MINERAL RESOURCES OF THE PAHRANAGAT RANGE 30' BY 60' QUADRANGLE

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Prepared in cooperation with the U.S. Geological Survey

A summary of the mineral resources of the Pahranagat Range 30' by 60' Quadrangle including mining history and geologic setting; descriptions of mines, prospects, and occurrences of minerals and geothermal resources; and results of geochemical analyses. A 1:100,000-scale map showing locations of the occurrences is included.
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INTRODUCTION

The Pahranagat Range 30’ by 60’ Quadrangle is mostly in southwestern Lincoln County about 60 miles north of Las Vegas. The quadrangle extends from Emigrant Valley on the west to Pahranagat Valley on the east and includes portions of the Hiko, Pahranagat, Desert, Pintwater, Papoose, Groom, and Halfpint Ranges. Essentially all of the southern and western parts of the quadrangle are within the Nellis Air Force Range and the Desert National Wildlife Range and are closed to public entry. All mineral occurrences described in this report, except those in the East Pahranagat Range, are within the Nellis Air Force Range. Recorded information on the history of this area is sparse. The Death Valley Emigrant Trail of the late 1840’s passed through the quadrangle from northeast to southwest. The ill-fated Death Valley party took this shortcut between Salt Lake and California in 1849. After passing southeast through White River Valley, the trail entered the north boundary of the quadrangle near the midpoint of the Pahranagat Range. The route crossed the range at Hancock Summit, touched at Summit Spring on the pass between the Groom Range and the Jumbled Hills, and crossed Emigrant Valley to exit the quadrangle near its southwest corner. From here, the Emigrant Trail continued south to Cane Springs near the camp of Wahmonie, which currently lies within the Nevada Test Site, before descending into Death Valley southwest of present-day Armgosa Valley.

The first record of prospecting activity in the quadrangle was in 1864 when lead-silver discoveries were made in the southern Groom Range (Humphrey, 1945, p. 35). Many of the small gold occurrences in the northern Groom Range were, no doubt, also prospected at that time. The copper-silver deposit in the Southeastern district was discovered in 1870 (Thompson and West, 1881, p. 486). In 1869, the Wheeler Survey passed through this area on their first general reconnaissance of the West; the party camped at Summit Spring, southeast of the Groom district, on their way north. The Wheeler party returned in 1871 and the party geologist, G. K. Gilbert, visited the Groom mine and recorded the first observations on the local geology (Wheeler, 1872). F. B. Weeks, of the U.S. Geological Survey made a reconnaissance survey of the geology of the area in 1901; Weeks’ information is included in geologic descriptions of the area by J. E. Spurr in 1903. Humphrey (1945) described the geology and mineral deposits of the Groom district and mention is made of the Groom deposits by Tschanz and Pampeyan (1970). Mineral deposits in the Nye County portion of the quadrangle are briefly described by Kral (1951). Descriptions of the general geology of the quadrangle are included in Tschanz and Pampeyan (1970) and Cornwall (1972).

Mineral production within the quadrangle has been principally lead and silver from the Groom mine in the Groom Range and silver from the Kelly mine located in the Pintwater Range south of Groom. At the present time, there is no mineral production from within the quadrangle.
Warm springs at Ash Springs, north of Alamo, are utilized for irrigation and recreational purposes but there has been no geothermal development within the quadrangle.

Seismic exploration for oil has been done but there has been no known drilling.

In 1984 and 1985, the Nevada Bureau of Mines and Geology conducted mineral inventory studies of the Nevada Test Site for the U.S. Department of Energy and of the Groom Range for the U.S. Air Force. As part of those projects, many of the mines and prospects in the Pahranagat Range 30' by 60' Quadrangle were examined and sampled. Field data were collected by J. Quade and J. V. Tingley. In 1987 a cooperative program was begun with the Branch of Western Regional Geology, U.S. Geological Survey, to complete mineral inventory studies on a number of 30' by 60' quadrangles in southeastern Nevada. The inventory of the Pahranagat Range Quadrangle is the first of these studies to be completed. Field examinations for this study were carried out by J. V. Tingley in 1987.

Samples were selected from dumps and mineralized outcrops to examine trace element associations. Sample descriptions and results of geochemical analyses are in the report. The samples are high grade and do not represent average ore grades. The U.S. Geological Survey Branch of Geochemistry performed the geochemical analyses as part of a cooperative agreement with the Nevada Bureau of Mines and Geology.

The information in this report draws from all known sources and is intended to be a compilation of data on mines, prospects, and mineral, geochemical, and oil and gas occurrences within the Pahranagat Range 30' by 60' Quadrangle. When information sources are cited, the first source listed has provided the primary information. The information from literature sources has been adjusted to reflect field observations, when available.

**GEOLOGICAL SETTING**

Rocks within the Pahranagat Range Quadrangle range in age from Precambrian through Tertiary. Precambrian rocks crop out mainly in the western portion of the quadrangle and consist of shale, siltstone, and silty limestone of the Johnnie Formation and quartzite, siltstone, and thin beds of limestone of the Sterling Quartzite in the Halfpint and Groom Ranges (Barnes and Christiansen, 1967). Rocks in the Papoose Range, shown by Tschanz and Pampeyan (1970) to be Cambrian age, may be Precambrian and correlate with those in the Groom Range to the north. Paleozoic quartzite, shale, and carbonate units are present in most of the ranges within the quadrangle but the most extensive Paleozoic exposures are in the Pahranagat, Desert, and Pintwater Ranges. Tertiary volcanic units, including andesite and basalt flows, welded ash-flow tuffs, and intervolcanic sedimentary units, cover portions of the Hiko, Pahranagat, Groom, and Halfpint Ranges.

The only intrusive rocks mapped within the quadrangle are porphyritic rhyodacite dikes, sills, and stocks in and adjacent to Bald Mountain in the central Groom Range (Ekren and others, 1977). The layer of carbonaceous shale at the top of the Pilot Shale. The shaft is sunk on a 10-foot-wide, N10°E-striking, 70°SE-dipping gossan zone along bedding in the shale. There are no visible metallic minerals except yellow-brown and red-brown iron oxides. A gypsum-rich horizon in the shale is exposed at the mouth of the adit. The zone is about 4 feet thick and is composed of iron-oxide gossan laced with clear gypsum veinlets up to 3 inches thick; a 3-foot-thick band of carbonaceous shale and gossan lies below an iron-oxide lense. Bedding in the shale strikes N40°E and dips 40°SE; the rock is contorted and sheared. The layer of carbonaceus shale at the top of the Pilot Shale has been prospected by cuts and trenches along strike for about 2 miles to the south.

**METALLIC OCCURRENCES**

**EAST PAHRANAGAT RANGE**

The East Pahranagat Range, in the northeastern part of the Pahranagat Range 30' by 60' Quadrangle, includes several small prospects west of the town of Alamo, Lincoln County. There is no recorded mineral production from the area and the prospects are inactive.

**Lightner claims (1)**

**Other names:** Kathleen claims and Lucky Linda claims

**Commodity:** gold (?)

**Location:** sec. 30, T6S, R60E

**UTM:** 4141040N 651920E

**Production:** none

**History:** Unknown, remains of a hand windlass at the shaft collar appear to date from 1900-20.

**Development:** Workings consist of a 6- by 8-foot shaft about 30 feet deep, a 570°W-bearing adit about 50 to 60 feet long, cuts, and a road to the shaft and adit.

**Geology:** The adit and shaft explore a gossan zone in a carbonaceous horizon near the top of the Cambrian Pilot Shale. The shaft is sunk on a 10-foot-wide, N10°E-striking, 70°SE-dipping gossan zone along bedding in the shale. There are no visible metallic minerals except yellow-brown and red-brown iron oxides. A gypsum-rich horizon in the shale is exposed at the mouth of the adit. The zone is about 4 feet thick and is composed of iron-oxide-gossan laced with clear gypsum veinlets up to 3 inches thick; a 3-foot-thick band of carbonaceous shale and gossan lies below an iron-oxide lense. Bedding in the shale strikes N40°E and dips 40°SE; the rock is contorted and sheared. The layer of carbonaceous shale at the top of the Pilot Shale has been prospected by cuts and trenches along strike for about 2 miles to the south.

**Remarks:** The Lightner claims were staked in January 1984.

**Field examination:** J. V. Tingley, 1987

**Nevin claims (2)**

**Other name:** Lucky Nelinda claims

**Commodity:** gold (?)

**Location:** sec. 32, T6S, R60E

**UTM:** 4138900N 652700E

**Production:** none

**History:** Bulldozer work not over 10 years old

**Development:** several cuts along upper Pilot Shale contact and access roads

**Geology:** An iron-oxide gossan layer occurs in a carbonaceous horizon at the upper contact of Pilot Shale with Guilmette Formation; the Pilot Shale is thin-beded and contains sandy limestone units up to 2 feet thick. Hematite occurs along bedding planes in the shale and gypsum bands are found both along bedding
planes and along cross-fractures; bedding exposed in
cuts strikes about N50°W and dips 10°SW but is
variable. No evidence of metallic mineralization, ex-
cept for iron oxides, was seen.
Remarks: The Nevin claims were staked in January
1984; no evidence of recent work was seen.
Field examination: J. V. Tingley, 1987

GROOM MINING DISTRICT

The Groom district, on the western border of Lincoln
County in the northwestern part of the quadrangle, in-
cludes all of the southern Groom Range. Mining properties
in the northern Groom Range are in the Don Dale district,
north of the quadrangle boundary, and are not discussed in
this report.

The first mineral discoveries in the Groom Range were
made in 1864 and the Groom mining district was organized
in 1869. Early accounts of the district describe mines
located on the western slopes of Tempaiute Peak (Bald
Mountain) and state that silver chloride ores were being
produced in 1870. These mines were worked until about
1874, yielding a small, unrecorded production. Later work
in the district was concentrated in the south end of
the range at the Groom mine; recorded production from
the Groom mine between 1915 and 1956 is about
$935,000, mainly in lead and silver.

At the Groom mine, mining has been from replacement
deposits of argentiferous galena and sphalerite formed in
Cambrian limestone and shale along steep, north-trending
faults. Mineralization can be traced by mine workings and
outcrops at the surface for over one mile along the eastern
margin of a graben. About three miles northwest of the
Groom mine, the Kahama mine and several nearby pros-
pects explore precious-metal-bearing veins which have
formed in north-trending shear zones in Cambrian quartz-
ite. Prospecting for placer gold was done in the major
drainages in the area north of the Groom mine but no infor-
mation is available on this activity and it is not discussed in
this report. On the east side of the Groom Range, there was
some prospecting for disseminated gold in an area of minor
jasperoid in limestone.

There is no activity in the district at the present time.
B. W. claims (3)
Commodities: gold
Location: sec. 21, T5S, R55½E
UTM 4150200N 611680E
Production: none
Development: old prospect pits
Geology: The B. W. claims cover an area of dominantly limestone outcrops which contains minor jasper-pod and gossan-like mineralization along bedding planes. An old prospect pit in the southeastern part of the claim group was dug in a jaspery, gossan outcrop; some jasper breccia is present. The limestone country rock strikes N30° to 60°E and is thin banded.
Field examination: J. Quade and J. V. Tingiey, 1985
Remarks: Workings expose the vein system for about 800 feet along strike; this system is parallel to, but several hundred feet west of, the vein exposed at the Kahama mine to the south.
Field examination: J. Quade and J. V. Tingiey, 1985
Copper prospect 1 (7)
Commodities: copper
Location: sec. 5, T6S, R55½E
UTM 4134900N 608800E
Production: none
Development: prospect pit
Geology: Iron oxides, azurite, malachite, pyrite, and chalcopyrite occur with quartz along a N10°E, nearly vertical structure cutting shale.
Field examination: J. Quade and J. V. Tingiey, 1985
Gold Butte claims (8)
Commodities: gold and silver
Location: sec. 13, T6S, R55E
UTM 4142000N 606100E
Production: none
Development: several prospect pits
Geology: The prospects expose several veins; the main vein is in a shear zone that can be traced along strike for several hundred feet. Near the eastern end of the shear structure is a knob of partly cemented, silicified fault breccia containing massive magnetite and hematite. The structure strikes N50°E, and dips 60°NW; the vein is up to 2 feet thick. At the eastern exposure, the vein strikes N20°E and dips 45°NW. Botryoidal hematite and manganese oxide cement the fault breccia.
Remarks: An old paper found in a location monument on claims was dated 1933.
Field examination: J. Quade and J. V. Tingiey, 1985
Gold occurrence 1 (9)
Commodities: gold and silver
Location: sec. 24, T6S, R55E
UTM 4140200N 606750E
Production: none
Development: none
Geology: A 6- to 8-inch-thick quartz vein crops out on the ridge west of the inclined shaft at the Highgrade mine. The vein, which generally follows a 4- to 5-foot-thick brecciated structure along bedding in the quartzite wall rock, strikes N30°W to north and dips 65° to 75°NW. The vein contains tetrahedrite, galena, manganese oxides, and some green and blue copper oxides. The structure cuts N70° to 75°E-striking quartz veins, possibly veins which project from the Highgrade shaft to east, and a N50°E-striking vein which crops out on the west slope of the ridge. A thin shale unit within the quartzite lies between the outcrop on the ridge and the prospect to the southwest.
Field examination: J. Quade and J. V. Tingiey, 1985
Gold occurrence 2 (10)
Commodities: gold and silver
Location: sec. 18, T6S, R55½E
UTM 4142060N 606995E
Production: none
Development: none
Geology: A N20°E-trending iron-oxide-stained, vuggy quartz vein crops out on the west slope of the ridge. A thin shale unit within the quartzite lies between the outcrop on the ridge and the prospect to the southwest.
Field examination: J. Quade and J. V. Tingiey, 1985
old stone monument; no prospects pits or other workings were found in the area.

Source of information: Humphrey (1945, p. 47)

Field examination: J. Quade, 1985

Gold prospect 1 (11)
Commodities: gold and silver
Location: sec. 24, T6S, R55E
UTM 414060N 806720E
Production: none
Development: five prospect pits and a 25-foot adit
Geology: Prospects explore several narrow quartz veins in quartzite that crop out between the main ridge and the Tram workings. In the adit, a N70°E-striking, 55°NW-dipping, manganese-oxide-stained quartz vein containing tetrahedrite, galena and pyrite is cut by a N40°W sheeted zone. The sheeted zone is iron- and manganese-oxide stained and contains quartz vein material along it. The vein in the sheeted zone is 6 inches to 1 foot wide; the N70°E vein is about 6 inches wide as exposed at the end of the adit. The quartzite wall rock is sheared and altered along the vein wall.
Remarks: This may be the same vein that is exposed at the Highgrade shaft on the eastern side of the ridge. The vein would, however, be offset across the north-trending shear structure exposed along the crest of the ridge.
Field examination: J. Quade and J. V. Tingley, 1985

Gold prospect 2 (12)
Commodities: gold and silver
County: Lincoln
UTM 4138575N 606750E
Production: none
Development: small prospect pit
Geology: A quartz vein, 2 to 3 feet thick, cuts interbedded shale and quartzite. The vein strikes N50°E and dips 55°NW. The country rock strikes N5°E and dips 40°SE. There is about a 1-foot offset in bedding across the vein structure. Galena and possibly other fine-grained black sulfides are present in the vein quartz; both vein and wall rock are stained with iron and manganese oxides. The vein is frozen to the footwall of the structure.
Field examination: J. Quade and J. V. Tingley, 1985

Groom mine (13)
Commodities: lead, silver, and zinc
Location: sec. 11,14, T7S, R55E
UTM 4133750N 509190E
Production: about $935,000
History: discovered in 1865, first production in 1865, last production 1956, owned by Sheahan family since 1885
Development: several shafts, an adit, an open pit, and underground workings
Geology: Replacement orebodies formed in Cambrian Pioche Shale and Lyndon Limestone near the intersection of the sedimentary rocks by north-trending normal faults, thrust faults, and cross-fractures. The fault/fracture system trends N10° to 20°E, and dips 55° to 60°SE; the limestone is silicified along mineralizing fissures and there are often very thin quartz veinlets in both limestone and shale near the orebodies. Ore minerals include argentiferous galena, sphalerite, cerussite, anglesite, chalcopyrite, and tetrahedrite. Silver consistently averages about ½ ounce per percent of the lead at the Groom mine, and gold content is practically nil. Copper, in the form of chalcopyrite, with possible tetrahedrite, averages about 0.35 percent. Pyrite, in minor amounts, is found in intimate association with the galena (Humphrey, 1945).
Remarks: Patented claims are White Lake, White Lake No. 2, Conception, Conception No. 2, South End, South End Fraction, Bride Lode, and Southern Groom Lode.
Sources of information: Humphrey (1945, p. 32-45); Tschanz and Pampeyan (1970, p. 148–149)
Field examination: J. Quade and J. V. Tingley, 1985

Highgrade mine (14)
Commodities: gold and silver
Location: sec. 24, T6S, R55E
UTM 4140260N 606910E
Production: small
Jumbo claims (16)
Commodities: gold and silver
Location: sec. 12, T6S, R55E
UTM 4142750N 606400E
Production: small
Development: a 40- to 50-foot-deep shaft and a prospect pit
Geology: The workings expose a quartz vein that formed along a shale-quartzite contact. The vein strikes N70° to 75°W and dips 60°SW. The shale exposed on the east edge of the shaft collar is brecciated and laced with limonite-hematite veins. There are pods of massive hematite formed along bedding in the shale. The quartz vein is brecciated and recemented by quartz; the breccia matrix contains sulfides and magnetite.
Remarks: The shaft is timbered with hewn juniper logs; the workings appear to be very old and may date to the 1870’s.
Field examination: J. Quade and J. V. Tingley, 1985

Kahama mine (17)
Other names: Hanus prospect, Hanus shaft, and New Kahama claims
Commodities: gold and silver
Location: sec. 35, T6S, R55E
UTM 4138100N 606480E
Production: small
History: mined in 1920’s and 1930’s by Charles P. Hanus
Development: Workings consist of two inclines, trenches, and stopes along about 1/2 mile of vein outcrop. The southernmost incline is reported to be 60 feet deep. The most recent activity has been on the north end of the claims.
Geology: A N5° to 10°E-striking, 60°NW-dipping quartz vein, up to 2 feet thick, cuts Prospect Mountain Quartzite. The quartzite strikes north to N60°E, dips 50°SE. The old workings were developed where the vein structure intersected shaly, argillaceous beds within the quartzite section. Alteration along the vein is noticeable in the shales; the rock is chloritized, laced with quartz stringers, and is limonite stained on fractures and bedding planes. The vein is stained with iron and manganese oxides.
Remarks: A composite sample of vein material collected by L. H. Beal in 1980 contained 0.245 ounces gold and 0.273 ounces silver per ton. The sample was taken from a number of cuts along the vein; vein width ranged from several inches up to 18 inches.
Source of information: Humphrey (1945, p. 47)
Field examination: J. Quade and J. V. Tingley, 1985

Silver occurrence 1 (18)
Commodities: silver and gold
Location: sec. 20, T6S, R55 E
UTM 4140750N 614100E
Production: none
Development: none
Geology: A gossan-like outcrop of limonite-hematite hosted in limestone at base of formation contact.
Remarks: There is no evidence of prospecting at this site.
Field examination: J. Quade and J. V. Tingley, 1985

Tram workings (19)
Commodities: gold and silver
Location: sec. 24, T6S, R55E
UTM 4140180N 606540E
Production: small
Development: Workings consist of cuts and a short adit on outcrop, up slope from main adit; the main adit is 270 feet long with about 60 feet of drift along the vein from end of adit.

Geology: A reddish, iron-oxide-stained quartz vein crops out along a N70°E-striking, 55°NW-dipping structure which cuts quartzite. The wall rock is kaolinized and gouge is present along the vein walls; some brecciation occurs in the vein. The vein is possibly the same vein exposed at gold prospect 1.

Remarks: The adit bears S40°E for 270 feet and intersects the vein at its end. A drift then follows the vein about 60 feet along strike. A tram line extended from the outcrop workings down to the adit level; ore was lowered to the adit level where it could be loaded onto trucks. The wire, drum, and tram poles are still present and are scattered along the slope below the mine workings.

Field examination: J. Quade and J. V. Tingley, 1985

OAK SPRING MINING DISTRICT

The Oak Spring district, Nye County, is centered around Oak Spring in the hills north of Yucca Flat about 3 miles west of the western boundary of the quadrangle. Only a small, outlying part of the district, in the Halfpint Range along the eastern boundary of Nye County, is within the quadrangle.

The only mine with recorded production, the Rainstorm, has produced less than 100 tons of lead-silver-gold ore.

The Rainstorm mine and several nearby prospects explore a series of northwest-trending, nearly vertical quartz veins in Precambrian shale and quartzite.

Rainstorm mine (20)

Commodities: lead, silver, and gold
Location: sec. 11, T9S, R54E
UTM 4113194N 595308E
Production: 80 tons, 55 percent lead, 0.25 ounces silver, and 0.25 ounces gold per ton
History: Production was before World War II.
Development: one 220-foot-deep shaft, a 220-foot-long adit, a 210-foot-long drift from the adit, and four prospect pits
Geology: Rocks in the mine area consist of interbedded siltstones and quartzite of the Precambrian Johnnie Formation. The formation is highly faulted and fractured. The mine workings are aligned along a N70°W, nearly vertical vein system. Wall rocks are commonly brecciated, silicified, and oxidized along the trace of the vein system outcrop. The quartz vein material is brecciated, cemented with silica, and stained with yellow and black oxides. The vein contains anglesite(?), galena, pyrite, and possibly stibnite. The sedimentary rocks near the adit portal strike N5°E and dip about 20°SE.

Source of information: Kral (1951, p. 141)
Field examination: J. Quade, 1983

Rainstorm prospect (21)

Commodities: lead, silver, and gold
Location: sec. 13, T9S, R54E
UTM 4117750N 597350E
Production: none
Development: small caved adit
Geology: Brecciated white vein quartz and quartzite breccia are exposed along a N70°W-striking, 70°NE-dipping fault. The vein structure is crosscut by a north-striking, vertical fault zone; the adit follows the north-striking structure. Some sulfides were noted in vein material found on the adit dump.

Field examination: J. Quade, 1983

UNNAMED SHAFT (22)

Commodities: lead, silver, and gold
Location: sec. 18, T9S, R55½E
UTM 4112240N 597550E
Production: small
Development: one shallow shaft and several prospect pits
Geology: The shaft was sunk on a N70°W-striking vein cutting highly fractured and oxidized Precambrian Johnnie Formation. The vein is brecciated and iron-oxide stained; wall-rock alteration is extensive but is most intense within 3 to 4 feet of the vein. The vein has the same strike as the vein at the nearby Rainstorm mine.

Field examination: J. Quade, 1983

PAPOOSE MINING AREA

The Papoose area, Lincoln County, includes the Papoose Range in the central southwest part of the quadrangle. Only one known mineral property, the Kelly mine, is located in this area. A small amount of silver-gold-lead ore was produced from this property in 1936–37.

Kelly mine (23)

Commodities: silver, gold, and lead
Location: sec. 18, T9S, R55½E
UTM 4112800N 607800E
Production: 1,157 ounces silver, 3 ounces gold, 44 pounds lead
History: A small amount of ore was shipped to the Groom mine in 1936–37.
Development: shaft, adit, and prospect pits
Geology: Narrow breccias and fissures cut Prospect Mountain Quartzite

SOUTHEASTERN MINING DISTRICT

The Southeastern district is in the northern Pintwater Range, Lincoln County, in the south-central part of the quadrangle. The only property in the district, the Southeastern mine, is located at the north end of the range. The earliest prospecting in this district was in 1870 but there has been no recorded production. Copper-lead-silver mineralization at the mine is reported to be associated with a fault zone in Paleozoic carbonate rocks.

Southeastern mine (24)

Other name: Arrowhead mine
Commodities: copper, lead, and silver
Location: sec. 4, T10S, R57E
UTM 4108180N 625840E
Production: small
History: Ore was discovered in this area in September 1870 and a district was organized at that time.
Development: inclined shaft (60 feet deep), adits, and prospect pits
Geology: The mine is in a silicified fault zone near the top of the Pogonip Group, copper-lead-silver(?), minerals crop out along this zone for 100 feet. It is likely that the deposit is just below a thrust sheet of Ordovician, Silurian, and Devonian dolomite.

Remarks: Thompson and West (1881, p. 486) reported that only assessment work had been done in the
Cavities weathered in welded tuff, near pumice prospect, East Pahranagat Range.

district after 1871; the ore was reported to assay between $30 and $180 per ton and specimens of native copper were frequently found. 


NONMETALLIC OCCURRENCES

EAST PAHRANAGAT RANGE

This area is described in the section on metallic occurrences.

Pumice prospect 1 (1)

Commodity: pumices(?)

Location: sec. 24, T7S, R60E

UTM 4132700N 659250E

Production: small

History: Camp remains indicate activity in 1940’s and 1950’s.

Development: small cuts, remains of hand screening equipment

Geology: The prospect is within a soft, nonwelded tuff composed mainly of pumice and pumice fragments. The flow weathers to a cavernous surface with caverns up to 3 by 6 feet.

Remarks: A very small pile of hand-screened pumice remains at the camp site.

Field examination: J. V. Tingley, 1987

GEOTHERMAL OCCURRENCES

ASH SPRINGS

Several springs near Ash Springs north of the town of Alamo in Lincoln County provide warm water used mainly for swimming and irrigation.

Ash Springs (1)

Location: sec. 6, T6S, R61E

UTM 4147800N 659850E

Temperature: 32°C

Source of information: Garside and Schilling (1979, p. 108, no. 175)

Little Ash Spring (2)

Location: sec. 36, T5S, R60E

UTM 4147600N 659800E

Temperature: 36°C

Remarks: 9,000 gal/min discharge

Source of information: Garside and Schilling (1979, p. 108, no. 175)

Unnamed spring 1 (3)

Location: sec. 18, T6S, R61E

UTM 4143500N 661000E

Temperature: warm

Source of information: Garside and Schilling (1979, p. 108, no. 175)

BIBLIOGRAPHY


**APPENDIX A. – Sample Descriptions**

<table>
<thead>
<tr>
<th>District/area</th>
<th>Occurrence (no.)</th>
<th>Sample no.</th>
<th>UTM</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Pahranagat Range</td>
<td>Lightner claims 1</td>
<td>3259</td>
<td>4141040N 651920E</td>
<td>Iron-oxide rich gossan in weakly silicified, brecciated Pilot Shale; clear gypsum cementing breccia and as crystals in open spaces in breccia</td>
</tr>
<tr>
<td></td>
<td>Nevin claims 2</td>
<td>3260</td>
<td>4138900N 652700E</td>
<td>Gossan in limy, sandy Pilot Shale; clear gypsum along bedding and fracture surfaces; iron oxide in gossan; some carbonaceous material.</td>
</tr>
<tr>
<td>Groom</td>
<td>B. W. claims 3</td>
<td>3026</td>
<td>4150600N 611300E</td>
<td>Outcrop of jaspery gossan, silicified lens along bedding in limestone; sample is mostly massive hematite</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3027</td>
<td>4150200N 611660E</td>
<td>Jasperoid-limonite outcrop exposed in prospect pit in limestone, some jasperoid breccia</td>
</tr>
<tr>
<td></td>
<td>Black Metal mine 4</td>
<td>3006</td>
<td>4132150N 609110E</td>
<td>Fine-grained, steely galena with fault gouge in shaly limestone</td>
</tr>
<tr>
<td></td>
<td>Boondock claim 5</td>
<td>2397-A</td>
<td>4134250N 608270E</td>
<td>Select, high-grade sample of massive galena; sample taken by claim owner</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3047</td>
<td>4134250N 608270E</td>
<td>White quartz with minor sulfides, brecciated; chipped from narrow vein outcrop at the Boondock claim location monument</td>
</tr>
<tr>
<td></td>
<td>Chicago/Illinois/Wisconsin claims 6</td>
<td>3055</td>
<td>4139130N 606480E</td>
<td>Manganese-stained white vein quartz containing some galena; vein is vuggy and brecciated; sample from dump and vein outcrop</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3056</td>
<td>4139040N 606440E</td>
<td>Vein quartz containing galena, iron and manganese oxides; sample taken from the &quot;Wheelbarrow adit&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3057</td>
<td>4138960N 606390E</td>
<td>3-foot-wide quartz vein containing galena and pyrite</td>
</tr>
<tr>
<td></td>
<td>Copper prospect 1</td>
<td>3007</td>
<td>4134900N 608800E</td>
<td>Quartz vein containing azurite, malachite, chalcopyrite, and bornite; sample selected from dump and vein outcrop</td>
</tr>
<tr>
<td></td>
<td>Gold Butte claims 8</td>
<td>3035</td>
<td>4141950N 606050E</td>
<td>Vein quartz with hematite, 12- to 18-inch-thick vein cuts shale; sample taken from exposure in location pit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3036</td>
<td>4142000N 606100E</td>
<td>Brecciated quartz with magnetite; sample taken from outcrop where quartz vein fills fault zone</td>
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<td></td>
<td></td>
<td>3037</td>
<td>4142000N 606100E</td>
<td>Vein quartz stained with iron oxides, rock silicified and brecciated, vein outcrop is 2 to 3 feet thick and can be traced for several hundred feet along strike</td>
</tr>
</tbody>
</table>

continued
<table>
<thead>
<tr>
<th>District/area</th>
<th>Occurrence (no.)</th>
<th>Sample no.</th>
<th>UTM</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groom (continued)</td>
<td>Gold occurrence 1 (9)</td>
<td>3015</td>
<td>4140060N 606620E</td>
<td>Vuggy quartz vein with manganese- and copper-oxide staining, galena, and tetrahedrite; sample taken from 6- to 12-inch-wide vein outcrop</td>
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<tr>
<td></td>
<td></td>
<td>3028</td>
<td>4140200N 606750E</td>
<td>Vuggy quartz vein with manganese- and copper-oxide staining, galena, and tetrahedrite; sample taken from 6- to 12-inch-wide vein outcrop</td>
</tr>
<tr>
<td>Gold occurrence 2 (10)</td>
<td></td>
<td>3018</td>
<td>4142080N 606995E</td>
<td>Iron-stained, vuggy quartz vein; sample chipped from outcrop near monument</td>
</tr>
<tr>
<td>Gold prospect 1 (11)</td>
<td></td>
<td>3029</td>
<td>4140060N 606720E</td>
<td>Quartz vein material from shear zone, contains manganese oxides, pyrite, galena, and tetrahedrite</td>
</tr>
<tr>
<td>Gold prospect 2 (12)</td>
<td></td>
<td>3054</td>
<td>4139575N 606750E</td>
<td>Quartz vein with iron and manganese oxides, galena, and other sulfides; sample taken from 2- to 3-foot-wide vein outcrop in small prospect pit, vein cuts interbedded shale and quartzite</td>
</tr>
<tr>
<td>Groom mine (13)</td>
<td></td>
<td>3008</td>
<td>4133820N 609180E</td>
<td>Replacement ore containing copper-oxide minerals, argentiferous galena, and other sulfides</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3009</td>
<td>4133800N 609190E</td>
<td>Replacement ore in limestone, massive limonite, and argentiferous galena</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3039</td>
<td>4133100N 609100E</td>
<td>Ore from dump; galena, sphalerite, and pyrite</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3040</td>
<td>4133350N 609000E</td>
<td>Sample of ore from stockpile at main adit, replacement ore in limestone, contains argentiferous galena</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3041</td>
<td>4133450N 609000E</td>
<td>Jarosite and limonite fracture coatings chipped from limestone outcrop, some calcite veining</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3042</td>
<td>4133400N 609200E</td>
<td>Oxidized replacement ore in limestone; contains cerussite, galena, and other sulfides</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3043</td>
<td>4133600N 609250E</td>
<td>Sample taken from outcrop of vein containing galena; vein up to 2 feet thick</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3044</td>
<td>4133780N 609190E</td>
<td>High-grade vein material from dump, contains galena, other sulfides, and copper-oxide minerals</td>
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<tr>
<td></td>
<td></td>
<td>3045</td>
<td>4134250N 609175E</td>
<td>Brecciated quartzite outcrop north of old mine</td>
</tr>
<tr>
<td>Highgrade mine (14)</td>
<td></td>
<td>3016</td>
<td>4140260N 606910E</td>
<td>Vein quartz, strong manganese-oxide staining, minor copper oxides, galena, tetrahedrite; sample taken from dump</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3017</td>
<td>4140260N 606910E</td>
<td>Quartz vein with manganese-oxide staining, galena, tetrahedrite; sample taken from from stockpile below mine workings</td>
</tr>
<tr>
<td>Horseshoe occurrence (15)</td>
<td></td>
<td>3046</td>
<td>4134800N 609175E</td>
<td>Quartz vein, 10 feet wide, brecciated and stained with manganese and iron oxides; sample chipped from vein outcrop</td>
</tr>
<tr>
<td>Jumbo claims (16)</td>
<td></td>
<td>3031</td>
<td>4142750N 606400E</td>
<td>Partly brecciated quartz vein in quartzite, vein contains pyrite; wall rock is silicified</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3032</td>
<td>4142750N 606400E</td>
<td>Silicified breccia containing magnetite and pyrite; sample taken from dump and the adjacent prospect pit</td>
</tr>
<tr>
<td>Kahama mine (17)</td>
<td></td>
<td>3010</td>
<td>4138120N 606480E</td>
<td>White vein quartz, vuggy, cockade structures, minor iron-oxide staining; vein 2 feet wide, partly brecciated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3011</td>
<td>4138100N 606480E</td>
<td>Channel sample cut across 12- to 14-inch-thick quartz vein, vein highly stained with iron oxides</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3012</td>
<td>4138150N 606480E</td>
<td>White vein quartz, highly iron-oxide stained; sample cut from vein crosscutting main vein</td>
</tr>
<tr>
<td>District/area</td>
<td>Occurrence (no.)</td>
<td>Sample no.</td>
<td>UTM</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------</td>
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<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Groom (continued)</td>
<td>Kahama mine (17)</td>
<td>3013</td>
<td>4138250N 606460E</td>
<td>Manganese- and iron-oxide stained vein, sample cut from vein exposed in main trench</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3033</td>
<td>4138100N 606480E</td>
<td>Brecciated, vuggy, vein quartz, some cockade structure, iron-oxide stained, vein cuts quartzite; sample from dump</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3034</td>
<td>4138360N 606460E</td>
<td>Vuggy, iron-oxide-stained quartz vein, minor brecciation, unidentified sulfides present; sample taken from prospect south of upper trenches</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3058</td>
<td>4136470N 606440E</td>
<td>Quartz vein containing pyrite, galena; quartzite wall rock; sample taken from dump of incline shaft on north-facing slope north of upper Kahama workings</td>
</tr>
<tr>
<td>Silver occurrence 1</td>
<td></td>
<td>3002</td>
<td>4140750N 6114100E</td>
<td>Gossan in limestone; limonite and hematite</td>
</tr>
<tr>
<td>Tram workings (19)</td>
<td></td>
<td>3014</td>
<td>4140180N 606540E</td>
<td>Partly brecciated quartz vein with manganese oxides, pyrite, tetrahedrite; vein cuts shale interbeds; sample taken from dump of 270-foot-long adit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3030</td>
<td>4140140N 606520E</td>
<td>Vein quartz and gouge material, brecciated and stained with hematite, some unidentified sulfides present; sample chipped from vein exposed in prospect pit</td>
</tr>
<tr>
<td>Oak Spring</td>
<td>Rainstorm mine (20)</td>
<td>1939</td>
<td>4113210N 595280E</td>
<td>Brecciated vein with galena, anglesite; sample from sidewall of shaft at 40-foot level</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1940</td>
<td>4113210N 595280E</td>
<td>Small stringer veinlets, silicified, brecciated, with galena, anglesite, stibnite, and copper oxides; sample taken from sidewall of shaft between 100 and 110 feet</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1941</td>
<td>4113210N 595280E</td>
<td>Brecciated quartz vein material, oxidized, silicified, with galena, anglesite, blue and yellow oxide coatings (copper and antimony?); sample from mine dump</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1942</td>
<td>4113210N 595280E</td>
<td>Oxidized vein material and replacement ore, galena, anglesite; sample from shaft dump</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1943</td>
<td>4113160N 595220E</td>
<td>Silicified quartz breccia from vein system, iron-oxides present; sample from vein exposed in pit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1944</td>
<td>4113200N 595220E</td>
<td>Quartz vein with copper and iron oxides, fine stringers of dark sulfides; sample chipped from face 225 feet into main adit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1945</td>
<td>4113200N 595220E</td>
<td>Brecciated vein material with yellow and black oxide coatings; vein contains galena, pyrite, and anglesite</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1946</td>
<td>4113200N 595220E</td>
<td>Quartz breccia with iron oxides, galena; almost all of matrix is composed of quartz and pyrite</td>
</tr>
<tr>
<td></td>
<td>Rainstorm prospect (21)</td>
<td>1918</td>
<td>4412720N 597410E</td>
<td>Brecciated white quartz vein and quartzite breccia with iron oxides and pyrite; sample taken from 3- to 4-foot-wide vein</td>
</tr>
<tr>
<td></td>
<td>Unnamed shaft (22)</td>
<td>1900</td>
<td>4112400N 597540E</td>
<td>Highly iron-oxide-stained quartz vein, brecciated; sample taken from dump</td>
</tr>
</tbody>
</table>
### Sample Analyses

**E. Pahranagat**  
**Lighter clays (1)**  
| Sample | Ca | Mn | Fe | Mg | Al | Ti | Ag | As | Ba | Be | Be | Bi | Co | Cr | Cu | Zn | Se | Sr | Th | U | W | Y | Zr | Zr | Mo | Ta | Nb | Ta | Ta | Nb | Ta | Nb | Ta | Nb | Ta | Nb |
|--------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|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MINERAL RESOURCES OF THE PAHRANAGAT RANGE 30' BY 60' QUADRANGLE
The Nevada Bureau of Mines and Geology is part of the Mackay School of Mines at the University of Nevada-Reno and is the state geological survey. Scientists at the Nevada Bureau of Mines and Geology conduct research and publish reports on mineral resources and various aspects of general, environmental, and engineering geology.

Current activities in mineral resources and general geology include detailed geologic mapping and stratigraphic studies in Nevada, comparative studies of bulk mineable precious-metal deposits, geochemical investigations of mining districts, resource assessments, igneous petrologic studies, hydrothermal experiments, research on the origin of hydrothermal platinum-group-element occurrences, and examination of the origin and distribution of borate deposits in Nevada.

Environmental, engineering, and urban geology projects include investigations of earthquake hazards and related aspects of neotectonics, examination of issues involved in siting nuclear and hazardous wastes, mapping of geomorphic features, radon hazard studies, and studies of landslide hazards.

Geologic information activities include creating and updating databases on mining districts, active mines and prospects, and geothermal and petroleum exploration and production; implementation and development of statewide geographic information systems; and maintenance of core and cuttings facilities, rock and mineral collections for research, aerial photographic imagery and maps, and extensive files on Nevada geology and resources.

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