981 and 1982

ABGMT - USBM File Data
Unpublished data of Arizona Bureau of Geology and Mineral Technology, and U.S. Bureau of Mines; production data

ABM, 1959,
Arizona Bureau of Mines; Geologic Map of Cochise County, Arizona

ADMR
Arizona Department of Mineral Resources File Data; Inactive Mines File

ADMR (Eyde), 1978,
Arizona Department of Mineral Resources (Eyde, Ted H.), 1978, Arizona Zeolites, Mineral Report No.-1

ADMR MAS
Arizona Department of Mineral Resources, 1976,
Minerals Availability System, Arizona Fluorspar

Bennett, K.C., 1975,
Geology and Origin of the Breccias in the Morenci-Metcalf District, Greenlee County, Arizona; M.S. Thesis, University of Arizona, 153 pp.

Blacet, Philip M. and Susan T. Miller, 1978,
Reconnaissance Geologic Map of the Jackson Mountain Quadrangle, Graham County, Arizona (1:62500); Map MF-939

Bromfield, Calvin S. and Andrew F. Shride, 1956,
Mineral Resources of the San Carlos Indian Reservation, Arizona; U.S. Geological Survey Bulletin 1027-N

Burchard, E.F., 1914,
Stone - Arizona IN Mineral Resources of the United States (1913); U.S. Geological Survey, pt. 2, p. 1338-1346

BLM
Bureau of Land Management Mining Claims Lead File, July 1980

Campbell, Marius R., 1904,
The Deer Creek Coal Field, Arizona IN Contributions to Economic Geology, 1903 (S.F. Emmons and C.W. Hayes, eds.); U.S. Geological Survey Bulletin 225, p. 248-251

Cooper, J.R., 1960,
Reconnaissance Map of the Willcox, Fisher Hills, Cochise, and Dos Cabezas Quadrangles, Cochise and Graham Counties, Arizona; U.S. Geological Survey Map MF-231

Copper Handbook, 1911,
Vol. X, compiled by H.J. Stevens (The Stevens Copper Handbook Co., New York)

Copper Handbook, 1912-1913,
Vol. XI, compiled by H.J. Stevens (The Stevens Copper Handbook Co., New York)

Dale, V.B., Stewart, L.A., and W.A. McKinney, 1960,
Tungsten Deposits of Cochise, Pima, and Santa Cruz Counties, Arizona; U.S. Bureau of Mines Report of Investigations 5650, p. 18-22

Eastlick, John, T., 1958,
New Development at the Christmas Mine, Gila County, Arizona IN Arizona Geological Society Digest, Vol. 1

Elevatorski, E.A., 1971,
Arizona Fluorspar, Arizona Department of Mineral Resources

Elevatorski, E.A., 1978,
Arizona Industrial Minerals; Arizona Department of Mineral Resources MR No.-2

Elsing, M.J. and R.E.S. Heinman, 1936,
Arizona Metal Production; Arizona Bureau of Mines Economic Series 19, Bulletin 140

Farnham, L.L., Stewart, L.A., and C.W. Delong, 1961,
Manganese Deposits of Eastern Arizona; U.S. Bureau of Mines Information Circular 7990

Harrer, C.M., 1964,
Reconnaissance of Iron Resources in Arizona, U.S. Bureau of Mines Information Circular 8236

Johnson, Maureen G., 1972,
Placer Gold Deposits of Arizona, U.S. Geological Survey Bulletin 1355

Jones, E.L. and F.L. Ransome, 1920,
Deposits of Manganese Ore in Arizona; U.S. Geological Survey Bulletin 710-D

Keith, Stanton, B., 1973,
Index of Mining Properties in Cochise County, Arizona; Arizona Bureau of Mines Bulletin 187

Knechtel, Maxwell M., 1938,
Geology and Ground-water Resources of the Valley of Gila River and San Simon Creek, Graham County, Arizona; U.S. Geological Survey Water-Supply Paper 796-F

Langton, J.M., 1973,
Ore Genesis in the Morenci-Metcalf District IN American Institute of Mining, Metallurgical, and Petroleum Engineers: Transactions, Vol. 254, p. 247-257

Lindgren, Waldemar, 1905,
The Copper Deposits of the Clifton-Morenci District, Arizona; U.S. Geological Survey Professional Paper 43

Meeves, H.C., 1966,
Nonpegmatitic Beryllium Occurrences in Arizona, Colorado, New Mexico, Utah, and Four Adjacent States; U.S. Bureau of Mines Report of Investigations 6828

Mines Handbook, 1916,
Vol. XII, compiled by W.H. Weed (The Stevens Copper Handbook Co., New York)

Mines Handbook, 1918,
Vol. XIII, compiled by W.H. Weed (The Stevens Copper Handbook Co., New York)

Mines Handbook, 1926,
Vol. XVII, compiled by W.G. Neale (The Mines Handbook Co., Inc, New York)

Mining World, 1963,
(untitled article), Vol. 25, No. 6, p. 38; Gila Valley Block Co.

Mining World, 1953,
(untitled article), Vol. 15, No. 6, p. 91

Moore, R.T., 1969,
Beryllium IN Mineral and Water Resources of Arizona; Arizona Bureau of Mines Bulletin 180

Moore, R.T. and G.H. Roseveare, 1969,
Silver IN Mineral and Water Resources of Arizona; Arizona Bureau of Mines Bulletin 180, p. 251-270

Paige, S., 1909,
Marble Prospects in the Chiricahua Mountains, Arizona; U.S. Geological Survey Bulletin 380, p. 299-311

Peirce, H. Wesley and Jan Carol Wilt, 1970,
Coal IN Coal, Oil, Natural Gas, Helium, and Uranium in Arizona; Arizona Bureau of Mines Bulletin 182

Peterson, Nels P. and Roger W. Swanson, 1956,
Geology of the Christmas Copper Mine, Gila County, Arizona; U.S. Geological Survey Bulletin 1027-H, 22 pp.

Regis, A.J. and L.B. Sand, 1967,
Lateral Gradation of Chabazite to Herschelite in the San Simon Basin (abs.), IN Bailey, S.W., ed., Clays and Clay Minerals, Vol. 27: Proceedings of the 15th. National Conference on Clays and Clay Minerals, p. 193

Renner, J.L., White, D.E., and D.L. Williams, 1975,
Hydrothermal Convection Systems IN Assessment of Geothermal Resources of the United States; U.S. Geological Survey Circular 726

Richter, D.H. and V.A. Lawrence, 1981,
Geologic Map of the Gila - San Francisco Wilderness Study Area, Graham and Greenlee Counties, Arizona; U.S. Geological Survey Map MF-1315-A

Richter, D.H., Shafiqullah, M., and V.A. Lawrence, 1981,
Geologic Map of the Whitlock Mountains and Vicinity, Graham County, Arizona; U.S. Geological Survey Map I-1302

Robinson, R.F., and Annan Cook, 1966,
The Safford Copper Deposits, Lone Star Mining District, Graham County, Arizona IN Geology of the Porphyry Copper Deposits, Southwestern North America; Spencer R. Titley and Carol L. Hicks, eds. (The University of Arizona Press), p. 251-266

Ross, Clyde P., 1925,
Geology and Ore Deposits of the Aravaipa and Stanley Mining Districts, Graham County, Arizona; U.S. Geological Survey Bulletin 763, 120 pp.

Ross, Clyde P., 1925 (B),
Ore Deposits of the Saddle Mountain and Banner Mining Districts, Arizona; U.S. Geological Survey Bulletin 771, 72 pp.

Sand, L.B., and A.J. Regis, 1966,
An Unusual Zeolite Assemblage, Bowie, Arizona (abs.), IN Abstracts for 1965: Geological Society of America Special Paper 87, pp. 145-146

Scarborough, Robert B., 1981,
Radioactive Occurrences and Uranium Production in Arizona; Arizona Bureau of Geology and Mineral Technology Open File Report 81-1

Sheppard, Richard A., 1969,
Zeolites IN Mineral and Water Resources of Arizona; Arizona Bureau of Mines Bulletin 180, pp. 464-467

Shields, J.C., Jr., 1940,
Geology and Ore Deposits of the Dives and Gold Ridge Groups, Dos Cabezas; M.S. Thesis, University of Arizona

Simons, Frank S., 1964,
Geology of the Klondyke Quadrangle, Graham and Pinal Counties, Arizona; U.S. Geological Survey Professional Paper 461, 173 pp.

Stewart, L.A., 1955,
Chyrsotile - Asbestos Deposits of Arizona; U.S. Bureau of Mines Information Circular 7706

Stewart, L.A. and A.J. Pfister, 1960,
Barite Deposits of Arizona; U.S. Bureau of Mines Report of Investigations 5651

Tenney, James B., 1927-1929,
History of Mining in Arizona; Arizona Bureau of Mines, p. 226-227

USAEC, 1954,
U.S. Atomic Energy Commission Preliminary Reconnaissance Report 172-481 (Arizona Bureau of Geology and Mineral Technology Microfiche)

USAEC, 1970,
U.S. Atomic Energy Commission Preliminary Reconnaissance Report for Uranium, Apache and Cochise Counties, Arizona, 1950 to 1970

USBM, 1965,
U.S. Bureau of Mines Information Circular 8252; Mercury Potential of the United States

USBM Files
U.S. Bureau of Mines Files, Mineral Availability System, 1981

USGS CRIB Data
U.S. Geological Survey, Computerized Resources Information Bank Data, 1972, 1979, 1980

Van Alstine, R.E. and R.T. Moore, 1969,
Fluorspar IN Mineral and Water Resources of Arizona; Arizona Bureau of Mines Bulletin 180, pp. 348-357

Willden, Ronald, 1964,
Geology of the Christmas Quadrangle, Gila and Pinal Counties, Arizona; U.S. Geological Survey Bulletin 1161-E, 64 pp.

Wilson, E.D., 1961,
Gold Placers and Placering in Arizona; Arizona Bureau of Mines Bulletin 168

Wilson, E.D., Cunningham, J.B., and G.M. Butler, 1934 (Revised 1967),
Arizona Lode Gold Mines and Gold Mining; Arizona Bureau of Mines Bulletin 137

Wilson E.D. and R.T. Moore, 1958,
Geologic Map of Graham and Greenlee Counties, Arizona; Arizona Bureau of Mines

Wilson E.D. and R.T. Moore, 1959,
Geologic Map of Pinal County, Arizona; Arizona Bureau of Mines

Wilson, E.D., Moore, R.T., and H.W. Peirce, 1959,
Geologic Map of Gila County, Arizona; Arizona Bureau of Mines

Wilson, E.D., Moore, R.T., and J.R. Cooper, 1969,
Geologic Map of Arizona; Arizona Bureau of Mines and U.S. Geological Survey

Wilson, E.D. and G.H. Roseveare, 1949,
Arizona Nonmetallics; Arizona Bureau of Mines Bulletin 155 (2nd. edition; revised)

Wynn, Jeffrey C., 1981,
Complete Bouguer Gravity Anomaly Map of the Silver City 1^{c} X 2^{o} Quadrangle, New Mexico - Arizona; U.S. Geological Survey Map I-1310-A

Possibilities for
porph Cu related
mineralization.

widespread py, cp in granite

Graham Cty, AZ.

NICOR Mineral Ventures, Inc.
2659-G Pan American Freeway, N.E.
Albuquerque, New Mexico 87107

The geology of, and known mineral occurrences within, Wilderness Study Area 4-8 Jackson Mountain - Black Rock

by
Susan R. Calder
Research Assistant

contract to: Dr. Stephen J. Reynolds
Arizona Bureau of Geology and Mineral Technology
Geological Survey Branch
845 N. Park Ave.
Tucson, Arizona 85719

contractor:
U.S. Dept. of Interior
Bureau of Land Management
Safford District Office
425 East 4th. Ave.
Safford, Arizona 85546
(Mr. Ron Loomis)

February 12, 1982

contents:

Brief summary of geological features and known mineral occurrences

Wilderness Study Area 4-8
Jackson Mountain - Black Rock

1) The WSA is underlain by Precambrian metamorphic rocks, Cretaceous or Tertiary granite, and middle Tertiary volcanics. Bedrock exposures are surrounded by late Tertiary-Quaternary basin-fill (sands, gravels, etc.). Three major fault systems transect the range;

2) Two groups of inactive prospects are located within the WSA; both are situated on the northern flanks of Jackson Mountain. The Spar Fluorite Group, largest mining operation in this area, produced 1200 tons of fluorspar prior to 1953; no further activity has been reported. Minor occurrences of secondary copper, lead, silver, and zinc minerals are associated with fruorspar; however, no significant production of these ores has been recorded.

   No information concerning development, mineral commodities, or production is available for the second group of prospects within the WSA;

3) Fluorspar also occurs to the south of the WSA in Precambrian schist. Several prospect pits were located in this area. Records of production are unavailable;

4) There are reports of uranium radioactivity from five exploration prospects to the north and south of the WSA. No uranium production has been recorded from the Jackson Mountain region;

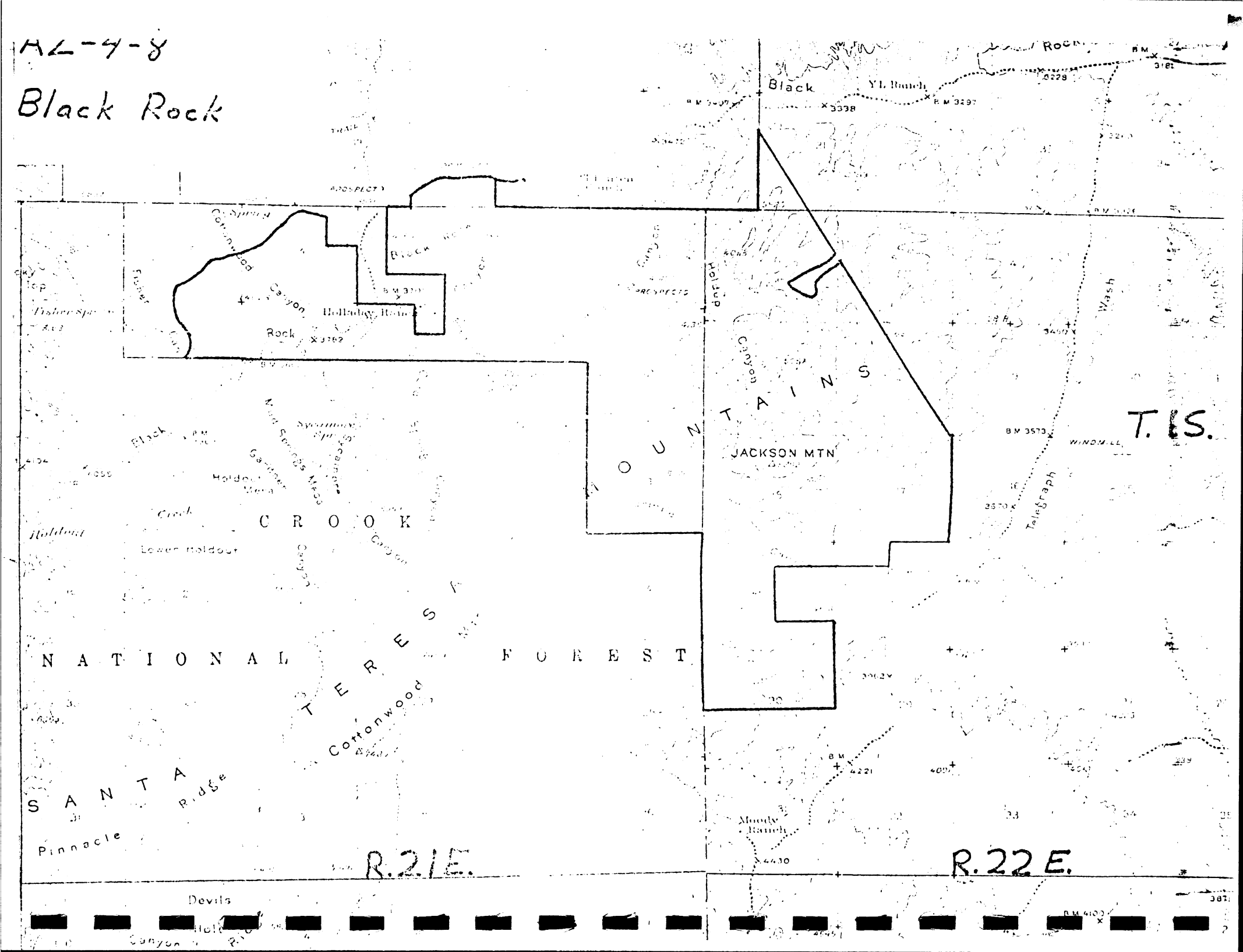
5) There are several copper occurrences in granitic rocks located in the south-central portion of the massive Tertiary granitic batholith to the northwest of Jackson Mountain. Minor amounts of lead, silver, and gold are associated with the copper deposits;

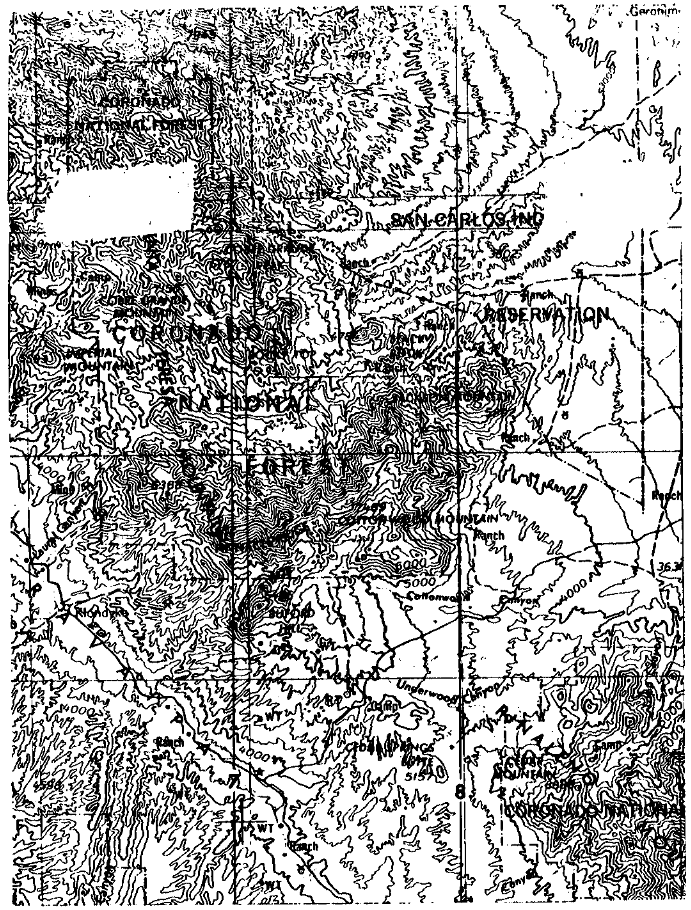
6) The Stanley-Aravaipa Mining District, to the west of the WSA, has been actively mined and prospected since the late 1800's. Lead, zinc, and silver deposits are contained in Precambrian metamorphosed igneous and sedimentary formations, Paleozoic sediments, Cretaceous or Tertiary granitic rocks, and middle Tertiary volcanics.

For additional discussions of the mineral potential of the Santa Teresa Mountain - Aravaipa region, see Ross (1925) and Simons (1964).

AZ-4-8

Black Rock





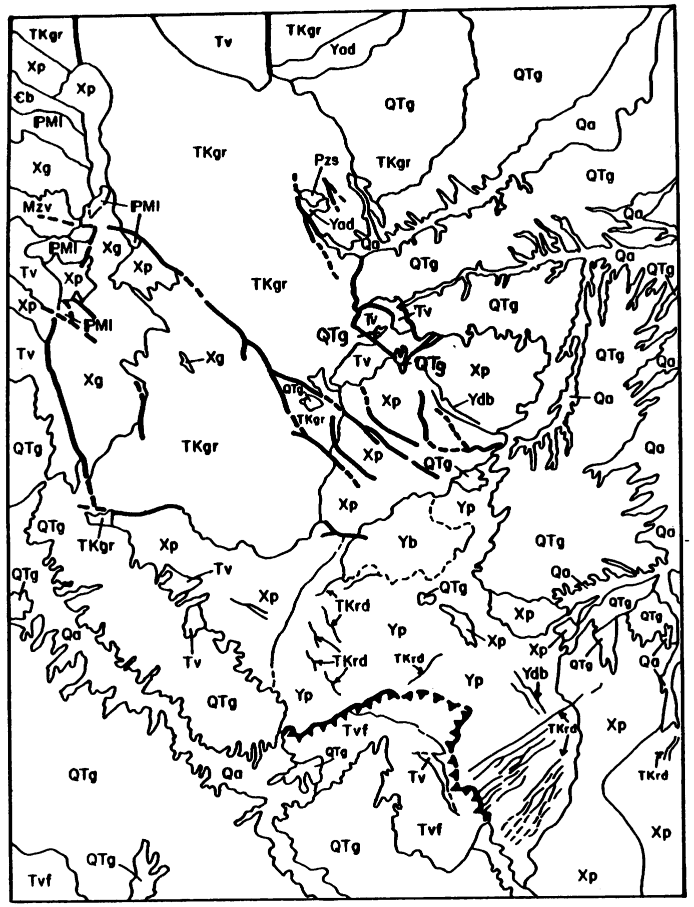
Scale 1:250,000

5 0 5 10 15 20 Statute Miles

5 0 5 10 15 20 25 30 Kilometers

5 0 5 10 15 Nautical Miles

CONTOUR INTERVAL 200 FEET
WITH SUPPLEMENTARY CONTOURS AT 100 FOOT INTERVALS



GEOLOGY OF THE JACKSON MOUNTAIN AREA (4-8)

sources of information include:

Blacet and Miller, 1978
Simons, F.S., 1969
Wilson, E.D., and R.T. Moore, 1958

EXPLANATION

Quaternary-Late Tertiary

- **Qa** — Younger alluvium; unconsolidated to weakly consolidated silt, sand and gravel.
- **QTg** — Weakly to well-indurated conglomerate, fanglomerate, and breccia capping low terraces and ridges.

Tertiary

- **Tvf** — Volcanic fanglomerate; well-indurated gravel, mudflow breccia, and mafic to intermediate volcanic flows.
- **Tv** — Rhyolite welded ash-flow tuff and coarse-grained porphyritic andesite flows.

Lower Tertiary-Cretaceous

- **Tkrd** — Dikes and small intrusive bodies of rhyolite and rhyolite porphyry.
- **Tkgr** — Porphyritic quartz monzonite and granodiorite-diorite; altered coarse-grained granite in south-central part of batholith contains disseminated pyrite and chalcopyrite.

Mesozoic-Cenozoic

- **Mzv** — Andesite and basalt flows and flow breccia with basal conglomerate.

Carboniferous

- **PMI** — Fine-grained fossiliferous limestone; Horquilla and Escabrosa formations.

- **Єb** — Bolsa Quartzite; orthoquartzite and grit with basal conglomerate unit.

Cambrian

- **Pzs** — Undifferentiated Paleozoic sedimentary rocks includes limestone, quartzite and shale.

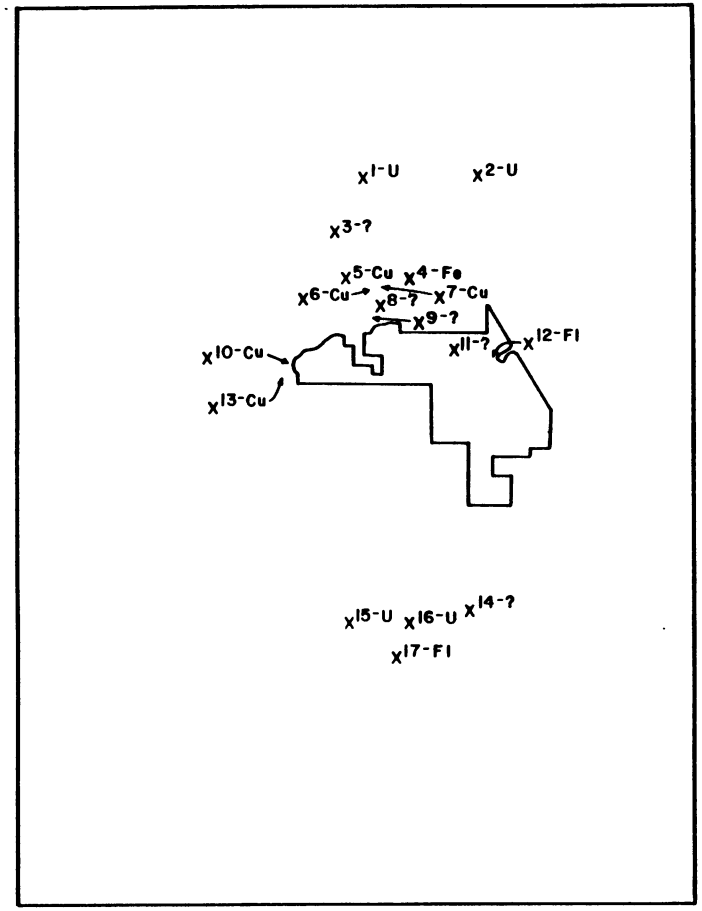
Precambrian

- **Ydb** — Diabase dikes and sills.
- **Yad** — Dripping Spring Quartzite of Apache Group.
- **Yp** — Coarse-grained porphyritic quartz monzonite, locally chloritized and foliated.
- **Yb** — Highly crushed and deformed porphyritic biotite quartz monzonite.
- **Xg** — Laurel Canyon Granodiorite; coarse-grained porphyritic granodiorite.
- **Xp** — Pinal Schist; locally containing units of granitic gneiss, pebbly quartzite, coarse-grained schist and cordierite gneiss.

contact

fault

low-angle fault, sawteeth on upper plate



EXPLANATION

Known mineral occurrences are located by map number, followed by type of mineral deposit. See accompanying table of mineral occurrences.

X^{Fl}	fluorspar; associated copper, lead, silver, and zinc
X^{Fe}	iron oxides
X^{Cu}	copper, chiefly chalcopyrite
X^{U}	uranium
$X^{?}$	unknown

MINERAL OCCURRENCES IN THE JACKSON MOUNTAIN AREA (4-8)

REFERENCES CITED

(references used in compiling information on WSA's 4-1A, 4-8, 4-14, 4-16, 4-22/23/24 A and B, 4-48, 4-60, 4-65, and the appealed area east of Turtle Mountain)

Allen, M.A. and G.M. Butler, 1921,
Vanadium; Arizona Bureau of Mines Bulletin 115, 23 pp.

ABGMT Clippings
Arizona Bureau of Geology and Mineral Technology newspaper clippings file, Tucson

ABGMT CRIB Data
Arizona Bureau of Geology and Mineral Technology, Computerized Resources Information Bank Data, 1981 and 1982

ABGMT - USBM File Data
Unpublished data of Arizona Bureau of Geology and Mineral Technology, and U.S. Bureau of Mines; production data

ABM, 1959,
Arizona Bureau of Mines; Geologic Map of Cochise County, Arizona

ADMR
Arizona Department of Mineral Resources File Data; Inactive Mines File

ADMR (Eyde), 1978,
Arizona Department of Mineral Resources (Eyde, Ted H.), 1978, Arizona Zeolites, Mineral Report No.-1

ADMR MAS
Arizona Department of Mineral Resources, 1976,
Minerals Availability System, Arizona Fluorspar

Bennett, K.C., 1975,
Geology and Origin of the Breccias in the Morenci-Metcalf District, Greenlee County, Arizona; M.S. Thesis, University of Arizona, 153 pp.

Blacet, Philip M. and Susan T. Miller, 1978,
Reconnaissance Geologic Map of the Jackson Mountain Quadrangle, Graham County, Arizona (1:62500); Map MF-939

Bromfield, Calvin S. and Andrew F. Shride, 1956,
Mineral Resources of the San Carlos Indian Reservation, Arizona; U.S. Geological Survey Bulletin 1027-N

Burchard, E.F., 1914,
Stone - Arizona IN Mineral Resources of the United States (1913); U.S. Geological Survey, pt. 2, p. 1338-1346

BLM
Bureau of Land Management Mining Claims Lead File, July 1980

Campbell, Marius R., 1904,
The Deer Creek Coal Field, Arizona IN Contributions to Economic Geology, 1903 (S.F. Emmons and C.W. Hayes, eds.); U.S. Geological Survey Bulletin 225, p. 248-251

Cooper, J.R., 1960,
Reconnaissance Map of the Willcox, Fisher Hills, Cochise, and Dos Cabezas Quadrangles, Cochise and Graham Counties, Arizona; U.S. Geological Survey Map MF-231

Copper Handbook, 1911,
Vol. X, compiled by H.J. Stevens (The Stevens Copper Handbook Co., New York)

Copper Handbook, 1912-1913,
Vol. XI, compiled by H.J. Stevens (The Stevens Copper Handbook Co., New York)

Dale, V.B., Stewart, L.A., and W.A. McKinney, 1960,
Tungsten Deposits of Cochise, Pima, and Santa Cruz Counties, Arizona; U.S. Bureau of Mines Report of Investigations 5650, p. 18-22

Eastlick, John, T., 1958,
New Development at the Christmas Mine, Gila County, Arizona IN Arizona Geological Society Digest, Vol. 1

Elevatorski, E.A., 1971,
Arizona Fluorspar; Arizona Department of Mineral Resources

Elevatorski, E.A., 1978,
Arizona Industrial Minerals; Arizona Department of Mineral Resources MR No.-2

Elsing, M.J. and R.E.S. Heinman, 1936,
Arizona Metal Production; Arizona Bureau of Mines Economic Series 19, Bulletin 140

Farnham, L.L., Stewart, L.A., and C.W. Delong, 1961,
Manganese Deposits of Eastern Arizona; U.S. Bureau of Mines Information Circular 7990

Harrer, C.M., 1964,
Reconnaissance of Iron Resources in Arizona, U.S. Bureau of Mines Information Circular 8236

Johnson, Maureen G., 1972,
Placer Gold Deposits of Arizona, U.S. Geological Survey Bulletin 1355

Jones, E.L. and F.L. Ransome, 1920,
Deposits of Manganese Ore in Arizona; U.S. Geological Survey Bulletin 710-D

Keith, Stanton, B., 1973,
Index of Mining Properties in Cochise County, Arizona; Arizona Bureau of Mines Bulletin 187

Knechtel, Maxwell M., 1938,
Geology and Ground-water Resources of the Valley of Gila River and San Simon Creek, Graham County, Arizona; U.S. Geological Survey Water-Supply Paper 796-F

Langton, J.M., 1973,
Ore Genesis in the Morenci-Metcalf District IN American Institute of Mining, Metallurgical, and Petroleum Engineers: Transactions, Vol. 254, p. 247-257

Lindgren, Waldemar, 1905,
The Copper Deposits of the Clifton-Morenci District, Arizona; U.S. Geological Survey Professional Paper 43

Meeves, H.C., 1966,
Nonpegmatitic Beryllium Occurrences in Arizona, Colorado, New Mexico, Utah, and Four Adjacent States; U.S. Bureau of Mines Report of Investigations 6828

Mines Handbook, 1916,
Vol. XII, compiled by W.H. Weed (The Stevens Copper Handbook Co., New York)

Mines Handbook, 1918,
Vol. XIII, compiled by W.H. Weed (The Stevens Copper Handbook Co., New York)

Mines Handbook, 1926,
Vol. XVII, compiled by W.G. Neale (The Mines Handbook Co., Inc, New York)

Mining World, 1963,
(untitled article), Vol. 25, No. 6, p. 38; Gila Valley Block Co.

Mining World, 1953,
(untitled article), Vol. 15, No. 6, p. 91

Moore, R.T., 1969,
Beryllium IN Mineral and Water Resources of Arizona; Arizona Bureau of Mines Bulletin 180

Moore, R.T. and G.H. Roseveare, 1969,
Silver IN Mineral and Water Resources of Arizona; Arizona Bureau of Mines Bulletin 180, p. 251-270

Paige, S., 1909,
Marble Prospects in the Chiricahua Mountains, Arizona; U.S. Geological Survey Bulletin 380, p. 299-311

Peirce, H. Wesley and Jan Carol Wilt, 1970,
Coal IN Coal, Oil, Natural Gas, Helium, and Uranium in Arizona; Arizona Bureau of Mines Bulletin 182

Peterson, Nels P. and Roger W. Swanson, 1956,
Geology of the Christmas Copper Mine, Gila County, Arizona; U.S. Geological Survey Bulletin 1027-H, 22 pp.

Regis, A.J. and L.B. Sand, 1967,
Lateral Gradation of Chabazite to Herschelite in the San Simon Basin (abs.), IN Bailey, S.W., ed., Clays and Clay Minerals, Vol. 27: Proceedings of the 15th. National Conference on Clays and Clay Minerals, p. 193

Renner, J.L., White, D.E., and D.L. Williams, 1975,
Hydrothermal Convection Systems IN Assessment of Geothermal Resources of the United States; U.S. Geological Survey Circular 726

Richter, D.H. and V.A. Lawrence, 1981,
Geologic Map of the Gila - San Francisco Wilderness Study Area, Graham and Greenlee Counties, Arizona; U.S. Geological Survey Map MF-1315-A

Richter, D.H., Shafiqullah, M., and V.A. Lawrence, 1981,
Geologic Map of the Whitlock Mountains and Vicinity, Graham County, Arizona; U.S. Geological Survey Map I-1302

Robinson, R.F., and Annan Cook, 1966,
The Safford Copper Deposits, Lone Star Mining District, Graham County, Arizona IN Geology of the Porphyry Copper Deposits, Southwestern North America; Spencer R. Titley and Carol L. Hicks, eds. (The University of Arizona Press), p. 251-266

Ross, Clyde P., 1925,
Geology and Ore Deposits of the Aravaipa and Stanley Mining Districts, Graham County, Arizona; U.S. Geological Survey Bulletin 763, 120 pp.

Ross, Clyde P., 1925 (B),
Ore Deposits of the Saddle Mountain and Banner Mining Districts, Arizona; U.S. Geological Survey Bulletin 771, 72 pp.

Sand, L.B., and A.J. Regis, 1966,
An Unusual Zeolite Assemblage, Bowie, Arizona (abs.), IN Abstracts for 1965: Geological Society of America Special Paper 87, pp. 145-146

Scarborough, Robert B., 1981,
Radioactive Occurrences and Uranium Production in Arizona; Arizona Bureau of Geology and Mineral Technology Open File Report 81-1

Sheppard, Richard A., 1969,
Zeolites IN Mineral and Water Resources of Arizona; Arizona Bureau of Mines Bulletin 180, pp. 464-467

Shields, J.C., Jr., 1940,
Geology and Ore Deposits of the Dives and Gold Ridge Groups, Dos Cabezas; M.S. Thesis, University of Arizona

Simons, Frank S., 1964,
Geology of the Klondyke Quadrangle, Graham and Pinal Counties, Arizona; U.S. Geological Survey Professional Paper 461, 173 pp.

Stewart, L.A., 1955,
Chyrsotile – Asbestos Deposits of Arizona; U.S. Bureau of Mines Information Circular 7706

Stewart, L.A. and A.J. Pfister, 1960,
Barite Deposits of Arizona; U.S. Bureau of Mines Report of Investigations 5651

Tenney, James B., 1927-1929,
History of Mining in Arizona; Arizona Bureau of Mines, p. 226-227

USAEC, 1954,
U.S. Atomic Energy Commission Preliminary Reconnaissance Report 172-481 (Arizona Bureau of Geology and Mineral Technology Microfiche)

USAEC, 1970,
U.S. Atomic Energy Commission Preliminary Reconnaissance Report for Uranium, Apache and Cochise Counties, Arizona, 1950 to 1970

USBM, 1965,
U.S. Bureau of Mines Information Circular 8252; Mercury Potential of the United States

USBM Files
U.S. Bureau of Mines Files, Mineral Availability System, 1981

USGS CRIB Data
U.S. Geological Survey, Computerized Resources Information Bank Data, 1972, 1979, 1980

Van Alstine, R.E. and R.T. Moore, 1969,
Fluorspar IN Mineral and Water Resources of Arizona; Arizona Bureau of Mines Bulletin 180, pp. 348-357

Willden, Ronald, 1964,
Geology of the Christmas Quadrangle, Gila and Pinal Counties, Arizona; U.S. Geological Survey Bulletin 1161-E, 64 pp.

Wilson, E.D., 1961,
Gold Placers and Placering in Arizona; Arizona Bureau of Mines Bulletin 168

Wilson, E.D., Cunningham, J.B., and G.M. Butler, 1934 (Revised 1967),
Arizona Lode Gold Mines and Gold Mining; Arizona Bureau of Mines Bulletin 137

Wilson E.D. and R.T. Moore, 1958,
Geologic Map of Graham and Greenlee Counties, Arizona; Arizona Bureau of Mines

Wilson E.D. and R.T. Moore, 1959,
Geologic Map of Pinal County, Arizona; Arizona Bureau of Mines

Wilson, E.D., Moore, R.T., and H.W. Peirce, 1959,
Geologic Map of Gila County, Arizona; Arizona Bureau of Mines

Wilson, E.D., Moore, R.T., and J.R. Cooper, 1969,
Geologic Map of Arizona; Arizona Bureau of Mines and U.S. Geological Survey

Wilson, E.D. and G.H. Roseveare, 1949,
Arizona Nonmetallics; Arizona Bureau of Mines Bulletin 155 (2nd. edition; revised)

Wynn, Jeffrey C., 1981,
Complete Bouguer Gravity Anomaly Map of the Silver City 1^{c} X 2^{o} Quadrangle, New Mexico - Arizona; U.S. Geological Survey Map I-1310-A

KNOWN MINERAL OCCURRENCES

JACKSON MOUNTAINS AREA (4-8)

Fluorspar, Uranium, and Copper Deposits

The Jackson Mountain region of the Santa Teresa range is chiefly composed of schists, quartzites, and gneisses of the late Precambrian Pinal Schist Formation. Rhyolite welded ash-flow tuffs (late Tertiary), and a massive granitic batholith (Tertiary or Cretaceous) covering approximately 50 square miles of the Aravaipa-Stanley region, are exposed to the north and northwest of Jackson Mountain. The Santa Teresa Mountains are surrounded by dissected coalescing pediments that slope northward and eastward to the terraced, alluvium-filled Gila Valley; three major fault systems, emplaced after the late Tertiary batholithic intrusion, transect the range (trending N20-30W, N70-80E, N60-70W, respectively).

Coarse-grained crystalline fluorspar deposits in the vicinity of Jackson Mountain (map numbers 12,17) occur as fissure vein deposits in gneissic granite and porphyritic quartz monzonite units of the Pinal Schist formation. Veins are nearly vertical and fluorspar is mixed with copper carbonates, chiefly chrysocolla, lead, silver, and zinc. Fluorspar deposits, located to the south of Jackson Mountain also evidenced some uranium content.

Pyrite and chalcopyrite are irregularly disseminated in altered coarse-grained granodiorite and porphyritic quartz monzonite throughout the south-central portion of the massive Tertiary granitic batholith (map numbers 5-7). The Fisher Prospect (map number 10) contains oxidized copper minerals, primarily chrysocolla and chalcopyrite, in veins within the batholith; narrow dikelets of aplite containing abundant micropegmatite, as well as some lead, silver, and gold, are associated with the copper deposits.

Iron ore, partially oxidized to leucoxene and associated with trace titanium, has been prospected from granodiorite in the southern part of the batholith (map number 4).

Uranium minerals associated with iron oxides, occur in contact zones between diabase intrusives and Precambrian quartzites (map number 1), in Quaternary-Tertiary gravel deposits to the north of Jackson Mountain, within pegmatites and porphyritic quartz monzonite of Precambrian age (map number 16), and as coatings on fracture planes in lower units of the Pinal Schist Formation.

Data on grades, tonnage, and early mining activity are largely unavailable.

Map No.: 4-8-1

Mine: Brushy Claims

Location: T. 5S, R. 21E, Sec. 9, SW
Lat. 33-00-27N
Long. 110-12-17W
Elev. 4471 Ft.

Geology:

Uranium minerals occur in alterred zone near contact between diabase intrusives and Precambrian quartzite countryrock. Uranium is associated with iron oxides.

Mineral Products: Uranium (U_3O_8)

Development and Production: Exploration prospect; 2 small prospect pits. Claims owned by Dan Hinton, as of 1954.

References:

USBM Files, Brushy Claims
USAEC, 1954, A-P-277
USGS Bylas Quad (1:62500)

Map No.: 4-B-2

Mine: Uranium Deposit

Location: T. 5S, R. 21E; Sec. 12, C; Lat. 33-00-45N, Long. 110-08-45W, Elev. 3640 Ft.

Geology:

Deposit located in Tertiary-Quaternary shallowly dipping to flat-lying gravel beds consisting of conglomerate, fanglomerate, and breccia. Coarse conglomerates, derived from mountains surrounding Gila River Valley and from lake deposits, include limestones, mudstones, diatomaceous sedimentary rocks and gypsum. Gila River Valley Tertiary sediments reach considerable depths (as much as 1600 Ft.) and are correlative with upper Pliocene Gila Conglomerate formation in other parts of SE Arizona.

Mineral Products: Uranium (U_3O_8)

Development and Production: Surface exploration prospect; extent of development unknown.

References:

USBM Files, Uranium Deposit
USGS Bylas Quad (1:62500)
Blacet and Miller, 1978
Bromfield and Shride, 1956, p. 625-626
Knechtel, 1938, p. 196-198

Map No.: 4-8-3

Mine: Prospects

Location: T. 5S, R. 21E; Sec. 16, SWSW; Lat. 32-59-29N, Long. 110-12-20W, Elev. 4200 Ft.

Geology:

Prospects located in undifferentiated Paleozoic sedimentary rocks (including limstone, quartzite, and shale) which are exposed as roof pendant in Tertiary-Cretaceous granite (granodiorite, quartz monzonite porphyry). Epidote and fluorite commonly occur in granite facies within region.

Mineral Products: Unknown

Development and Production: Exploration prospects (3); extent of development unknown.

References:

USBM Files, Prospects
Blacet and Miller, 1978
USGS Jackson Mtn. Quad (1:24000)

Map No.: 4-8-4

Mine: Bluff No. 1 Claim
(Red Hill)

Location: T. 5S Sec. 27 Lat. 32-58-08N
R. 21E C E2 Long. 110-10-26W
Geology: Elev. 3681 Ft.

Small mineralized fracture, containing iron minerals, in Tertiary or Cretaceous granodiorite-diorite. Granite overlain locally by Tertiary-quaternary gravel deposits consisting of conglomerate, fanglomerate, and breccia in shallowly dipping to flat-lying beds. Prospect located on red hill SE of Hinton Ranch.

Mineral Products: Iron; Hematite-Magnetite, Limonite.

Development and Production: Surface exploration prospect; one small prospect pit. Owned by John Hinton (1954-?)

References:

USBM Files, Bluff No. 1 Claim
USAEC, 1954, A-P-275
Blacet and Miller, 1978
USGS Jackson Mtn. Quad (1:24000)

Map No.: 4-8-5

Mine: Prospect

Location: T. 5S R. 21E Sec. 29 SW Lat. 32-57-46N Long. 110-13-15W Elev. 4320 Ft.

Geology:

Disseminated pyrite and chalcopyrite in alterred coarse-grained granodiorite and porphyritic quartz monzonite (Tertiary or Cretaceous). Prospect located in south-central part of massive Tertiary granitic batholith N of Santa Teresa Mountains (area approximately 50 sq. miles). Epidote and fluorite commonly occur in granodiorite-diorite facies within southern portion of batholith. Iron ore in some sections of batholith has partially alterr ed to leucoxene (evidence of titanium content).

Mineral Products: Copper: Chalcopyrite; Pyrite

Development and Production: Surface exploration prospect; extent of development unknown.

References:

USBM Files, Prospect
USGS Jackson Mtn Quad (1:24000)
Blacet and Miller, 1978
Ross, 1 25, pp. 32-34

Map No.: 4-8-6

Mine: Prospects

Location: T. 5S Sec. 32 Lat. 32-57-35N
Long. 110-12-36W
Elev. 4220 Ft.

Geology:

Disseminated pyrite and chalcopyrite in alterred coarse-grained granodiorite and porphyritic quartz monzonite (Tertiary or Cretaceous). Quartz monzonite has been extensively shattered and sheared in region; multiple shear joints strike NE-SW and NW-SE, generally dipping 25°S.

Mineral Products: Copper: Chalcopyrite; Pyrite

Development and Production: Surface exploration prospects; extent of development unknown.

References:

USBM Files, Prospects
USGS Jackson Mtn. Quad (1:24000)
Blacet and Miller, 1978

Map No.: 4-8-7

Mine: Prospect

Location: T. 5S R. 21E Sec. 33 NE Lat. 32-57-32N Long. 110-11-38W Elev. 3830 Ft.

Geology:

Copper minerals disseminated in coarse-grained porphyritic andesite flow comprising lower unit of the Tertiary Galiuro Volcanics. Andesite flows in region are commonly vesicular in their upper portion. Contact of andesite porphyry with Tertiary granodiorite and quartz monzonite (containing disseminated pyrite and chalcopyrite) of the massive granite batholith is several thousand feet to the west.

Mineral Products: Copper

Development and Production: Surface exploration prospect; extent of development unknown.

References:

USBM Files, Prospect
Blacet and Miller, 1978
USGS Jackson Mtn. Quad (1:24000)

Map No.: 4-8-8

Mine: Carpenters Cave

Location: T. 5S R. 21E Sec. 33 C E2 Lat. 32-57-21N Long. 110-11-30W Elev. 3800 Ft.

Geology:

Cave adit located in upper unit of the Tertiary Galiuro Volcanics which consists predominantly of rhyolite welded ash-flow tuff, containing intercalated rhyolite breccias, coarse sedimentary breccia and rhyolite clasts, and thi k rhyolite flows. Tuffaceous beds strick N-S and dip about 30°W.

Mineral Products: Unknown. Copper prospects in vicinity.

Development and Production: Underground exploration prospect; extent of development known.

References:

USBM Files, Carpenters Cave
Blacet and Miller, 1978
USGS Jackson Mtn. Quad (1:24000)

Map No.: 4-8-9

Mine: Prospect

Location: T. 5S R. 21E Sec. 33 SE Lat. 32-56-56N Long. 110-11-31W Elev. 3880 Ft.

Geology:

Prospect located in coarse-grained porphyritic andesite flow comprising lower unit of the Tertiary Galiuro Volcanics. Andesite flows in region are comonly vesicular in their upper portion. Contact of andesite porphyry with massive granite batholith (Tertiary), containing disseminated deposits of pyrite and chalcopyrite, is less than 1/4 mile to the west.

Mineral Products: Unknown. Copper prospects in vicinity.

Development and Production: Surface exploration prospect.

References:

USBM Files, Prospect
Blacet and Miller, 1978
USGS Jackson Mtn. Quad (1:24000)

Map No.: 4-8-10

Mine: Fisher Prospect

Location: T. 6S, R. 21E; Sec. 6, NESE; Lat. 32-56-19N, Long. 110-13-55W, Elev. 4700 Ft.

Geology:

Oxidized copper minerals, chiefly chrysocolla and chalcopyrite, in veins paralleling shear zones, and in irregular dissemination in early Tertiary quartz monzonite and granodiorite. 6 or 7 veins cut across granitic batholith in which claims are located, generally striking E-W and dipping 60°- 70°N. Aplitic dikes (Tertiary) rich in micropegmatite occur in vicinity of prospect, averaging less than 1 Ft. in width. Chalcopyrite greatly alterred by oxidation, and replaced by supergene minerals; associated with epidote, apatite, chlorite, and granular aggreg tes of titanite.

Mineral Products: Lead; Silver; Gold ; Copper: Chalcopyrite, Chrysocolla, Chalcocite, Covellite, Melaconite, Cuprite.

Development and Production: 5 unpatented mining claims, located by John Fisher in 1908 ,situated in Coronado National Forest. Owned by Mrs. W. H. Detamore (1964-?). Development included 350 Ft. long adit, 2 vertical shafts of unknown depth, 65 Ft. long adit, 40 Ft. long adit, stockpile containing 2-3% CU, several open pits. Short irregular tunnels follow indefinitely bounded zones of mineralization.

References:

ADMR Fisher Prospect File
ADMR U File
USBM Files, Fisher Prospect
Ross, 1925
Blacet and Miller, 1978
USGS Jackson Mtn. Quad (1:24000)

Map No.: 4-8-11

Mine: Prospects

Location: T. 6S R. 21E Sec. 01 SW Lat. 32-56-13N Long. 110-09-29W Elev. 3850 Ft.

Geology:

Prospects located on or near NE-trending fault in the lower andesite flow unit of the Tertiary Galiuro Volcanics. Exposures of this coarse-grained porphyritic andesite flow are numerous in the vicinity and are commonly vesicular in their upper portions. Fault dips 35°NW.

Mineral Products: Unknown (Adjacent to Spar Fluorspar Group)

Development and Production: Exploration prospect, surface cuts. Extent of development unknown.

References:

USBM Files, Prospects
Blacet and Miller, 1978
USGS Jackson Mtn. Quad (1:24000)

Map No.: 4-8-12

Mine: Spar Fluorite Group (Mt. Jackson Patented Claims No. 1 and 2, Mt. Jackson, Rhodes Spar)

Location: T. 6S, R. 22E; Sec. 6, SE; Lat. 32-56-18N, Long. 110-07-41W, Elev. 4150 Ft.

Geology:

Coarse-grained crystalline fluorspar occurs as fissure vein deposits in a single fault zone, which strikes S50°E and dips about 60°SW, in a mid-late Precambrian gneissic granite unit of the Pinal Schist formation. Granite countryrock is cut in locality by a late-Precambrian diabase dike striking S36°E and dipping steeply to the NE (?). Mineralized zone average 1-3 Ft. wide in the main vein along the fault; at least one subsidiary vein or stringer of fluorspar runs subparallel to vein. Fluorspar Tertiary veins associated with late Tertiary faulting.

Mineral Products: Fluorspar: Fluorine; Copper: Malachite, Azurite, Chrysocolla; Lead; Silver; Zinc

Development and Production: 2 patented claims located and owned by Rhodes Brothers (Ft. Thomas, AZ). Rhodes Spar Property contains 6 unpatented claims extending into sections 5, 7, and 8 (T. 6S, R. 22E). Development by 200 Ft. long open trench connecting with small underground workings. 3 smaller trenches located along subsidiary veins. Mine produced 1200 tons of 60-70% CaF_2 in the 1950's (300 tons in 1953). Operated in 1953 by Spar Mining Co.

References:

ADMR U File
BLM Mining District Sheet 767
Elevatorski, 1971, p. 17-18
BLM Mining Claims Lead File 50176, July 1980
USBM Files, Spar Fluorite Group
USBM Files, Mt. Jackson Mine
ADMR MAS, 1976
Van Alstine and Moore, 1969
Blacet and Miller, 1978
USGS Jackson Mtn. Quad (1:24000)
USGS Crib Data, Mt. Jackson Mine
Mining World, 1953

Map No.: 4-8-13

Mine: Prospect

Location: T. 6S, R. 21E; Sec. 7, C N2; Lat. 32-56-04N, Long. 110-14-20W, Elev. 4860 Ft.

Geology:

Disseminated pyrite and chalcopyrite in alterred coarse-grained early Tertiary granodiorite and porphyritic quartz monzonite. Prospect located in massive early Tertiary granitic batholith N. of Santa Teresa Mountains, on or near major NW trending fault with downthrow on NE side. Chalcopyrite formed by replacement of granitic countryrock and has been extensively alterred by oxidation.

Mineral Products: Copper: Chalcopyrite; Pyrite

Development and Production: Surface exploration prospect; extent of development unknown.

References:

USBM Files, Prospect
USGS Jackson Mtn. Quad (1:24000)
Blacet and Miller, 1978
Ross, 1925, pp. 103-105

Map No.: 4-8-14

Mine: Prospect

Location: T. 7S
R. 21E
Sec. 12
SE
Lat. 32-50-03N
Long. 110-08-58W
Elev. 4600 Ft.

Geology:

Prospect located in coarse-grained porphyritic quartz monzonite (late Precambrian). Beds are locally chloritized and foliated. On or near contact between quartz monzonite and micaeous, quartzitic Pina Schist (early Precambrian). Schistocity of Pinal formation generally strikes nearly parallel to the bedding and dips in the same direction but at steeper angles.

Mineral Products: Unknown

Development and Production: Surface exploration prospect; extent of development unknown.

References:

USBM Files, Prospect
USGS Buford Hill Quad (1:24000)
Blacet and Miller, 1978
Ross, 1925, p. 13-15

Map No.: 4-8-15

Mine: Moss Claims

Location: T. 7S, R. 21E; Sec. 16, C N2; Lat. 32-49-48N, Long. 110-12-12W, Elev. 5400 Ft.

Geology:

Uranium radioactivity associated with fracture planes coated by hematite in a quartz vein in porphyritic quartz monzonite (late Precambrian). Located on or near N-S trending rhyolite dike (Tertiary-Cretaceous). Foliation and parallel bedding of quartz monzonite strike N-S and dip 75° to west.

Mineral Products: Uranium (U_3O_8)

Development and Production: Exploration Prospect; surface prospect pits. Owned by Mrs. Joe Rogers (1954 - ?)

References:

USBM Files, Moss Claims
USAEC, 1954, A-P-364
Blacet and Miller, 1978
USGS Buford Hill Quad (1:24000)
Ross, 1925, p. 34

Map No.: 4-8-16

Mine: Denny Claims

Location: T. 7S R. 21E Sec. 14 C Lat. 32-49-30N Long. 110-10-15W Elev. 4860 Ft.

Geology:

Prospects located in pegmatites in porphyritic quartz monzonite (late Precambrian). Radioactivity associated with iron oxides. No uranium minerals visible on surface.

Mineral Products: Uranium (U_3O_8)

Development and Production: 3 exploration prospect pits; owned and operated by W. A. McBride (1955 - ?)

References:

USBM Files, Denny Claims
USAEC, 1954, A-P-371
Scarborough, 1981, p. 191
Blacet and Miller, 1978
USGS Buford Hill Quad (1:24000)

Map No.: 4-8-17

Mine: Crazy Horse (Shanondoah, Edith Property, Rick Stewart 1-4)

Location: T. 7S R. 21E Sec. 23; 22 NW; NE Lat. 32-49-02N Long. 110-10-39W Elev. 5020 Ft.

Geology:

1-to-2 Ft. coarse-grained crystalline fluorspar veins in faulted porphyritic quartz monzonite (late Precambrian). Area locally cut by swarm of NE-striking rhyolitic dikes (Tertiary or Cretaceous). Veins are nearly vertical; fluorspar is mixed with copper carbonates within the veins.

Mineral Products: Uranium (U_3O_8); Copper; Fluorspar: Fluorine

Development and Production: Several prospect pits. 2 claims on state land, leased by Larson-McBride Realty Co. (1960 - ?)

References:

USGS Buford Hill Quad (1:24000)
USAEC, 1954, A-P-371
Elevatorski, 1971
ADMR Edith #1 and #2 File
ADMR Card File, Rick Stewart 1-4
USBM Files, Crazy Horse Mine
Blacet and Miller, 1978
Van Alstine and Moore, 1969

~$11,300 - $100 or best.

Check labeled V

occurrences for A1 - A6

- possible Pueblo Viejo model

Graham Cty. #2

The geology of, and known mineral occurrences within, Wilderness Study Area 4-48 Whitlock Mountains

by
Susan R. Calder
Research Assistant

contract to: Dr. Stephen J. Reynolds
Arizona Bureau of Geology and Mineral Technology
Geological Survey Branch
845 N. Park Ave.
Tucson, Arizona 85719

contractor:
U.S. Dept. of Interior
Bureau of Land Management
Safford District Office
425 East 4th. Ave.
Safford, Arizona 85546
(Mr. Ron Loomis)

February 5, 1982

contents:

Interpretations and conclusions in this report are those of the consultant and do not necessarily coincide with those of the staff of the Bureau of Geology and Mineral Technology.

Brief summary of geological features and known mineral occurrences

Wilderness Study Area 4-48
Whitlock Mountains

1) The entire WSA is underlain by either middle Tertiary volcanics or late Tertiary-Quaternary basin-fill (sand , gravels, etc.);

2) The WSA does not contain any known base or precious metal occurrences. Middle Tertiary volcanic rocks around the WSA do not contain any known base and precious metal mineralization;

3) There are several zeolite occurrences in volcanic rocks near the northern boundary of the WSA. The significance of these is unknown;

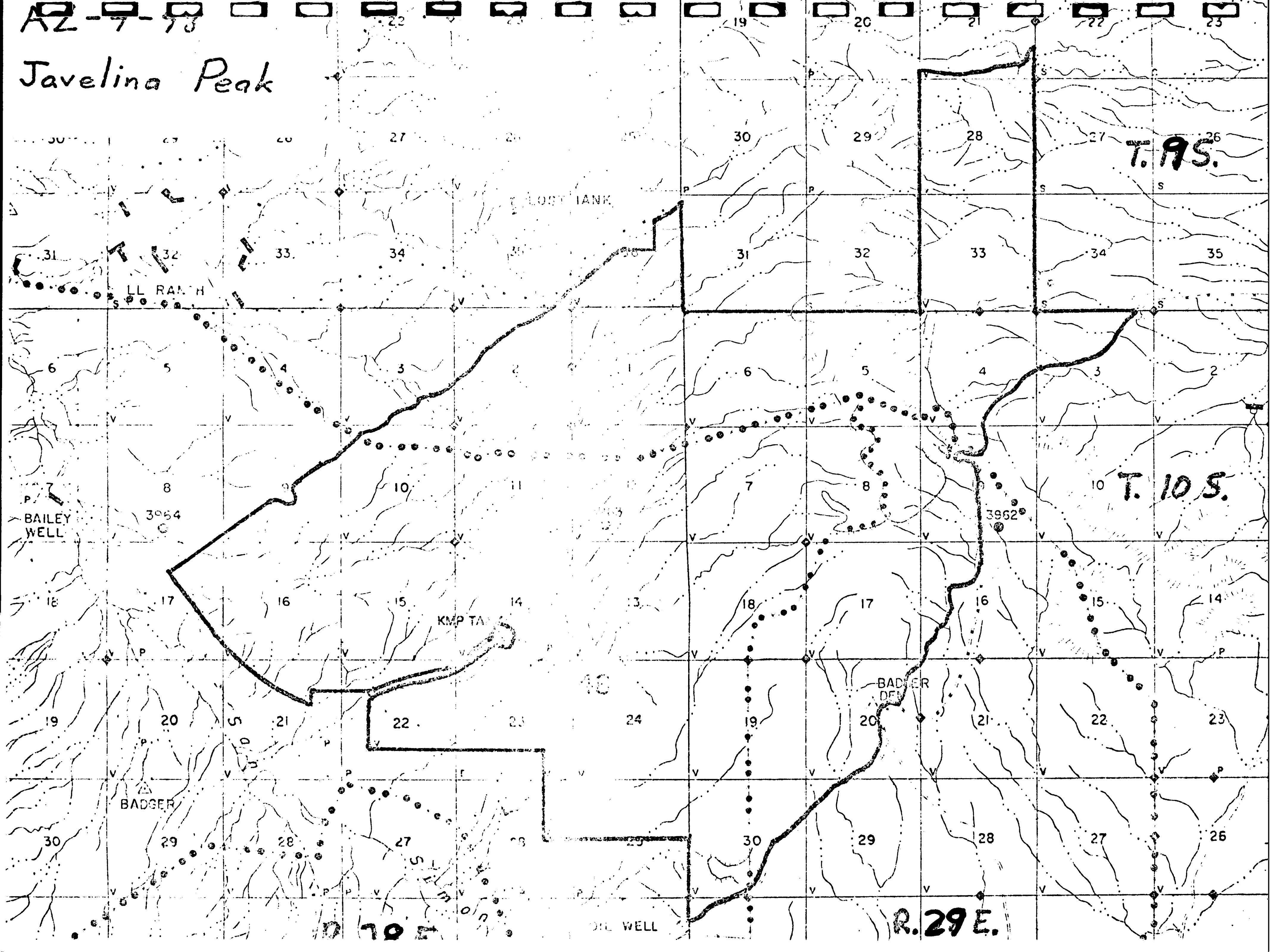
4) There are zeolite and uranium occurrences in basin-fill deposits of the San Simon Valley outside of the WSA. Basin-fill underlies the western part of the WSA, but no zeolite or uranium occurrences have been reported; and

5) Newspaper articles of 1927 report that oil was encountered in a water well south of the WSA. These reports have not been confirmed.

For additional discussions of the mineral potential of the WSA see Richter and others (1981).

AZ-7-73

Javelina Peak



WHITLOCK MOUNTAINS AREA (4-48)

Zeolite and Uranium Deposits

The Whitlock Mountains are primarily composed of basaltic to rhyolitic volcanic rocks of Cenozoic age (16 to 30 million years). Two dome flow complexes, with eruptive centers at Powerline Pass and Dry Mountain, probably formed around 22 to 26 million years ago.

Map numbers 8-10 to 12-16 represent zeolite deposits. Zeolite minerals, principally clinoptilolite, are common secondary minerals in many of the pyroclastic flow and air-fall breccias throughout the region. Map numbers 8-10 are contained in a pyroclastic breccia zone resulting from voluminous explosive activity associated with the eruptive center at Powerline Pass; formation of breccia zones in the area followed the main period of dome-flow emplacement and was contemporaneous with the beginning of basaltic andesite volcanism. Map numbers 12-16 comprise water-laid deposits of vitric tuff that have been altered to zeolite minerals; sedimentary beds containing zeolites are intercalated with Pliocene-Pleistocene age San Simon basin-fill and lacustrine strata.

Map numbers 1-7 contain secondary uranium minerals, primarily uranophane and carnotite-type deposits. Uranium minerals coat fracture and bedding planes in late Pliocene-early Pleistocene lacustrine strata on the north flank of Dry Mountain.

An oil sand deposit (map number 11), associated with a large artesian well in lacustrine sediments south of the Whitlock Mountains, was reported in 1927. No records of further development are available.

MAP NO. 4-48-1

Mine: Royal John Group

Location: T.8S R.28E Sec. 22 Cen., S½ Lat. 32-42-04N Long. 109-28-03W Elev. 3400 ft.

Geology: Carnotite-type mineralization in interbedded clays and tuffs in lake bed sediments of late Pliocene-early Pleistocene age.

Mineral Products: Uranium (U_3O_8): carnotite

Development and Production: Prospect pit and bulldozer cuts. Claims located by George and John Lee (Gila, New Mexico).

References

USGS Dry Mountain Quad (1:24000)
USBM Files, Royal John Group
Scarborough, Robert B., 1981
USAEC, 1954, A-P-376
Richter, et al., 1981

MAP NO. 4-48-2

Mine Pluto Group

Location T.8S Sec. 21
R.28E SW¼

Geology Uranium minerals in late Pliocene-Early Pleistocene lacustrine bedded clay and tuffs.

Mineral Products Uranium (U_3O_8)

Development and Production One bulldozer cut 3 ft deep. Claims located by Alf Claridge.

References

Scarborough, Robert B., 1981, p 193
USAEC, 1954, A-P-378
USGS Dry Mountain Quad (1:24000)
Richter, et al., 1981

MAP NO. 4-48-3

Mine Last Chance Group

Locaation T.8S Sec. 21 Lat. 32-42-59N Elev. 3340 Ft.
Long. 109-27-45W

Geology Thin coating of carnotite on fractures in a thin opalized bed within bedded clays and tuffs in late Pliocene to early Pleistocene lacustrine strata. Sedimentary beds are capped by rhyolite flow.

Mineral Products Uranium (U_3O_8): carnotite

Development and Production One location pit; 43 claims owned and located by Lewis Olson, Sam Jensen and Assoc. (1955). Operated by U.S. Lime and Mining Corp.

References

Scarborough, Robert B., 1981, p. 192
USAEC, 1954, A-P-376
Richter et al., 1981
USBM Files, Last Chance Group
USGS Dry Mountain Quad (1:24000)

MAP NO. 4-48-4

Mine Flat Tire Group
(A.H. Haralson Property)

Location T.8S Sec. 27 Lat. 32-42-38N
R.28E SW¼ NW¼ Long. 109-28-30W
On old 111 ranch

Geology Carnotite coating fractures and disseminated in a 12-15 ft. bed of hard greenish-brown clay of Pliocene lacustrine and paludal sedimentary sequence. Strata near the claims are anomalous over a considerable area. Uranium minerals occur in small and scattered masses within 3 separate layers (each 12-18 inches thick) in the clay. Ore body dimensions: 40 ft. wide, 400 ft. long, 4 ft. deep.

Mineral Products Uranium (U_3O_8): uranophane; diatomite; zeolites: chabazite

Development and Production Developed by a 30 ft shaft and 3 trenches; produced 4 tons of 0.02% U_3O_8 in 1955 and 9 tons of 0.11% U_3O_8 in 1958. Flat Tire Shaft shows no uranium deposits below a depth of 15 ft. 52 unpatented claims located by A. H. Haralson and Sons (1955). Operated by U.S. Lime And Mining Corp., Yates Petroleum Co. of Artesia, Metals Corp. of America. Claims total 2540 acres.

References

Scarborough, Robert B. 1981, p. 192
USGS Dry Mountain Quad (1:24000)
Richiter et.al., 1981
USBM Files, Flat Tire Mine
ADMR Flat Tire Mine File
ADMR U.S. Lime and Mining Corp. File
USAEC, 1954, A-P-378

MAP NO. 4-48-5

Mine Mermaid Mining Co. Property
unpatented claims (moon mist, saturn, moon beam)

Location T8S R.28E Sec. 28 W½ Lat. 32-42-30N Long. 109-29-37W Elev. 3290 Ft.

Geology Secondary uranium minerals coating fractures and bedding planes in Pliocene lake beds of the nw flank of Dry Mountain.

Mineral Products Clay, diatomite; uranium (U_3O_8)

Development and Production Unknown; unpatented claims extend into sections 26, 27, 33, 34, and 35 (T.8S, R.28E). Owned by U.S. Lime and Mining Corp. as of 1965.

References

ADMR card file-Mermaid Mining Co File
BLM Mining Claims - Lead File, July 1980
USBM Files, Mermaid Mining Co Property
USGS Dry Mountain Quad (1:24000)
Richter, et a., 1981

MAP NO. 4-48-6

Mine Canuk Group

Location T.8S R.28E Sec. 26; 35 SW¼, NW¼ Lat. 32-42-08N Long. 109-27-39W Elev. 3500 Ft.

Geology Carnotite-type mineral coatings on fractures in opalized beds in lake sediments, tuffs and gravels of Pliocene age. Secondary uranium minerals locally occur coating bedding planes and fractures in Pliocene lacustrine strata on the north flank of Dry Mountain.

Mineral Products Uranium (U_3O_8)

Development and Production Prospect pits.

References

Scarborough, Robert B, 1981, p. 191
Richter et al., 1981
USGS Dry Mountain Quad (1:24000)
USAEC, 1954, A-P-375
USBM Files, Prospect

MAP NO. 7

Mine White Bluffs Uranium Area
(Crunk Group;Whitlock Mines, Inc.)

Location T.8S Sec. 33 Lat. 32-41-54N
R.28E NW¼, NE¼, NE¼ Long. 109-28-49W

Geology Uranophane coatings along bedding planes and on fractures in siliceous lake beds interbedded with diatomaceous earth, bentonitic clay mudstones, and thin vitric ash-fall tuffs of Pliocene paludal sediments. Yellow stained opal lenses in diatomite and disseminated radioactivity in light-colored calcic paludal beds. Located on or near contact between lacustrine strata, and high-silica rhyolite dome-flow comples or Dry Mountain (Oligocene).

Mineral Products Uranium (U_3O_8); diatomite;clay; bentonite

Development and Production Surface prospects, bulldozer cuts. Whitlock Mines Inc. prospected for diatomite, and leased claims in section 28, 26, 33, 34, and 35 (T.8S, R. 28E) from L. Grogg (owner) in 1976, Whitlock Mines Inc. subleased uranium deposits to Anaconda Corp.

References

Scarborough, Robert B, 1981, p. 194
USAEC, 1954, A-P-330
USBM Files, White Bluff Uranium
USBM Files, Crunk Group
ADMR Whittlock Mines, Inc. File
USGS Dry Mountain Quad (1:24000)

MAP NO. 4-48-8

Mine Highline claims

Location T.9S Sec. 20 Lat: 32-37-55N Elev. 4680 ft.
R.29E 5½ Long: 109-23-55W

Geology Claims located within rhyodacite, dacite, andesite dome-flow-cone complex of powerline pass (late Oligocene). Fibrous zeolite minerals locally fill interclast cavities and vesicles within silicic clasts near the outer edges of a remnant of structureless pyroclastic

Geology (continuned)

breccia cone. Breccia cone is overlain by thin (less than 5 m.) glassy flows, flow breccias and agglutinates, probably of rhyodacite composition.

Mineral Products Clinoptilolite occurrence

Development and Production Prospect; extent of development is unknown.

References

BLM Mining Claims - lead file 22949 July 1980
USBM Files, Highline Claims
Richter, et.al, 1981

MAP NO. 4-48-9

Mine Cave

Location				
T9S	sec. 32	Lat. 32-36-32N	Elev. 4620 ft.
R29E	NW¼	Long. 109-24-14W	

Geology Cave is located in massive nonbedded vent breccia, between a contact zone to the west of vent breccia and massive hornblende-biotite rhyodacite dome, and a contact zone to the east of vent breccia and massive pyroclastic breccia (Oligocene) composed almost entirely of secondary zeolite minerals. Pyroclastic (rhyolitic to rhyodacitic) breccia zone to the east contains occasional blocks almost wholly replaced by clinoptilolite (secondary zeolite mineral)

Mineral Products Unknown; clinoptilolite occurs in vicinity.

Development and Production Exploration prospect, underground. Extent of development ins unknown.

References

USBM Files, Cave
Richter, et al, 1981
USGS Javeline Peak Quad (1:24,000)

MAP NO.4-48-10

Mine Cave

Location				
T95	Sec. 32	Lat. 32-36-08N	Elev. 4730 ft.
R.29E	SW¼	Long. 109-24-07W	

Geology Cave located on contact zone between massive rhyolite flow associated with Javelina Peak (Oligocene) and porphyritic quartz latite flow of the Whitlock Mountain Range (Oligocene). Situated on or near NW-SE trending basaltic andesite dike (Miocene - Oligocene (20-30 my); Richter, et al, 1981). Maximum flow thickness about 210 m. with 0-60m basal vitrophyre and flow breccias; source unknown. Rare inclusions of fluorite (less than 2%) in quartz flow groundmass, ore minerals unknown.

Mineral Products Unknown; clinoptilolite occurs in vicinity.

Development and Production Exploration prospect, underground. Extent of development is unknown.

References

USBM Files, Cave
Richter, et. al, 1981
USGS Javelina Pead Quad (1:24000)

MAP NO. 4-48-11

Mine Whitlock Oil Company Drillings

Location T. 10S Sec. 36 Lat. 32-31-26N Elev. 3440 ft.
R. 28E SE¼NE¼ Long. 109-25-20W

Geology Newspaper articles of 1927 report the following information: 22.5 ft. thick oil sand deposit below 1400 vertical ft. of alternating layers of sand, shales, and clays (Pliocene-Pleistocene). Sands containing oil capped by a conglomerate consisting of gravel cemented by lime. Oil drilling at the 1200 ft. level encountered a large artesian well which brought a heavy proportion of oil to the surface.

Mineral Products crude oil potential

Development and Production Oil drilling conducted by Pinal Oil Co., under lease from Whitlock Oil Co., in 1927. Oil encountered in main drill hole at a depth of about 1427 ft. No records of production or continuation of operations after initial drilling. Whitlock Oil Co. claimed 70,000 acres of land 15 - 17 miles north of Bowie.

References

ABGMT Clippings, Whitlock Oil Company
USGS Javelina Peak Quad (1:24000)

MAP NO. 4-48-12

Mine San Simon Zeolite Deposits - Union Carbide Non-metallic Exploration Corp. (EZ Claims, Cab Claims, Bowie Chabazite Deposit)

Location T. 11S, R. 28E, Sec. 01,12,13,18,20,28,30,33 (EZ Claims)
T. 11S, R. 29E, Sec. 13,17,18,19,20,28,29,33
T. 12S, R. 29E, Sec. 01,02,03,04,10,11,12
Ore Body: Lat. 32-26-49N, Long. 109-21-04W Elev. 3420 ft.

Geology Zeolites, consisting primarily of the minerals chabazite, erionite, and clinoptilolite, occur in bedded alterred silicic tuff deposits (Miocene) in an unnamed Tertiary lacustrine formation. Extensive and highly pure (more than 90% zeolite) beds form thin flat layers 0-15 inches thick; beds are underlain by a thick deposit of conglomerates, quartz-feldspar silt, and fine-grained plastic clay material containing some montmorillonite and bentonite, and overlain by 3-4 ft. of partially alterred volcanic ash. Some bed layers are nearly monomineralic. Minor amounts of halite, thenardite, and iron oxides associated with sodic-rich zeolites.

Mineral Products Zeolites: chabazite, erionite, clinoptilolite, analcime, hershelite, gmelinite

Development and Production Union Carbide Corp. property consists of over 200 claims totalling about 4000 acres; Claims are single placer claims of 20 acres (660 ft by 1320 ft.). Development included exploration rotary drilling on each claim to depths of 70 feet open cuts to expose zeolotized volcanic ash bed (maximum of 60 feet overburden), strip mining of flat zeolotized layers. Area has been commercially exploited since 1968. Individual placer claims were located in 1961.

References

ADMR EZ Mine File
ADMR Union Carbide Non-Metallic Exploration File
ADMR (Eyde), 1978
USBM Files, Cab Claims
USBM Files, EZ Mine Claims
USBM Files, Bowie Chabazite Deposit
Regis and Sand, 1967
Sand and Regis, 1966
BLM Mining Claims Lead File 39883, July 1980
Sheppard, Ricard A., 1969
USGS Bowie Quad (1:62500)
USGS Javelina Peak Quad (1:24000)

MAP NO. 4-48-13

Mine San Simon Zeolite Deposits - BMS Associates Property
(Genie Claims, Courthouse Claims, Norton Abrasives Property)

Location				Ore Body:
	T.11S	R.29E	Sec. 21 (center), 28	Lat. 32-27-51N
	T.11S	R 28E	Sec. 13, 14, 18	Long. 109-23-20W

Geology See San Simon Zeolite Deposits - Union Carbide Non-Metallic Exploration Corp. and NRB Mining Co. Inc. claims for regional geological description.

Mineral Products Zeolites

Development and Production Prospect; extent of development unknown. Anaconda Corp. owns a portion of the Genie Claims in section 28 (T.11S, R.29E). Property overlaps with Union Carbide Corp. claims.

References

USBM Files, Genie Claims
ADMR Card File - BMS Associates Card
BLM Mining Claims Lead File 56580, July 1980
ADMR Ez Mine File (map)
USGS Bowie Quad (1:62500)

MAP NO. 4-48-14

Mine San Simon Zeolite Deposits - NRG Mining Co., Inc. Claims (Cholla Unpatented Claims, Ruth unpatented Claims)

Location T.11S R.29E Sec. 27,24, 35 Ore Body: Lat 32-2600N Elevation 3460 Long. 109-22-20W

Geology See: San Simon Zeolite Deposits - Union Carbide Non-Metallic Exploration Corp.
Herschelite occurs as thin layers interbedded with layers of other secondary zeolite minerals.
Center of San Simon Basin contains richest deposits; beds of chabazite, analcime, and bentonite pinch out to the north and are nearly absent in the NW part of the basin. Tertiary andesites and Quaternary basalt rim the basin.

Mineral Products Zeolites: Chabazite, erionite, clinoptilolite, herschelite

Development and Production Property consists of 54 claims; claims are single placer claims of 20 acres (660 ft by 1320 ft). Development similar to that on Union Carbide Corp. property. NRG Mining Co. was incorporated in 1973 (formerly Systems Capital Corp.)

References

ADMR NRG Inc. File
BLM Mining Claims Lead File, July 1980
USBM Files, NRG Mining Co Claims
ADMR (EYDE),1978
Regis and Sand, 1967
Sand and Regis, 1966
USGS Bowie Quad (1:62500)

MAP NO. 4-48-15

Mine Tuffa-Tex Group (Clark Claims)

Location T.11S R.29E Sec. 34 Lat. (estimated) 32-26-00N Elev. 3470 ft. Long. (estimated) 109-22-22W

Geology See: San Simon Zeilite Deposits for regional geological description.
6 inch bed of zeolitized volcanic ash in alterred silicic tuff deposits underlain by an unknown depth of plastic clay and quartz-feldspar silt. Deposits are Miocene-Pliocene in age.

Mineral Products Zeolites; "Tuffa-Tex" (zeolotized volcanic ash)

Development and Production Prospecting on 2 unpatented claims. Property owned by Frank W. Clark, Bowie. Small tonnage amounts of "Tuffa-Tex" have been quarried for use in interior decorating. Claims located in 1958-1959. Property leased in 1961 for oil drilling exploration.

References

USBM Files, Tuffa Tex 1-2-3-4
ADMR Tuffa-Tex Group File
ADMR Ez Mine File
ADMR (Eyde), 1978
USGS Bowie Quad (1:62500)

MAP. NO. 4-48-16

Mine W.R. Grace Co. Claims

Location T.12S Sec. 0Z Lat. 32-25-12N Elev. 3440 ft.
R. 29E Long. 109-21-25W

Geology See: San Simon Zeolite Deposits for regional geological description.
Zeolotized beds in alterred silicic tuff deposits (Miocene).

Mineral Products Zeolites

Development and Production Unknown.

References

ADMR E Mine File
USBM Files, Grace 1-4
USGS Bowie Quad (1:62500)
ADMR (Eyde), 1978

REFERENCES CITED

(references used in compiling information on WSA's 4-1A, 4-8, 4-14, 4-16, 4-22/23/24 A and B, 4-48, 4-60, 4-65, and the appealed area east of Turtle Mountain)

Allen, M.A. and G.M. Butler, 1921,
Vanadium; Arizona Bureau of Mines Bulletin 115, 23 pp.

ABGMT Clippings
Arizona Bureau of Geology and Mineral Technology newspaper clippings file, Tucson

ABGMT CRIB Data
Arizona Bureau of Geology and Mineral Technology, Computerized Resources Information Bank Data, 1981 and 1982

ABGMT - USBM File Data
Unpublished data of Arizona Bureau of Geology and Mineral Technology, and U.S. Bureau of Mines; production data

ABM, 1959,
Arizona Bureau of Mines; Geologic Map of Cochise County, Arizona

ADMR
Arizona Department of Mineral Resources File Data; Inactive Mines File

ADMR (Eyde), 1978,
Arizona Department of Mineral Resources (Eyde, Ted H.), 1978, Arizona Zeolites, Mineral Report No.-1

ADMR MAS
Arizona Department of Mineral Resources, 1976,
Minerals Availability System, Arizona Fluorspar

Bennett, K.C., 1975,
Geology and Origin of the Breccias in the Morenci-Metcalf District, Greenlee County, Arizona; M.S. Thesis, University of Arizona, 153 pp.

Blacet, Philip M. and Susan T. Miller, 1978,
Reconnaissance Geologic Map of the Jackson Mountain Quadrangle, Graham County, Arizona (1:62500); Map MF-939

Bromfield, Calvin S. and Andrew F. Shride, 1956,
Mineral Resources of the San Carlos Indian Reservation, Arizona; U.S. Geological Survey Bulletin 1027-X

Burchard, E.F., 1914,
Stone - Arizona IN Mineral Resources of the United States (1913); U.S. Geological Survey, pt. 2, p. 1338-1346

BLM
Bureau of Land Management Mining Claims Lead File, July 1980

Campbell, Marius R., 1904,
The Deer Creek Coal Field, Arizona IN Contributions to Economic Geology, 1903 (S.F. Emmons and C.W. Hayes, eds.); U.S. Geological Survey Bulletin 225, p. 248-251

Cooper, J.R., 1960,
Reconnaissance Map of the Willcox, Fisher Hills, Cochise, and Dos Cabezas Quadrangles, Cochise and Graham Counties, Arizona; U.S. Geological Survey Map MF-231

Copper Handbook, 1911,
Vol. X, compiled by H.J. Stevens (The Stevens Copper Handbook Co., New York)

Copper Handbook, 1912-1913,
Vol. XI, compiled by H.J. Stevens (The Stevens Copper Handbook Co., New York)

Dale, V.B., Stewart, L.A., and W.A. McKinney, 1960,
Tungsten Deposits of Cochise, Pima, and Santa Cruz Counties, Arizona; U.S. Bureau of Mines Report of Investigations 5650, p. 18-22

Eastlick, John, T., 1958,
New Development at the Christmas Mine, Gila County, Arizona IN Arizona Geological Society Digest, Vol. 1

Elevatorski, E.A., 1971,
Arizona Fluorspar; Arizona Department of Mineral Resources

Elevatorski, E.A., 1978,
Arizona Industrial Minerals; Arizona Department of Mineral Resources MR No.-2

Elsing, M.J. and R.E.S. Heinman, 1936,
Arizona Metal Production; Arizona Bureau of Mines Economic Series 19, Bulletin 140

Farnham, L.L., Stewart, L.A., and C.W. Delong, 1961,
Manganese Deposits of Eastern Arizona; U.S. Bureau of Mines Information Circular 7990

Harrer, C.M., 1964,
Reconnaissance of Iron Resources in Arizona, U.S. Bureau of Mines Information Circular 8253

Johnson, Maureen G., 1972,
Placer Gold Deposits of Arizona, U.S. Geological Survey Bulletin 1355

Jones, E.L. and F.L. Ransome, 1920,
Deposits of Manganese Ore in Arizona; U.S. Geological Survey Bulletin 710-D

Keith, Stanton, B., 1973,
Index of Mining Properties in Cochise County, Arizona; Arizona Bureau of Mines Bulletin 187

Knechtel, Maxwell M., 1938,
Geology and Ground-water Resources of the Valley of Gila River and San Simon Creek, Graham County, Arizona; U.S. Geological Survey Water-Supply Paper 796-F

Langton, J.M., 1973,
Ore Genesis in the Morenci-Metcalf District IN American Institute of Mining, Metallurgical, and Petroleum Engineers: Transactions, Vol. 254, p. 247-257

Lindgren, Waldemar, 1905,
The Copper Deposits of the Clifton-Morenci District, Arizona; U.S. Geological Survey Professionaal Paper 43

Meeves, H.C., 1966,
Nonpegmatitic Beryllium Occurrences in Arizona, Colorado, New Mexico, Utah, and Four Adjacent States; U.S. Bureau of Mines Report of Investigations 6828

Mines Handbook, 1916,
Vol. XII, compiled by W.H. Weed (The Stevens Copper Handbook Co., New York)

Mines Handbook, 1918,
Vol. XIII, compiled by W.H. Weed (The Stevens Copper Handbook Co., New York)

Mines Handbook, 1926,
Vol. XVII, compiled by W.G. Neale (The Mines Handbook Co., Inc, New York)

Mining World, 1963,
(untitled article), Vol. 25, No. 6, p. 38; Gila Valley Block Co.

Mining World, 1953,
(untitled article), Vol. 15, No. 6, p. 91

Moore, R.T., 1969,
Beryllium IN Mineral and Water Resources of Arizona; Arizona Bureau of Mines Bulletin 180

Moore, R.T. and G.H. Roseveare, 1969,
Silver IN Mineral and Water Resources of Arizona; Arizona Bureau of Mines Bulletin 180, p. 251-270

Paige, S., 1909,
Marble Prospects in the Chiricahua Mountains, Arizona; U.S. Geological Survey Bulletin 380, p. 299-311

Peirce, H. Wesley and Jan Carol Wilt, 1970,
Coal IN Coal, Oil, Natural Gas, Helium, and Uranium in Arizona; Arizona Bureau of Mines Bulletin 182

Peterson, Nels P. and Roger W. Swanson, 1956,
Geology of the Christmas Copper Mine, Gila County, Arizona; U.S. Geological Survey Bulletin 1027-H, 22 pp.

Regis, A.J. and L.B. Sand, 1967,
Lateral Gradation of Chabazite to Herschelite in the San Simon Basin (abs.), IN Bailey, S.W., ed., Clays and Clay Minerals, Vol. 27: Proceedings of the 15th. National Conference on Clays and Clay Minerals, p. 193

Renner, J.L., White, D.E., and D.L. Williams, 1975,
Hydrothermal Convection Systems IN Assessment of Geothermal Resources of the United States; U.S. Geological Survey Circular 726

Richter, D.H. and V.A. Lawrence, 1981,
Geologic Map of the Gila - San Francisco Wilderness Study Area, Graham and Greenlee Counties, Arizona; U.S. Geological Survey Map MF-1315-A

Richter, D.H., Shafiqullah, M., and V.A. Lawrence, 1981,
Geologic Map of the Whitlock Mountains and Vicinity, Graham County, Arizona; U.S. Geological Survey Map I-1302

Robinson, R.F., and Annan Cook, 1966,
The Safford Copper Deposits, Lone Star Mining District, Graham County, Arizona IN Geology of the Porphyry Copper Deposits, Southwestern North America; Spencer R. Titley and Carol L. Hicks, eds. (The University of Arizona Press), p. 251-266

Ross, Clyde P., 1925,
Geology and Ore Deposits of the Aravaipa and Stanley Mining Districts, Graham County, Arizona; U.S. Geological Survey Bulletin 763, 120 pp.

Ross, Clyde P., 1925 (B),
Ore Deposits of the Saddle Mountain and Banner Mining Districts, Arizona; U.S. Geological Survey Bulletin 771, 72 pp.

Sand, L.B., and A.J. Regis, 1966,
An Unusual Zeolite Assemblage, Bowie, Arizona (abs.), IN Abstracts for 1965: Geological Society of America Special Paper 87, pp. 145-146

Scarborough, Robert B., 1981,
Radioactive Occurrences and Uranium Production in Arizona; Arizona Bureau of Geology and Mineral Technology Open File Report 81-1

Sheppard, Richard A., 1969,
Zeolites IN Mineral and Water Resources of Arizona; Arizona Bureau of Mines Bulletin 180, pp. 464-467

Shields, J.C., Jr., 1940,
Geology and Ore Deposits of the Dives and Gold Ridge Groups, Dos Cabezas; M.S. Thesis, University of Arizona

Simons, Frank S., 1964,
Geology of the Klondyke Quadrangle, Graham and Pinal Counties, Arizona; U.S. Geological Survey Professional Paper 461, 173 pp.

Stewart, L.A., 1955,
Chyrsotile – Asbestos Deposits of Arizona; U.S. Bureau of Mines Information Circular 7706

Stewart, L.A. and A.J. Pfister, 1960,
Barite Deposits of Arizona; U.S. Bureau of Mines Report of Investigations 5651

Tenney, James B., 1927-1929,
History of Mining in Arizona; Arizona Bureau of Mines, p. 226-227

USAEC, 1954,
U.S. Atomic Energy Commission Preliminary Reconnaissance Report 172-481 (Arizona Bureau of Geology and Mineral Technology Microfiche)

USAEC, 1970,
U.S. Atomic Energy Commission Preliminary Reconnaissance Report for Uranium, Apache and Cochise Counties, Arizona, 1950 to 1970

USBM, 1965,
U.S. Bureau of Mines Information Circular 8252; Mercury Potential of the United States

USBM Files
U.S. Bureau of Mines Files, Mineral Availability System, 1981

USGS CRIB Data
U.S. Geological Survey, Computerized Resources Information Bank Data, 1972, 1979, 1980

Van Alstine, R.E. and R.T. Moore, 1969,
Fluorspar IN Mineral and Water Resources of Arizona; Arizona Bureau of Mines Bulletin 180, pp. 348-357

Willden, Ronald, 1964,
Geology of the Christmas Quadrangle, Gila and Pinal Counties, Arizona; U.S. Geological Survey Bulletin 1161-E, 64 pp.

Wilson, E.D., 1961,
Gold Placers and Placering in Arizona; Arizona Bureau of Mines Bulletin 168

Wilson, E.D., Cunningham, J.B., and G.M. Butler, 1934 (Revised 1967),
Arizona Lode Gold Mines and Gold Mining; Arizona Bureau of Mines Bulletin 137

Wilson E.D. and R.T. Moore, 1958,
Geologic Map of Graham and Greenlee Counties, Arizona; Arizona Bureau of Mines

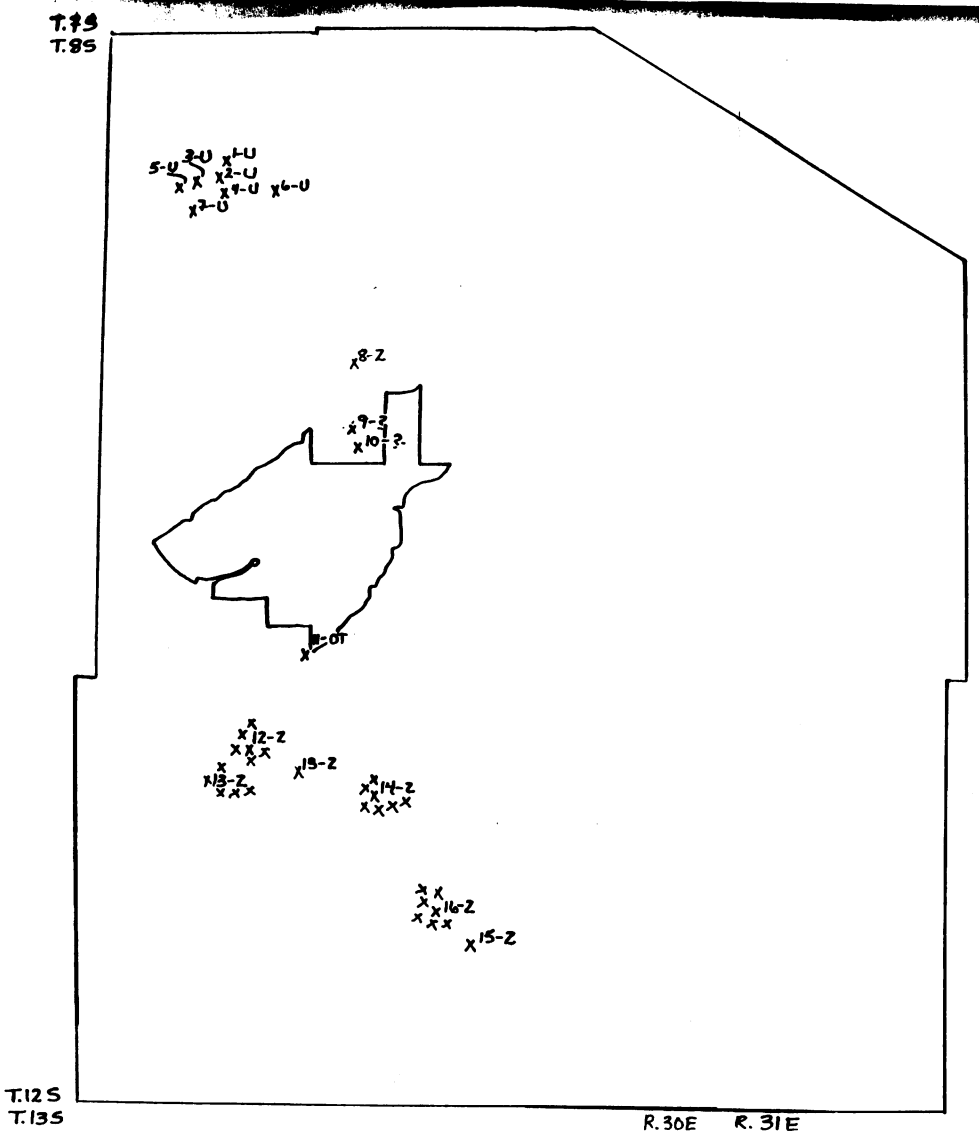
Wilson E.D. and R.T. Moore, 1959,
Geologic Map of Pinal County, Arizona; Arizona Bureau of Mines

Wilson, E.D., Moore, R.T., and H.W. Peirce, 1959,
Geologic Map of Gila County, Arizona; Arizona Bureau of Mines

Wilson, E.D., Moore, R.T., and J.R. Cooper, 1969,
Geologic Map of Arizona; Arizona Bureau of Mines and U.S. Geological Survey

Wilson, E.D. and G.H. Roseveare, 1949,
Arizona Nonmetallics; Arizona Bureau of Mines Bulletin 155 (2nd. edition; revised)

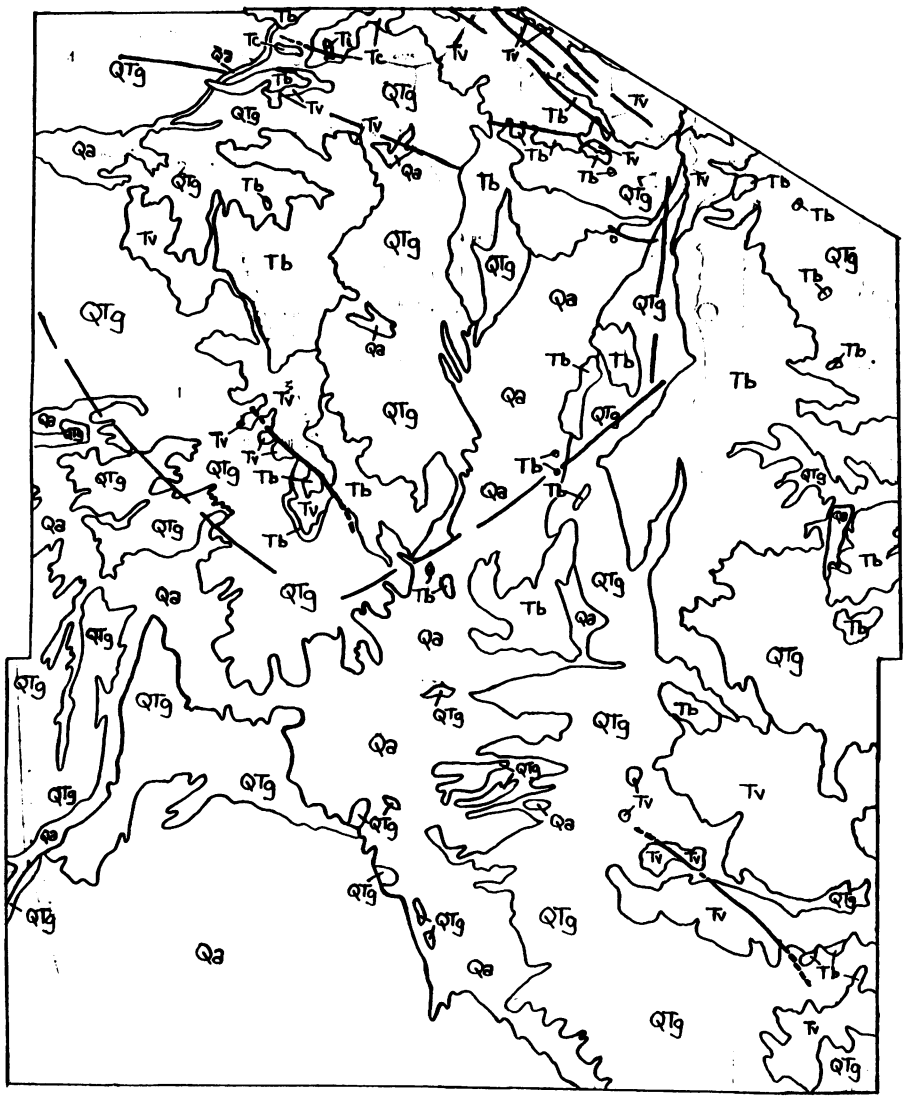
Wynn, Jeffrey C., 1981,
Complete Bouguer Gravity Anomaly Map of the Silver City 1° X 2° Quadrangle, New Mexico - Arizona; U.S. Geological Survey Map I-1310-A



EXPLANATION

Known mineral occurrences are located by map number, followed by type of mineral deposit. See accompanying table of mineral occurrences.

- x^U uranium, chiefly uranophane and carnotite-type deposits
- x^Z zeolites, chiefly clinoptilolite
- x^OT oil test
- x^? unknown; clinoptilolite occurs in vicinity



EXPLANATION

QUATERNARY-LATE TERTIARY

- **Qa** — Younger alluvium; unconsolidated silt, sand, and gravel.
- **QTg** — Sedimentary deposits; mostly alluvium on stream terraces, fan aprons, and pediments; colluvium on hill slopes; and eolian and lacustrine deposits in intermontane regions. Includes Gila Conglomerate, local clay, gypsum, marl, limestone, diatomite, and some intercalated basalt flows and felsic tuff beds.

MIDDLE TERTIARY

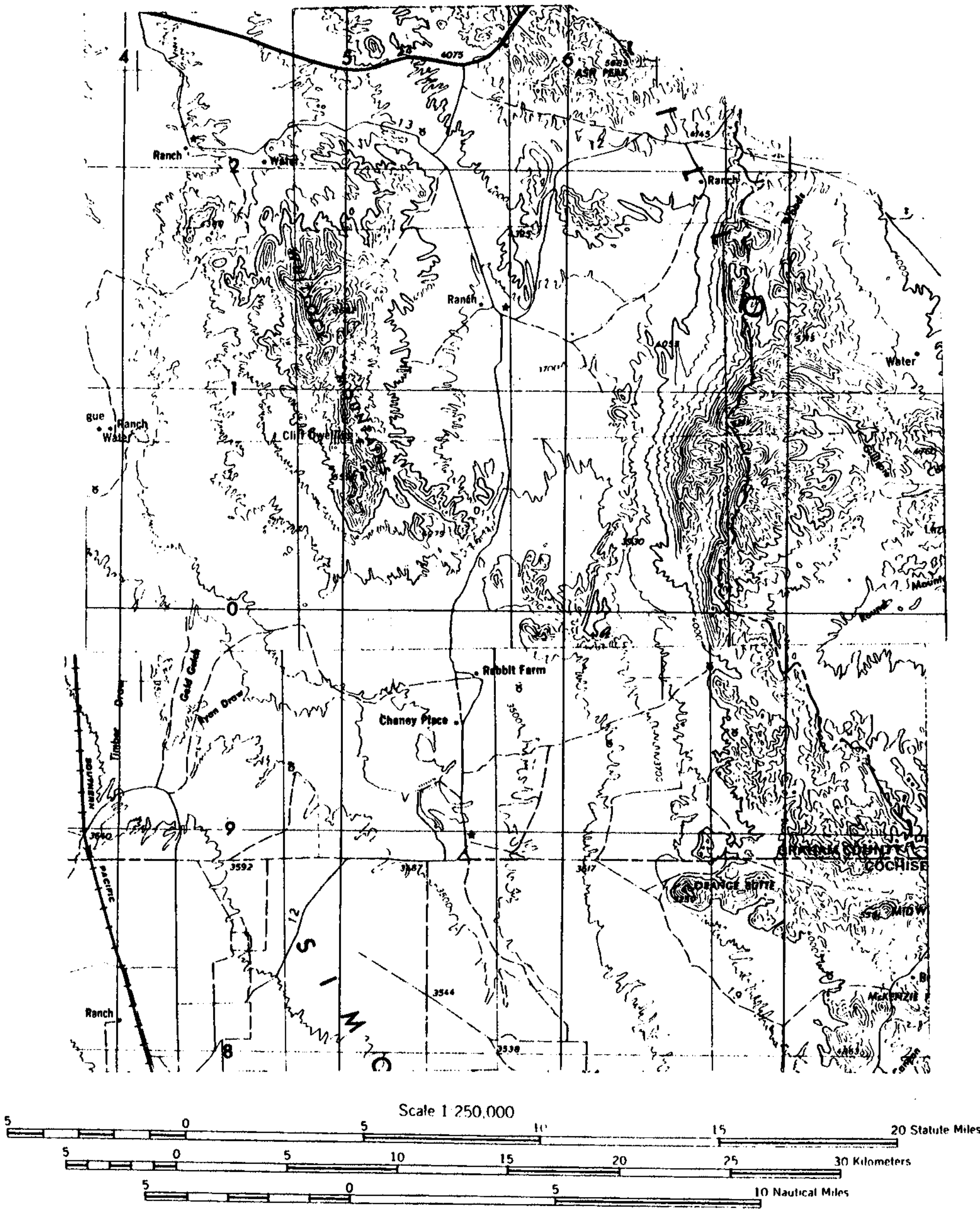
- **Tc** — Conglomerates, with intercalated mafic to intermediate flows and felsic tuffs.
- **Tb** — Basalt and basaltic andesite flows and pyroclastic deposits; locally includes felsic volcanic rocks and volcaniclastic rocks.
- **Tv** — Rhyolite and dacite flows, domes, and pyroclastic deposits; locally includes sedimentary rocks and mafic volcanic rocks.
- **Ti** — Intrusive rocks, including granitic plutons and aphanitic to porphyritic plugs and dikes.

——— Contact

—·— Fault, dashed where inferred ~~or concealed~~ or covered

Sources of information include:
Wynn, J.C., 1981
Wilson et al., 1969
Richter et al., 1981

GEOLOGY OF THE WHITLOCK MOUNTAINS (4-48)



CONTOUR INTERVAL 200 FEET