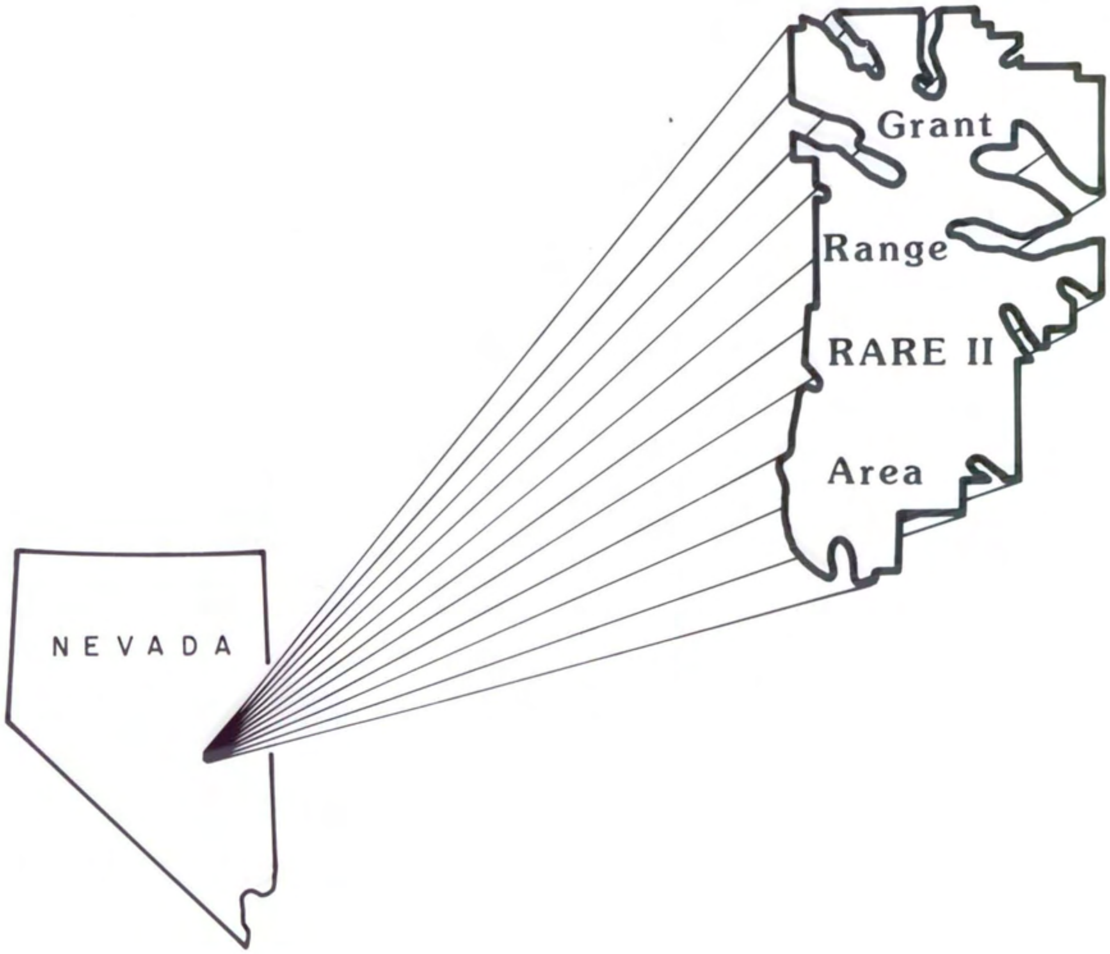
MLA 31-88

Mineral Land Assessment
Open File Report/1988

Mineral Resources of the Grant Range RARE II Area, Nye County, Nevada



BUREAU OF MINES
UNITED STATES DEPARTMENT OF THE INTERIOR

MINERAL RESOURCES OF THE GRANT RANGE RARE II AREA, NYE COUNTY, NEVADA

by

Richard F. Kness

MLA 31-88
1988

Intermountain Field Operations Center
Denver, Colorado

UNITED STATES DEPARTMENT OF THE INTERIOR
Donald P. Hodel, Secretary

BUREAU OF MINES
T S Ary, Director

CONTENTS

CONTENTS--Continued

ILLUSTRATIONS

ILLUSTRATIONS--Continued

TABLES

UNIT OF MEASURE ABBREVIATIONS USED IN THIS REPORT

bbl	barrel
°	degree
°C	degree, Celsius
°F	degree, Fahrenheit
ft	foot
ft^3	cubic foot
hfu	heat flow unit
hr	hour
in.	inch
km	kilometer
mi	mile
m.y.	million years
oz/st	troy ounce per short ton
ppm	part per million
%	percent
st	short ton

PREFACE

The Wilderness Act (Public Law 88-577, September 3, 1964) and related acts require the U.S. Geological Survey and the U.S. Bureau of Mines to survey certain areas on Federal lands to determine the mineral values, if any, that may be present. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a mineral survey of the Grant Range RARE II Wilderness Recommendation area, Humboldt National Forest, Nye County, Nevada. The area was established as a wilderness recommendation area during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979.

This open-file report summarizes the results of a Bureau of Mines wilderness study. The report is preliminary and has not been edited or reviewed for conformity with the Bureau of Mines editorial standards. This study was conducted by personnel from the Branch of Resource Evaluation, Intermountain Field Operations Center, P.O. Box 25086, Denver Federal Center, Denver, CO 80225.

MINERAL RESOURCES OF THE GRANT RANGE RARE II AREA, NYE COUNTY, NEVADA

by

Richard F. Kness, Bureau of Mines

SUMMARY

The Grant Range RARE II study area comprises 101,070 acres in the Humboldt National Forest, Nye County, Nevada. During May-September 1985 and August 1986, the Bureau of Mines conducted a mineral resource investigation of the study area as required by Public Law 88-577.

Mining has occurred since 1867 in and near the study area. Copper, gold, lead, silver, tungsten, and zinc have been mined or prospected for inside and within 1.5 miles of the northwestern boundary. Fluorspar and molybdenum prospecting occurred outside the southeastern boundary.

Inferred subeconomic gold, silver, and tungsten resources are in the Troy mineralized area in and near the northwestern boundary. Tungsten resources which are outside the study area, are high-grade but low tonnage. Quartz veins in Irwin and Troy Canyons contain gold, lead, silver, and zinc, but element concentrations are generally too low to constitute an identified resource in most of the veins. Gold and silver resources in quartz veins in and near the study area are mostly low-grade and low-tonnage. Inferred subeconomic low-grade and low-tonnage gold and silver resources are in the Leadhill adit within the study area south of Troy Canyon. The Locke vein, outside the study area, contains higher-tonnage but low-grade inferred gold and silver resources.

Indicators of Carlin-type disseminated gold deposits are present within the Crystal mineralized area near the southeastern study area boundary. Surface indicators and gangue minerals present are similar to those found near

this type gold deposit. Samples contained low gold and pathfinder element concentrations that are typical of precious metal deposits elsewhere in Nevada.

Limestone within the study area is without special or unique properties but would be suitable for road metal. Although high calcium limestone beds may be present, none were noted during the field investigation. No nearby markets have been identified and higher quality resources are present elsewhere in the region.

Oil is being produced 3.5 miles to the north in the Railroad Valley. The Troy metamorphic aureole inside the northwestern boundary and thick sequences of extrusive igneous rocks inside the southern boundary indicate high geothermal temperatures which generally preclude the presence of hydrocarbons. Mississippian rocks, petroleum source rocks in the Railroad Valley oil fields, crop out inside the eastern study area boundary and any petroleum generated may have been lost.

Geothermal resources exist outside the study area in Railroad Valley but are not likely at depth within the study area. Thermal springs and wells are along, or basinward, from major Basin and Range faults that are outside the boundaries. No thermal springs or travertine deposits were observed within the study area during the field study.

INTRODUCTION

In May-September 1985 and August 1986, the Bureau of Mines studied the mineral resources of the Grant Range RARE II Wilderness Recommendation area, Nye County, Nevada, on land administered by the U.S. Forest Service. The study area (SA) comprises 101,070 acres. The Bureau surveys and studies mines, prospects, and mineralized areas to appraise reserves and identified resources. This report presents the results of the Bureau of Mines study.

Geographic setting

The Grant Range SA is in south-central Nevada, about 70 mi southwest of Ely and about 25 mi south of Currant (fig. 1). From the Nyala Road west of the SA, unimproved roads into Grant, Irwin, Troy, and Little Meadows Creek Canyons provide access to the northern and western boundaries. The Cherry Creek Road generally parallels the southwestern and southern boundaries, and one branch (pl. 1) splits in a northeasterly direction paralleling the eastern boundary until turning east toward Sunnyside. From this road, unimproved roads provide access into Rimrock, Scofield, and Sherwood Canyons.

The study area is in the Great Basin section of the Basin and Range physiographic province, which is characterized by subparallel mountain ranges separated by broad alluvium-filled valleys. In the southern part of the Grant Range, the SA is bounded on the east by Garden and White River Valleys and on the west by Railroad Valley. Cherry Creek Canyon, along the southwestern boundary, separates the Grant Range from the Quinn Canyon Range to the south.

Topography within the study area is rugged. Elevations range from approximately 6,200 to 11,298 ft at Troy Peak. Easterly and westerly flowing ephemeral and perennial streams have cut deep canyons in Paleozoic-age sedimentary and Cretaceous-age granitic rocks. Profiles of larger canyons such as Irwin, Troy, Rimrock, and Scofield change abruptly from deep v-shaped to broad or shallow braided drainages as range-front gravel pediment surfaces are encountered. Resistant limestones and quartzites tend to form ridges which contrast with more subdued and rounded topography developed on exposed granitic plutons. Horizontal or gently dipping Tertiary-age lava flows form red or orange buttes and mesas.

Climate is semi-arid and precipitation increases with elevation. Annual normal precipitation for Adaven near the southern boundary (pl. 1), is

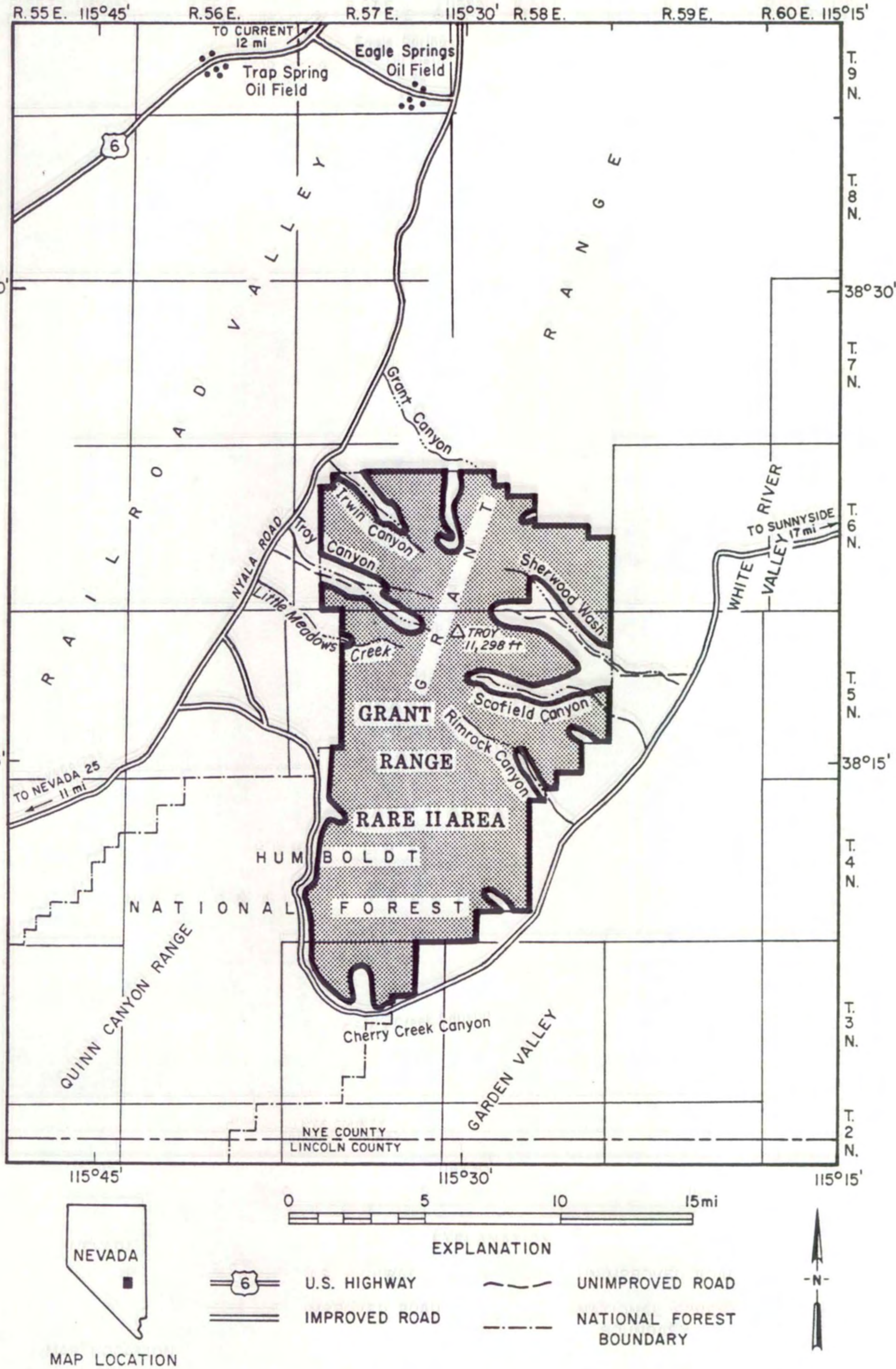


Figure 1.--Index map of the Grant Range RARE II area, Nye County, Nevada.

12.8 in. compared with 20 in. for the higher mountains (Kleinhampl and Ziony, 1985, p. 9-10).

Previous investigations

Hill (1916) described the Troy (Irwin Canyon) mining district and prepared a reconnaissance geologic map. The Troy (Irwin Canyon) district was briefly mentioned by Lincoln (1923). The mineral resources of Nye County, Nevada, were complied by Kral (1951) and updated by Kleinhampl and Ziony (1984). Fluorspar deposits in the Quinn Canyon Range were studied by Sainsbury and Kleinhampl (1969) and Papke (1979). Hamilton (1987) evaluated the mineral resources and Hofstra and others (1984) did a geochemical assessment of Riorden's Well Study Area outside the northern boundary. Mines and prospects in the Quinn RARE II Study Area, outside the southern boundary, were appraised by Thompson (1988).

Several unpublished Ph.D. dissertations and a M.S. thesis cover areas near to, or part of the SA. Huttrer (1963) mapped the geology from Irwin Canyon north to Grant Canyon. Tertiary geology and ignimbrite petrology of the Grant Range was the subject of a Ph.D. dissertation by Scott (1965). Cebull (1967) mapped the geology from Irwin Canyon southward to Cherry Creek. The stratigraphy and structural development of the west-central Grant Range, which includes an area southward from Irwin Canyon to Little Meadows Creek, was studied by Fryxell (1984).

Stratigraphy and structure of the Grant Range were studied by Kirkpatrick (1960), Cebull (1970), and Hyde and Huttrer (1970). The Grant Range is included in a regional tectonic study by Moores and others (1968). Bartley and others (1984) showed the Grant/Quinn Canyon Ranges formed during Tertiary extension in the Great Basin.

A preliminary geologic map of northern Nye County was published by Kleinhampl and Ziony (1967). Reconnaissance geologic mapping (Sainsbury and Kleinhampl, 1969) covers part of the southern SA. Many of the previous mentioned geologic investigations have been summarized by Kleinhampl and Ziony (1985).

Numerous technical papers pertaining to Railroad Valley petroleum resources are in two guidebooks. Guidebook to the geology of east central Nevada (Boettcher and Sloan, 1960) was published by the Intermountain Association of Petroleum Geologists and Eastern Nevada Geological Society. Updated oil and gas information is presented in Basin and Range Symposium and Great Basin Field Conference (Newman and Goode, 1979) published by Rocky Mountain Association of Geologists and Utah Geological Association.

Methods of investigation

This study included a literature and records search and a field investigation. County records in Tonopah, Nevada, and records on file with the Bureau of Land Management (BLM) in Reno, Nevada, were examined for the location of patented and unpatented mining claims; BLM records were also examined for oil and gas leases. Two Bureau geologists spent 60 days on the field study, which included ground reconnaissance, surface traverses, a 2 hr helicopter overflight, and an examination of mines and prospects within and near the study area.

A total of 561 rock, 10 panned-concentrate, and 46 stream-sediment samples was collected. Sampled localities are shown on plate 1 and figures 3-9.

Sample analyses were done by: Barringer Laboratories, Golden, CO; Bondar Clegg, Inc., Lakewood, CO; and the Bureau's Reno Research Center, Reno, NV.

Analytical detection limits and methods are presented in the appendix. Complete analytical results are available for public inspection at the Bureau of Mines, Intermountain Field Operations Center, Building 20, Denver Federal Center, Denver, CO.

Acknowledgments

The author gratefully acknowledges Becky S. Weimer, Nevada Bureau of Mines, who provided oil and gas data. Joan E. Fryxell lent a copy of her geologic map and Ph.D. dissertation. Rene P. Demeule, U.S. Forest Service, Ely Ranger District, provided assistance and housing facilities at the Cherry Creek Guard Station.

GEOLOGIC SETTING

This geologic summary is largely summarized from Cebull (1970), Fryxell (1984), Kleinhampl and Ziony (1985), and supplemented by field observations made during the Bureau study. The Grant Range is a fault-block range in the Basin and Range Physiographic Province. The Grant Range is an east-dipping horst bordered by the Railroad and White River Valley grabens and formed as the result of large-scale crustal extension along late Cenozoic-age normal faults. The boundary fault zone along the west side of the Grant Range exhibits 10,000-15,000 ft of stratigraphic displacement (Bortz and Murray, 1979, p. 443).

Paleozoic-age sedimentary, Mesozoic-age plutonic, and Cenozoic-age sedimentary and volcanic rocks are exposed in the study area. More than 20,000 ft of Paleozoic marine carbonate and clastic rocks are exposed in the Grant Range (Cebull, 1970, p. 1828). These rocks are miogeosynclinal and of the eastern carbonate assemblage. In general, Paleozoic sedimentary rocks range in age from Cambrian to Pennsylvanian and the oldest rocks crop out along the western portion of the SA. Several thousand feet of Cenozoic sedimentary and silicic volcanic rocks uncomformably overlie the Paleozoic sequence.

In and near Irwin and Troy Canyons, a quartz monzonite pluton (Troy Granite) intrudes lower Cambrian limestones, sandstones, and shales (Hill, 1916, p. 140). Fryxell (1984, p. 37) describes the Troy Granite as a medium- to coarse-grained, equigranular to porphyritic, biotite-muscovite (two-mica) granite rather than a quartz monzonite. The granite yielded a potassium-argon age of 22-25 m.y. (Cebull, 1970, p. 1829), but this Tertiary age may have been reset by thermal stresses related to fault-related movements. According to Fryxell (1984, p. 96-101), five leucogranite samples yielded rubidium-strontium age dates of 70.2 $\pm$ 3.5 m.y. which indicates a Cretaceous age emplacement. Tungsten skarn mineralization associated with the Troy Granite may be similiar to mineralization associated with silica-rich granites elsewhere in the western Cordillera. All but one of the Troy granite samples (table 19) contained more silica than the average granite (70.18% SiO_2) (Spock, 1953, p. 100) and the Troy Granite is the probable source of mineralization.

Tertiary-age volcanic rocks crop out in Cherry Creek and Troy Canyons. Extrusive volcanic rocks are Oligocene-age and Miocene-age rhyolitic to quartz latite ash-flow tuffs. Sainsbury and Kleinhampl (1969, p. C-6) hypothesize the existence of volcanic centers (calderas) in the Cherry Creek area and Quinn Canyon Range, however their shape and extent is not well defined.

Structural relations in the Grant Range within the study area are very complex. Structurally, Paleozoic rocks are divided into a lower and upper level, principally on the basis of deformational style. The lower level is characterized by eastward recumbently-folded and metamorphosed strata of early and middle Cambrian age. Low-angle faulting characterizes the unmetamorphosed upper level and these faults are present in the upper structural level within the Grant Range and study area (Cebull, 1970, p. 1828). The age of these faults are in dispute. Some geologists ascribe the deformation to a Mesozoic episode while others emphasize Tertiary deformation because the major folding and low-angle faulting occurred during the Miocene.

Most of the Cambrian-age rocks exposed from Timber Mountain (pl. 1) to the mouth of Troy Canyon are part of the overturned limb of the Timber Mountain anticline. Erosion has removed the upper limb of the recumbent fold. The fold nose crops out west of Timber Mountain and just south of the mouth of Troy Canyon. The overturned limb shows the inverted sequence of Cambrian-age Pole Canyon Limestone, Pioche Shale, and Prospect Mountain Quartzite. The lower, overturned fold limb was metamorphosed largely after folding and before late Cretaceous granite emplacement. (See Fryxell, 1984, p. 56, 66, and 69.)

Low-grade metamorphism in the study area is indicated by schistose marble, metasiltstone, metaquartzite, and phyllite. Biotite schists, characteristic of intermediate-grade metamorphism, are present near the Troy Granite at the Nye Mine. Intermediate-grade metamorphic rocks (580-700°C) represent the highest grade of metamorphism in the study area. Rocks near the lower South Fork of Troy Canyon were metamorphosed between 450-600°C. Rocks at the upper South Fork of Troy Canyon were metamorphosed only slightly or not at all (<380°C). Metamorphism may be regional or a large contact metamorphic aureole surrounding the Troy Granite. (See Fryxell, 1984, p. 64.)

Skarn (contact-metamorphic) zones containing epidote, garnet, quartz, and scheelite are at and near the contact between the Troy Granite and

Cambrian-age limestones in the Nye and Terrell Mines. Cordilleran tungsten skarns generally occur in the lowest exposed carbonate bed of a stratigraphic sequence, thus basal Cambrian limestones are common host rocks (Newberry and Einaudi, 1981, p. 102).

Kleinhampl and Ziony (1985, p. 147) suggested, and Fryxell (1984, p. 1-2) investigated the possibility, that structures present in the Grant Range are similiar to those present in metamorphic core complexes. In northeastern Nevada, metamorphic core complexes have been identified in the Ruby and Snake Ranges. Metamorphic core complexes are composed of a lower structural level of igneous and metamorphic rocks and an unmetamorphosed upper level separated by a major low-angle normal fault, called a detachment fault. Disseminated gold is sometimes found in low-angle detachment fault breccias related to metamorphic core complexes (Bouley, 1986, p. 251). Although similarites exist, Fryxell (1984, p. 106) found no detachment fault and differences in age and geometry of ductile shearing and low-angle normal faulting within the study area.

MINING ACTIVITY

Copper, fluorite, gold, lead, molybdenum, silver, tungsten, and zinc have been mined or prospected for in and within 1.5 mi of the study area. Mining began in 1867 when silver was discovered at the Troy Mine, and claims were first located in Irwin Canyon in 1905 (Hill, 1916, p. 141-142). Prospecting for molybdenum occurred in 1980 when Superior Oil Co. staked claims in and near the southeastern boundary and drilled at least one hole (near sample no. 595). Recent activity in the same area occurred in 1986 when Hecla Mining Co. staked claims. During 1987, the U.S. Forest Service reported that claimants were upgrading the old Troy Mine Road.

Unpatented mining claims extend inside the northwestern and southern study area boundaries (pl. 1). Patented mining claims covering the Gray Eagle vein and the Troy Mine are just outside the boundary in the Troy Canyon "cherry stem". The Troy patented millsite is in lower Troy Canyon near the Troy town site. In 1869, a 20-stamp mill with Stetefeldt (chloridizing roast) furnaces was built at Troy and closed in 1872 because of low-grade silver ore (Hill, 1916, p. 141).

The following information on mining districts is summarized from Hill (1916, p. 142-144), Kral (1951, p. 176, 216), and Kleinhampl and Ziony (1984, p. 191-194, 227). The Troy mining distict is mostly inside the northwestern boundary encompassing an area northward from Little Meadows Creek to Grant Canyon (pl. 1). The Willow Creek mining district is in the Quinn Canyon Range south of the study area. The Sharp (Adaven, Uhalde Ranch) area of the Willow Creek district is between Cherry and Pine Creeks outside the southern boundary. The Willow Creek district includes the Quinn Canyon fluorspar district. Located in the Quinn Canyon fluorspar district, the Crystal Group of fluorspar occurrences are north of Cherry Creek near the southeastern boundary.

The Troy mining district has produced gold, lead, silver, and tungsten. Total recorded production of gold, lead, and silver was about 2,358 tons valued at $31,781 when produced. The largest producers were probably the Locke and Troy Mines which were acquired by the Old English Gold Corp. in 1936. A 50-ton flotation mill was installed at the Locke Mine in 1946. A 26-ft-thick quartz vein reportedly carried gold values of $10-$20 per ton. The mine was inactive in 1949, however, some development work was completed in the early 1960's. Quartz veins containing low gold and silver concentrations are present in the Haller, Irwin, Mayolli, and Vanderhoef workings in Irwin Canyon but these workings have had little or no known (recorded) production.

Tungsten was discovered in the 1950's outside the northwestern SA boundary. Recorded tungsten production was near 10,000 tons valued between $100,000 and $250,000 when produced. Terrell Mine tungsten concentrate (67% WO_3, tungsten oxide) production was valued at $60,000 from ore containing about 1% WO_3 and 16% zinc. Nye Mine tungsten concentrate (65% WO_3) production was valued at more than $60,000 from ore containing from 1% to 17% WO_3. Production ceased in the early 1960's. In 1959, the U.S. Government terminated tungsten stockpile purchases resulting in closure of most domestic tungsten mines. The Terrell Mine shown on the 1:62,500 Troy Canyon topographic map is the Terrell Mill.

The Willow Creek district has produced fluorite, gold, lead, and silver. Production records are incomplete, but from 1911 to 1951 gold, lead, and silver production was valued at about $116,000. In the Sharp area, a 238 ton dump shipment from the Roadside Mine (pl. 1) averaging 13 oz silver/ton, 26% iron, and 15% manganese was made during the winter of 1938-1939. Kleinhampl and Ziony (1984, p. 227) estimated Willow Creek district fluorite production at 214 tons, however, Papke (1979, p. 48) estimated fluorite production at 29,500 tons because of open-pit mines in the Quinn Canyon Range.

The Crystal Group of fluorspar occurrences, outside the southeastern boundary, were located by Hubert Welch from 1952-1958. According to Papke (1979, p. 50), there has been no production and very little exploration on the Crystal Group of fluorspar occurrences.

ENERGY RESOURCES

The Bureau's literature search indicated that oil and geothermal resources occur near the study area.

Oil

No drilling is known to have occurred in the study area, but two producing oil fields are present approximately 3 1/2 mi north in Railroad Valley. The fields, as well as nearby drilled wells, dry holes, and oil and gas leases, are shown on figure 2.

Railroad Valley is the major oil producing area in Nevada from which four fields are currently producing. The Eagle Springs and Trap Spring oil fields (fig. 1) produce from a combination of structural and stratigraphic traps. Eagle Springs reservoir rocks are the Pennsylvanian Ely Limestone, Eocene-age Sheep Pass Formation, and Oligocene-age ash-flow tuffs. Reservoir rock at the Trap Spring field is the Tertiary Pritchards Station Formation, an ash-flow tuff. Hydrocarbon source rocks probably were either or both Mississippian Chainman Shale and Sheep Pass Formation. The fields are structurally controlled by the down-thrown sides of the eastern and western Railroad Valley bounding faults. (See Bortz and Murray, 1979, p. 441; Duey, 1979, p. 469.)

The Bacon Flat and Grant Canyon fields (fig. 2) were discovered in 1981 and 1983, respectively. For both fields, the Mississippian Chainman Shale is the major petroleum source rock (Poole and Claypool, 1985, p. 861). Reservoir rocks are Paleozoic carbonates (Bortz, 1985, p. 117 and 119). Structural information is not available but conditions are probably similiar to those at the Eagle and Trap Springs fields since these fields are west of the down-thrown side of the Railroad Valley fault.

Railroad Valley oil fields produce virtually no gas. Grant Canyon field is the most productive in Railroad Valley as can be seen in the following table.

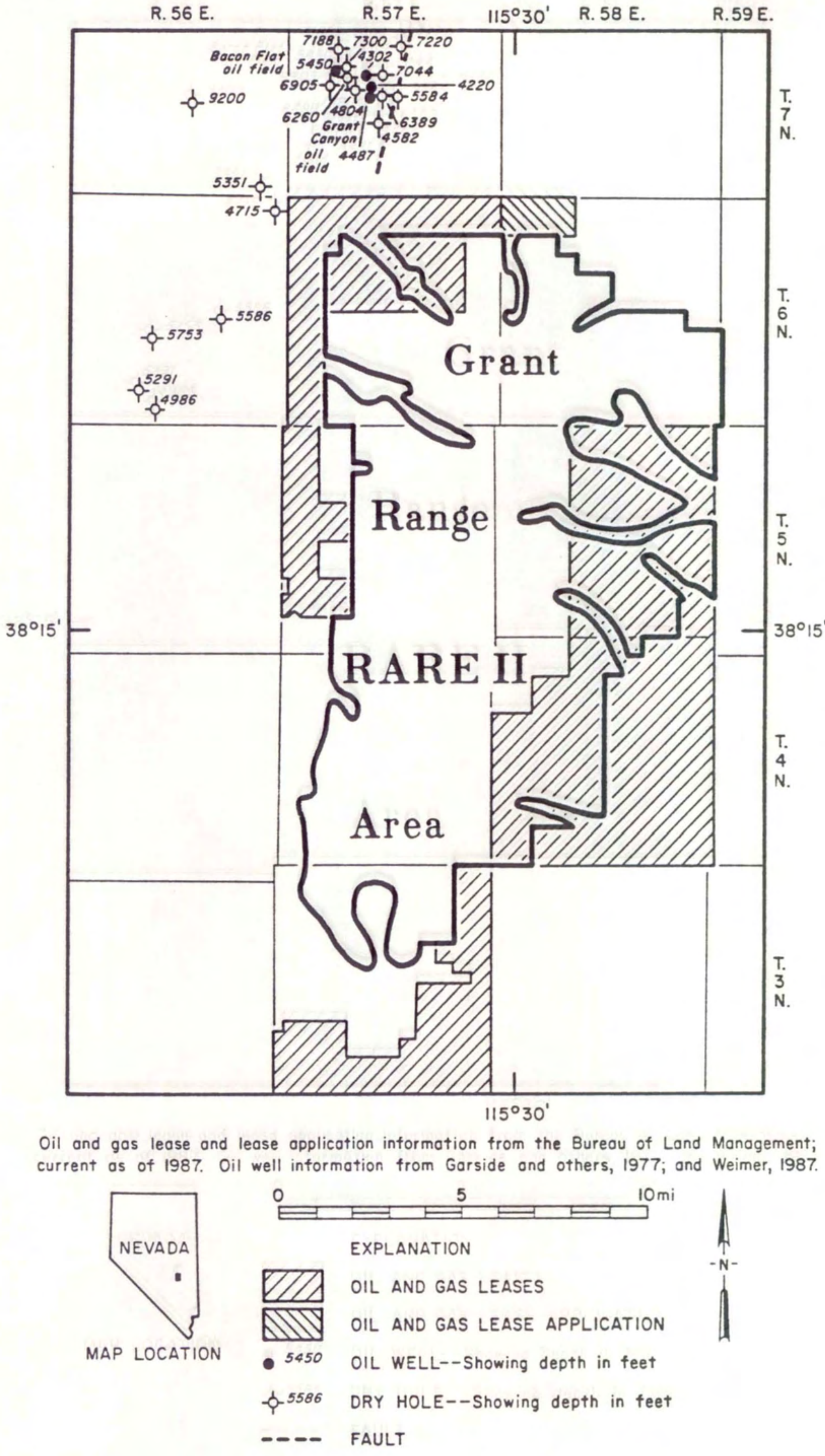


Figure 2.--Map showing oil and gas wells and leases in or near the Grant Range RARE II area.

Railroad Valley oil production.

Field (discovery date)	1984	1985	1986
	bbl		
Eagle Springs (1954)	69,673	58,807	28,408
Trap Spring (1976)	522,830	582,822	500,517
Currant (1979)	0	0	0
Bacon Flat (1981)	10,855	47,942	72,643
Grant Canyon (1983)	1,168,711	2,065,747	1,862,784

Source: Garside and Weimer, 1987, p. 25

Sandberg (1983, p. H1, H8) evaluated the petroleum resources of wilderness lands in Nevada using the following four major parameters that govern oil and gas accumulation: presence of source rocks, hydrocarbon maturation, reservoir rocks, and traps. He rated the Grant Range study area as having "medium potential" because of optimum maturity of source rocks in the upper Devonian-age Pilot Shale and the Mississippian-age Chainman Shale and proximity to oil fields in Railroad Valley. However, the Troy metamorphic aureole inside the northwestern boundary and thick sequences of extrusive igneous rocks inside the southern boundary indicate high geothermal temperatures which may preclude the presence of hydrocarbons. Mississippian rocks, source rocks in the Railroad Valley oil fields, crop out inside the eastern boundary and any petroleum generated may have been lost.

Geothermal

In the Basin and Range region, heat flow is well above normal and the occurrence of geothermal convection systems is significantly controlled by recurrent tensional faulting and rifting. Median heat flow in the Basin and Range Province is 2.01 hfu compared to a median heat flow of 1.52 hfu for the U.S. The Battle Mountain High, partly located in northwestern Nevada, has an average of 3 hfu. Low heat flow (<1.5 hfu) is characteristic of the Eureka

Low, a region in south-central Nevada which includes the study area. (See Grose and Keller, 1979, p. 365-366; Hyde, 1979, p. 381.) Sammel (1978, p. 116-117) identified Railroad Valley as favorable for the occurrence of low-temperature (<90°C) geothermal waters at less than 1 km depth. Circulation is along range-bounding faults.

The Railroad Valley geothermal area (pl. 1) is about 4 mi outside the northwestern study area boundary. No geothermal leases or lease applications are within the study area. Thermal springs and wells in Railroad Valley occur mainly along the margins of the valley, either coincident with, or basinward from, major Basin and Range faults. Bullwhacker, Thorn, Willow, and other thermal springs (pl. 1) are outside the study area and aligned along the trend of a northeast-striking fault. Temperatures of the thermal springs are about 60°F. (See Garside and Schilling, 1979, p. 50; Kleinhampl and Ziony, 1985, p. 24, 29-30.) No thermal springs or travertine deposits were observed during the field study.

MINERAL RESOURCE APPRAISAL

Two mineralized areas were defined by this study. The Troy mineralized area, mostly inside the northwestern boundary, is associated with a Cretaceous granitic pluton. The Crystal mineralized area, mostly within the southern study area, is associated with jasperoid and the Crystal Group of fluorspar occurrences. Mineral occurrences are summarized on table 1. Limestone and dolomite occur within the study area and both mineralized areas.

Troy mineralized area

The Troy mineralized area contains five areas and most of the mine workings in the Grant Range study area. The Grant Canyon area has limestone replacement deposits. The Terrell area just north of the SA has tungsten in skarn deposits.[1/] Irwin Canyon has quartz veins containing gold, lead, silver, and zinc. Troy Canyon has gold, lead, silver, and zinc mineralization in contact quartz veins. The Troy Canyon south area has quartz veins containing gold, lead, silver, and zinc.

Mineralization is genetically and spatially related to the intrusion of the Troy Granite. Tungsten precipitation in skarn occurs at relatively high temperatures (>500°C) and moderate pressures near intrusive contacts, whereas sulfides are best precipitated at lower temperatures and pressures (Newberry and Einaudi, 1981, p. 99). Fryxell (1984, p. 64) found that the highest grade (staurolite) metmorphic rocks are at the head of Irwin Canyon in proximity to the tungsten mines, and rock thermal aureole temperatures decline to the southeast.

The distribution of metamorphic facies and the pattern of skarn, quartz veins, and replacement-type deposits in the study area suggests a crude zoning. Zoning results from decreasing metasomatism and thermal effects away from the intrusive contact. High-temperature scheelite near the intrusive is zoned outward to low-temperature base-metal sulfide veins. Arsenic and antimony, pathfinder elements for silver-rich base metal sulfide veins, show high concentrations in workings (Leadhill adit, Troy Mine) near the periphery of the Troy metamorphic aureole.

Although mineral occurrences are restricted to metamorphosed Cambrian sedimentary and Cretaceous igneous rocks of Cebull's (1970, p. 1828) lower

---

1/ Skarn consists of coarse-grained Ca-Fe-Mg-Mn silicates formed by replacement of carbonate-bearing rocks accompanying regional or contact metamorphism and metasomatism. Metal deposits (Cu, Fe, Mo, Sn, W, Zn-Pb) that contain skarn as gangue are termed skarn deposits. Majority of major skarn deposits are related to magmatic-hydrothermal systems. (See Einaudi and others, 1981, p. 317.)

structural level, mineral occurrences seem genetically and spatially related to the Troy metamorphic aureole rather than dynamothermal metamorphism.

Resource estimates were made for some faults or veins in the Troy mineralized area using the weighted average of samples taken across the fault or vein. Mineral resource/reserve definitions are in U.S. Geological Circular 831. For estimating inferred resources, the fault or vein was projected 1/2 the measured strike length updip or downdip and projected 1/4 the measured strike length beyond each exposure in the adit or mine. A tonnage factor of 12.2 ft^3/st was used. A summary of inferred gold, silver, and tungsten resources is included in table 2 and commodity statistics are in table 3.

Limestones are host for lead, silver, and zinc in replacement deposits (Mother's Day adit). Skarns at the Nye and Terrell Mines contain disseminated scheelite, an ore of tungsten. Some quartz veins contain gold, lead, silver, and zinc and are structurally controlled along faults in granite (Irwin Mine), concordant with the granite-limestone unconformity (Mayolli adits, Vanderhoef adits, Locke Mine, Locke vein adits), or along sedimentary lithologic or formation contacts (Haller adits, Leadhill adit, Troy Mine).

Limestone replacement deposits

Limestone replacement deposits are outside the study area in Grant Canyon. Prospects in the Grant Canyon area are shown on plate 1 and analytical data is in table 4.

The Mother's Day adit (fig. 3) is outside the study area in Grant Canyon. Mineralization occurred as replacement of limestone and terminated against cross-cutting faults. The 50-ft-wide replacement zone contains quartz, galena, and pyrite in brecciated limestone. Samples contained high lead and zinc and low silver concentrations (fig. 3), but they are generally too low-grade to constitute an identified resource.

Tungsten skarn deposits

Skarn mineralization is found in places at or near the contact between the Troy pluton and carbonate rocks. Contact-metasomatic (skarn) deposits result from hydrothermal solutions emanating from a crystallizing granitic magma reacting with a favorable host rock, such as limestone, at high temperatures and pressures (Elliott, 1982, p. 52). Scheelite (tungsten oxide) as well as the skarn minerals epidote and garnet were noted in the Nye and Terrell Mines. Tungsten-bearing skarn was found at the Locke Mine and in Troy Canyon in a 3-ft-wide fault traceable only 30 ft (fig. 7A, table 9, sample nos. 230-231).

The Terrell area is between Grant and Irwin Canyons. The Terrell and the Nye Mines are outside the northwestern study area boundary and the Terrell mill site is about 1/2 mi east of the Terrell Mine (pl. 1). Table 5 shows analytical data and sample descriptions for the Terrell mill.

At the Terrell Mine (fig. 4) scheelite is disseminated in a 3-to-7 ft-wide skarn zone parallel to metamorphosed limestone beds in the Cambrian Pioche Shale (?). Limestone beds are in fault contact with the Troy Granite. Gangue minerals noted were calcite, epidote, garnet, pyrite, and quartz. Samples contained mostly low tungsten concentrations, the highest being 2.54% tungsten (fig. 4, sample no. 36). Low gold and silver and high bismuth, fluorine, manganese, and zinc concentrations were present. No resources were defined.

The Nye Mine (fig. 5) is about 1 mi southwest of the Terrell Mine. Scheelite is disseminated in skarn and in northwest-striking faults.

Limestone and shale beds have been metamorphosed to marble and biotite schists, respectively. Limestone beds in the Pioche Shale (?) are contorted due to intrusion of the granite. A 6-ft-wide skarn zone, striking N. 15° W. and dipping 45° NE, is exposed in two prospect pits (pl. 1, sample nos. 46-47) above the Nye Mine. Samples contained tungsten concentrations (table 6). Gangue minerals noted in skarn at the mine and pits were calcite, epidote, garnet, hematite, and quartz. Samples taken across fault A contained tungsten concentrations as much as 8.7%. Low gold and silver and high bismuth, fluorine, and manganese concentrations were noted. Inferred subeconomic resources in the Nye Mine for fault A (sample nos. 54-60), with an average mineralized thickness of 2.7 ft and a strike length of 52 ft, are approximately 800 st at an average grade of 1.78% tungsten.

Pathfinder or geochemical signature elements are closely associated with, and may assist in finding, mineral occurrences or deposits. Pathfinders associated with tungsten skarn deposits are arsenic, beryllium, copper, fluorine, lead, molybdenum, tin, and zinc (Levinson, 1980, p. 885; Cox, 1986, p. 55). The amount and distribution of pathfinder elements in samples taken in the Irwin Canyon area about 1 mi to the south is not indicative of an extension of tungsten resources beyond known workings in the Terrell area.

Quartz veins

Structurally controlled quartz veins containing gold, lead, silver, and zinc are found along faults in granite (Irwin Mine), concordant with the granite-limestone unconformity (Mayolli adits, Vanderhoef adits, Locke Mine, Lock Mine, and Locke vein adits), or along sedimentary lithologic or formation contacts (Haller adits, Leadhill adit, Troy Mine). Mine workings are concentrated in Irwin and Troy Canyons.

Thick (6-50 ft) quartz veins at the Locke Mine, Locke vein adits, Mayolli adits, and Vanderhoef adits, concordant with the granite-limestone contact, may have resulted from late-stage skarn destruction. According to Einaudi and others (1981, p. 376), extensive skarn destruction can occur if significant hydrothermal circulation continues at low temperatures. Large portions of the skarn are converted to quartz along with clays, carbonates, sulfides, and iron oxides.

Irwin Canyon area

Prospects in the Irwin Canyon area are shown on figure 6A and analytical data is in table 7. At the Mayolli adits (fig. 6B), outside the study area, mineral occurrences are in 6-ft-wide quartz veins concordant with the granite-limestone contact. Samples contained lead and zinc (fig. 6B). Gold concentrations ranged from below detection limits to 7.8 ppm (0.23 oz/st) and silver concentrations ranged from 0.35 ppm (0.01 oz/st) to 40 ppm (1.16 oz/st). Gold, lead, silver, and zinc concentrations are generally too low to constitute an identified resource.

The Irwin Mine (fig. 6C) is also outside the study area. Mineral occurrences are in a 1 1/2-ft-wide fault/vein striking N. 60° E., dipping 75° NW. in granite. The vein is traceable about 125 ft on the surface and about 160 ft in the mine. Within the mine, the 65°-75° NW. dipping vein (sample nos. 119-124) terminates against a northwest-striking vertical fault. The vein was extensively stoped for an estimated 80 ft to the surface by shrinkage stoping. Samples contained lead, zinc, and low gold concentrations (table 8). Silver concentrations ranged from below detection limits to 40.9 ppm (1.2 oz/st). Gold, lead, silver, and zinc concentrations are too low to constitute an identified resource.

The Haller adits (fig. 6D) are inside the study area. Mineral occurrences are in a 6-to 36-in.-wide, northwest-striking quartz vein parallel to limestone bedding, granite, and quartz pods. Silicified limestone is in contact with the Troy granite. Samples contained high lead concentrations in the quartz vein, granite, and quartz pods (fig. 6D). Gold, lead, silver, and zinc concentrations are too low to constitute an identified resource.

The Vanderhoef workings (fig. 6E-G) are outside the study area on either side of Irwin Canyon. Mineral occurrences are in quartz veins concordant with the granite contact. A 20-ft-wide quartz vein (fig. 6A, sample no. 190) crops out, strikes about N. 80° W. and dips about 50° NE., and may be traced on the surface and in workings. The vein thins to about 16 in. (fig. 6A, sample no. 219) and terminates against a northwest-striking fault.

Analytical data indicates the presence of lead and zinc. Sample no. 205 (fig. 6F) showed the highest gold concentration of 2.27 ppm (0.07 oz/st). Most silver concentrations are low, although the highest silver grade was 20.1 oz/st (fig. 6G, sample no. 207). Gold, lead, silver, and zinc concentrations are generally too low to constitute an identified resource.

Troy Canyon area

Prospects in the Troy Canyon area are shown on figure 7A and analytical data is in table 9. The Locke Mine (fig. 7B) is outside the study area. The mine comprises over 2,000 ft of workings with stoping, raises, and winzes. Gold and silver occur in 12- to 40-ft-wide quartz veins concordant with the Troy Granite-Pole Canyon Limestone contact. Throughout the Locke Mine the quartz veins are brecciated and iron-oxide stained. Veins strike northerly or northeasterly and dip to the east or southeast. Thick quartz veins are exposed in three areas within the mine and are labeled A, B, and C (fig. 7B).

Vein A strikes northeast and dips about 36° SE. The vein has been extensively stoped above the main haulage level and an inclined drift and stoped areas parallel the vein dip. Vein A contains the highest gold concentration of 88.75 ppm (2.59 oz/st) and the highest silver concentration of 311 ppm (9.07 oz/st) (table 10). Inferred subeconomic resources for vein A with an average sampled thickness of 3.7 ft and a projected strike length of 240 ft and dip length of 340 ft, are approximately 50,000 st at an average concentration of 3.06 ppm (0.09 oz/st) gold and 13.3 ppm (0.39 oz/st) silver.

Vein B (fig. 7D) strikes northwest and dips 35° northeast. The 12-ft-wide vein is extensively stoped. Minor disseminated galena was noted (samples nos. 359-360). Inferred subeconomic resources for vein B with an average sampled thickness of 3.2 ft, strike length of 40 ft, and a dip length of 110 ft are approximately 2,200 st at an average concentration of 1.33 ppm (0.04 oz/st) gold and 12.8 ppm (0.37 oz/st) silver.

Vein C may be the south extension of Vein B since strike and dip are similiar. Vein C terminates southward against a northwest-striking fault (fig. 7B). Minor stoping has occurred along the 40-ft-wide vein. Inferred subeconomic resources for vein C with an average sampled thickness of 2.9 ft and a strike length of 145 ft, are approximately 3,800 st at an average concentration of 0.169 ppm (0.005 oz/st) gold and 1.45 ppm (0.04 oz/st) silver.

The Lock Mine (fig. 7A), outside the study area near the Locke Mine, was driven in Troy Granite and along the faulted Troy Granite-Pole Canyon Limestone contact. Quartz veins are in granite and concordant with the contact. Samples contained arsenic, gold, and silver concentrations (fig. 7E). Galena was noted on the dump. No identified resources are present.

The Locke quartz vein, shown on fig. 7A, is exposed on the ridge west of the Locke Mine. This quartz vein may be an updip extension of quartz veins present in the Locke Mine which would have been driven to intersect (cross-cut) the vein at a lower level. Three adits (fig. 7A) and five prospects were driven on the northeast-striking, southeast-dipping vein. The vein may be traced and projected about 1,200 ft on the surface. The vein thins southwesterly from about 50 ft (near sample no. 427) to 3 1/2 ft (sample no. 454) and could not be traced into the study area. The vein is faulted but generally concordant with the Troy Granite-Pole Canyon Limestone contact.

Arsenic, gold, lead, silver, and zinc occur in the Locke vein. The highest gold grade is 1.195 oz/st (table 9, sample no. 452) and the highest silver concentration is 36.7 ppm (1.07 oz/st) (fig. 7F). Inferred subeconomic resources for the Locke vein outside the Locke Mine (fig. 7A, sample nos. 418-454) with an average sampled thickness of 4.3 ft and a strike length of 1,200 ft, are approximately 300,000 st at an average concentration of 0.95 ppm (0.03 oz/st) gold and 15.98 ppm (0.46 oz/st) silver.

The Troy Mine is in upper Troy Canyon just outside the northwestern study area boundary in a "cherry stem" (pl. 1). Workings are caved or inaccessible but azurite, chalcopyrite, galena, malachite, and pyrite are present on the dumps. Mineral occurrences are in a 2- to 2 1/2-ft-wide, northeast-striking quartz vein in the Cambrian Sidehill Spring Formation, a limestone with interbedded siltstone layers. The vein is traceable on the surface for about 200 ft towards the study area. Low-grade metamorphism is indicated by the presence of phyllite. Samples contained high lead, zinc, and pathfinder element (antimony, arsenic) concentrations (table 11). A select sample contained 1.174 ppm (0.03 oz/st) gold and 390 ppm (11.37 oz/st) silver. No identified resources could be defined because the mine is inaccessible and surface exposures are limited.

Troy Canyon south area

Prospects in the Troy Canyon south area are shown on figure 8A and analytical data is in table 12. The Leadhill adit (fig. 8B) is in the study area about 1/2 mi south of the mouth of Troy Canyon. The mineral occurrence is in a 4- to 9-in.-wide northeast-striking brecciated vein parallel to Pole Canyon Limestone bedding. The vein can be traced downdip for about 60 ft. Galena and pyrite are present in the vein. Malachite was observed in a minor fault exposed in a short side drift (sample no. 485). Samples contained high lead, zinc, and pathfinder element (antimony, arsenic) concentrations (table 13). Sample no. 473 showed the highest gold grade of 0.457 oz/st and the highest silver grade of 9.59 oz/st. Inferred subeconomic resources for the vein with an average mineralized thickness of 1.3 ft and a dip length of 60 ft, are approximately 500 st at an average concentration of 2.5 ppm (0.07 oz/st) gold and 71.3 ppm (2.08 oz/st) silver.

The Galena vein (fig. 8A) is in the study area about 1/2 mi south of the Leadhill adit. Mineral occurrences are in a 4-ft-wide, northeast-striking quartz vein that is traceable for 225 ft. Cambrian Pioche Shale has been metamorphosed to phyllite. Galena was present in the vein. Samples contained high lead and zinc concentrations (table 12, sample nos. 497-503). A select sample (no. 501) contained the highest silver concentration of 35.9 ppm (1.05 oz/st). Gold, lead, silver, and zinc concentrations are generally too low to constitute an identified resource.

The Little Meadows Creek area (pl. 1, sample nos. 504-513) is just south of the Troy Canyon south area. Some samples contained gold, lead, and silver concentrations (table 14). No identified resources were defined.

Resources in the Troy mineralized area may be summarized by the following. Tungsten resources are high-grade but low-tonnage. Gold, lead, silver, and zinc concentrations are too low to constitute a resource in most of the quartz veins. Gold and silver resources in quartz veins are low-grade and generally low-tonnage. The Locke Mine contains high tonnages and the highest average gold concentration (3.06 ppm or 0.09 oz/st). Highest average silver concentration in the mine is 13.3 ppm (0.39 oz/st). Assuming gold valued at $400/oz and silver valued at $8/oz, the ore would be valued at $39/ton. This could be mined profitably only by open-pit methods. Analytical data show that gold and silver within quartz veins are erratically distributed and variable in vertical and horizontal extent.

Crystal mineralized area

The Crystal mineralized area is mostly within the southern part of the study area. Indications of Carlin-type gold deposits and fluorite prospects are present. Molybdenum exploration occurred here in the early 1980's. Panned-concentrate and stream-sediment samples were taken to delineate extent of known mineral occurrences. The Wadsworth Ranch area is outside the Crystal mineralized area.

Carlin-type deposits

Jasperoid results from hydrothermal alteration which may be associated with Carlin-type disseminated gold deposits. Massive fine-grained silica (quartz) commonly replaces limestone (silicification) forming jasperoid that is most pronounced near faults, along lithologic contacts, and in permeable limestones (Fournier, 1985, p. 21). The jasperoid commonly shows evidence of multiple periods of hydrothermal brecciation and may occur either capping the main ore horizon, within it, or below it. In some deposits, the jasperoid is of ore grade (Bonham, 1985, p. 73). According to Radtke and others (1980, p. 641-642), microscopic gold was introduced by low-temperature (175-200°C), silica-rich, meteoric, hydrothermal systems circulating along faults in response to thermal anomalies associated with Tertiary igneous and tectonic activity.

Carlin-type gold deposits are low-grade, ranging from 0.1-0.25 oz gold/st (3.4-8.6 ppm). Gangue minerals include barite, calcite, fluorite, hematite, pyrite, and quartz. (See Tooker, 1985, p. 146.) Pathfinder or geochemical signature elements associated with Carlin-type gold deposits are antimony (Sb), arsenic (As), mercury (Hg), thallium (Tl), and tungsten (W); fluorine (F) and molybdenum (Mo) may or may not be present (Berger, 1986, p. 175).

In the Crystal mineralized area (fig. 9), Sainsbury and Kleinhampl (1969) mapped Devonian dolomites and limestones, Mississippian limestones and shales, and Tertiary ash-flow tuffs, dikes, and rhyolites. Silicified ash-flow tuffs, silicified limestones, and jasperoid crop out near a fluorite breccia pipe. Extensive silicification seems to be restricted to the limestone beds in the upper Devonian Guilmette Formation. At the Alligator Ridge Mine, the Carlin-type deposit associated with miogeoclinal carbonate facies nearest the study area, jasperoid formed at the Devonian Devils Gate Limestone-Mississippian Pilot Shale contact (Tooker, 1985, p. 110).

The jasperoid in the Crystal mineralized area is brecciated, iron oxide stained, and contains hematite and pyrite pseudomorphs. Slickenslides indicate fault movements. Gold and silver are present in some of the jasperoid samples (table 17). The highest gold concentration was 0.255 ppm (sample no. 582) and the highest silver concentration was 2.02 ppm (sample no. 587). Jasperoid samples contained low concentrations of antimony, mercury, and thallium. Highest antimony, mercury, and thallium concentrations are 27 ppm, 1 ppm, and 1.4 ppm, respectively. Some samples contained high arsenic (0.08%), fluorine (0.14%), and molybdenum (86 ppm) concentrations.

Berger (1985, p. 52) presents trace element data on altered limestone and jasperoid samples from five Nevada carbonate-hosted disseminated precious-metal deposits. Gold and pathfinder element concentrations vary within and from deposit to deposit. Comparing the five deposits, gold concentrations ranged from <0.05 ppm to 59 ppm. Silver concentrations ranged from <0.5 ppm to 30 ppm. Mercury concentrations ranged from 0.08 ppm to 25 ppm. Highest arsenic concentration was 3,000 ppm (0.3%). Thallium concentrations ranged from 0.8 ppm to 3.6 ppm. Geochemical element concentrations in jasperoid samples from the Crystal mineralized area are consistent with geochemical element concentrations obtained from carbonate-hosted disseminated deposits elsewhere in Nevada.

Samples (table 17, sample nos. 569-571) taken outward and at lower elevations from the jasperoid-capped ridge also show low gold and silver concentrations. An ore horizon may be present at depth beneath the jasperoid cap because jasperoid overlies the ore zone at most Carlin-type deposits.

Panned-concentrate and stream-sediment samples (table 16) taken in and near the Crystal mineralized area contained consistent and generally high molybdenum concentrations (2 ppm to 21 ppm). Molybdenum was detected in all but three samples (nos. 547-548, 552) and these were in Dry Wash and Spring Creek drainages. Molybdenum was not detected in any stream-sediment sample from Scofield and Rimrock Canyon areas (table 15). Amount and distribution of molybdenum may show the northern boundaries of the mineralized area.

In summary, surface indicators of Carlin-type gold deposits within the Crystal mineralized area include: Paleozoic carbonate host rocks, Tertiary intrusive rocks that may have acted as a heat source, jasperoid occurring at a favorable stratigraphic horizon, silicification of ash flow-tuffs and limestone, faults that served as conduits for hydrothermal solutions, and hydrothermal breccias. Gangue minerals present here that are typical of Carlin-type deposits include calcite, fluorite, hematite, quartz, and pyrite. Analytical data shows the presence of gold and pathfinder elements that are typical of concentrations reported for similar altered rock at carbonate-hosted precious metal deposits elsewhere in Nevada. The amount and distribution of gold and pathfinder elements may be indicative of the presence of Carlin-type disseminated gold deposits. Amount and distribution of molybdenum in stream-sediment samples also points to the presence of mineral occurrences.

Fluorite

Fluorite occurrences in the study area were described by Papke (1979, p. 50-51) and Sainsbury and Kleinhampl (1969, p. C11-C12). These occurrences are covered by claims known as the Crystal Group. Fluorite is present in a breccia pipe, breccia zones, and quartz veins in limestone and limestone replacements.

Fluorite is present in a breccia zone (fig. 9, sample no. 571) and a breccia pipe (sample nos. 579-580) within the Crystal mineralized area. A 6-ft-wide breccia zone occurs in limestone but could not be traced on the surface beyond the pit. A 50-ft-diameter breccia pipe is exposed on a ridge capped by jasperoid and silicified limestone. Fluorite is associated with quartz breccia. Samples contained high fluorine concentrations in the breccia zone and breccia pipe (table 17, sample nos. 571, 579-580). According to Sainsbury and Kleinhampl (1969, p. C11), the breccia pipe contains about 35% CaF_2, most of which cements the breccia fragments. No identified fluorite resources could be defined because of the small size of the surface occurrence.

Wadsworth Ranch area

The Wadsworth Ranch area (pl. 1, sample nos. 614-617) is outside the southern boundary. Minerals occur in a 2-ft-wide, northeast-striking breccia zone. Kral (1951, p. 217) describes a 2-ft-wide, 40-ft-long vein striking N. 5° E., dipping 70° NW., containing arsenopyrite, galena, and sphalerite exposed in a 30-ft-deep shaft on a patented claim. No vein was noted but this is probably the shaft on the Comet claim where samples 616-617 were taken. Arsenopyrite, calcite, galena, hematite, manganese, pyrite, and quartz were noted on the shaft dumps. Samples contained high arsenic, lead, silver, and zinc concentrations (table 18). Molybdenum and tungsten were present. No identified resources could be defined because of the limited size of the surface exposure.

Limestone

Paleozoic limestones and dolomites crop out in and adjacent to the study area. Limestone is used in the agricultural, construction, and chemical industries. Most chemical uses require limestone of more than 95% calcium carbonate (Carr and Rooney, 1983, p. 836). High calcium (greater than 95% $CaCO_3$) limestone beds may be present in the study area although none were identified during field studies. Impurities such as chert, clay, iron, organic matter, and silica may affect utilization of carbonate rocks. Analytical data for samples of two carbonate rocks near the study area show calcium carbonate values of 48.5% and 80.5%. One limestone sample was iron-oxide stained and contained chert (table 19, no. 595). Limestone from the study area may be suitable for road metal. Even though a large inferred subeconomic resource of limestone suitable for such use is present in the study area, the high bulk, low unit value of this commodity, in conjunction with the high transporation cost resulting from the remoteness of the area, would limit its development for all but local uses. Local demand for these commodities is limited to nonexistent.

CONCLUSIONS

Inferred subeconomic gold, silver, and tungsten resources are in the Troy mineralized area in and near the northwestern boundary. Tungsten resources outside the study area are high-grade but low tonnage. Quartz veins in Irwin and Troy Canyons contain gold, lead, silver, and zinc, but element concentrations are too low to constitute an identified resource in most of the veins. Gold and silver resources in quartz veins in and near the study area are mostly low-grade and low-tonnage. The Locke vein, outside the study area, contains higher-tonnage but low grade gold and silver resources.

Carlin-type disseminated gold deposits may be present at depth within the Crystal mineralized area near the southeastern study area boundary. Surface indicators and gangue minerals present are similar to those found near this type gold deposit. Samples contained low gold and pathfinder element concentrations that are typical of similiar precious metal deposits elsewhere in Nevada.

Limestone within the study area is without special or unique properties but may be suitable for road metal. Although high calcium limestone beds may be present, none were identified. No markets have been identified and higher quality resources are present elsewhere in the region.

Oil is being produced 3 1/2 mi to the north in Railroad Valley. The Troy metamorphic aureole inside the northwestern boundary and thick sequences of extrusive igneous rocks inside the southern boundary indicate high geothermal temperatures which generally preclude the presence of hydrocarbons.

Mississippian rocks, petroleum source rocks in the Railroad Valley oil fields, crop out inside the eastern study area boundary and any petroleum generated would have been lost.

Geothermal resources exist outside the study area in Railroad Valley but are not likely at depth within the study area. Thermal springs and wells are along, or basinward from, major Basin and Range faults that are outside the boundaries. No thermal springs or travertine deposits were observed within the study area during the field investigation.

REFERENCES

Bartley, J. M., Fryxell, J. E., Murray, M. E., and Wright, S. D., 1984, Patterns of Tertiary extension in the Great Basin exemplified in the Grant/Quinn Canyon Range, Nevada: Geological Society of America Abstracts with Programs, 97th annual meeting, vol. 16, no. 6, p. 438.

Berger, B. R., 1985, Geologic-Geochemical features of hot spring precious-metal deposits; in Tooker, E. W., ed., Geologic characteristics of sediment- and volcanic-hosted disseminated gold deposits--search for an occurrence model: U.S. Geological Survey Bulletin 1646, p. 47-53.

_____, 1986, Descriptive model of carbonate-hosted Au-Ag; in Cox, D. P., and Singer, D. A., eds., Mineral deposit models: U.S. Geological Survey Bulletin 1693, p. 175.

Boettcher, J. W., and Sloan, W. W., Jr., eds., 1960, Guidebook to the geology of east-central Nevada: Intermountain Association of Petroleum Geologists, 11th Annual Field Conference, 278 p.

Bonham, H. F., Jr., 1985, Characteristics of bulk-minable gold-silver deposits in Cordilleran and island-arc settings; in Tooker, E. W., ed., Geological characteristics of sediment- and volcanic-hosted disseminated gold deposits--search for an occurrence model: U.S. Geological Survey Bulletin 1646, p. 71-77.

Bortz, L. C., 1985, Hydrocarbons in the northern Basin and Range, Nevada and Utah: Oil and Gas Journal, vol. 83, no. 45, p. 117-122.

Bortz, L. C., and Murray, D. K., 1979, Eagle Springs oil field, Nye County, Nevada; in Newman, G. W., and Goode, H. D., eds., Basin and Range symposium and Great Basin field conference: Rocky Mountain Association of Geologists and Utah Geological Association, p. 441-453.

Bouley, B. A., 1986, Descriptive model of gold on flat faults; in Cox, D. P., and Singer, D. A., eds., Mineral deposit models: U.S. Geological Survey Bulletin 1693, p. 251.

Carr, D. D., and Rooney, L. F., 1983, Limestone and dolomite; in Lefond, S.J., ed., Industrial Minerals and Rocks: 5th ed., vol. 2, Society of Mining, Metallurgical, and Petroleum Engineers, Inc., New York, p. 833-868.

Cebull, S. E., 1967, Bedrock geology of the southern Grant Range, Nye County, Nevada: Unpublished Ph.D. dissertation, University of Washington-Seattle, 130 p.

_____, 1970, Bedrock geology and orogenic succession in southern Grant Range, Nye County, Nevada: American Association of Petroleum Geologists Bulletin, vol. 54, no. 10, p. 1828-1842.

Cox, D. P., 1986, Descriptive model of W skarn deposits; in Cox, D. P., and Singer, D. A., eds., Mineral deposit models: U.S. Geological Survey Bulletin 1693, p. 55.

Duey, H. D., 1979, Trap Spring oil field, Nye County, Nevada; in Newman, G. W., and Goode, H. D., eds., Basin and Range symposium and Great Basin field conference: Rocky Mountain Association of Geologists and Utah Geological Association, p. 469-476.

Einaudi, M. T., Meinert, L. D., and Newberry, R. J., 1981, Skarn deposits: Economic Geology, 75th Anniversary Volume, p. 317-391.

Elliott, J. E., 1982, Model for contact metasomatic tungsten/copper/gold/ deposits; in Erickson, R. L., ed., Characteristics of mineral deposit occurrences: U.S. Geological Survey Open-File Report 82-795, p. 49-54.

Fournier, R. O., 1985, Silica minerals as indicators of conditions during gold deposition; in Tooker, E. W., ed., Geologic characteristics of sediment- and volcanic-hosted disseminated gold deposits--search for an occurrence model: U.S. Geological Survey Bulletin 1646, p. 15-26.

Fryxell, J. E., 1984, Structural development of the west-central Grant Range, Nye County, Nevada: Unpublished Ph.D. dissertation, University of North Carolina-Chapel Hill, 140 p.

Garside, L. J., and Schilling, J. H., 1979, Thermal waters of Nevada: Nevada Bureau of Mines and Geology Bulletin 91, 163 p.

Garside, L. J., and Weimer, B. S., 1987, Oil and gas; in The Nevada Mineral industry: Nevada Bureau of Mines and Geology MI 1986, p. 25-30.

Grose, L. T., and Keller, G. V., 1979, Geothermal energy in the Basin and Range province; in Newman, G. W., and Goode, H. D., eds., Basin and Range symposium and Great Basin field conference: Rocky Mountain Association of Geologists and Utah Geological Association, p. 361-369.

Hamilton, M. M., 1987, Mineral resources of the Riordan's Well Study Area, Nye County, Nevada: U.S. Bureau of Mines Open-File Report MLA 26-87, 22 p.

Hill, J. M., 1916, Notes on some mining districts in eastern Nevada: U.S. Geological Survey Bulletin 648, 214 p.

Hofstra, A. H., Rowan, E. L., and Day, G. W., 1984, Reconnaissance geochemical assessment of metallic mineral resource potential, Riordan's Well Wilderness Study Area (NV-040-166), Nye County, Nevada: U.S. Geological Survey Open-File Report 84-781, 25 p.

Huttrer, G. W., 1963, Structure and stratigraphy of the central Grant Range, Nevada: Unpublished M.S. thesis, University of Washington-Seattle, 59 p.

Hyde, Joy, 1979, An overview of geothermal exploration and development in Nevada; in Newman, G. W., and Goode, H. D., eds., Basin and Range symposium and Great Basin field conference: Rocky Mountain Association of Geologists and Utah Geological Association, p. 381-388.

Hyde, J. H., and Huttrer, G. W., 1970, Geology of the central Grant Range, Nevada: American Association of Petroleum Geologists Bulletin, vol. 54, no. 3, p. 503-526.

Kirkpatrick, D. H., 1960, Structure and stratigraphy of the northern portion of the Grant Range, east-central Nevada: in Boettcher, J. W., and Sloan, W. W., Jr., eds., Guidebook to the geology of east-central Nevada: Intermountain Association of Petroleum Geologists 11th Annual Field Conference, p. 186-188.

Kleinhampl, F. J., and Ziony, J. I., 1967, Preliminary geologic map of northern Nye County, Nevada: U.S. Geological Survey Open-File Report 67-129, scale 1:200,000, 2 sheets.

_____, 1984, Mineral resources of northern Nye County, Nevada: Nevada Bureau of Mines and Geology Bulletin 99B, 243 p.

_____, 1985, Geology of northern Nye County, Nevada: Nevada Bureau of Mines and Geology, Bulletin 99A, 172 p.

Kral, V. E., 1951, Mineral resources of Nye County, Nevada: University of Nevada Bulletin 45, no. 3, Nevada State Bureau of Mines and Mackay School of Mines, 223 p.

Levinson, A. A., 1980, Introduction to exploration geochemistry: Applied Publishing, Wilmette, Illinois, 924 p.

Lincoln, F. C., 1923, Mining districts and mineral resources of Nevada: Nevada Newsletter Publishing Co., Reno, Nevada, 295 p.

Moores, E. M., Scott, R. B., and Lumsden, W. W., 1968, Tertiary tectonics of the White Pine-Grant Range region, east-central Nevada, and some regional implications: Geological Society of America Bulletin, vol. 79, no. 12, p. 1703-1726.

Newberry, R. J., and Einaudi, M. T., 1981, Tectonic and geochemical setting of tungsten skarn mineralization in the Cordillera; in Dickinson, W. R., and Payne, W. D., eds., Relations of tectonics to ore deposits in the southern Cordillera: Arizona Geological Society Digest vol. XIV, Tucson, p. 99-111.

Newman, G. W., and Goode, H. D., eds., 1979, Basin and Range symposium and Great Basin field conference, Rocky Mountain Association of Geologists and Utah Geological Association, 662 p.

Papke, K. G., 1979, Fluorspar in Nevada: Nevada Bureau of Mines and Geology Bulletin 93, 75 p.

Poole, F. G., and Claypool, G. E., 1985, Petroleum source rock potential and crude oil correlation in Great Basin [abs.]: American Association of Petroleum Geologists Bulletin, vol. 69, p. 861.

Radtke, A. S., Rye, R. O., and Dickson, F. W., 1980, Geology and stable isotope studies of the Carlin gold deposit, Nevada: Economic Geology, vol. 75, no. 5, p. 641-672.

Sainsbury, C. L., and Kleinhampl, F. J., 1969, Fluorite deposits of the Quinn Canyon Range, Nevada: U.S. Geological Survey Bulletin 1272-C, 22 p.

Sammel, E. A., 1978, Occurrence of low-temperature geothermal waters in the United States; in Muffler, L. J. P., ed., Assessment of geothermal resources of the United States-1978: U.S. Geological Survey Circular 790, p. 86-131.

Sandberg, C. A., 1983, Petroleum potential of wilderness lands in Nevada: U.S. Geological Survey Circular 902-H, p. H1-H11.

Scott, R. B., 1965, The Tertiary geology and ignimbrite petrology of the Grant Range, east-central Nevada: Unpublished Ph.D. dissertation, Rice Institute-Houston, 116 p.

Spock, L. E., 1953, Guide to the study of rocks (2d ed.): New York, Harper and Row, 298 p.

Thompson, J. R., 1988, Mineral resources of the Quinn RARE II Area, Nye County, Nevada: U.S. Bureau of Mines Open-File Report [in press].

Tooker, E. W., 1985, Discussion of the disseminated-gold-ore-occurrence model; in Tooker, E. W., ed., Geologic characteristics of sediment- and volcanic-hosted disseminated gold deposits--search for an occurrence model: U.S. Geological Survey Bulletin 1646, p. 107-150.

U.S. Bureau of Mines, 1987, Mineral commodity summaries 1987: U.S. Government Printing Office, Washington, D.C., 189 p.

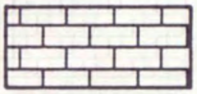
U.S. Bureau of Mines and U.S. Geological Survey, 1980, Principles of a resource/reserve classification for minerals: U.S. Geological Survey Circular 831, 5 p.

Weimer, B. S., 1987, List of wells drilled for oil and gas since 1976 [updates Nevada Bureau of Mines and Geology Report 29 and Map 56]: Nevada Bureau of Mines and Geology List L-4, 12 p.

EXPLANATION OF SYMBOLS FOR FIGURES 3-9


GRANITE


GRANITE GNEISS


LIMESTONE

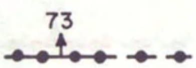

SHALE


INTRUSIVE ROCKS, UNDIFFERENTIATED

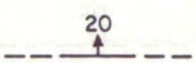

QUARTZ


CLAY AND QUARTZ BRECCIA

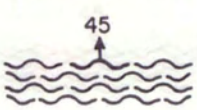

VERTICAL VEIN--Dashed where approximate



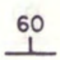
VEIN--Showing strike and dip; dashed where approximate



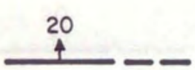
CONTACT--Showing strike and dip; dashed where approximate



SHEAR ZONE--Showing strike and dip

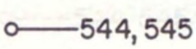


STRIKE AND DIP OF BEDDING



FAULT--Showing strike and dip; dashed where approximate


VERTICAL FAULT--Dashed where approximate



SAMPLE LOCALITY--Showing sample number(s)

LOCALITY OF HORIZONTAL CHIP SAMPLE--Vertical chip if on cross section; showing sample number

EXPLANATION OF SYMBOLS FOR FIGURES 3-9--Continued

PORTAL

PORTAL WITH OPENCUT

WINZE

RAISE

TIMBERING

INCLINED WORKINGS--Showing degree of inclination; chevrons pointing down

STOPING ABOVE LEVEL

STOPING BELOW LEVEL

STOCKPILE

INACCESSIBLE WORKINGS

BENCH--Showing height in feet; hachures on down side

PILLAR, PILLAR IN STOPE

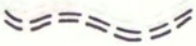
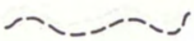
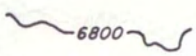
WASTE

MINE DUMP

APPROXIMATE BOUNDARY OF THE GRANT RANGE RARE II AREA

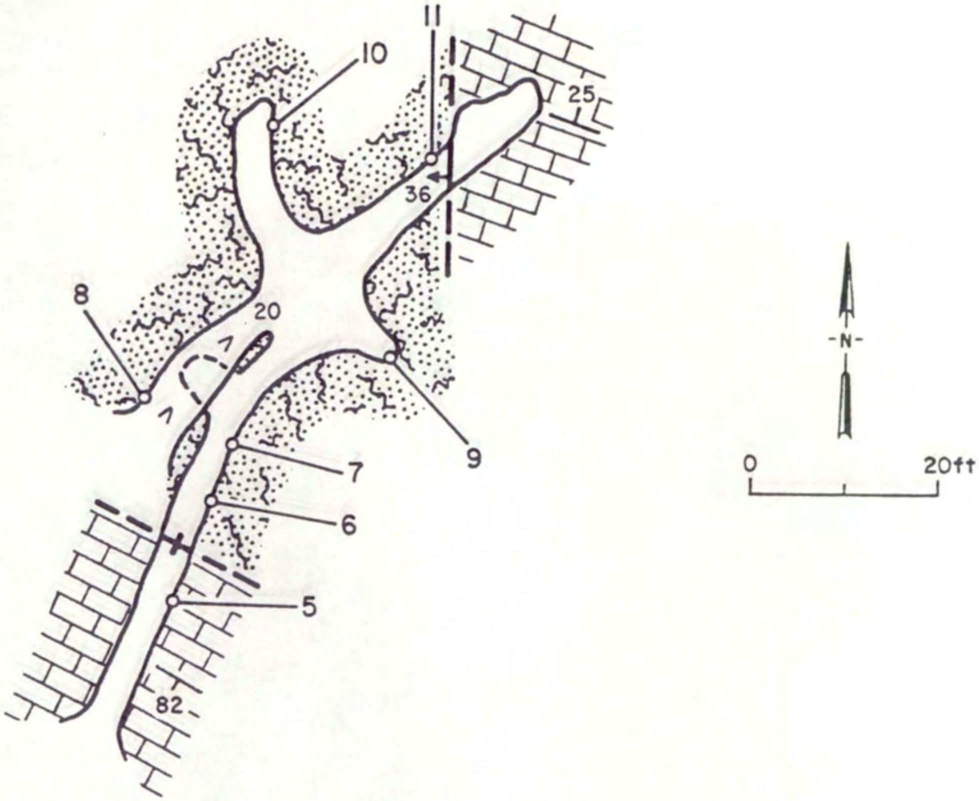
LOCALITY OF SAMPLED OUTCROP--Showing sample number

EXPLANATION OF SYMBOLS FOR FIGURES 3-9--Continued

●594	LOCALITY OF PANNED-CONCENTRATE SAMPLE--Showing sample number
△ 562	LOCALITY OF STREAM-SEDIMENT SAMPLE--Showing sample number
	ROAD
	TRAIL
	PATENTED MINING CLAIM
	TOPOGRAPHIC CONTOUR--Showing elevation in feet above sea level
	SURFACE OPENINGS--Showing sample number(s)
≻ 74-76	Adit
145	Inaccessible adit
◩ 113	Shaft
×90	Prospect pit
116	Trench

SYMBOLS USED IN TABLES PRESENTED ON FIGURES

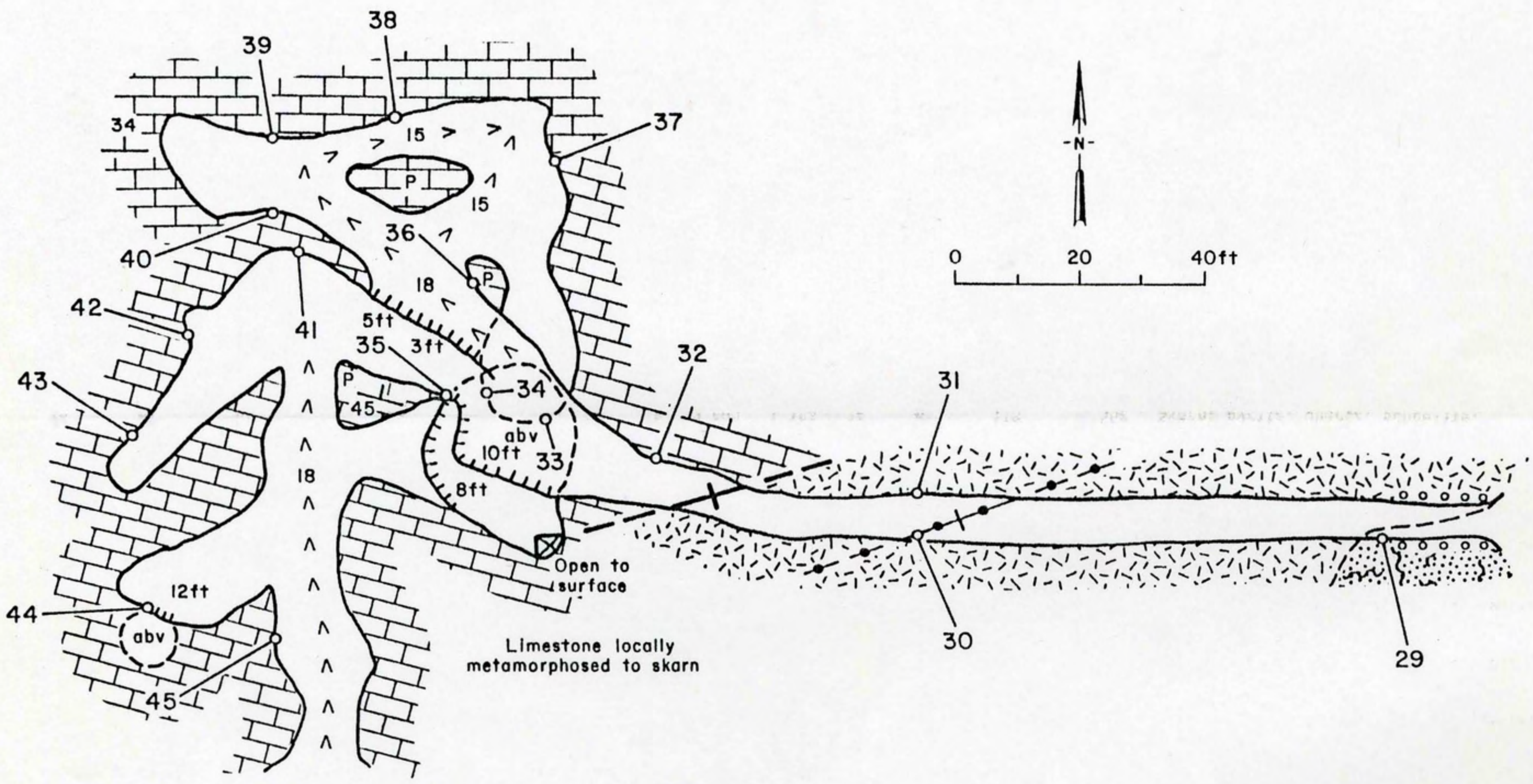
---	Not detected
na	Not analyzed
*	Analyzed by atomic absorption with lower detection limit
BC	Bondar-Clegg Analytical Lab
R	Reno Research Center Analytical Lab



Sample No.	Sample Length of chip (in.)	Au	Ag	As	Cu	Pb	Sb	W	Zn	Description
		Assay data (ppm)								
5	17	0.005	0.5	448	40	269	---	13	1,591	Limestone, iron oxide stained, silicified.
6	31	.015	.5	225	16	197	---	---	511	Quartz; copiapite-(Fe^{2+} Fe_4 $^{3+}$ $(SO_4)_6OH_2 \cdot 20\ H_2O$), minor galena, disseminated pyrite.
7	19	---	1.3	75	54	3,387	---	---	652	Quartz; copiapite, galena, pyrite.
8	36	---	5	27	15	4,057	---	---	2,824	Quartz, brecciated, iron oxide stained; galena, pyrite.
9	30	.015	8	40	401	7,392	6	---	2,558	Quartz, brecciated; chalcanthite ($CuSO_4$ $5H_2O$), copiapite, galena, pyrite.
10	26	.025	3.9	117	156	8,011	17	---	4,307	Quartz, brecciated, iron oxide stained; pyrite.
11	24	.045	6.8	47	260	9,657	9	---	813	Quartz, brecciated, iron oxide stained, vuggy.

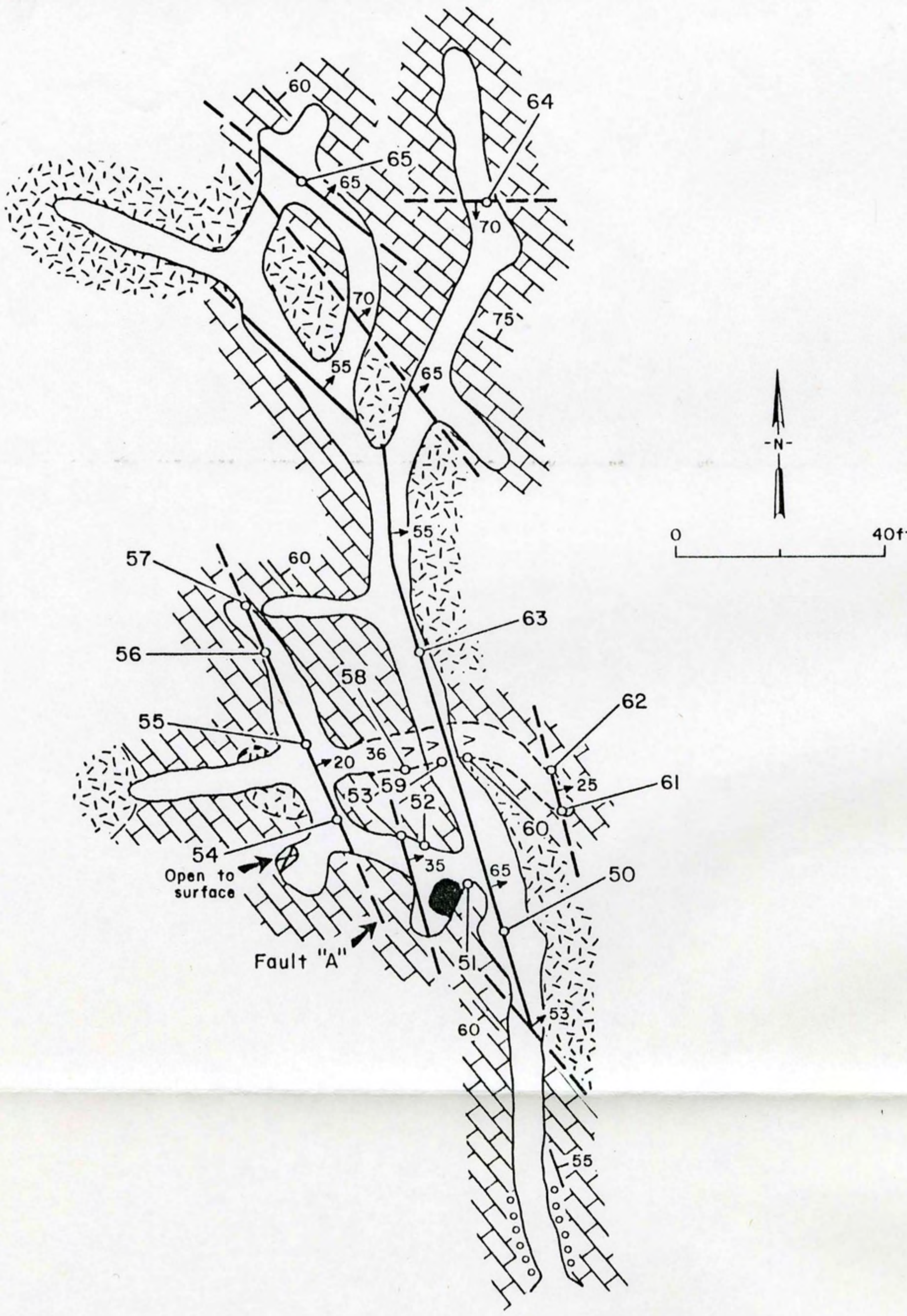
[Analyzed by Bondar-Clegg.]

Figure 3.--Mother's Day adit showing sample localities 5-11 and table showing analytical data.



Sample No.	Length of chip (in.)	Lab	Au	Ag	As	Be	Bi	Cu	F	Mn	Mo	Sn	W	Zn	Description
			Assay data, ppm (unless noted)												
29	36	BC	0.055	1.1	10	na	126	12	na	31	---	na	---	805	Quartz pod, fractured, iron oxide stained, vuggy.
30	24	BC	.01	.6	---	na	37	29	na	66	7	na	---	269	Quartz vein, fractured, iron oxide stained, vuggy.
31	36	R	---	---	---*	9.2	---	6.9	.3%	90	22	---*	28	110	Granite, medium grained.
32	28	BC	---	---	14	na	7	21	140	667	4	na	---	932	Limestone; calcite, quartz.
33	33	BC	.045	.5	9	na	89	57	12,000	1,379	9	na	425	9,897	Skarn; epidote, garnet, pyrite, quartz, disseminated scheelite.
34	36	BC	.065	---	---	na	116	332	9.44%	8,993	18	na	369	6,744	Skarn, 5 ft wide; calcite, epidote, garnet, pyrite, quartz, disseminated scheelite.
35	24	BC	.04	3.2	---	na	111	168	10.88%	4,581	38	na	423	14,380	Skarn, 6 ft wide; calcite, epidote, pyrite, quartz, disseminated scheelite.
36	28	BC	.055	.8	6	na	193	92	6.08%	3,138	15	na	2.54%	12,890	Skarn, 3 ft wide; epidote, garnet, pyrite, disseminated scheelite.
37	23	BC	.01	---	---	na	19	38	5.44%	3,409	16	na	474	3,798	Skarn; epidote, garnet, pyrite, quartz, scheelite.
38	36	BC	.01	---	17	na	7	21	2,200	593	3	na	---	291	Skarn, 3 ft wide, iron oxide stained; epidote, pyrite, quartz.
39	30	BC	---	---	---	na	10	13	2,100	415	---	na	---	148	Skarn; calcite, epidote, pyrite, quartz.
40	25	BC	.005	---	9	na	15	27	6.56%	7,439	22	na	257	11,478	Skarn, iron oxide stained; epidote, garnet, hematite, pyrite, quartz.
41	31	BC	---	---	19	na	43	66	1,250	399	4	na	81	7,737	Skarn, iron oxide stained; quartz.
42	28	BC	---	---	---	na	6	5	800	491	3	na	46	237	Skarn, iron oxide stained; quartz, minor scheelite.
43	31	BC	---	---	---	na	18	8	2,600	1,156	14	na	113	562	Skarn; pyrite, quartz, scheelite.
44	28	BC	.14	0.5	9	na	282	31	2,900	925	13	na	27	959	Skarn; calcite, hematite, quartz.
45	31	BC	.13	4.8	5	na	292	230	4.74%	3,650	50	na	375	9,730	Skarn, 6 ft wide, iron oxide stained; epidote, garnet, hematite, quartz.

Figure 4.--Terrell Mine showing sample localities 29-45 and table showing analytical data.



[Analysis by Reno Research Center.]

Sample No.	Length of chip (in.)	Au	Ag	As	Be	Bi	Cu	F	Mn	Mo	Sn	W	Zn	Description
		Assay data, ppm (unless noted)												
50	60	---	0.62	7.4	42	370	230	780	0.95%	30	---*	0.26%	150	Fault gouge; disseminated scheelite.
51	6	---	1.31	7.9	11	180	160	0.2%	.63%	41	---*	8.2%	440	Skarn; marble and mica schist; garnet, quartz stringers, scheelite.
52	24	---	3.35	6.9	21	620	310	.17%	1.2%	25	---*	5.9%	480	Fault, 3 in. wide; disseminated scheelite.
53	24	---	1.01	21.3	27	270	59	.12%	.51%	20	---*	.85%	260	Fault; scheelite.
54	42	---	---	3	4.7	47	11	460	300	---	---*	100	47	Fault; disseminated scheelite.
55	9	0.07	1.1	3.7	21	570	130	620	.2%	7.3	---*	1.73%	250	Do.
56	36	---	---	33	26	240	150	.24%	.25%	12	14	.14%	150	Do.
57	36	---	---	---*	25	110	120	430	.2%	10	---*	110	85	Do.
58	30	---	.71	15.7	46	350	130	970	.51%	15	---*	8.7%	0.12%	Fault; scheelite.
59	30	---	.57	10	67	180	38	730	.43%	66	---*	1.19%	360	Do.
60	72	.069	.67	7.9	44	230	96	750	.5%	15	---*	5.6%	370	Do.
61	54	.044	.56	7.9	32	360	250	770	.23%	---	---*	.14%	163	Fault, 12 in. wide; scheelite.
62	12	---	3.45	6.9	47	770	190	.12%	.33%	---	---*	5.7%	580	Do.
63	36	---	---	9	8.2	140	31	210	540	9.3	---*	60	110	Fault gouge; minor scheelite.
64	30	---	---	4.8	6.7	84	27	.13%	.13%	19	---*	.37%	130	Fault; minor scheelite.
65	72	---	----	5.3	5.4	77	---	.2%	.27%	16	---*	.3%	190	Skarn, 3 ft wide, along fault; calcite, epidote, garnet, quartz, scheelite.

Figure 5.--Nye Mine showing sample localities 50-65 and table showing analytical data.

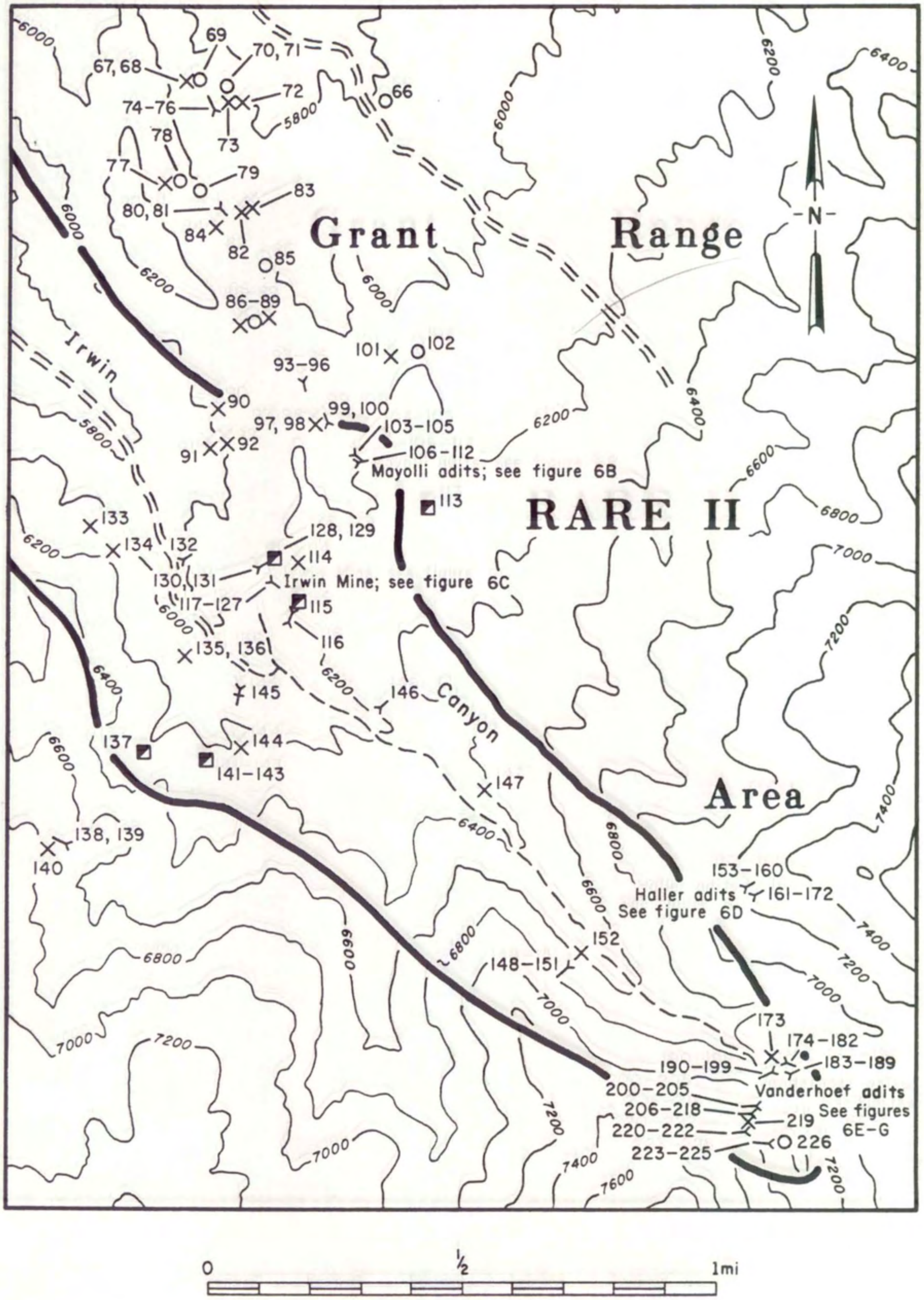
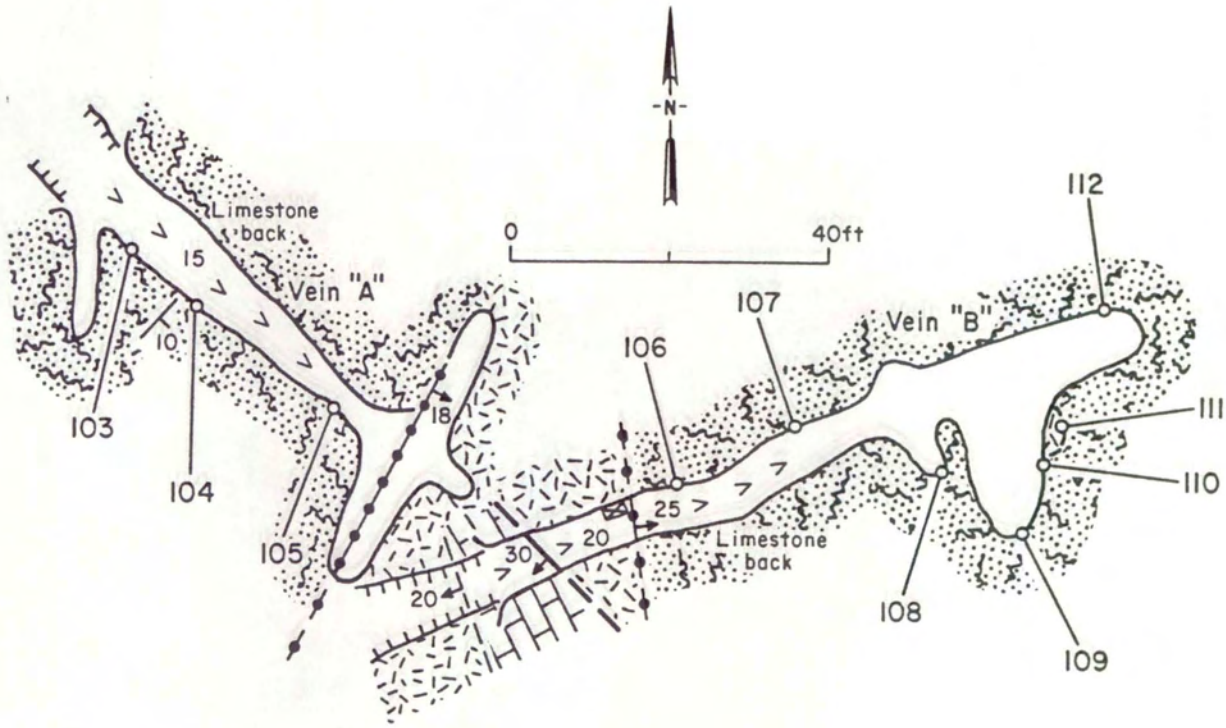


Figure 6A.--Irwin Canyon area showing sample localities 66-226. Table 7 shows sample data.



Sample No.	Length of chip (in.)	Au	Ag	As	Cu	F	Mo	Pb	Zn	Description
		Assay data ppm (unless noted)								
103	48	1.47	36	0.017%	110	20	---	1.6%	410	Quartz vein, fractured, iron oxide stained, vuggy.
104	60	.634	11.7	.011%	36	13	---	.75%	0.15%	Do.
105	36	.099	9.69	20	26	16	---	.27%	270	Do.
106	36	.088	5.75	52	30	86	---	.65%	230	Do.
107	36	1.07	4.11	70	12	17	---	.43%	120	Do.
108	36	7.8	40	52	40	55	---	1.7%	.14%	Do.
109	12	---	4.66	8	7	170	---	840	570	Limestone, fractured; calcite veinlets.
110	36	.253	4.84	49	12	19	---	.28%	150	Quartz vein, fractured, iron oxide stained, vuggy.
111	36	---	.35	---	24	75	---	200	.27%	Granite, fractured; clay.
112	48	.039	7.84	---	27	12	---	.14%	190	Quartz vein, fractured, iron oxide stained.

[Analyzed by Reno Research Center.]

Figure 6B.--Mayolli adits showing sample localities 103-112 and table showing analytical data.

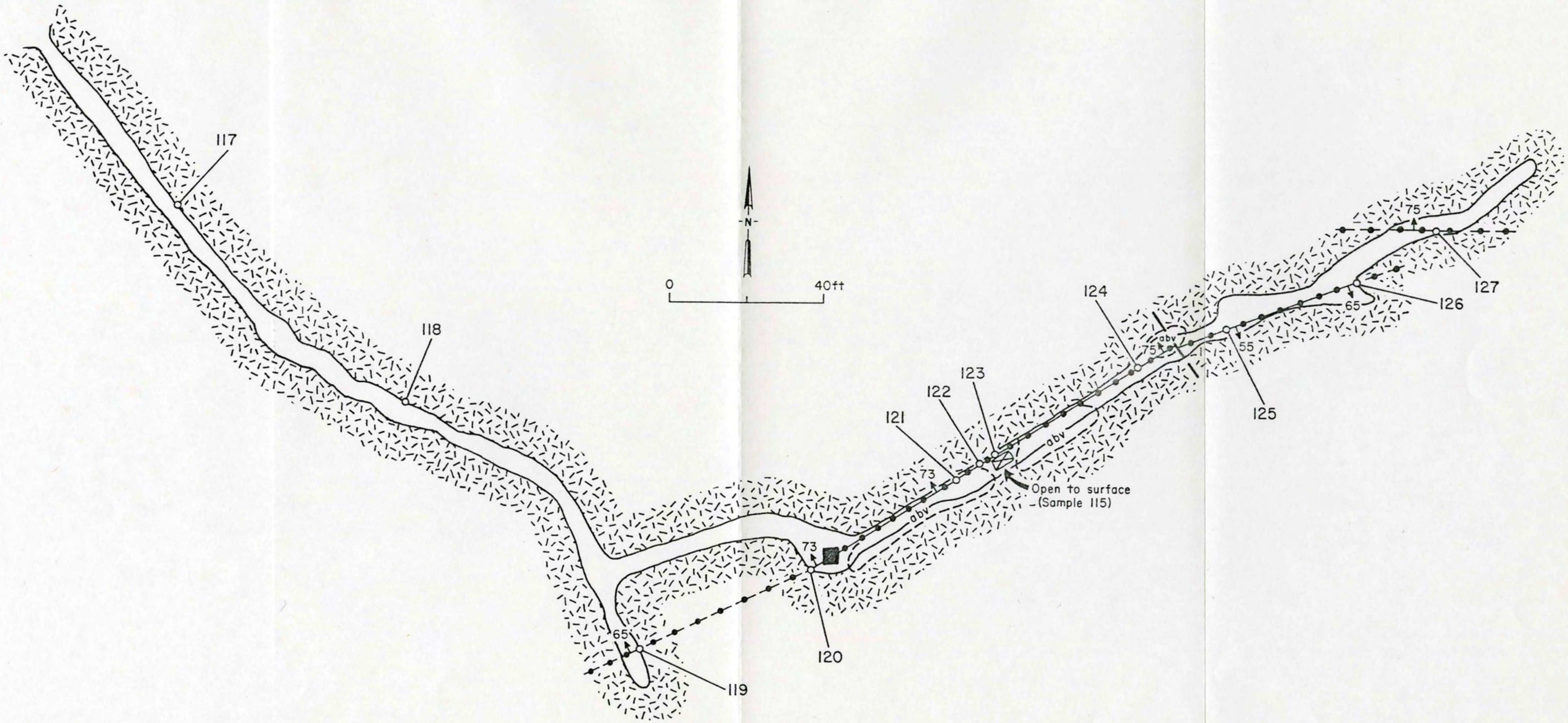
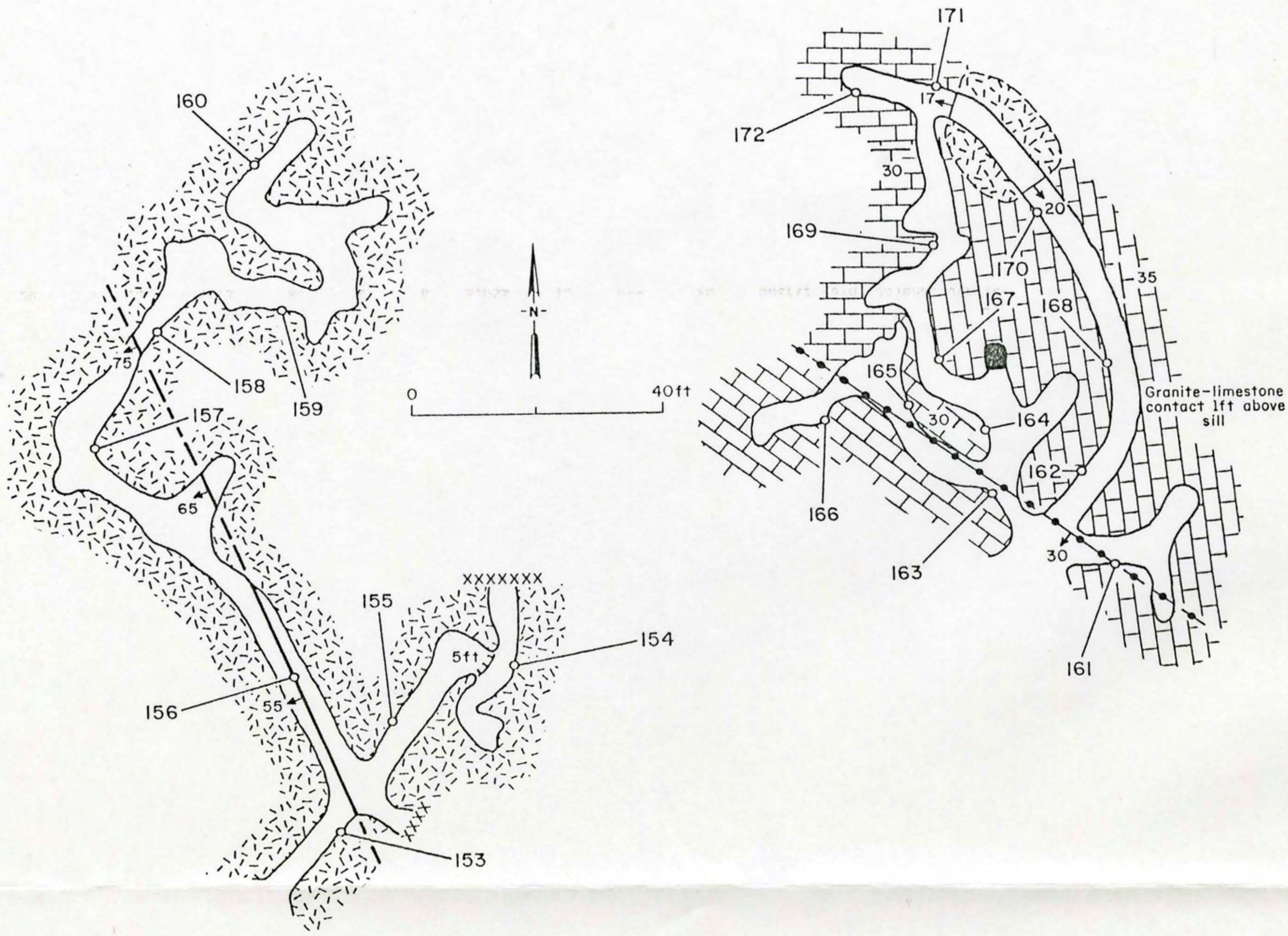


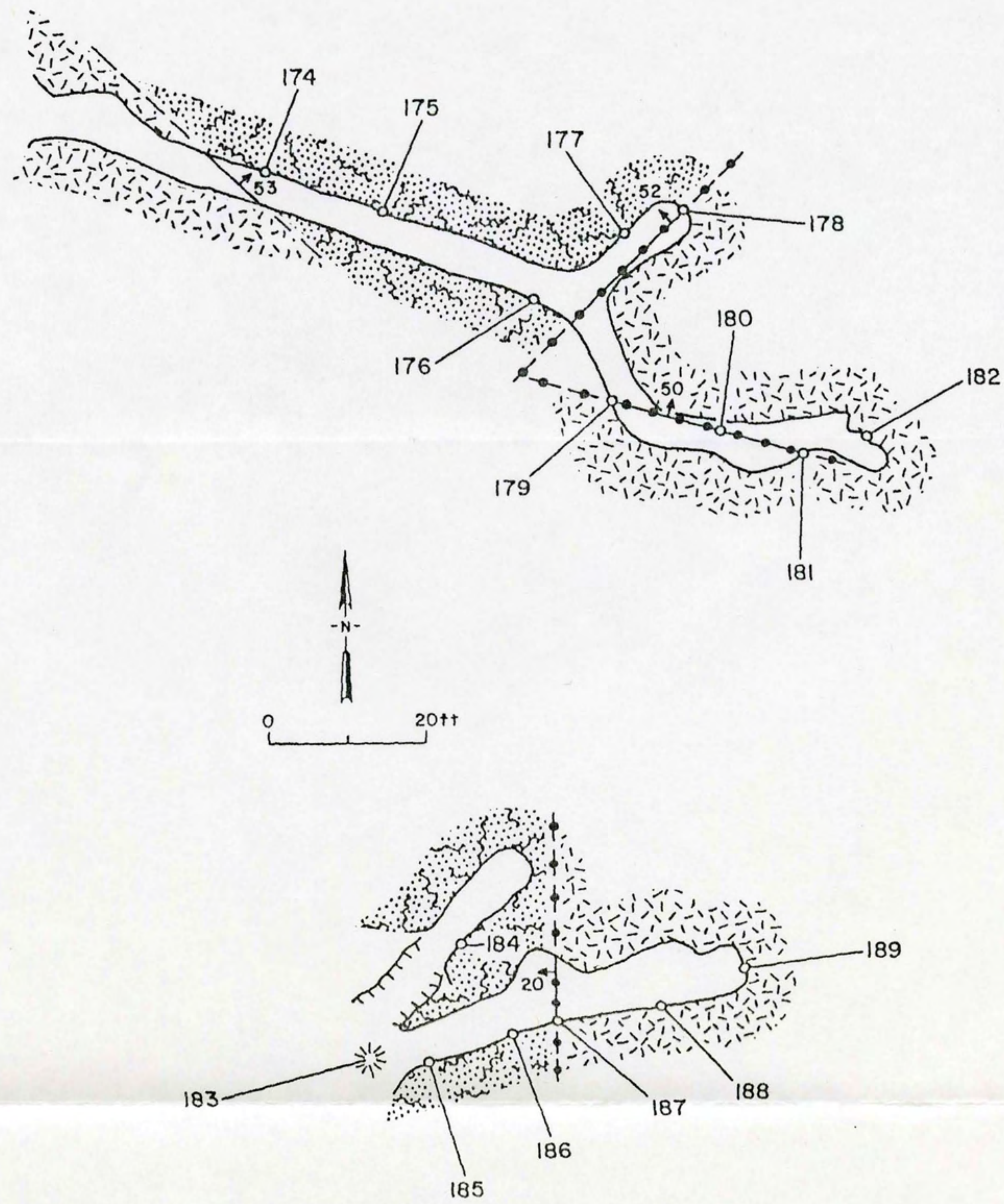
Figure 6C.--Irwin Mine showing sample localities 117-127. Table 8 shows sample data.



[Analysis by Bondar-Clegg.]

Sample		Assay data									
	Length of	Au	Ag	As	Cu	Mo	Pb	Sb	W	Zn	
No.	chip (in.)	ppm (unless noted)									Description
153	16	---	1.8	15	16	3	1,096	---	---	464	Granite, iron oxide stained.
154	20	---	---	17	21	3	586	---	---	363	Granite; clay.
155	24	---	---	6	1	1	82	---	11	137	Do.
156	16	---	.8	22	9	3	807	---	---	145	Fault, 6 in. wide, iron oxide stained.
157	12	0.016	.5	9	9	2	437	---	---	195	Quartz pod, 6 ft long.
158	16	.015	3.9	76	9	9	312	---	---	76	Quartz pod; hematite, pyrite.
159	12	.1	15.2	69	15	7	1,992	---	---	116	Quartz pod, 3 ft long; hematite.
160	13	.03	2.2	88	19	8	537	---	11	252	Quartz pod, 15 ft long.
161	24	.11	5.7	71	12	47	1.47%	---	11	541	Quartz vein, 6 in. wide; hematite, pyrite pseudomorphs.
162	19	1.6	10.3	167	12	18	1.23%	---	15	322	Quartz vein; minor galena, pyrite.
163	36	.11	2.9	327	4	4	2,668	---	12	26	Quartz vein; pyrite.
164	20	.32	41.3	84	9	6	5.05%	13	---	28	Quartz vein; galena, pyrite.
165	24	.17	8.8	148	7	4	1,085	---	---	63	Do.
166	21	.045	7	234	11	12	1,485	---	---	149	Quartz vein, iron oxide stained; pyrite.
167	18	---	---	53	32	7	573	---	---	458	Granite sill.
168	21	.015	---	13	41	1	201	---	14	205	Silicified limestone, iron oxide stained.
169	24	---	1.9	32	38	3	758	---	---	125	Quartz pod, 6 ft long.
170	24	---	---	5	14	---	22	---	10	40	Two quartz stringers, each 3 in. wide.
171	24	---	---	6	16	2	96	---	12	35	Quartz stringer, 1/2 in. wide.
172	20	---	---	15	22	2	19	---	---	18	Quartz pod, 5 ft long.

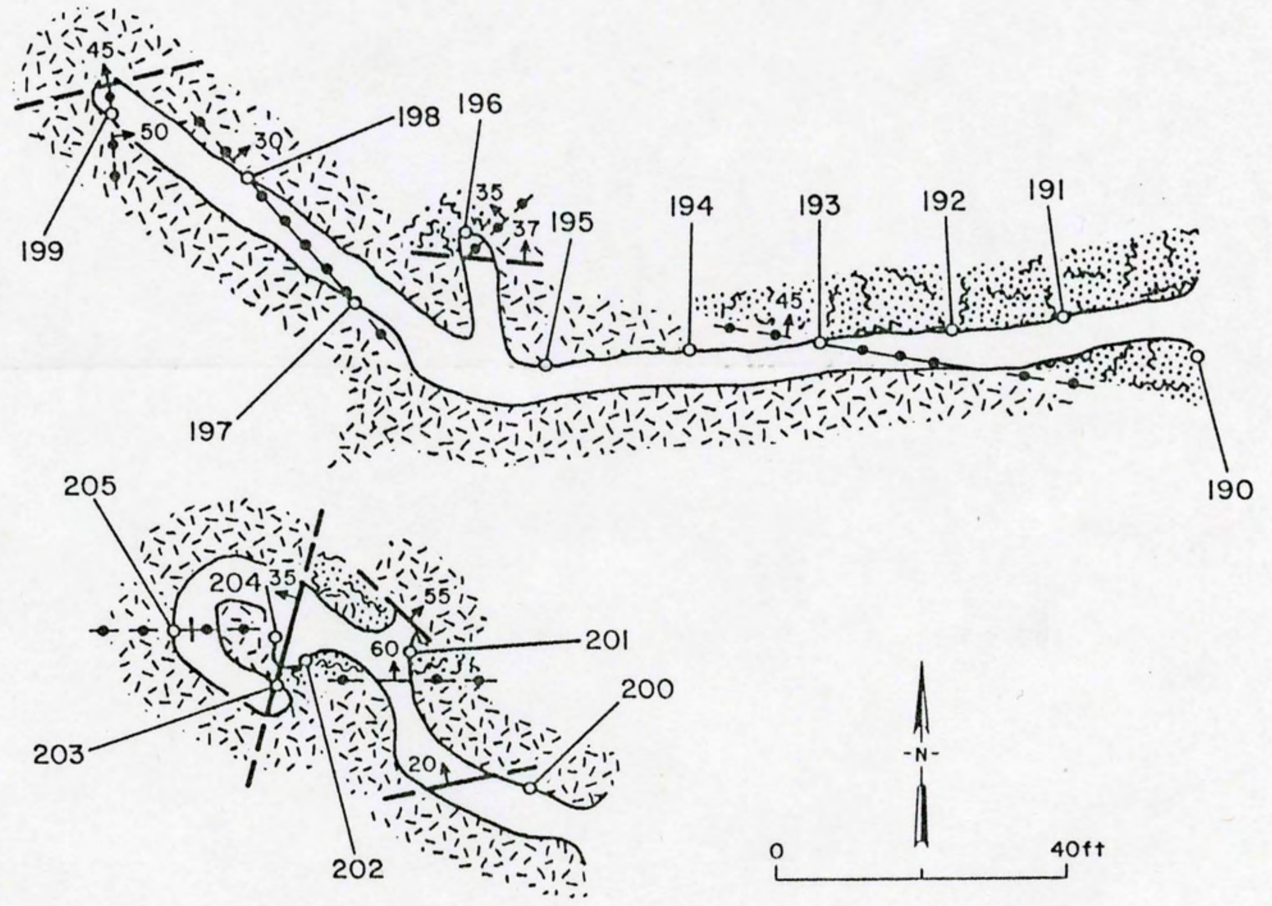
Figure 6D.--Haller adits showing sample localities 153-172 and table showing analytical data.



[Analysis by Bondar-Clegg.]

Sample		Assay data									
No.	Type and/ or length	Au	Ag	As	F	Mo	Sb	Pb	W	Zn	Description
		ppm (unless noted)									
174	Chip, 36 in.	0.065	2.5	111	na	---	---	107	na	393	Quartz vein, brecciated; arsenopyrite, pyrite.
175	Chip, 48 in.	---	---	471	na	---	---	56	na	310	Quartz vein, brecciated; arsenopyrite.
176	Chip, 48 in.	---	4	131	na	1	---	224	na	63	Quartz vein, brecciated, iron oxide stained.
177	Chip, 60 in.	.01	20.7	53	na	---	---	388	na	67	Quartz vein, iron oxide stained, vuggy.
178	Chip, 24 in.	.01	2.4	13	730	---	---	485	---	225	Granite, fractured; clay.
179	Chip, 18 in.	---	1.8	---	na	1	9	99	na	102	Quartz vein, brecciated, iron oxide stained.
180	Chip, 8 in.	---	1.6	14	1,050	3	na	119	---	95	Do.
181	Chip, 11 in.	---	6.1	41	na	---	---	52	na	270	Do.
182	Chip, 30 in.	---	---	11	830	3	na	66	---	2,186	Granite, fractured, iron oxide stained.
183	Select	.02	20.6	327	na	3	---	5,500	na	356	Stockpile; gossan, vuggy quartz.
184	Chip, 48 in.	.12	34.7	0.31%	na	5	9	4,800	na	2,882	Quartz vein, brecciated, iron oxide stained.
185	Chip, 60 in.	.005	32.5	71	na	---	9	1,570	na	164	Do.
186	Chip, 36 in.	.005	22.7	361	na	---	---	1,912	na	196	Quartz vein, brecciated, iron oxide stained, vuggy.
187	Chip, 6 in.	.005	33	1,739	na	18	11	4,200	na	3,600	Gouge, iron oxide stained; granite; clay, quartz.
188	Chip, 18 in.	---	26.5	999	na	2	---	1,642	na	429	Quartz vein, brecciated, iron oxide stained.
189	Chip, 18 in.	.04	48.2	.42%	na	28	11	7,700	na	5,482	Gouge, iron oxide stained; granite; clay, quartz.

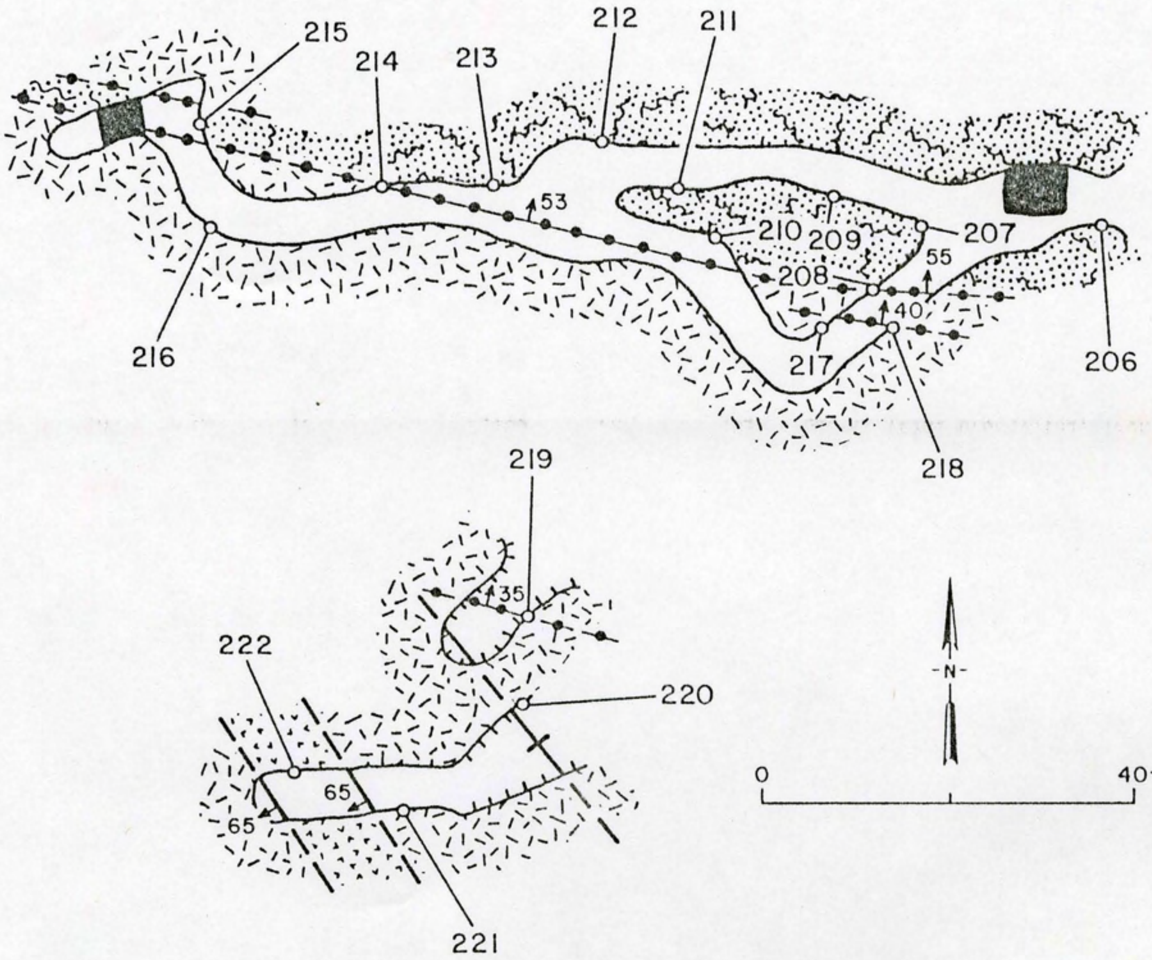
Figure 6E.--Eastern Vanderhoef adits showing sample localities 174-189 and table showing analytical data.



[Analysis by Bondar-Clegg.]

Sample		Assay data									
No.	Length of chip (in.)	Au	Ag	As	F	Mo	Sb	Pb	W	Zn	Description
		ppm (unless noted)									
190	84	---	1.2	8	na	na	---	75	na	41	Quartz vein, 20 ft wide, brecciated, iron oxide stained, vuggy; hematite.
191	60	---	19.1	19	na	na	---	1,100	na	29	Quartz vein, brecciated, iron oxide stained, vuggy; hematite.
192	60	---	2.2	10	na	na	---	59	na	36	Quartz vein, brecciated; arsenopyrite, pyrite.
193	12	---	4.3	30	na	na	---	190	na	84	Quartz vein, brecciated, iron oxide stained, vuggy; arsenopyrite, hematite, pyrite.
194	36	---	1.7	7	1,050	5	na	138	---	372	Granite, fractured; pyrite.
195	12	---	6.2	28	1,000	4	---	61	na	278	Granite, fractured; arsenopyrite, pyrite, quartz.
196	24	---	1	111	na	2	---	212	na	607	Quartz pod, brecciated, iron oxide stained.
197	18	---	---	13	90	---	---	24	na	47	Quartz vein, brecciated, iron oxide stained, vuggy.
198	18	---	---	5	na	---	---	18	na	52	Do.
199	22	---	1	13	570	---	---	50	na	73	Do.
200	6	---	20.7	53	na	3	---	582	na	452	Quartz lens, iron oxide stained; hematite.
201	60	---	11.9	9	na	1	---	332	na	177	Quartz vein, brecciated, iron oxide stained.
202	60	---	12.2	50	na	---	---	302	na	293	Do.
203	15	---	7.9	100	670	1	---	945	na	926	Fault gouge, iron oxide stained; granite; clay.
204	36	---	7.4	264	630	7	na	759	---	2,406	Granite, fractured; clay.
205	5	2.27	37.4	185	na	3	8	1,314	na	1,587	Quartz vein.

Figure 6F.--Lower western Vanderhoef adits showing sample localities 190-205 and table showing analytical data.



[Analysis by Bondar Clegg.]

Sample		Assay data									
No.	Length of chip (in.)	Au	Ag	As	F	Mo	Sb	Pb	W	Zn	Description
		ppm (unless noted)									
206	60	---	34.1	16	na	---	6	1,312	na	153	Quartz vein, brecciated, iron oxide stained, vuggy.
207	12	0.28	20.1 oz/st	116	na	8	---	5.93%	na	850	Quartz vein, brecciated, iron oxide stained, vuggy; galena.
208	60	.005	35.3	12	na	---	6	1,699	na	121	Quartz vein, brecciated, iron oxide stained, vuggy; chalcopyrite, galena, pyrite.
209	60	.08	37.3	24	na	---	---	6,500	na	156	Quartz vein, brecciated, iron oxide stained, vuggy; disseminated galena.
210	36	---	7.9	32	na	---	---	522	na	110	Quartz vein, brecciated, iron oxide stained, vuggy.
211	48	.02	29.2	12	na	---	---	993	na	14	Quartz vein, brecciated, iron oxide stained, vuggy; disseminated galena.
212	32	.045	32.8	---	na	---	---	3,800	na	100	Do.
213	60	---	27.5	15	na	---	---	1,128	na	30	Quartz vein, brecciated, iron oxide stained, vuggy.
214	48	---	3.6	---	na	---	---	153	na	36	Do.
215	36	---	18	34	na	---	6	224	na	122	Do.
216	16	---	1	---	830	---	---	190	na	856	Granite, manganese oxide stained.
217	30	---	1.3	---	630	6	na	102	---	1,421	Granite, fractured, iron oxide stained.
218	12	1.67	41.1	50	310	2	---	524	na	592	Quartz vein, brecciated, iron oxide stained.
219	16	---	14.2	84	na	4	7	1,051	na	471	Quartz vein.
220	24	.015	47	108	na	12	---	2,168	na	402	Quartz vein, brecciated, iron oxide stained.
221	60	.025	1.68 oz/st	95	1,300	15	---	5,600	---	579	Granite, fractured, iron oxide stained.
222	24	---	4.1	---	na	2	---	31	na	1,131	Diabase dike, fractured, iron oxide stained.

Figure 6G.--Upper western Vanderhoef adits and prospect showing sample localities 206-222 and table showing analytical data.

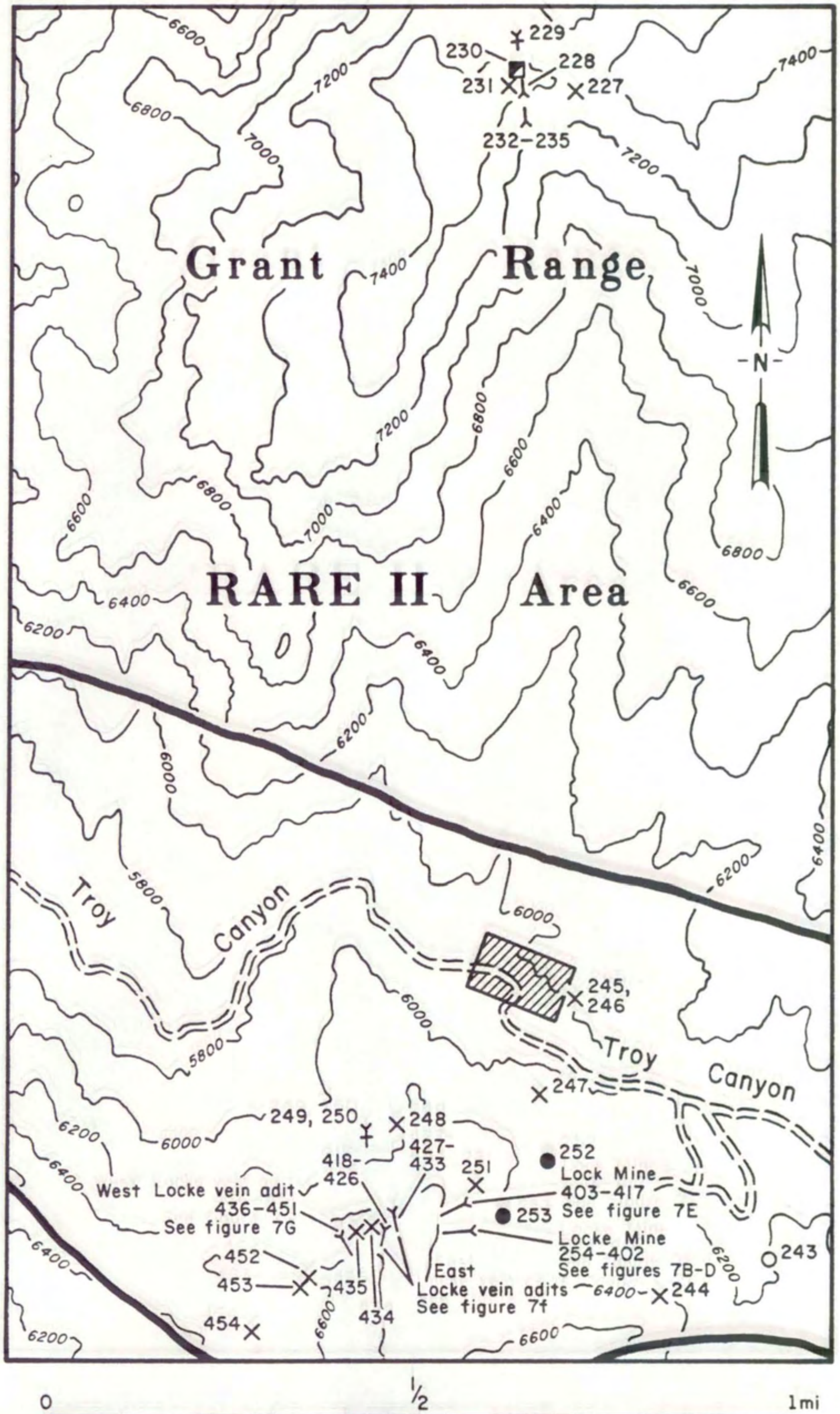


Figure 7A.--Troy Canyon area showing sample localities 227-235, 243-454. Tables 9 and 10 show sample data.

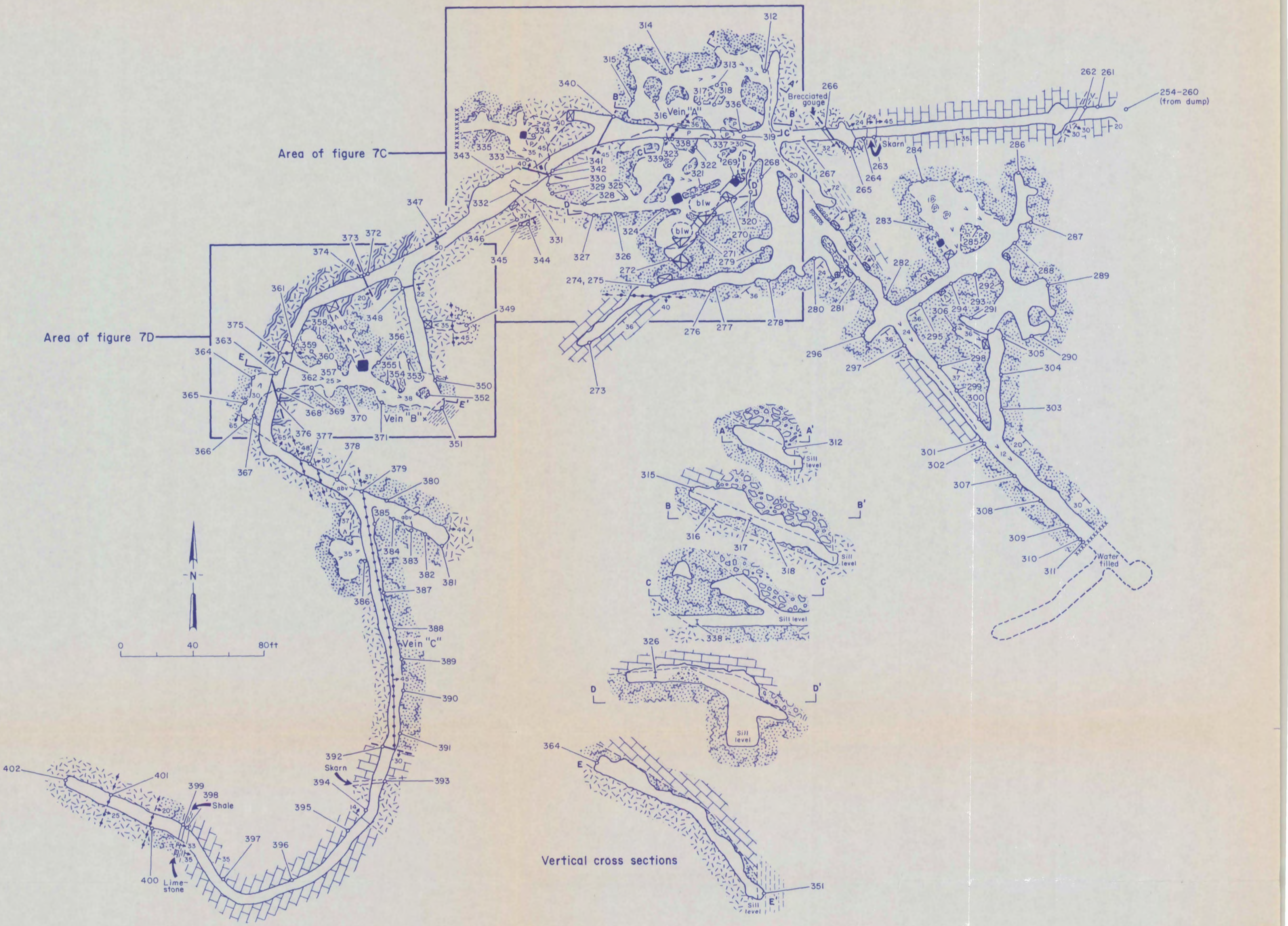


Figure 7B.--Locke Mine, showing sample localities 254-402. Table 10 shows sample data.

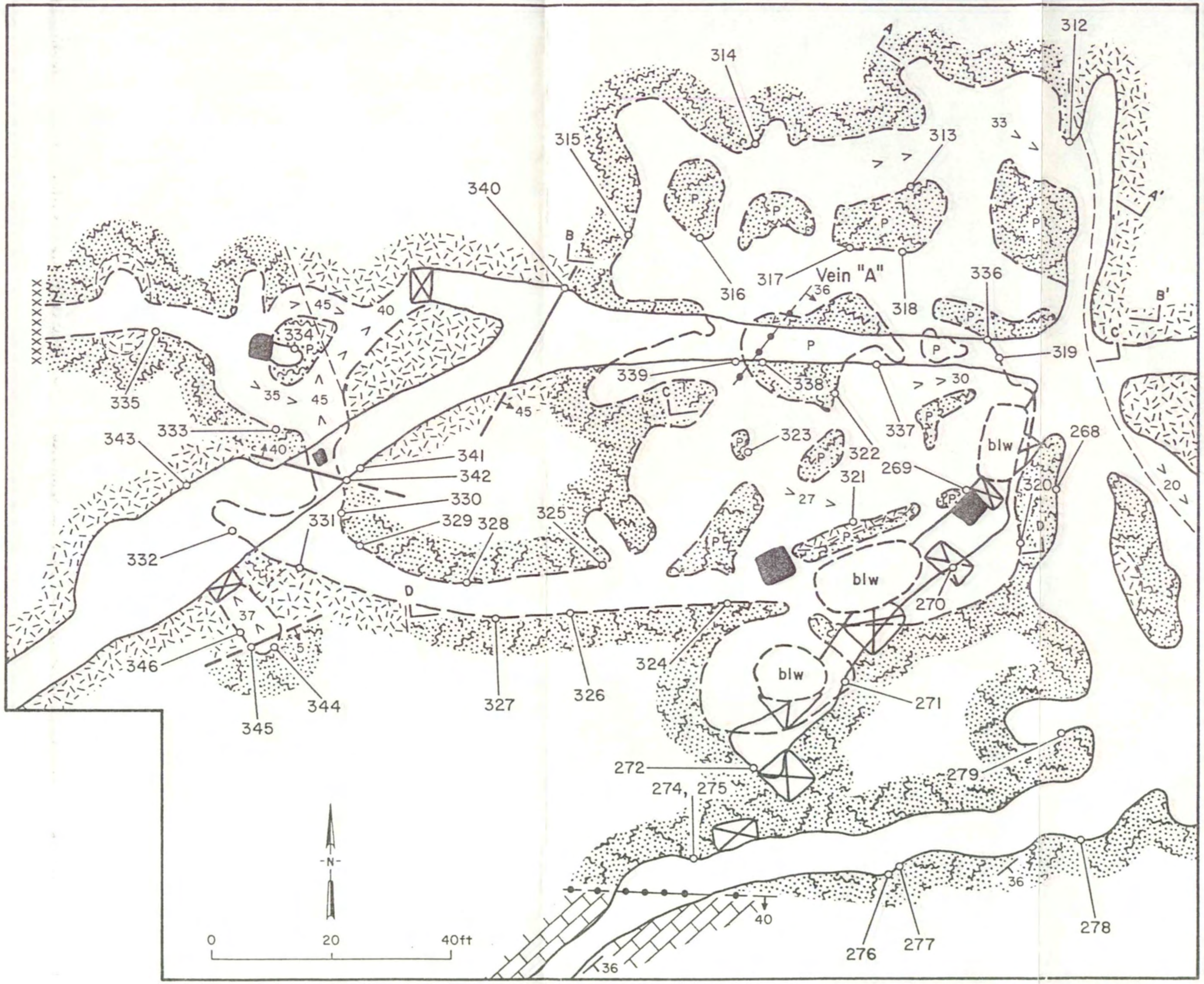


Figure 7C.--Enlargement of part of vein A in Locke Mine.

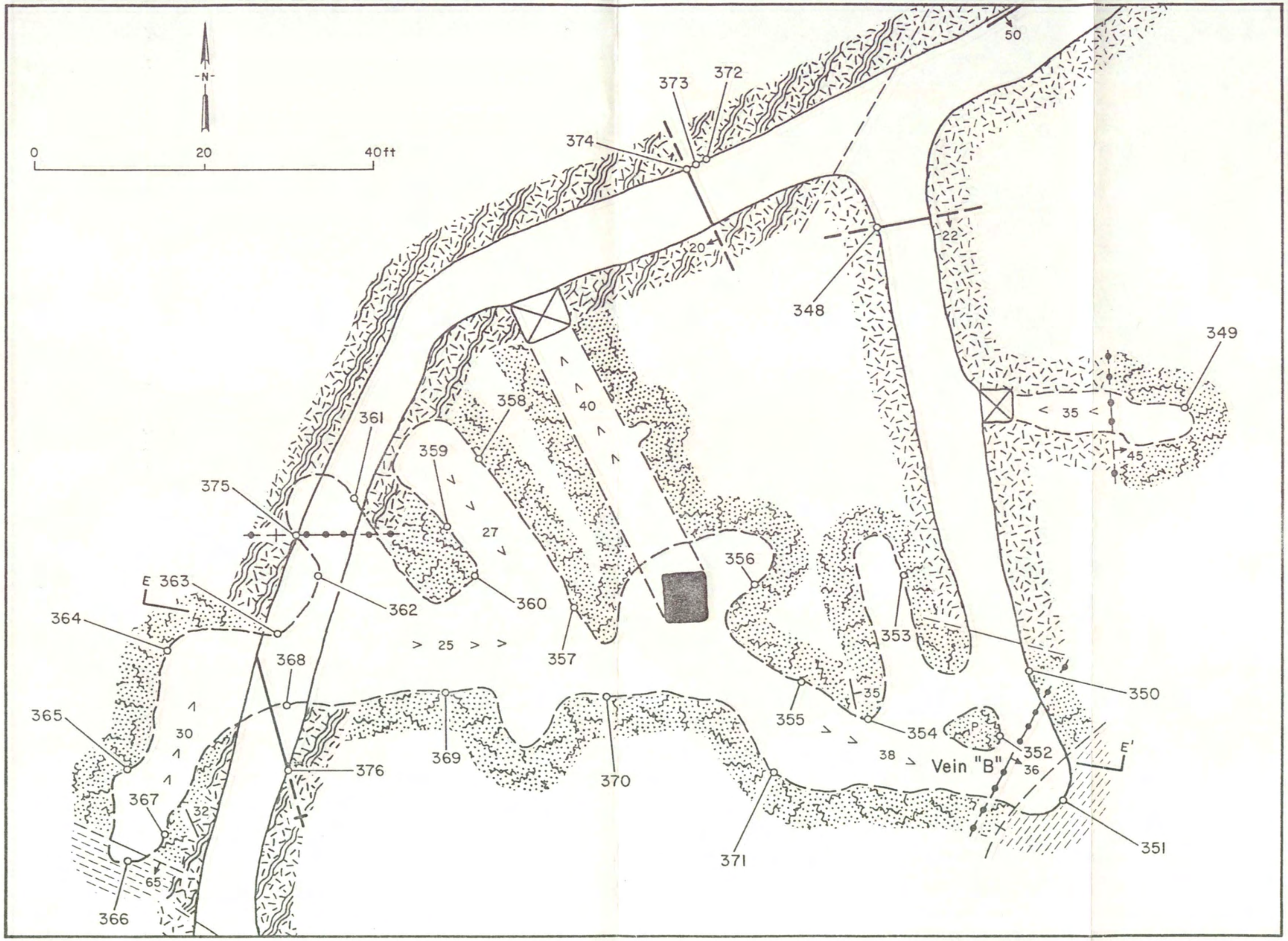
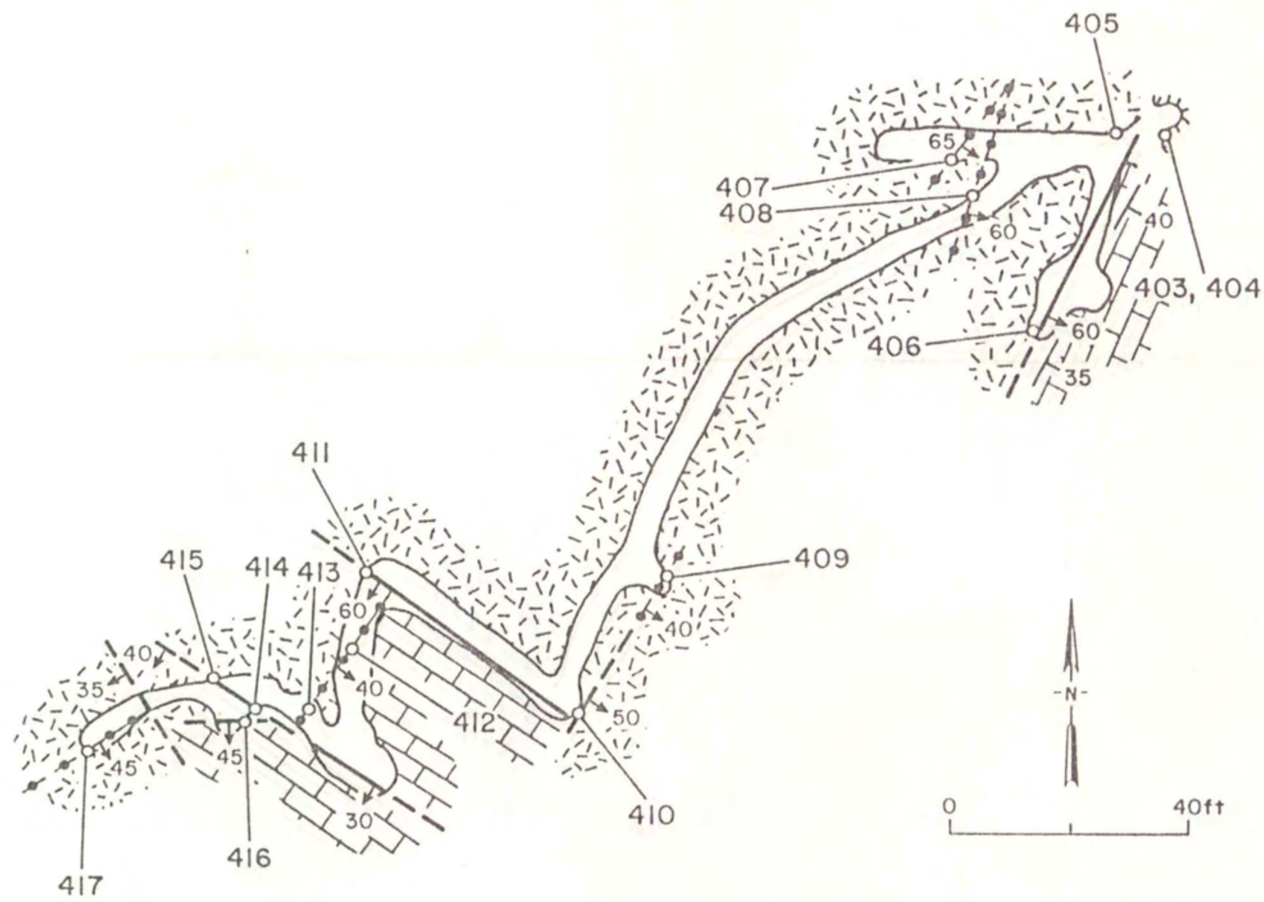


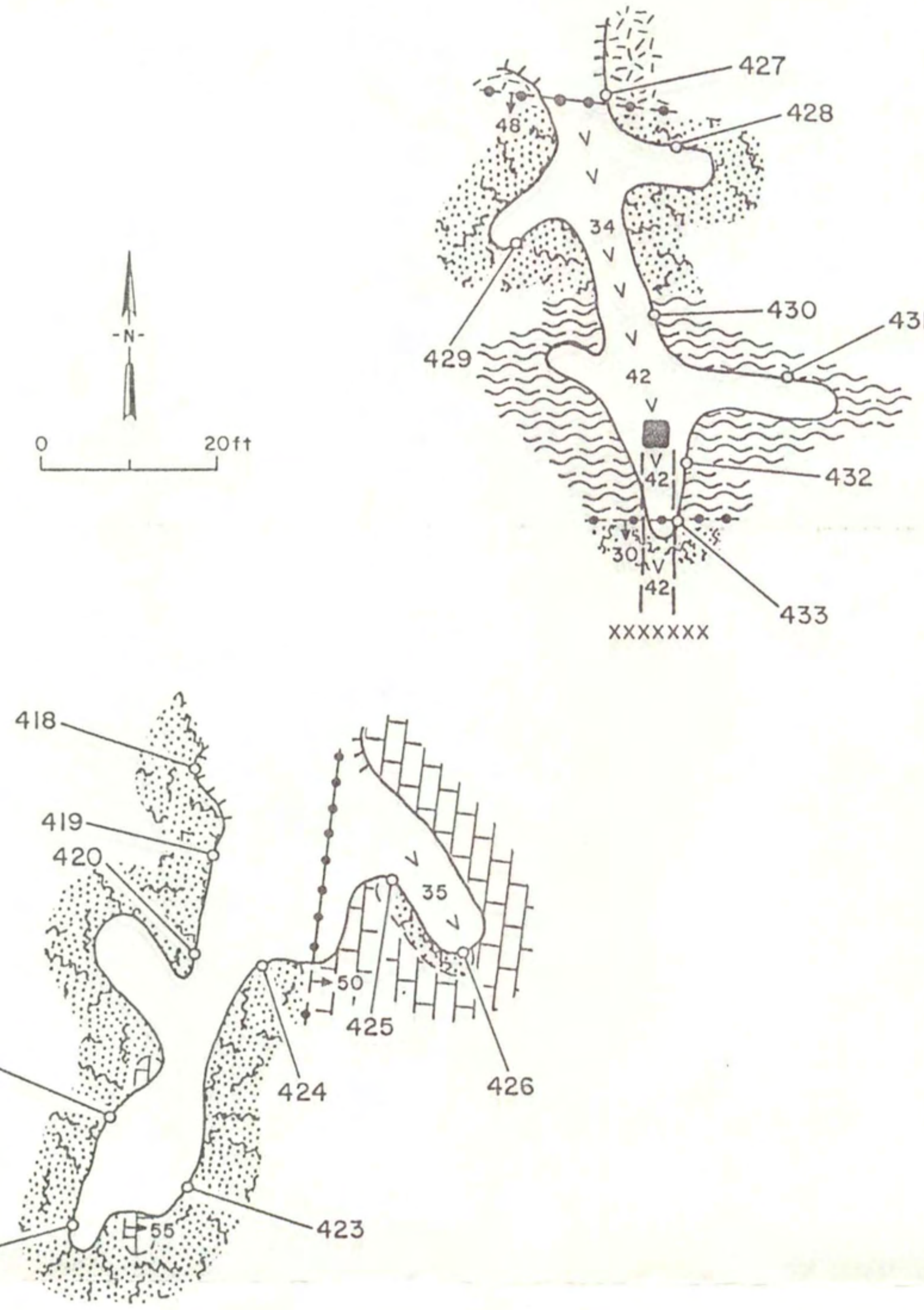
Figure 7D.--Enlargement of vein B in Locke Mine.



[Analysis by Reno Research Center.]

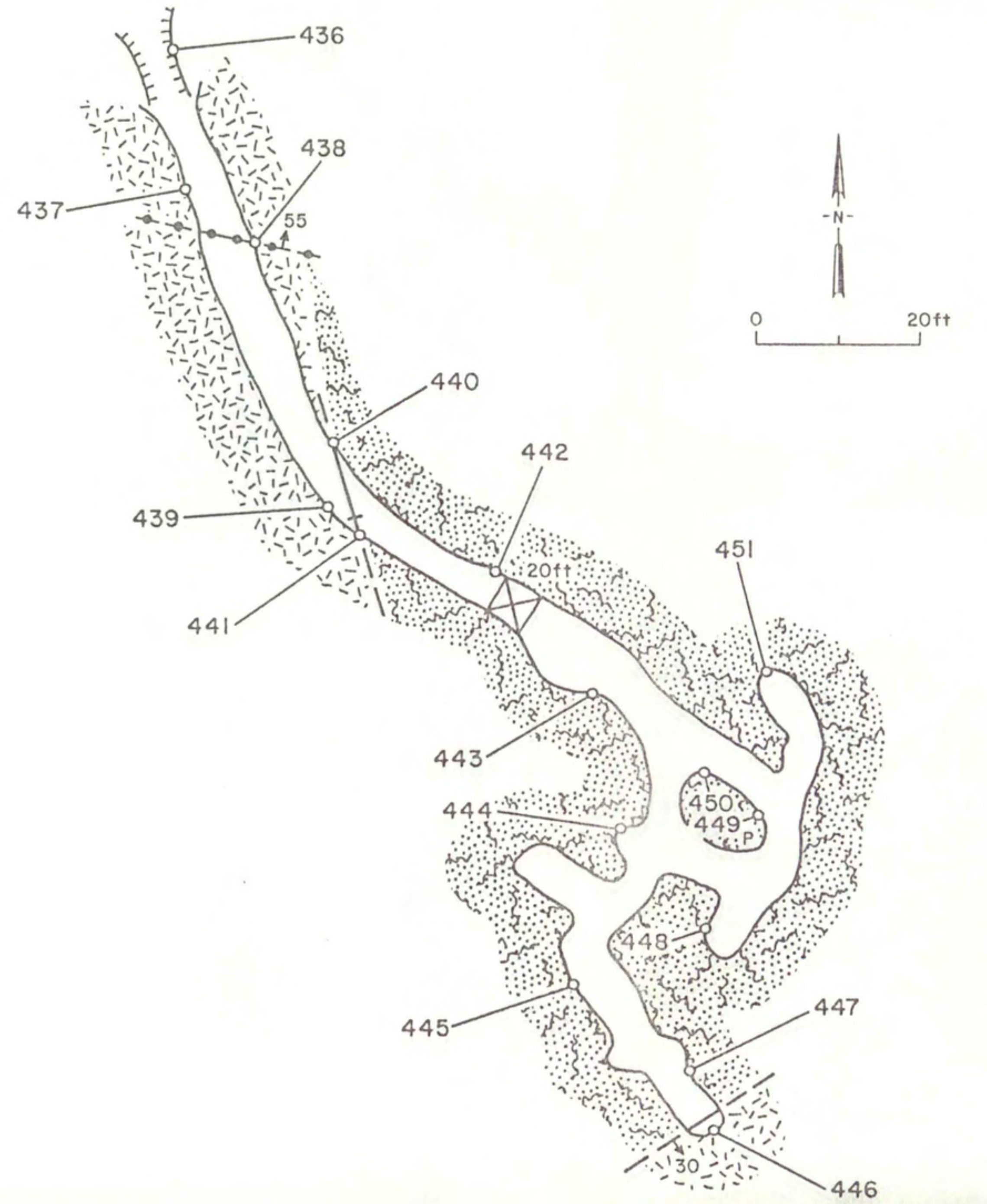
Sample		Assay data									
No.	Type and/ or length	Au	Ag	As	Cu	F	Mo	Pb	W	Zn	Description
		ppm (unless otherwise noted)									
403	Select	4.346	27.81	0.079%	na	na	na	na	na	na	Dump; minor galena, quartz.
404	Grab, 3-ft grid	.411	.78	.022%	---	150	---	190	---*	390	Dump; granite, limestone; quartz.
405	Chip, 32 in.	.035	.58	29.1	---	810	---	81	6	270	Granite, fractured, iron oxide stained; quartz lenses and pods.
406	Chip, 40 in.	4.885	7.94	.137%	---	43	6	0.11%	6	870	Granite, fractured, iron oxide stained.
407	Chip, 30 in.	.06	.83	.02%	na	na	na	na	na	na	Quartz vein, 6 in. wide.
408	Chip, 36 in.	.132	2.78	.01%	na	na	na	na	na	na	Quartz vein, 15 in. wide.
409	Chip, 36 in.	---	.51	.016%	na	na	na	na	na	na	Quartz vein, brecciated.
410	Chip, 10 in.	.099	2.92	.063%	na	na	na	na	na	na	Fault gouge; clay, pyrite, quartz.
411	Chip, 24 in.	---	---	21.2	---	84	---	38	---*	250	Fault gouge; clay.
412	Chip, 24 in.	.104	2.12	.06%	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained.
413	Chip, 24 in.	.057	.77	.043%	na	na	na	na	na	na	Do.
414	Chip, 18 in.	---	---	11.6	12	48	---	24	---*	110	Fault gouge; clay.
415	Chip, 24 in.	.026	1.69	35	na	na	na	na	na	na	Fault gouge; clay, quartz.
416	Chip, 30 in.	8.783	10.13	.018%	11	170	110	.11%	8	540	Fault gouge, 6 in. wide.
417	Chip, 20 in.	.012	---	.21%	na	na	na	na	na	na	Quartz vein, iron oxide stained, 6 in. wide.

Figure 7E.--Lock Mine showing sample localities 403-417 and table showing analytical data.



Sample No.	Length of chip (in.)	Lab	Au	Ag	As	Cu	F	Mo	Pb	W	Zn	Description
			Assay data, ppm (unless otherwise noted)									
418	48	BC	0.88	10.1	168	na	100	14	987	---	386	Quartz vein, brecciated, iron oxide stained, vuggy.
419	54	BC	.21	28.7	216	na	110	112	2,638	31	556	Do.
420	72	BC	1.2	26.6	318	na	270	46	1,079	53	848	Quartz vein, brecciated; hematite.
421	36	BC	.81	19.7	366	na	na	43	611	21	762	Quartz vein, brecciated, iron oxide stained, vuggy.
422	42	BC	.215	2.7	406	na	340	23	211	17	583	Quartz vein, brecciated, iron oxide stained.
423	18	BC	2.65	8	285	na	na	16	617	---	1,346	Quartz vein, brecciated, iron oxide stained; pyrite.
424	48	BC	1.03	36.7	182	na	na	385	2,313	16	1,059	Quartz vein, brecciated, iron oxide stained.
425	60	BC	5.3	28.7	394	na	na	166	2,226	---	4,886	Quartz vein, brecciated, vuggy; arsenopyrite.
426	48	BC	0.252 oz/st	27.8	179	na	180	26	2,646	---	954	Quartz vein, brecciated, iron oxide stained; hematite.
427	30	R	---	---	15.9	---	310	---	47	---*	200	Granite.
428	48	R	.794	.68	0.033%	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained.
429	40	R	.05	---	1.05%	na	na	na	na	na	na	Do.
430	42	R	.145	1.08	---*	14	490	93	---	140	0.99%	Shear zone; limestone, shale; gossan, quartz.
431	40	R	.742	1.51	.294%	28	50	30	---	20	.19%	Do.
432	48	R	.408	.7	---*	81	50	130	74	32	.32%	Do.
433	30	R	---	.3	.021%	na	na	na	na	na	na	Quartz vein, brecciated.

Figure 7F.--East Locke vein adits showing sample localities 418-433 and table showing analytical data.



[Analysis by Bondar-Clegg.]

Sample No.	Length of chip (in.)	Au	Ag	As	Cu	F	Mo	Pb	W	Zn	Description
		Assay data									
		ppm (unless otherwise noted)									
436	36	0.055	0.8	33	na	na	6	141	11	296	Granite, fractured, iron oxide stained; quartz veinlets.
437	60	---	.5	22	na	na	3	32	---	42	Quartz pod, brecciated.
438	16	.045	.8	27	na	na	5	30	---	96	Quartz vein, iron oxide stained.
439	42	---	.5	11	na	1,350	4	61	---	126	Granite, fractured, iron oxide stained; quartz veinlets.
440	24	.02	.8	92	na	na	17	89	---	1,209	Fault gouge; hematite, quartz.
441	36	---	1.1	58	na	140	22	74	---	227	Do.
442	30	1.59	7.1	845	na	na	17	71	25	544	Quartz vein, brecciated, iron oxide stained.
443	60	.32	2.9	118	na	500	16	164	---	135	Quartz vein, brecciated, iron oxide stained, vuggy.
444	60	1.38	2.3	356	na	na	40	120	---	321	Quartz vein, brecciated, iron oxide stained.
445	48	.51	1.6	401	na	100	14	49	---	311	Do.
446	30	.07	1.6	16	na	900	3	45	---	345	Granite, fractured; quartz-sericite alteration.
447	48	.465	.6	316	na	na	12	22	---	166	Quartz vein, brecciated, iron oxide stained; granite lenses.
448	48	.17	7.5	529	na	160	23	301	---	252	Quartz vein, brecciated, iron oxide stained.
449	48	3.04	8.3	178	na	na	32	168	---	383	Quartz vein, brecciated, iron oxide stained, vuggy.
450	60	.96	8.8	489	na	na	44	226	---	489	Do.
451	48	.55	3.4	327	na	400	33	71	---	549	Do.

Figure 7G.--West Locke vein adit showing sample localities 436-451 and table showing analytical data.

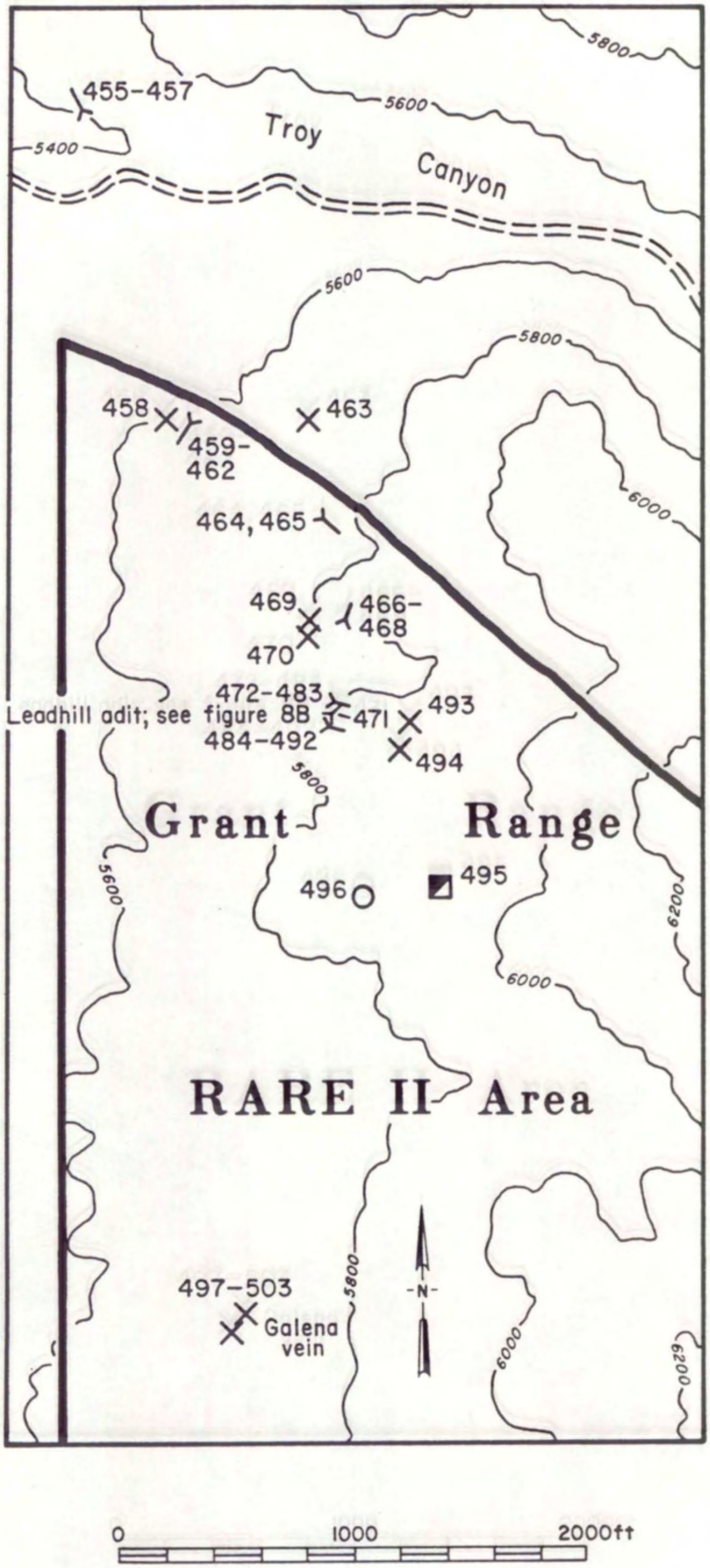


Figure 8A.--Troy Canyon south area showing sample localities 455-503. Tables 12 and 13 show sample data.

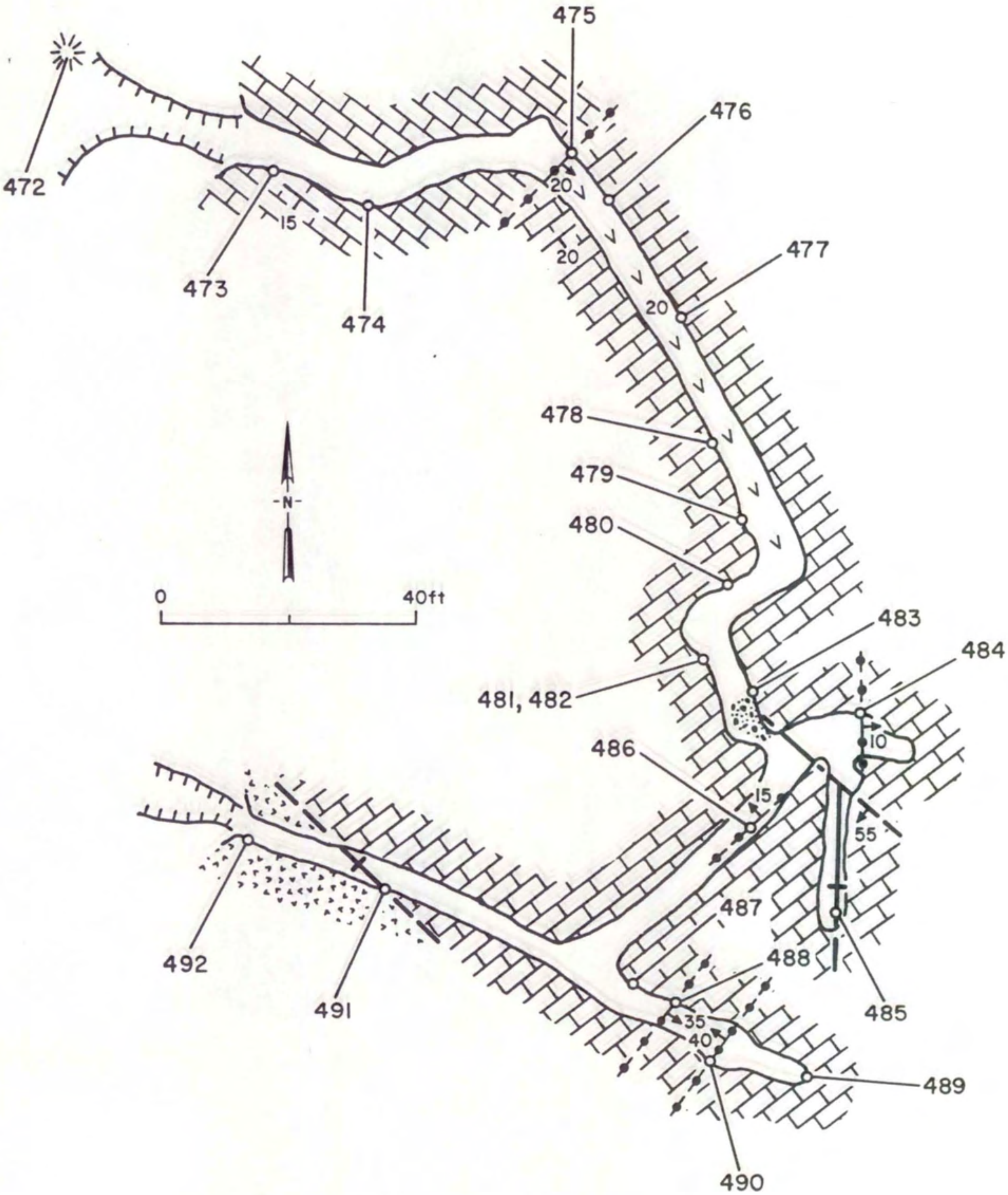


Figure 8B.--Leadhill adit showing sample localities 472-492.
Table 13 shows sample data.

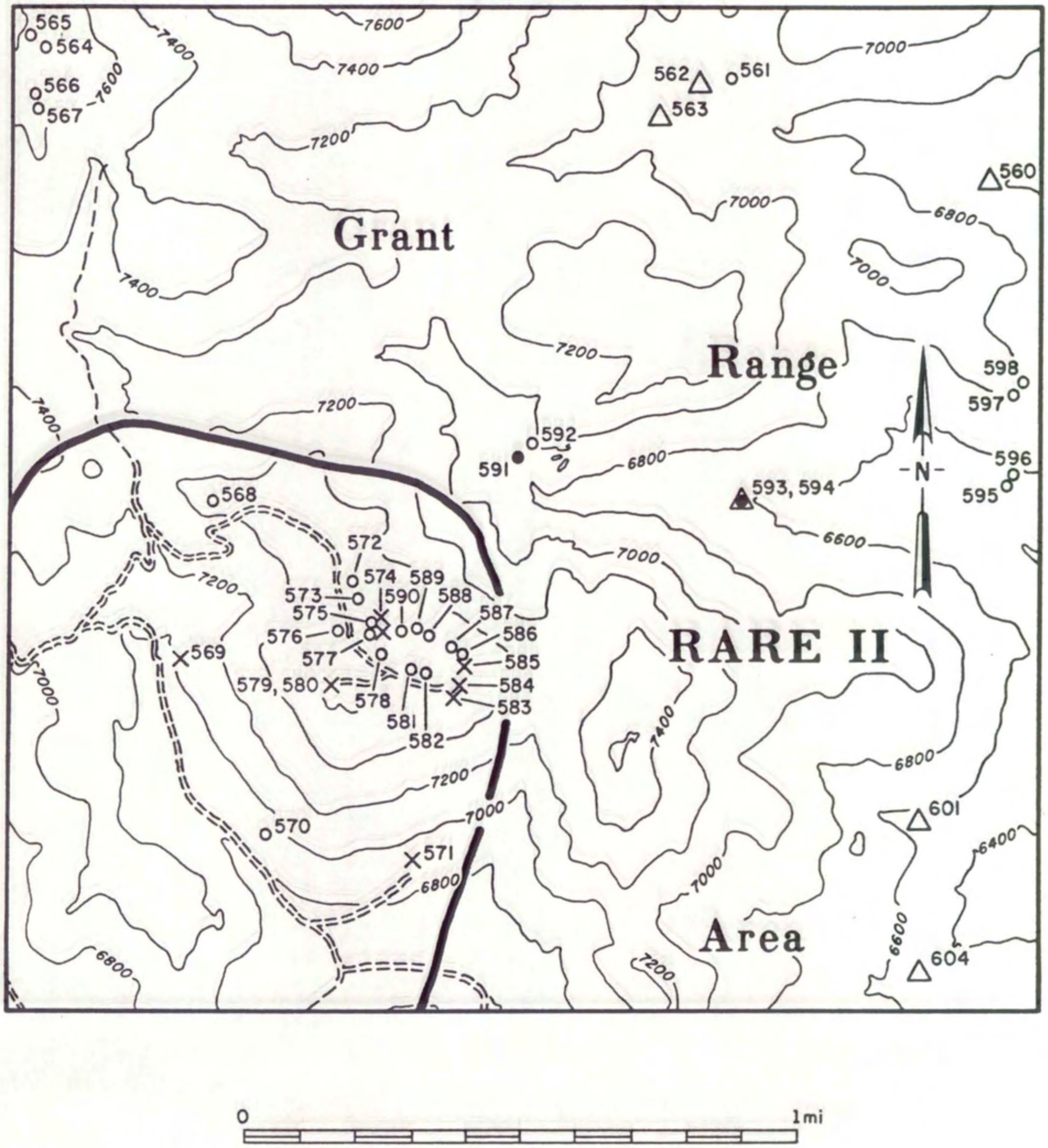


Figure 9.--Crystal mineralized area showing sample localities 560-598, 601, 604. Tables 16 and 17 show sample data.

Table 1.--Mineral occurrences near the Grant Range RARE II area, Nye County, Nevada.

Map locality	Property name (commodity)	Summary	Number and type workings	Sample data
5-11 (fig. 3.)	Mother's Day (lead, zinc.)	Quartz replacement along limestone bedding, about 50 ft wide, terminates against faults; limestone silicified; chalcanthite, copiapite, galena, pyrite.	115-ft adit and drifts.	Highest lead, silver, and zinc concentrations are 9,657, 8, and 4,307 ppm, respectively (fig. 3).
12	None (none.)	Fault breccia in silicified limestone.	20-ft adit	Table 4.
13-14	None (none.)	Sandy limestone, iron-oxide stained.	55-ft adit	Table 4.
16-17	None (none.)	Limestone; calcite, quartz.	75-ft adit	Table 4.
18-19	None (copper, lead, silver, zinc.)	Quartz vein along limestone bedding; chalcopyrite, galena, malachite.	15-ft adit	2.1% copper, 1.2% lead, 16.08 ppm silver, 0.54% zinc are highest concentrations (table 4).
21-22	None (lead, silver, zinc.)	Fault/vein; limestone; gossan, pyrite, quartz.	15-ft shaft	0.18% lead, 111 ppm silver, 0.28% zinc highest concentrations (table 4).
29-45 (fig. 4.)	Terrell Mine (tungsten.)	Tungsten skarn formed by contact metamorphism of limestone beds in the Pioche Shale (?) associated with emplacement of the Troy granitic pluton; skarn zone parallel to bedding and ranges from 3 to 7 ft wide. Scheelite is disseminated in skarn containing calcite, epidote, garnet, pyrite, quartz. Tungsten concentrates were valued at $60,000 from ore containing 1% WO_3 and 16% zinc (Kleinhampl and Ziony, 1984, p. 193).	515-ft adit and drifts.	High Bi, F, Mn, Mo (?), Zn concentrations. 2.54% W highest concentration (fig. 4).
50-65 (fig. 5.)	Nye Mine (tungsten.)	Tungsten skarn formed by contact metamorphism of limestone beds in the Pioche Shale (?) associated with emplacement of the Troy granitic pluton. Skarn zone (about 6 ft wide) traceable on surface above mine (sample nos. 46-49). Scheelite is disseminated in skarn and faults within the mine. Tungsten concentrates were valued at $60,000 from ore containing from 1% to 17% WO_3 (Kleinhampl and Ziony, 1984, p. 194).	600-ft adit and drifts.	High Be, Bi, F, Mn, Mo (?), Zn. 8.7% W highest concentration (fig. 5).
74-76 (fig. 6A.)	None (silver.)	Quartz veins and granite lenses parallel limestone bedding.	35-ft adit	One sample contained 7.96 ppm silver (table 7).
80-81 (fig. 6A.)	None (lead, silver, zinc.)	Quartz vein in limestone near granite contact.	20-ft adit	One sample yielded 1% lead, 17.74 ppm silver, 0.14% zinc (table 7).

Table 1.--Mineral occurrences near the Grant Range RARE II area, Nye County, Nevada--Continued

Map locality	Property name (commodity)	Summary	Number and type workings	Sample data
93-96 (fig. 6A.)	None (none.)	Faults and quartz vein in granite.	80-ft adit	Table 7.
103-112 (fig. 6A, B.)	Mayolli (lead, silver, zinc.)	Quartz replacement veins, about 6 ft wide, faulted; footwall-granite, hanging wall-limestone.	100-ft inclined adit and drifts (sample nos. 103-105); 105-ft inclined adit and drifts (sample nos. 106-112).	One sample yielded 7.8 ppm gold, 40 ppm silver, 1.7% lead, 0.14% zinc (fig. 6B).
114-131 (fig. 6A, C.)	Irwin Mine and prospects (gold, silver, zinc.)	Irwin fault/vein traceable 125 ft on surface (sample nos. 115-116), 22 in. wide, strike N. 60° E., dip 75° NW.; Irwin fault/vein traceable 162 ft in mine, 3 to 17 in. wide, strike N. 60° E., dip 73° NW. (sample nos. 119-124); granite; hematite, pyrite, quartz.	80-ft (?) shaft (sample no. 115); trench (sample no. 116); 300-ft cross-cut, 200-ft drift; shaft (sample nos. 128-129); 30-ft adit (sample nos. 130-131).	Irwin fault/vein (sample nos. 115-116, 119-124), highest concentrations were 6 ppm gold, 40.9 ppm silver, and 3,033 ppm zinc (table 7).
132 (fig. 6A.)	None (none.)	Quartz vein; sandstone.	25-ft adit	Table 7.
137 (fig. 6A.)	None (none.)	Mafic dike; granite.	20-ft shaft	Table 7.
138-139 (fig. 6A.)	None (none.)	Pegmatite pod and granite.	50-ft adit	Table 7.
141-143 (fig. 6A.)	None (none.)	Fault/vein; granite; quartz.	20-ft shaft	Table 7.
146 (fig. 6A.)	None (none.)	Quartz pods; granite.	20-ft adit	Table 7.
148-151 (fig. 6A.)	None (silver.)	Quartz vein, 36 in. wide, strike N. 80° W., dip 35° NE., traceable 60 ft in adit and 15 ft on surface; granite; pyrite.	65-ft adit	Silver concentrations ranged from 9.9 to 30.5 ppm (table 7).
153-172 (fig. 6A, D.)	Haller (lead, silver.)	Quartz replacement vein, 6 to 36 in. wide, strike N. 55° W., dip 30° SW. (sample nos. 161-166); limestone; galena, pyrite.	285-ft adit and drifts (sample nos. 153-160); 270-ft adit and drifts (sample nos. 161-172).	Highest vein concentrations (sample nos. 161-166) are 41.3 ppm silver and 5.05% lead (fig. 6D).

Table 1.--Mineral occurrences near the Grant Range RARE II area, Nye County, Nevada--Continued

Map locality	Property name (commodity)	Summary	Number and type workings	Sample data
174-222 (fig. 6A, E, F, G.)	Vanderhoef (lead, silver.)	Quartz veins striking northeast, north, and northwest. Quartz vein strikes about N. 80° W. and dips about 50° NE. traced on surface and in workings (sample nos. 190-219), thickness is about 20 ft (sample no. 190) but thins to 16 in. (sample no. 219) and terminates against northwest-striking fault; granite footwall; quartz veins contain arsenopyrite, chalcopyrite, galena, hematite, pyrite.	125-ft adit (sample nos. 174-182); 15-ft adit (sample no. 184); 43-ft adit (sample nos. 185-189); 165-ft adit (sample nos. 190-199); 90-ft adit (sample nos. 200-205); 170-ft adit (sample nos. 206-218); 20-ft adit (sample nos. 220-222).	Low gold, highest vein grade (sample no. 207) 20.1 oz/st silver, 5.93% lead (fig. 6G).
223-225 (fig. 6A.)	None (none)	Quartz vein, traceable 15 ft, strike W., dip 60° S.; granite.	20-ft adit	Table 7.
227-235 (fig. 7A.)	None (gold, lead, silver, zinc, tungsten.)	Fault, 3 ft wide, traceable 30 ft, strike N. 25° W., dip 65° NE.; footwall-granite, hanging wall-marble; galena, quartz, skarn (?).	15-ft adit (sample no. 228); 30-ft shaft (sample no. 230); 115-ft adit (sample nos. 232-235).	Mineralized fault (sample nos. 230-231) containing, gold, lead, silver, tungsten, zinc (table 9).
254-402 (fig. 7A, B, C, D.)	Locke Mine (gold, lead, silver.)	Quartz replacement veins striking generally northeasterly dipping about 35° to the southeast, concordant with unconformity, thickness from about 12 to 40 ft; footwall-granite, hanging wall-Pole Canyon Limestone; arsenopyrite, chalcopyrite, galena, malachite, pyrite, skarn.	2,100-ft adit and drifts, extensive inclined stoped areas; Locke mill, primary and secondary crushers, ball mill, shaking tables, froth flotation cells.	Highest grades 2.59 oz/st gold, 1.95% lead, 9.07 oz/st silver (table 10).
403-417 (fig. 7A, E.)	Lock Mine (gold, silver.)	Quartz veins in granite and concordant along Troy Granite-Pole Canyon Limestone contact, numerous faults.	300-ft adit and drifts	Highest concentrations 8.783 ppm gold, 0.11% lead, 27.81 ppm silver (fig. 7E).
418-454 (fig. 7A, F, G.)	Locke vein (gold, lead, silver, zinc.)	Quartz replacement vein, vein traceable and projected about 1,200 ft on the surface thinning from about 50 ft (near sample no. 427) to 3 1/2 ft (sample no. 454) toward southwest, vein faulted but concordant along Troy Granite-Pole Canyon Limestone contact.	85-ft adit and drifts (sample nos. 418-426); 110-ft inclined adit and drifts (sample nos. 427-433); 225-ft adit and drifts (sample nos. 436-451).	Shear zone (sample nos. 430-432) contains anomalous molybdenum and tungsten (fig. 7F).
455-457 (fig. 8A.)	None (none.)	Pole Canyon Limestone; quartz.	45-ft adit	Table 12.

Table 1.--Mineral occurrences near the Grant Range RARE II area, Nye County, Nevada--Continued

Map locality	Property name (commodity)	Summary	Number and type workings	Sample data
459-462 (fig. 8A.)	None (gold, lead, silver, zinc.)	Fault/vein, 3 ft wide, strike N. 55° E., dip 55° SE.; Pole Canyon Limestone; quartz.	30-ft inclined adit	5.54 ppm gold, 22.1 ppm silver, 1.46% lead, 16,381 ppm zinc highest concentrations (table 12).
464-465 (fig. 8A.)	None (lead, silver, zinc.)	Quartz vein, 2 ft wide, strike N. 25° E., dip 50° SE.; Pole Canyon Limestone.	20-ft inclined adit	20.5 ppm silver, 7,000 ppm lead, 2,305 ppm zinc (table 12).
466-468 (fig. 8A.)	None (none.)	Pole Canyon Limestone and diabase dike; calcite, pyrite, quartz.	12-ft adit	Table 12.
472-492 (fig. 8A, B.)	Leadhill (gold, lead, silver, zinc.)	Vein along bedding 4 to 9 in. wide, traceable about 60 ft, strike N. 45° E., dip 20° SE. (sample nos. 475-479); Pole Canyon Limestone; galena, pyrite, quartz.	340-ft adit and drifts	High gold, silver, lead, zinc concentrations and high pathfinder (As, Sb) concentrations (table 13).
495 (fig. 8A.)	None (none.)	Quartz pod; Pole Canyon Limestone.	10-ft shaft	Table 12.
497-503 (fig. 8A.)	Galena (lead, silver zinc.)	Quartz vein, about 4 ft wide, traceable 225 ft, strike N. 25-35° E., dip 70-75° NW.; Pioche Shale, phyllite; galena, hematite.	Prospect pits along vein	High lead, silver, zinc concentrations (table 12).
514-516	Gray Eagle (lead, silver, zinc).	Quartz vein, 25 ft wide, strike N. 40° E., dip 65° NW.; Pole Canyon Limestone; chalcopyrite.	Prospect pit	55 ppm silver, 0.27% lead, 0.24% zinc highest concentrations, high pathfinder (As, Sb) concentrations (table 11).
517-525	Troy Mine (lead, silver, zinc.)	Quartz vein along bedding, 2 to 3 ft wide, strike N. 10-25° E., dip 20-35° NE., traceable 200 ft; Sidehill Springs Formation; arsenopyrite, azurite, chalcopyrite, galena, malachite, pyrite.	Caved adit (sample no. 517); 500-ft shaft (sample no. 518); caved adit and pits on vein (sample nos. 519-525).	High silver, lead, zinc concentrations and high pathfinder (As, Sb) concentrations (table 11).
543-613 (fig. 9.)	Crystal mineralized area (gold, fluorite, molybdenum.)	Jasperoid, brecciated, iron-oxide stained; silicified Tertiary ash flow tuffs and silicified Devonian limestones and dolomites; calcite, fluorite, gossan, hematite, pyrite pseudomorphs, quartz breccia.	Prospect pits	Possible Carlin-type disseminated gold replacement deposit; low gold and pathfinder (As, Hg, Sb, Tl) element concentrations (table 16, 17).
614-617	Wadsworth Ranch (lead, silver, zinc.)	Breccia zone and vein in limestone.	Shaft and prospect pit	Tungsten, and high lead, silver, and zinc, and high pathfinder (As, Sb) concentrations (table 18).

Table 2.--Summary of inferred subeconomic gold, silver, and tungsten resources in the Troy mineralized area, Grant Range RARE II area.

[---, not detected; na, not analyzed; xx, not applicable; st, short ton.]

Name	Highest assay ppm (unless noted) Au	Ag	W	Average mineralized or sampled thickness (ft)	Strike length (ft)	Average grade ppm (unless noted) Au	Ag	W	Tonnage (st)
Terrell (skarn)	0.14	4.8	2.54%	xx	xx	xx	xx	xx	xx
Nye	.187	4.6	8.7%	xx	xx	xx	xx	xx	xx
fault A, sample nos. 54-60	.07	1.1	8.7%	2.7	52	xx	xx	1.78%	800
Irwin	6	40.9	12	xx	xx	xx	xx	xx	xx
vein, sample nos. 119-124	6	40.9	12	xx	xx	xx	xx	xx	xx
Mayolli	7.8	40	na	xx	xx	xx	xx	xx	xx
vein A, sample nos. 103-105	1.47	36	na	xx	xx	xx	xx	xx	xx
vein B, sample nos. 106-108, 110, 112	7.8	40	na	xx	xx	xx	xx	xx	xx
Vanderhoef	2.27	20.1 oz/st	---	xx	xx	xx	xx	xx	xx
vein, sample nos. 184-189	.12	48.2	na	xx	xx	xx	xx	xx	xx
vein, sample nos. 206-215	.28	20.1 oz/st	na	xx	xx	xx	xx	xx	xx
Locke	88.75	311	28	xx	xx	xx	xx	xx	xx
vein A, sample nos. 268-272, 274, 276-330, 332-338	88.75	311	15	3.73	240	3.06	13.3	xx	50,000
vein B, sample nos. 350, 352-367	11.09	48	28	3.21	40	1.33	12.8	xx	2,200
vein C, sample nos. 379-391	1.08	3.8	---	2.96	145	.169	1.45	xx	3,800

Table 2.--Summary of inferred subeconomic gold, silver, and tungsten resources in the Troy mineralized area, Grant Range RARE II area--Continued

Name	Highest assay Au	Highest assay Ag	Highest assay W	Average mineralized or sampled thickness (ft)	Strike length (ft)	Average grade Au	Average grade Ag	Average grade W	Tonnage (st)
	ppm (unless noted)					ppm (unless noted)			
Lock	8.783	27.81	8	xx	xx	xx	xx	xx	xx
Locke									
vein, sample nos. 418-454	1.195 oz/st	36.7	140	4.3	1,200	0.95	15.98	xx	300,000
Haller	1.6	41.3	15	xx	xx	xx	xx	xx	xx
vein, sample nos. 161-166	1.6	41.3	15	2	67	.34	11.33	xx	xx
Leadhill	.457 oz/st	9.59 oz/st	na	xx	xx	xx	xx	xx	xx
vein, sample nos. 475-479	.264 oz/st	4.29 oz/st	na	1.3	xx	2.5	71.3	xx	500
Galena	.285	35.9	na	xx	xx	xx	xx	xx	xx
Troy	1.174	390	12	xx	xx	xx	xx	xx	xx
Mother's Day	.045	8	13	xx	xx	xx	xx	xx	xx

Table 3.--Commodity highlights.

[Principal metallic commodities in and near the Grant Range RARE II area are gold, silver, and tungsten. Limestone, also present, is difficult to assess in terms of marketability and price and not covered in the following summary. Commodity statistics are from the Bureau of Mines Mineral Commodity Summaries (1987).]

Commodity	1985 Domestic mine production	1985 Apparent consumption	Units	Major import sources	1985 Net import reliance (percent)	Average 1985 domestic price (dollars)	Price unit	Expected U.S. demand through year 2000	Major uses
Gold	2,480,000	3,400,000	Troy oz	Canada Uruguay Switzerland other	46	317.66	Troy oz	Not forecast	Jewelry industrial dental
Silver	39,400,000	160,000	Troy oz	Canada Mexico United Kingdom Peru	60	6.14	Troy oz	Not forecast	Photography electrical electronics sterlingware jewelry
Tungsten	983	8,211	Metric tons	Canada China Bolivia Portugal	68	68	Metric ton WO_3	Not forecast	Metal working mining machinery lamps lighting

Table 4.--Data for samples 1-4, 12-23 from the Grant Canyon area, Grant Range RARE II area.

[---, not detected; na, not analyzed; *, analyzed by atomic absorption with lower detection limit. Analytical lab: BC, Bondar-Clegg; R, Reno Research Center.]

Sample			Assay data										
			Au	Ag	As	Cu	F	Mo	Pb	Sb	W	Zn	
No.	Type and/or length	Lab	ppm (unless noted)										Description
1	Chip, random	R	0.185	---	3	7.2	150	11	---	---*	10	49	Quartz vein, 1-2 ft wide, traceable 20 ft, strike N. 40° E., dip 35° SE.; limestone and mica schist; pyrite.
2	Grab, 2-ft grid	R	---	---	4	6.1	150	12	---	---*	---*	57	Dump; limestone and mica schist; quartz.
3	Chip, random	R	---	---	---	9.6	83	16	17	---*	---*	45	Quartz vein, 10 ft wide, traceable 150 ft, strike N. 10° E., dip 50° SE.; phyllite; pyrite pseudomorphs.
4	Chip, 12 in.	R	---	---	3	8.6	84	10	---	---*	---*	35	Do.
12	Chip 28 in.	BC	---	0.5	43	5	na	2	83	---	---	83	Fault breccia, strike N. 50° W., dip vertical; limestone, silicified.
13	Chip 27 in.	BC	.025	---	74	31	na	1	35	9	---	120	Sandy limestone; iron oxide stained.
14	Chip, 24 in.	BC	---	---	27	49	na	---	92	---	17	158	Do.
15	Chip 24 in.	BC	.04	6.6	27	5	na	1	3,425	8	---	3,478	Quartz pod, 10 ft diameter; phyllite, strike N. 40° W., dip 30° NE.; galena specks.
16	Chip, 28 in.	BC	---	---	10	4	na	1	67	---	---	66	Quartz pod, 10 ft long; limestone, strike N. 20° W., dip 45° NE.; calcite, pyrite.
17	Chip, 24 in.	BC	---	---	11	11	na	2	33	---	---	16	Limestone; calcite, pyrite.
18	Chip, 48 in.	R	.152	16.08	26.5	0.43%	250	---	0.46%	---*	---*	0.26%	Quartz vein along bedding (?); limestone, strike N. 60° E., dip 55° NW.; chalcopyrite, malachite.

Table 4.--Data for samples 1-4, 12-23 from the Grant Canyon area, Grant Range RARE II area--Continued

Sample			Assay data										
	Type and/or		Au	Ag	As	Cu	F	Mo	Pb	Sb	W	Zn	
No.	length	Lab	ppm (unless noted)										Description
19	Select	R	---	---	19.7	2.1%	38	---	1.2%	33	---*	0.54%	Dump; limestone; chalcopyrite, galena, quartz.
20	Chip, random	R	---	4.5	0.11%	15	21	---	96	---*	---*	48	Quartz vein, 10 ft wide, traceable 60 ft, strike N. 15° E., dip vertical, iron oxide stained; limestone.
21	Chip, 54 in.	R	---	21	86	290	36	---	380	11.6	24	.24%	Fault/vein, 3 ft wide, strike N. 25° W., dip 44° SW.; limestone; gossan, pyrite, quartz.
22	Select	R	---	111	.014%	840	14	---	.18%	---*	20	.28%	Dump; limestone; gossan, pyrite, vuggy quartz.
23	do.	R	---	---	23.6	---	23	---	13	---*	6	7	Dump; limestone, iron oxide stained; pyrite pseudomorphs, vuggy quartz.

Table 5.--Data for samples 24-28 from the Terrell Mill, Grant Range RARE II area.

[---, not detected; na, not analyzed; *, analyzed by atomic absorption with lower detection limit. Analytical lab: BC, Bondar-Clegg; R, Reno Research Center.]

Sample			Assay data												
No.	Type and/or length	Lab	Au	Ag	As	Be	Bi	Cu	F	Mn	Mo	Sn	W	Zn	Description
			ppm (unless noted)												
24	Select	R	0.383	11.05	3	---	580	160	8.5%	0.18%	190	5	5.6%	0.45%	Terrell mill tailings.
25	do.	R	.099	4.48	5	18	240	100	5.3%	.31%	74	---*	.94%	1.2%	Do.
26	do.	R	1.707	3.3	17.8	12	130	120	6.4%	.26%	86	---*	.21%	.92%	Do.
27	Panned concentrate	BC	.225	3.7	---	na	150	170	12.08%	4,400	58	---*	540	13,134	Do.
28	Select	R	1.25	2.53	---*	28	---	31	.7%	.59%	19	---*	360	.2%	Terrell mill dump; skarn; epidote, garnet, pyrite, quartz, sphalerite.

Table 6.--Data for samples 46-49 from the Nye Mine area, Grant Range RARE II area.

[---, not detected; na, not analyzed; *, analyzed by atomic absorption with lower detection limit.
Analytical lab: BC, Bondar-Clegg; R, Reno Research Center.]

Sample			Assay data												
No.	Type and/or length	Lab	Au	Ag	As	Be	Bi	Cu	F	Mn	Mo	Sn	W	Zn	Description
			ppm (unless noted)												
46	Chip 31 in.	BC	---	0.5	---	na	48	11	na	813	5	na	975	82	Skarn, 7 ft wide; granite and limestone; epidote, garnet, quartz; pit.
47	Chip, 30 in.	BC	0.07	.5	5	na	242	228	na	1,447	7	na	1,192	113	Skarn, 6 ft wide, iron and manganese oxide stained, strike N. 15° W., dip 45° NE.; mica schist; epidote, garnet, quartz; pit.
48	Chip, 60 in.	R	.089	.69	4.8	150	0.12%	8.5	2.6%	0.31%	---	9	0.32%	140	Skarn; granite and silicified limestone; calcite, garnet, quartz; pit.
49	Chip, 44 in.	R	.187	4.6	---*	61	880	310	.1%	.87%	---	---*	200	120	Fault, strike N. 55° W., dip 65° NE.; granite; quartz pods; pit.

Table 7.--Data for samples 66-90, 92-102, 113-116, 128-152, 173, 223-226, from the Irwin Canyon area not shown on other tables or figures, Grant Range RARE II area.

[---, not detected; na, not analyzed; *, analyzed by atomic absorption with lower detection limit. Analytical lab: BC, Bondar-Clegg; R, Reno Research Center.]

Sample			Assay data													
	Type and/or		Au	Ag	As	Be	Bi	Cu	F	Mn	Mo	Pb	Sb	W	Zn	
No.	length	Lab	ppm (unless noted)													Description
66	Chip, random	R	0.202	167	15.1	0.78	---	46	75	240	---	59	3	---*	14	Quartzite, iron oxide stained, strike N. 30° W., dip 20° NE.
67	Chip, 24 in.	R	---	.36	7.6	2.8	---	7.8	110	150	---	25	---*	6	72	Granite.
68	Chip, 24 in.	R	.054	1.24	9.4	2.3	---	34	66	680	---	51	---*	10	460	Limestone.
69	Chip, random	R	---	---	---*	---	---	---	180	25	---	---	---*	---*	---	Quartz vein, fractured, 4 ft wide, traceable 40 ft, strike N. 20° E., dip vertical; granite.
70	do.	R	.053	6.45	0.11%	---	42	130	88	12	---	22	---*	6	260	Quartz vein, 25 ft wide, traceable 100 ft, strike N. 70° W., dip 70° SE.; granite.
71	do.	R	.065	.39	11	---	---	20	15	26	---	14	---*	---*	36	Quartz vein, same as no. 70, fractured, iron oxide stained, vuggy.
72	Chip, 12 in.	R	---	1.66	11	---	---	14	16	72	---	110	---*	---*	81	Quartz vein, fractured, iron oxide stained, strike N. 75° W., dip 25° NE.; along granite and limestone contact (hanging wall); hematite.
73	Select	R	.243	19.57	99	---	190	270	36	67	36	0.27%	---*	28	0.14%	Stockpile; gossan, pyrite, quartz.
74	Chip, 6 in.	R	---	7.96	27.6	---	---	170	28	140	---	40	---*	---*	380	Quartz vein along bedding, strike N° 30° W., dip 55° NE.; limestone, silicified.
75	Chip, 42 in.	R	---	1.17	7	.81	---	30	0.14%	610	---	320	---*	8	540	Limestone, iron oxide stained, silicified; quartz pods and veinlets.
76	Chip, 24 in.	R	.073	.35	9.9	3.3	---	14	54	190	---	32	---*	6	120	Granite; quartz veinlets.
77	Grab, 4-ft grid	R	.041	.48	---	---	46	26	230	0.12%	---	---	---*	10	79	Dump; limestone.

Table 7.--Data for samples 66-90, 92-102, 113-116, 128-152, 173, 223-226, from the Irwin Canyon area not shown on other tables or figures, Grant Range RARE II area--Continued

Sample			Assay data													
			Au	Ag	As	Be	Bi	Cu	F	Mn	Mo	Pb	Sb	W	Zn	
No.	Type and/or length	Lab	ppm (unless noted)													Description
78	Chip, random	R	---	---	4.1	0.2	---	6	160	49	---	22	---*	6	18	Quartz vein, fractured, 30 ft wide, traceable 30 ft, strike N. 15° W., dip 44° SW. slickenslides; limestone.
79	do.	R	---	0.58	13.9	---	---	41	44	19	---	26	9.4	---*	61	Quartz vein, fractured, iron oxide stained, 4 ft wide, traceable 8 ft; minor disseminated pyrite.
80	Chip, 15 in.	R	---	17.74	46	.17	150	20	12	79	920	1%	---*	na	0.14%	Quartz vein, fractured, iron oxide stained, strike N. 20° E., dip 25° SE.; limestone.
81	Chip, 54 in.	R	---	.42	19.1	3.8	---	20	0.14%	960	---	78	---*	---*	110	Granite and limestone contact.
82	Select	R	---	45	6.4	.2	160	6.7	24	52	---	.97%	---*	---*	560	Dump; limestone; quartz, iron oxide stained.
83	do.	R	---	3.86	0.016%	.1	---	380	110	48	15	---	---*	20	270	Dump; limestone; gossan, quartz.
84	Chip, random	R	---	1.2	39	---	---	67	---	84	---	200	---*	---*	79	Quartz, fractured, iron oxide stained.
85	do.	R	---	.56	26.5	---	---	30	11	52	---	40	---*	---*	23	Quartz vein, fractured, iron oxide stained, 25 ft wide, traceable 125 ft, strike N. 25° W., dip 65° SW.
86	Select	R	---	2.05	65	---	---	340	27	110	---	85	---*	---*	230	Dump; pyrite, quartz.
87	Chip, 60 in.	R	---	---	5.9	.24	---	19	18	84	---	45	---*	---*	57	Quartz vein, traceable 80 ft, strike W., dip 55° S.
88	Chip, 36 in.	R	---	.75	27	.11	---	41	13	140	---	210	---*	---*	390	Quartz vein, same as no. 87, fractured, iron oxide stained.
89	Chip, 48 in.	R	---	---	57	---	---	33	18	77	---	33	---*	---*	17	Quartz vein, same as no. 87, fractured, iron oxide stained; pyrite.
90	Chip, 14 in.	BC	---	3.3	15	na	24	48	na	72	---	361	8	---	190	Quartz vein, 3 to 14 in. wide, strike N. 55° W., dip 60° NE.; granite; pyrite.

Table 7.--Data for samples 66-90, 92-102, 113-116, 128-152, 173, 223-226, from the Irwin Canyon area not shown on other tables or figures, Grant Range RARE II area--Continued

Sample			Assay data													
	Type and/or		Au	Ag	As	Be	Bi	Cu	F	Mn	Mo	Pb	Sb	W	Zn	
No.	length	Lab	ppm (unless noted)													Description
92	Chip, 12 in.	BC	---	0.5	75	na	---	57	na	468	2	52	---	---	520	Quartz vein, 3 to 12 in. wide, strike N. 60° E., dip 55° NW.; granite; hematite.
93	Chip, 12 in.	R	0.095	---	20.8	1.6	---	13	120	60	---	32	---*	---*	23	Quartz vein, iron oxide stained, strike N. 85° E., dip 57° SE.; granite.
94	Chip, 15 in.	R	---	---	---*	2.2	---	12	92	97	---	35	---*	---*	6.7	Fault gouge, strike W., dip 20° S.; granite.
95	Chip, 15 in.	R	---	---	---*	1.9	---	17	120	180	---	38	---*	---*	7.6	Fault gouge, strike W., dip 30° N.; granite.
96	Chip, 54 in.	R	---	---	3	2.2	---	7.5	170	270	---	38	---*	---*	11	Granite.
97	Chip, 24 in.	R	---	---	7	.55	---	17	32	57	---	51	---*	---*	12	Quartz vein; granite and limestone.
98	Chip, 36 in.	R	---	---	4	2.6	---	8.2	200	380	---	19	---*	---*	18	Limestone with granite lenses.
99	Chip, 18 in.	R	---	.38	---*	.64	---	74	32	110	---	68	---*	---*	15	Quartz vein, strike N. 85° E., dip 43° NW.; limestone and granite.
100	Chip, 30 in.	R	---	---	---*	2.2	---	8.7	140	130	---	23	---*	---*	4.1	Granite.
101	Select	R	---	---	20.8	.21	---	6	260	94	---	11	---*	---*	16	Dump; limestone.
102	Chip, random	R	---	.73	13.9	.13	---	24	35	74	---	72	---*	---*	28	Quartzite, strike N. 25° W., dip 65° SW.
113	Grab, 3-ft grid	R	---	---	---*	.99	---	18	220	240	---	15	---*	---*	17	Dump; phyllite; quartz.
114	Select	BC	.19	12.2	112	na	64	72	na	210	3	308	---	14	802	Dump; granite; hematite, pyrite, vuggy quartz.
115	Chip, 22 in.	BC	.34	5.6	26	na	18	38	na	60	1	268	---	---	2,788	Quartz vein, traceable 125 ft, strike N. 60° E., dip 75° NW., vuggy; granite; hematite, pyrite.

Table 7.--Data for samples 66-90, 92-102, 113-116, 128-152, 173, 223-226, from the Irwin Canyon area not shown on other tables or figures, Grant Range RARE II area--Continued

Sample No.	Sample Type and/or length	Lab	Au	Ag	As	Be	Bi	Cu	F	Mn	Mo	Pb	Sb	W	Zn	Description
			Assay data ppm (unless noted)													
116	Chip, 22 in.	BC	6	8.7	23	na	31	8	na	57	1	58	6	12	726	Quartz vein, same as no. 115.
128	Select	BC	.28	6.6	288	na	34	76	na	37	7	357	---	---	295	Stockpile; quartz vein, 3 ft wide, strike N. 65° E., dip 70° NW.; granite; hematite, pyrite, quartz.
129	Grab, 3-ft grid	BC	.94	5.1	391	na	33	43	na	70	3	464	---	---	408	Dump; granite; quartz.
130	Chip, 36 in.	BC	.05	1.2	178	na	5	28	na	36	5	155	---	---	233	Quartz vein, brecciated, traceable 14 ft, strike N. 63° E., dip vertical; granite; gypsum.
131	Chip, 24 in.	BC	.025	---	288	na	3	20	na	107	3	52	---	---	198	Do.
132	Chip, 27 in.	BC	.01	---	18	na	---	32	na	424	---	22	---	---	87	Quartz vein, 1 in. wide, strike N. 65° W., dip 20° NE.; sandstone.
133	Select	BC	---	---	---	na	---	16	na	463	1	13	---	---	53	Dump; granite; quartz.
134	Chip, 30 in.	BC	---	---	---	na	---	16	na	463	1	13	---	---	53	Mafic dike in granite.
135	Chip, 24 in.	BC	.38	6	56	na	29	54	na	35	3	66	---	---	82	Quartz vein, brecciated, strike N. 70° E., dip vertical; granite; pyrite.
136	Select	BC	1.65	22	205	na	43	102	na	29	6	161	---	---	452	Stockpile; hematite, pyrite, vuggy quartz.
137	Grab, 3-ft grid	BC	.01	---	17	na	2	10	na	184	---	14	---	13	41	Dump; 8 in. wide mafic dike in granite, strike N. 85° E., dip 75° NW.; pyrite, vuggy quartz.
138	Chip, 18 in.	BC	---	---	---	na	4	4	na	31	2	8	---	---	5	Pegmatite, 6-ft-long pod; granite; feldspar, quartz.
139	Chip, 30 in.	BC	---	---	---	na	---	3	na	80	3	10	---	---	34	Granite.
140	Chip, 24 in.	BC	---	.7	16	na	7	8	na	14	2	22	---	---	14	Quartz vein, 6 to 24 in. wide, strike N. 70° E., dip 60° NW.; granite.

Table 7.--Data for samples 66-90, 92-102, 113-116, 128-152, 173, 223-226, from the Irwin Canyon area not shown on other tables or figures, Grant Range RARE II area--Continued

Sample			Assay data													
	Type and/or		Au	Ag	As	Be	Bi	Cu	F	Mn	Mo	Pb	Sb	W	Zn	
No.	length	Lab	ppm (unless noted)													Description
141	Select	BC	0.19	2.2	226	na	13	59	na	28	13	56	---	---	806	Stockpile; quartz vein, 6 in. wide, strike N. 75° E., dip vertical; granite; hematite, pyrite.
142	do.	BC	.025	---	38	na	14	7	na	24	7	25	---	---	43	Dump; granite; pyrite, quartz.
143	Grab, 4-ft grid	BC	---	---	32	na	---	8	na	92	8	25	---	---	72	Dump; granite; iron-oxide-stained quartz.
144	Chip, 28 in.	BC	.01	---	18	na	---	21	na	737	---	9	---	---	128	Granite-mica schist contact, strike N. 10° W., dip 70° NE.; quartz pods.
145	Grab, 3-ft grid	BC	---	---	12	na	3	7	na	132	2	13	---	---	25	Dump; granite, mafic rock; quartz.
146	Chip, 18 in.	BC	.03	---	8	na	---	5	na	16	1	26	---	---	13	Granite, fractured; quartz pods.
147	Chip, 36 in.	BC	.32	15.1	71	na	45	27	na	25	15	2,442	---	---	378	Quartz vein, 12 to 36 in. wide, strike N. 60° E., dip 55° NW.; granite; gossan, hematite.
148	Chip, 24 in.	BC	.02	17.5	46	na	168	45	na	17	3	134	---	---	10	Quartz vein, fractured, vuggy, traceable 60 ft, strike N. 80° W., dip 35° NE.; granite; pyrite.
149	Chip, 30 in.	BC	.005	9.9	9	na	49	36	na	24	4	63	---	12	8	Do.
150	Chip, 23 in.	BC	.01	22.6	80	na	95	127	na	20	6	480	---	10	44	Do.
151	Chip, 26 in.	BC	.015	30.5	25	na	181	13	na	14	2	103	---	---	2	Do.
152	Chip, 24 in.	BC	---	---	12	na	3	14	na	78	---	21	---	11	30	Granite, fractured.
173	Chip, 14 in.	BC	---	37.5	51	na	na	na	na	2	---	1,492	na	na	406	Quartz vein, brecciated, strike N. 60° E., dip 70° NW.; granite; pit.

Table 7.--Data for samples 66-90, 92-102, 113-116, 128-152, 173, 223-226, from the Irwin Canyon area not shown on other tables or figures, Grant Range RARE II area--Continued

Sample			Assay data													
	Type and/or		Au	Ag	As	Be	Bi	Cu	F	Mn	Mo	Pb	Sb	W	Zn	
No.	length	Lab	ppm (unless noted)													Description
223	Chip, 60 in.	BC	---	0.5	12	na	na	na	na	na	3	39	na	---	52	Quartz vein, brecciated, iron oxide stained, traceable 15 ft, strike W., dip 60° S., terminates against N. 65° W., dip 42° NE. fault; granite.
224	Chip, 24 in.	BC	---	1	15	na	na	na	na	na	5	31	na	---	137	Quartz vein, same as 223; granite; pyrite.
225	Chip, 28 in.	BC	---	---	na	na	na	na	600	na	5	28	na	---	163	Granite, fractured, iron oxide stained.
226	Chip, 24 in.	BC	---	.5	---	na	na	na	na	na	5	8	na	---	1	Quartz vein, brecciated, iron oxide stained, traceable 50 ft towards adit, strike W., dip 75° S.; granite.

Table 8.--Data for samples 117-127 from the Irwin Mine, Grant Range RARE II area.

[---, not detected. Analyzed by Bondar-Clegg.]

Sample		Assay data										
No.	Length of chip, (in.)	Au	Ag	As	Bi	Cu	Mo	Pb	Sb	W	Zn	Description
		ppm										
117	30	---	---	---	5	7	2	32	---	---	190	Granite, fractured; clay.
118	14	---	---	7	2	3	2	6	---	---	77	Do.
119	9	0.005	---	18	---	6	2	13	---	---	55	Quartz vein, 3 in. wide.
120	12	.015	0.6	18	6	16	2	67	---	---	122	Quartz vein, iron oxide stained; hematite.
121	13	.28	2.7	20	9	25	2	82	---	---	586	Quartz vein; hematite, pyrite.
122	11	2.2	8.7	38	28	24	2	256	---	---	579	Do.
123	15	1.05	2.7	26	15	13	1	127	---	---	354	Do.
124	17	4.7	40.9	47	123	40	6	862	---	---	3,033	Do.
125	11	.54	1.5	22	8	8	3	45	---	---	169	Quartz vein; clay gouge.
126	18	.01	---	17	---	4	2	6	---	---	23	Do.
127	21	.03	---	24	2	6	2	48	---	---	136	Quartz vein.

Table 9.--Data for samples 227-253, 434-435, 452-454 from the Troy Canyon area not shown on other tables or figures, Grant Range RARE II area.

[---, not detected; na, not analyzed. Analytical lab: BC, Bondar-Clegg; R, Reno Research Center.]

Sample			Assay data										
	Type and/or		Au	Ag	As	Cu	F	Mo	Pb	Sb	W	Zn	
No.	length	Lab	ppm (unless noted)										Description
227	Chip, 12 in.	BC	---	---	na	na	900	4	8	na	---	34	Granite-mica schist contact; minor quartz.
228	Chip, 6 in.	BC	0.04	0.6	na	na	490	6	85	na	---	1,111	Granite, fractured; calcite.
229	Select	BC	.195	2.2	20	na	na	8	694	na	---	2,904	Dump; granite, marble; quartz, skarn (?).
230	do.	BC	0.39 oz/st	28	na	na	na	18	2.65%	na	95	3,557	Dump; fault, 3 ft wide, traceable 30 ft, strike N. 25° W., dip 65° NE.; minor galena, gossan, quartz, skarn (?).
231	Chip, 36 in.	BC	.815	5.1	99	na	na	20	5,700	na	312	6,852	Fault, same as no. 230; granite, marble; gossan, quartz, skarn (?).
232	Chip, 6 in.	BC	---	.5	na	na	na	1	22	na	---	29	Fault, strike N. 65° E., dip 60° NW.; granite; clay, gouge, quartz.
233	Chip, 6 in.	BC	---	.8	na	na	710	5	57	na	---	57	Do.
234	Chip, 6 in.	BC	---	.5	10	na	na	2	29	na	---	105	Quartz vein, strike N. 60° W., dip 58° SW.; granite.
235	Chip, 60 in.	BC	---	1	na	na	na	2	15	na	---	35	Marble, strike N. 30° W., dip 20° NE.
236	Chip, random	BC	.02	---	24	na	na	4	38	na	---	12	Prospect Mountain Quartzite (?), fractured, iron oxide stained.
237	do.	BC	---	---	153	na	180	3	14	na	---	39	Rhyolite, fractured, iron oxide stained.
238	Select	BC	.115	35.3	---	na	310	5	1.49%	na	---	2.85%	Dump; Pole Canyon Limestone (?); azurite, galena, malachite, pyrite.

Table 9.--Data for samples 227-253, 434-435, 452-454 from the Troy Canyon area not shown on other tables or figures, Grant Range RARE II area--Continued

Sample			Assay data										
No.	Type and/or length	Lab	Au	Ag	As	Cu	F	Mo	Pb	Sb	W	Zn	Description
			ppm (unless noted)										
239	Chip, 6 in.	BC	---	1.3	---	na	130	3	123	na	---	316	Quartz pod; Pole Canyon Limestone (?); malachite.
240	Chip, 12 in.	BC	---	---	---	na	na	6	22	na	---	34	Limestone and quartzite; micaceous partings.
241	Stream sediment	BC	---	---	36	---	na	---	---	---	---	46	None.
242	Chip, 36 in.	BC	0.05	.6	10	na	na	8	105	na	16	68	Prospect Mountain Quartzite (?); manganese, quartz veinlets.
243	Chip, random	BC	---	.5	217	na	490	3	21	na	---	53	Rhyolite; hematite, manganese.
244	Chip, 36 in.	BC	---	.6	150	na	380	4	56	na	---	122	Fault, 3 in. wide, strike N. 20° W., dip vertical; rhyolite, fractured, iron oxide stained.
245	Chip, 12 in.	BC	---	.9	---	na	na	2	20	na	---	6	Quartz vein, strike N. 60° E., dip 36° SE.; footwall-granite, hanging wall-Pole Canyon Limestone.
246	Chip, 60 in.	BC	---	.7	8	na	430	2	13	na	---	18	Granite, fractured; argillic alteration.
247	Chip, 12 in.	BC	---	---	28	na	na	6	6	na	---	283	Quartz vein, traceable 50 ft, strike N. 60° E., dip 39° SE.; foot wall-granite, hanging wall-Pole Canyon Limestone.
248	Chip, 48 in.	BC	.05	---	---	na	na	3	5	na	---	7	Quartz vein, traceable 10 ft, strike N. 55° E., dip 7° SE.; granite.
249	Select	BC	---	1.4	311	na	na	8	87	na	---	518	Stockpile; quartz, iron oxide stained.
250	Grab, 10-ft grid	BC	---	1.2	8	na	na	4	22	na	---	152	Dump; granite; quartz.
251	Chip, 48 in.	BC	.025	---	0.015%	na	na	na	na	na	na	na	Quartz pod; granite.

Table 9.--Data for samples 227-253, 434-435, 452-454 from the Troy Canyon area not shown on other tables or figures, Grant Range RARE II area--Continued

Sample			Assay data										
	Type and/or		Au	Ag	As	Cu	F	Mo	Pb	Sb	W	Zn	
No.	length	Lab	ppm (unless noted)										Description
252	Panned conc.	R	0.471	8.8	0.025%	15	20	19	0.15%	na	8	220	Locke Mill tailings.
253	do.	R	5.071	3.94	.192%	24	45	28	260	na	16	560	Do.
434	Chip, 36 in.	R	.037	---	.057%	na	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained; gossan, hematite.
435	Chip, 72 in.	R	.012	---	.01%	na	na	na	na	na	na	na	Quartz vein, brecciated, iron-oxide stained.
452	Select	BC	1.195 oz/st	7.2	609	na	na	9	112	na	---	90	Dump; quartz, iron oxide stained.
453	Chip, random	BC	.065	---	138	na	230	4	14	na	---	56	Quartz vein; granite.
454	Chip, 44 in.	BC	---	.9	---	na	120	4	112	na	---	262	Quartz vein, brecciated, iron oxide stained, strike N. 40° E., dip 30° SE.; footwall-granite, hanging wall-limestone.

Table 10.--Data for samples 254-402 from the Locke Mine, Grant Range RARE II area.

[---, not detected; na, not analyzed; *, analyzed by atomic absorption with lower detection limit. Analytical lab: B, Barringer; BC, Bondar-Clegg; R, Reno Research Center.]

Sample			Assay data									
			Au	Ag	As	Cu	F	Mo	Pb	W	Zn	
No.	Type and/ or length	Lab	ppm (unless otherwise noted)									Description
254	Grab, 10-ft grid	R	0.191	0.95	82	12	160	7.6	100	---*	340	Dump; granite; quartz.
255	Grab, 10-ft grid	R	.072	.41	0.013%	12	250	7.8	70	6	570	Dump; granite, limestone; quartz.
256	Select	R	.647	5.98	65	na	na	na	na	na	na	Dump; gossan, vuggy quartz.
257	do.	R	.369	5.59	57	na	na	na	na	na	na	Stockpile; quartz, iron oxide stained, vuggy.
258	do.	R	.463	4.5	94	na	na	na	na	na	na	Do.
259	Grab, 10-ft grid	R	.105	.77	.038%	9.3	140	7.8	160	12	840	Dump; granite; quartz; iron oxide stained.
260	Grab, 10-ft grid	R	.176	1.44	.072%	na	na	na	na	na	na	Dump; limestone; quartz.
261	Chip, 32 in.	R	---	---	---*	35	260	36	180	---*	270	Limestone, thin bedded; calcite veinlets.
262	Chip, 24 in.	R	---	---	5	---	160	---	25	---*	17	Granite; argillic alteration.
263	Chip, 48 in.	R	---	---	25.4	58	0.33%	74	35	---*	440	Marble; skarn (epidote, garnet).
264	Chip, 72 in.	R	.031	1.29	.027%	6.4	250	---	260	---*	560	Granite, brecciated, iron oxide stained; quartz-sericite alteration.
265	Chip, 48 in.	R	.401	.88	.072%	na	na	na	na	na	na	Quartz vein, iron oxide stained, fractured.
266	Chip, 10 in.	BC	.24	2.7	294	na	na	9	123	---	1,180	Fault gouge, iron oxide stained.

Table 10.--Data for samples 254-402 from the Locke Mine, Grant Range RARE II area--Continued

Sample			Assay data									
No.	Type and/ or length	Lab	Au	Ag	As	Cu	F	Mo	Pb	W	Zn	Description
			ppm (unless otherwise noted)									
267	Chip, 30 in.	B	0.038	0.3	na	na	na	na	na	na	na	Granite, fractured; argillic alteration.
							Vein A					
268	Chip, 60 in.	B	1.662	2.36	na	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained; chalcopyrite.
269	Chip, 60 in.	B	.006	.6	na	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained.
270	Chip, 48 in.	B	.6	.9	na	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained; hematite.
271	Chip, 48 in.	B	.3	.7	na	na	na	na	na	na	na	Quartz vein, brecciated.
272	Chip, 48 in.	B	.162	.6	na	na	na	na	na	na	na	Do.
273	Chip, 60 in.	R	---	1.47	13.4	25	420	17	79	---*	160	Limestone; calcite veinlets.
274	Chip, 48 in.	R	.114	152	0.036%	na	na	na	na	na	na	Quartz vein, brecciated.
275	Chip, 18 in.	R	.08	1.1	.054%	27	0.1%	---	46	---*	710	Limestone and shale, above no. 274.
276	Chip, 36 in.	R	.117	.49	.054%	na	na	na	na	na	na	Quartz vein, brecciated.
277	Chip, 36 in.	R	.105	.89	.02%	na	na	na	na	na	na	Do.
278	Chip, 60 in.	R	.566	1.81	.049%	na	na	na	na	na	na	Do.
279	Chip, 72 in.	R	2.832	3.52	.195%	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained.
280	Chip, 36 in.	R	88.75	124	.45%	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained; arsenopyrite.

Table 10.--Data for samples 254-402 from the Locke Mine, Grant Range RARE II area--Continued

Sample No.	Sample Type and/ or length	Lab	Assay data Au	Ag	As	Cu	F	Mo	Pb	W	Zn	Description
			ppm (unless otherwise noted)									
281	Chip, 48 in.	R	0.062	0.64	75	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained; arsenopyrite.
282	Chip, 46 in.	R	.054	311	0.025%	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained.
283	Chip, 36 in.	R	.147	---	.01%	na	na	na	na	na	na	Do.
284	Chip, 30 in.	R	6.568	2.65	.241%	na	na	na	na	na	na	Do.
285	Chip, 48 in.	R	40.56	98	.76%	na	na	na	na	na	na	Do.
286	Chip, 36 in.	R	.031	.56	.011%	na	na	na	na	na	na	Do.
287	Chip, 36 in.	R	.114	.76	54	na	na	na	na	na	na	Do.
288	Chip, 36 in.	R	.099	1.43	.034%	na	na	na	na	na	na	Do.
289	Chip, 24 in.	R	.853	1.2	.157%	na	na	na	na	na	na	Do.
290	Chip, 40 in.	R	1.43	1.72	.034%	na	na	na	na	na	na	Do.
291	Chip, 30 in.	R	---	---	21.2	na	na	na	na	na	na	Do.
292	Chip, 36 in.	R	.028	1.62	.02%	na	na	na	na	na	na	Do.
293	Chip, 36 in.	R	.076	1.38	.024%	na	na	na	na	na	na	Do.
294	Chip, 36 in.	R	.042	.5	.065%	na	na	na	na	na	na	Do.
295	Chip, 30 in.	R	.347	4.14	.31%	na	na	na	na	na	na	Do.

Table 10.--Data for samples 254-402 from the Locke Mine, Grant Range RARE II area--Continued

Sample			Assay data									
No.	Type and/ or length	Lab	Au	Ag	As	Cu	F	Mo	Pb	W	Zn	Description
			ppm (unless otherwise noted)									
296	Chip, 36 in.	R	0.294	4.42	0.036%	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained.
297	Chip, 60 in.	R	.062	9.37	.032%	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained; pyrite.
298	Chip, 33 in.	R	---	7.8	.027%	na	na	na	na	na	na	Do.
299	Chip, 30 in.	R	.027	---	35	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained.
300	Chip, 60 in.	R	.354	1.3	.036%	38	160	14	80	---*	230	Quartz vein, brecciated; minor shale; pyrite.
301	Chip, 24 in.	R	.066	1.01	.02%	na	na	na	na	na	na	Do.
302	Chip, 36 in.	R	.059	---	14.2	na	na	na	na	na	na	Quartz vein, brecciated.
303	Chip, 96 in.	R	.034	.84	56	na	na	na	na	na	na	Do.
304	Chip, 72 in.	R	.026	.44	17.7	na	na	na	na	na	na	Do.
305	Chip, 48 in.	R	.209	.71	6	na	na	na	na	na	na	Do.
306	Chip, 48 in.	R	---	---	43	na	na	na	na	na	na	Do.
307	Chip, 60 in.	R	.017	8.5	.017%	na	na	na	na	na	na	Do.
308	Chip, 48 in.	R	.015	1.56	25.6	na	na	na	na	na	na	Quartz vein, brecciated; hematite.
309	Chip, 60 in.	R	.032	1.17	.015%	na	na	na	na	na	na	Quartz vein, brecciated.
310	Chip, 36 in.	R	.128	---	11.6	na	na	na	na	na	na	Quartz vein, brecciated; chalcopyrite.

Table 10.--Data for samples 254-402 from the Locke Mine, Grant Range RARE II area--Continued

Sample No.	Sample Type and/ or length	Lab	Au	Ag	As	Cu	F	Mo	Pb	W	Zn	Description
			Assay data ppm (unless otherwise noted)									
311	Chip, 48 in.	R	---	---	10.7	9.4	420	6	29	10	600	Quartz vein and limestone, brecciated.
312	Chip, 20 in.	BC	0.44	25.3	1,853	na	170	199	1,065	---	587	Quartz vein, brecciated, iron oxide stained.
313	Chip, 48 in.	BC	3.9	7.1	1,086	na	130	15	538	15	1,222	Quartz vein, brecciated, iron oxide stained, vuggy.
314	Chip, 32 in.	B	.5	.3	na	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained.
315	Chip, 30 in.	B	.051	1.9	na	na	na	na	na	na	na	Clay with quartz breccia; between vein and limestone.
316	Chip, 40 in.	B	.155	.3	na	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained.
317	Chip, 12 in.	B	.28	2.8	na	na	na	na	na	na	na	Do.
318	Chip, 54 in.	B	.92	1.2	na	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained, vuggy.
319	Chip, 48 in.	B	2.4	1.1	na	na	na	na	na	na	na	Do.
320	Chip, 48 in.	BC	2.21	8.4	1,084	na	na	20	533	---	920	Quartz vein, brecciated, iron oxide stained.
321	Chip, 60 in.	BC	0.757 oz/st	4.9	601	na	670	12	475	---	336	Granite, fractured, iron oxide stained; quartz veinlets.
322	Chip, 60 in.	B	1.8	1.2	na	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained.
323	Chip, 30 in.	B	.92	.7	na	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained, vuggy.
324	Chip, 48 in.	B	.28	.5	na	an	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained.
325	Chip, 24 in.	R	.057	1.38	0.036%	na	na	na	na	na	na	Do.

Table 10.--Data for samples 254-402 from the Locke Mine, Grant Range RARE II area--Continued

Sample			Assay data									
	Type and/		Au	Ag	As	Cu	F	Mo	Pb	W	Zn	
No.	or length	Lab	ppm (unless otherwise noted)									Description
326	Chip, 48 in.	B	0.004	0.1	na	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained.
327	Chip, 36 in.	B	.013	.1	na	na	na	na	na	na	na	Do.
328	Chip, 36 in.	R	.087	1.51	0.017%	na	na	na	na	na	na	Do.
329	Chip, 30 in.	R	---	---	30	na	na	na	na	na	na	Do.
330	Chip, 30 in.	B	.007	.1	na	na	na	na	na	na	na	Do.
331	Chip, 30 in.	B	.096	.8	na	na	na	na	na	na	na	Granite, fractured, iron oxide stained.
332	Chip, 48 in.	R	.084	---	.013%	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained.
333	Chip, 40 in.	R	.088	---	.02%	na	na	na	na	na	na	Do.
334	Chip, 48 in.	R	.023	.98	.019%	na	na	na	na	na	na	Do.
335	Chip, 60 in.	R	---	1.9	.027%	na	na	na	na	na	na	Do.
336	Chip, 40 in.	R	.039	---	.017%	na	na	na	na	na	na	Do.
337	Chip, 48 in.	R	.068	.62	26.5	na	na	na	na	na	na	Do.
338	Chip, 36 in.	R	---	---	.011%	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained; hematite.
339	Chip, 40 in.	R	---	---	27.5	27	390	---	46	----	710	Granite, fractured, iron oxide stained; argillic and quartz sericite alteration.

Table 10.--Data for samples 254-402 from the Locke Mine, Grant Range RARE II area--Continued

Sample			Assay data									
No.	Type and/ or length	Lab	Au	Ag	As	Cu	F	Mo	Pb	W	Zn	Description
			ppm (unless otherwise noted)									
340	Chip, 14 in.	R	---	---	28.6	---	220	---	39	---*	64	Fault gouge; clay.
341	Chip, 72 in.	R	0.021	---	12.3	---	140	---	39	---*	90	Granite, fractured.
342	Chip, 24 in.	R	---	0.36	37	---	190	---	27	---*	130	Fault gouge; clay, mica.
343	Chip, 40 in.	R	.081	---	35	---	220	---	27	---*	120	Granite, fractured; argillic alteration.
344	Chip, 6 in.	R	.075	1.16	0.014%	46	0.11%	20	60	20	0.2%	Shale.
345	Chip, 12 in.	R	.594	3.98	.157%	na	na	na	na	na	na	Fault gouge; quartz.
346	Chip, 24 in.	R	---	.59	.019%	---	120	---	---	---*	500	Granite, fractured; quartz breccia.
347	Chip, 12 in.	R	.075	---	89	8.7	260	8	34	---*	280	Fault gouge; biotite, clay, quartz.
348	Chip, 12 in.	R	.01	---	30	na	na	na	na	na	na	Fault gouge; clay, muscovite, quartz.
349	Chip, 36 in.	R	.016	1.5	.019%	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained; hematite.
							Vein B					
350	Chip, 36 in.	R	.032	4.4	.02%	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained.
351	Chip, 48 in.	R	.02	2.24	.1%	60	440	90	490	12	.31%	Shale, iron oxide stained; calcite and quartz veinlets.
352	Chip, 30 in.	R	.054	4.3	.043%	na	na	na	na	na	na	Quartz vein; brecciated, iron oxide stained.
353	Chip, 36 in.	BC	.08	10.5	230	na	na	48	478	20	392	Do.

Table 10.--Data for samples 254-402 from the Locke Mine, Grant Range RARE II area--Continued

Sample No.	Sample Type and/ or length	Lab	Assay data Au	Ag	As	Cu	F	Mo	Pb	W	Zn	Description
			ppm (unless otherwise noted)									
354	Chip, 48 in.	R	0.324	4.91	80	na	na	na	na	na	na	Quartz vein; brecciated, iron oxide stained.
355	Chip, 36 in.	R	11.09	8.58	0.028%	na	na	na	na	na	na	Do.
356	Chip, 30 in.	R	.023	1.47	.024%	na	na	na	na	na	na	Do.
357	Chip, 42 in.	BC	.48	1.9	66	na	na	9	170	---	102	Do.
358	Chip, 40 in.	R	.083	3.79	91	na	na	na	na	na	na	Do.
359	Chip, 60 in.	BC	2.08	31.2	189	na	100	49	6,000	---	308	Quartz vein, brecciated; minor disseminated galena.
360	Chip, 42 in.	BC	7.75	30.1	105	na	na	28	1.95%	28	93	Quartz vein, brecciated, iron oxide stained; minor disseminated galena.
361	Chip, 48 in.	R	3.992	48	.021%	na	na	na	na	na	na	Do.
362	Chip, 42 in.	BC	.54	20.9	177	na	80	26	1,525	---	207	Quartz vein, brecciated, iron oxide stained, vuggy.
363	Chip, 36 in.	R	.288	7.31	73	na	na	na	na	na	na	Do.
364	Chip, 54 in.	BC	.29	8.1	86	na	75	85	591	---	68	Quartz vein, brecciated, iron oxide stained, vuggy, 12 ft wide.
365	Chip, 48 in.	BC	.105	16	135	na	na	84	481	---	94	Quartz vein, brecciated, iron oxide stained, vuggy.
366	Chip, 12 in.	R	.107	9.36	.046%	na	na	na	na	na	na	Fault gouge; hematite, quartz.
367	Chip, 36 in.	R	.054	13.7	24.7	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained; hematite.
368	Chip, 6 in.	BC	3.76	21.5	139	na	na	119	2,277	---	164	Do.

Table 10.--Data for samples 254-402 from the Locke Mine, Grant Range RARE II area--Continued

Sample			Assay data									
	Type and/		Au	Ag	As	Cu	F	Mo	Pb	W	Zn	
No.	or length	Lab	ppm (unles otherwise noted)									Description
369	Chip, 36 in.	R	0.163	20.35	0.052%	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained; hematite.
370	Chip, 32 in.	R	.452	5.63	.048%	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained; minor galena.
371	Chip, 60 in.	BC	1	4.6	334	na	200	27	238	---	545	Quartz vein, brecciated, iron oxide stained.
372	Chip, 18 in.	R	.017	---	55	na	260	na	na	---*	na	Granite gneiss, fractured, iron oxide stained.
373	Chip, 24 in.	R	.022	---	72	---	86	---	---	---*	370	Do.
374	Chip, 13 in.	R	---	---	25.6	na	na	na	na	na	na	Fault gouge, iron oxide stained; clay, mica, quartz.
375	Chip, 10 in.	R	.124	1.32	.028%	na	na	na	na	na	na	Quartz vein, brecciated; arsenopyrite, chalcopyrite, malachite, pyrite.
376	Chip, 24 in.	R	.11	2.25	.013%	na	na	na	na	na	na	Fault gouge, iron oxide stained; clay, quartz.
377	Chip, 24 in.	B	.7	.8	na	na	na	na	na	na	na	Quartz vein, brecciated, 7 ft wide; pyrite.
378	Chip, 30 in.	B	.032	.2	na	na	na	na	na	na	na	Granite; argillic alteration.
								Vein C				
379	Chip, 36 in.	BC	.44	3.8	36	na	na	9	7	---	27	Quartz vein, brecciated, iron oxide stained, 40 ft wide.
380	Chip, 36 in.	B	.068	1.5	na	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained.
381	Chip, 24 in.	BC	1.08	1.5	1,053	na	na	7	58	---	32	Do.
382	Chip, 36 in.	B	.106	2.1	na	na	na	na	na	na	na	Do.

Table 10.--Data for samples 254-402 from the Locke Mine, Grant Range RARE II area--Continued

Sample No.	Sample Type and/ or length	Lab	Au	Ag	As	Cu	F	Mo	Pb	W	Zn	Description
			Assay data ppm (unless otherwise noted)									
383	Chip, 36 in.	B	0.08	2.8	na	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained.
384	Chip, 36 in.	B	.047	1.4	na	na	na	na	na	na	na	Do.
385	Chip, 36 in.	B	.022	2.6	na	na	na	na	na	na	na	Do.
386	Chip, 36 in.	BC	.78	1.3	393	na	na	16	6	---	60	Do.
387	Chip, 30 in.	B	.027	.1	na	na	na	na	na	na	na	Do.
388	Chip, 36 in.	B	.03	1.1	na	na	na	na	na	na	na	Do.
389	Chip, 36 in.	B	.04	.5	na	na	na	na	na	na	na	Do.
390	Chip, 36 in.	B	.039	.6	na	na	na	na	na	na	na	Quartz vein, brecciated, iron oxide stained, vuggy; hematite.
391	Chip, 44 in.	B	.014	2.1	na	na	na	na	na	na	na	Quartz vein, brecciated; chalcopyrite, pyrite.
392	Chip, 12 in.	B	1.48	11.3	na	na	na	na	na	na	na	Fault gouge, iron oxide stained; clay, quartz.
393	Chip, 24 in.	B	.017	.5	na	na	na	na	na	na	na	Skarn, iron oxide stained, 2 ft wide; epidote, garnet, pyrite.
394	Chip, 30 in.	B	.029	.2	na	na	na	na	na	na	na	Granite, fractured, iron oxide stained.
395	Chip, 24 in.	B	.002	.2	na	na	na	na	na	na	na	Limestone, fractured; calcite pods and veinlets.
396	Chip, 18 in.	B	.004	.3	na	na	na	na	na	na	na	Limestone; calcite pods and veinlets.

Table 10.--Data for samples 254-402 from the Locke Mine, Grant Range RARE II area--Continued

Sample No.	Sample Type and/ or length	Lab	Assay data Au	Ag	As	Cu	F	Mo	Pb	W	Zn	Description
			ppm (unless otherwise noted)									
397	Chip, 36 in.	B	0.006	0.4	na	na	na	na	na	na	na	Limestone; calcite pods and veinlets.
398	Chip, 36 in.	B	.011	.4	na	na	na	na	na	na	na	Shale; calcite veinlets.
399	Chip, 30 in.	BC	1.35	20.3	355	na	na	18	755	11	463	Limestone, fractured, thin bedded; pyrite.
400	Chip, 36 in.	B	.58	.2	na	na	na	na	na	na	na	Quartz vein, brecciated iron oxide stained.
401	Chip, 30 in.	B	.26	.6	na	na	na	na	na	na	na	Quartz vein, brecciated; pyrite.
402	Chip, 12 in.	BC	---	---	---	na	430	7	8	---	44	Granite, fractured.

Table 11.--Data for samples 514-525 from the Troy Mine area, Grant Range RARE II area.

[---, not detected; na, not analyzed; *, lower detection limit. Analysis by Reno Research Center.]

Sample		Assay data											
	Type and/or	Au	Ag	As	Bi	Cu	F	Mo	Pb	Sb	W	Zn	
No.	length	ppm (unless otherwise noted)											Description
514	Chip, 30 in.	---	---	---	---	11	na	---	19	---	---	8.4	Quartz vein, strike N. 35° E., dip 83° NW.; Pole Canyon Limestone.
515	Select	---	55	0.028%	110	0.45%	na	---	0.27%	0.117%	---	0.24%	Dump; quartz vein, 25 ft wide, strike N. 40° E., dip 65° NW.; Pole Canyon Limestone; chalcopyrite.
516	Chip, random	0.13	---	4.1	---	9.3	31	---	17	3	6	18	Quartz vein, brecciated, vuggy, 25 ft wide, strike N. 40° E., dip 67° NW.; Pole Canyon Limestone.
517	Select	---	19.97	.052%	---	.23%	na	---	.19%	.072%	---	.24%	Dump; phyllite; arsenopyrite, azurite, galena, malachite, pyrite, quartz.
518	do.	---	---	9.4	---	33	na	---	---	---	---	32	Dump; limestone, phyllite; arsenopyrite, chalcopyrite, pyrite, quartz.
519	do.	.057	117	.0158%	89	.59%	na	---	.14%	.164%	---	2%	Stockpile; chalcopyrite, galena, malachite, pyrite, quartz.
520	do.	---	16.81	.015%	---	710	40	---	85	.019%	---*	.52%	Stockpile; azurite, chalcopyrite, galena, malachite, pyrite, quartz.
521	Grab, 10-ft grid	---	11.92	.012%	---	680	na	---	210	.011%	---	.17%	Dump; limestone, phyllite; azurite, calcite, malachite, quartz.
522	Chip, 25 in.	---	23.57	53	68	.11%	220	8.8	49	84	---*	.15%	Quartz vein, iron oxide stained, strike N. 25° E., dip 20° SE.; azurite, malachite.
523	Select	1.174	390	.076%	190	1.4%	na	---	.14%	.089%	---	.29%	Dump; azurite, malachite, quartz.
524	do.	.007	210	.127%	130	1%	na	---	.1%	.173%	---	.48%	Dump; azurite, chalcopyrite, galena, malachite, pyrite, quartz.
525	Chip, 30 in.	.555	47	.018%	72	.4%	800	90	710	76	12	.52%	Quartz vein, strike N. 10° E., dip 35° SE.; footwall-limestone, hanging wall-phyllite.

Table 12.--Data for samples 455-471, 493-503 from the Troy Canyon south area, Grant Range RARE II area.

[---, not detected; na, not analyzed. Analyzed by Bondar-Clegg.]

Sample		Assay data										
No.	Type and/or length	Au	Ag	As	Cu	F	Mo	Pb	Sb	W	Zn	Description
		ppm (unless otherwise noted)										
455	Select	0.03	1.9	584	42	na	na	708	---	na	42	Stockpile; quartz, iron oxide stained.
456	Chip, random	.02	1.1	201	25	na	na	174	---	na	152	Quartz pod, brecciated, iron oxide stained, vuggy; Pole Canyon Limestone.
457	Chip, 60 in.	.215	1.6	269	na	1,250	9	986	na	10	123	Pole Canyon Limestone; calcite veinlets, mica lenses.
458	Grab, 5-ft grid	.105	1.4	116	na	430	15	461	na	18	521	Dump; diabase, quartzite; quartz.
459	Grab, 5-ft grid	4.16	19.8	1,559	1,220	na	na	1.02%	---	na	10,082	Dump; limestone; quartz.
460	Chip, 14 in.	3.035	19.2	314	877	na	na	1.46%	---	na	16,381	Fault/vein, iron oxide stained, strike N. 55° E., dip 55° SE.; Pole Canyon Limestone; clay gouge, quartz.
461	Chip, 30 in.	5.54	22.1	631	1,194	na	na	.9%	---	na	9,712	Do.
462	Chip, 24 in.	2.22	12.3	726	464	na	na	6,400	9	na	4,333	Do.
463	Grab, 3-ft grid	---	.8	---	na	470	7	70	na	---	152	Dump; granite, limestone; quartz.
464	Chip, 24 in.	.34	5.5	268	32	na	na	2,693	---	na	2,305	Quartz vein, strike N. 25° E., dip 50° SE.; Pole Canyon Limestone.
465	Chip, 22 in.	.5	20.5	560	26	na	na	7,000	---	na	1,163	Do.
466	Select	.01	.8	255	56	na	na	118	---	na	543	Dump; pyrite, quartz.
467	Chip, 48 in.	---	---	47	15	na	na	63	---	na	87	Pole Canyon Limestone; calcite.
468	Chip, 48 in.	---	---	12	10	na	na	21	---	na	73	Diabase dike, iron oxide stained, strike N. 80° W., dip vertical.

Table 12.--Data for samples 455-471, 493-503 from the Troy Canyon south area, Grant Range RARE II area--Continued

Sample		Assay data										
No.	Type and/or length	Au	Ag	As	Cu	F	Mo	Pb	Sb	W	Zn	Description
		ppm (unless otherwise noted)										
469	Chip, 12 in.	---	0.7	58	8	na	na	81	---	na	28	Quartz vein, strike N. 55° E., dip 62° NW.; Pole Canyon Limestone.
470	Chip, 12 in.	---	---	12	4	na	na	18	---	na	10	Quartz vein, strike N. 45° E., dip 55° SE.; Pole Canyon Limestone.
471	Chip, 48 in.	---	.9	54	9	na	na	10	---	na	358	Pole Canyon Limestone, fractured, iron oxide stained.
493	Chip, 24 in.	---	---	12	7	na	na	31	---	na	400	Pole Canyon Limestone, strike N. 30° E., dip 60° NW.
494	Chip, 30 in.	---	---	7	5	na	na	11	---	na	27	Quartz vein, traceable 5 ft, strike N. 10° W., dip 75° NE.; Pole Canyon Limestone.
495	Chip, 32 in.	---	7.2	111	50	na	na	196	---	na	267	Quartz pod; Pole Canyon Limestone.
496	Chip, random	---	---	19	5	na	na	9	6	na	7	Prospect Mountain Quartzite, fractured, iron oxide stained, strike N. dip 20° W.
497	Chip, 48 in.	0.005	2	44	13	na	na	276	---	na	249	Quartz vein, brecciated, strike N. 35° E., dip 70° NW.; Pioche Shale, phyllite; hematite.
498	Chip, 48 in.	---	---	22	2	na	na	132	---	na	95	Do.
499	Select	.02	29.5	154	17	na	na	2.55%	13	na	13,000	Dump; minor galena, hematite, quartz.
500	Chip, 48 in.	.015	7.6	82	13	na	na	1,400	---	na	1,909	Quartz vein, brecciated, iron oxide stained.
501	Select	.285	35.9	184	16	na	na	4.73%	6	na	4.6%	Dump; hematite, quartz.
502	Chip, 48 in.	---	9.9	27	3	na	na	6,000	---	na	335	Quartz vein, brecciated, iron oxide stained, strike N. 25° E., dip 70° NW.
503	Chip, 42 in.	---	26	22	3	na	na	1.6%	---	na	9,300	Quartz vein, brecciated, iron oxide stained, strike N. 25° E., dip 75° NW.; minor disseminated galena.

Table 13.--Data for samples 472-492 from the Leadhill adit, Grant Range RARE II area.

[---, not detected; na, not analyzed. Analysis by Bondar-Clegg.]

Sample		Assay data								
		Au	Ag	As	Cu	F	Pb	Zn	Sb	
No.	Type and/or length	ppm (unless otherwise noted)								Description
472	Select	0.312 oz/st	2.76 oz/st	8.33%	320	130	2.65%	3,978	63	Dump; galena, gossan, pyrite, quartz, skarn (epidote, garnet).
473	Chip, 9 in.	.457 oz/st	9.59 oz/st	7.3%	202	260	23.82%	6,623	153	Gossan lens along bedding, 10 ft long; 2 in.-wide galena vein.
474	Chip, 12 in.	.055	1.9	908	52	160	150	17,907	6	Gossan pod; pyrite.
475	Chip, 12 in.	.87	36.6	1,111	232	130	1.76%	15,401	14	Fault/vein along bedding, 5 in. wide, iron oxide stained; galena veinlets.
476	Chip 18 in.	.205	3.15 oz/st	1,089	251	130	5.05%	6,683	99	Fault/vein along bedding, 9 in. wide, iron oxide stained; galena veinlets.
477	Chip, 12 in.	.77	3.1	1,110	57	170	695	944	7	Do.
478	Chip, 18 in.	1.28	1.35 oz/st	.73%	312	160	4.2%	11,762	23	Fault/vein along bedding, 4 in. wide, iron oxide stained.
479	Chip, 18 in.	.264 oz/st	4.29 oz/st	4.02%	598	150	12%	5,720	330	Fault/vein along bedding, 8 in. wide; galena, granular pyrite.
480	Chip, 26 in.	7.955	35.7	3.5%	617	230	7.5%	6,310	122	Gossan pod; pyrite.

Table 13.--Data for samples 472-492 from the Leadhill adit, Grant Range RARE II--Continued

Sample		Assay data								
	Type and/or	Au	Ag	As	Cu	F	Pb	Zn	Sb	
No.	length	ppm (unless otherwise noted)								Description
481	Chip, 12 in.	6.275	20.4	1.34%	505	310	3,108	7,911	12	Gossan lens; pyrite.
482	Chip, 12 in.	.135	4.4	786	57	200	1,510	2,214	6	Gossan lens.
483	Chip, 36 in.	.08	3.	416	26	na	546	858	---	Marble.
484	Chip, 18 in.	.035	27.3	199	90	na	3,600	5,000	---	Quartz vein, brecciated, vuggy; pyrite.
485	Chip, 24 in.	0.37 oz/st	6.68 oz/st	7.02%	2,364	na	13%	8,100	87	Fault; hematite, malachite, pyrite.
486	Chip, 12 in.	---	.8	708	32	na	163	83	---	Quartz vein, 7 in. wide; pyrite.
487	Chip, 12 in.	.02	.9	590	30	na	19	22	---	Pyrite, quartz.
488	Chip, 12 in.	.06	2.9	1.03%	65	na	634	80	---	Quartz vein, 8 in. wide; pyrite.
489	Chip, 72 in.	---	---	24	33	700	6	69	---	Calcite, pyrite.
490	Chip, 30 in.	---	.6	644	30	170	162	131	---	Quartz vein, 6 in. wide; pyrite.
491	Chip, 4 in.	---	1.4	5	26	370	14	70	---	Diabase dike-limestone contact.
492	Chip, 36 in.	---	.8	22	21	na	19	142	---	Diabase dike.

Table 14.--Data for samples 504-513 from the Little Meadows Creek area, Grant Range RARE II area.

[---, not detected; na, not analyzed; *, analyzed by atomic absorption with lower detection limit. Analytical lab: BC, Bondar-Clegg; R, Reno Research Center.]

Sample			Assay data									
No.	Type and/or length	Lab	Au	Ag	As	Cu	Mo	Pb	Sb	W	Zn	Remarks
			ppm									
504	Stream sediment	R	---	---	4.3	---	---	---	---	---	34	Little Meadows Creek.
505	Chip, 120 in.	BC	---	1.2	27	6	na	34	6	na	27	Limestone, fractured; calcite veinlets, hematite.
506	Chip, 48 in.	BC	---	1.3	30	4	na	146	---	na	58	Jasperoid, brecciated, iron oxide stained; limestone.
507	Stream sediment	R	---	---	6.9	---	---	---	---	---*	35	Little Meadows Creek.
508	Chip, random	BC	0.04	2.2	233	8	na	669	---	na	178	Quartzite, brecciated.
509	Stream sediment	R	---	---	29.5	---	---	---	---	---*	45	Little Meadows Creek.
510	Chip, random	BC	---	1.6	30	3	na	104	---	na	31	Quartzite, brecciated.
511	Chip, 36 in.	BC	---	1.	57	2	na	195	---	na	79	Conglomerate.
512	Chip, random	BC	.085	3.9	430	5	na	1,802	---	na	91	Limestone, iron oxide stained.
513	Stream sediment	R	---	---	5.3	---	---	---	---	---	---	Little Meadows Creek.

Table 15.--Data for samples 526-542 from Scofield and Rimrock Canyon areas, Grant Range RARE II area.

[---, not detected; na, not analyzed; *, analyzed by atomic absorption with lower detection limit. Analysis by Reno Research Center.]

Sample		Assay data									
		Au	Ag	As	Cu	Mo	Pb	Sb	W	Zn	
No.	Type	ppm									Remarks
526	Stream sediment	---	---	3	---	---	---	---*	---*	53	
527	do.	---	---	---*	---	---	---	---*	---*	57	
528	do.	---	---	---*	---	---	---	4	---*	47	
529	Chip, random	---	---	---	na	4	10	na	---	2	Quartzite, brecciated, iron oxide stained.
530	Stream sediment	---	---	---*	---	---	---	---*	---*	43	
531	do.	---	---	11	---	---	---	---*	---*	67	
532	do.	---	1.14	3	---	---	---	---*	---*	66	
533	do.	---	---	3	---	---	---	---*	---*	67	
534	do.	---	---	---*	---	---	---	---*	---*	71	
535	do.	---	---	3	---	---	---	---*	---*	63	
536	do.	---	---	3	---	---	---	---*	---*	41	
537	do.	---	---	32	---	---	---	---*	---*	42	

Table 15.--Data for samples 526-542 from Scofield and Rimrock Canyon areas, Grant Range RARE II area--Continued

Sample		Assay data									
No.	Type and/or length	Au	Ag	As	Cu	Mo	Pb	Sb	W	Zn	Remarks
		ppm									
538	Stream sediment	---	---	3.7	---	---	---	---*	---*	44	
539	do.	---	---	3	---	---	---	---*	---*	47	
540	do.	---	0.46	43	---	---	---	---	---*	54	
541	do.	---	---	43	---	---	---	---	---*	58	
542	do.	---	---	---	---	---	---	---	---*	45	

Table 16.--Data for panned-concentrate and stream-sediment samples 543-558, 560, 562-563, 591, 593-594, 599-604, 606-610, from in and near the Crystal mineralized area, Grant Range RARE II area.

[---, not detected; na, not analyzed; *, analyzed by atomic absorption with lower detection limit; Panned conc., panned concentrate. Analytical lab: BC, Bondar-Clegg; R, Reno Research Center.]

Sample			Assay data											
			Au	Ag	As	Cu	F	Hg	Mo	Pb	Sb	W	Zn	
No.	Type	Lab	ppm (unless otherwise noted)											Remarks
543	Stream sediment	R	---	---	7	6.4	540	na	8.1	---	---*	---*	71	
544	do.	R	---	---	7	---	650	na	5.8	---	---*	---*	65	
545	do.	R	---	---	7	---	360	na	9	---	---*	---*	73	
546	do.	R	---	---	8	---	320	na	6.7	---	---*	---*	76	
547	do.	R	---	0.92	7	---	290	na	---	---	---*	---*	55	
548	do.	R	---	---	4	---	500	na	---	---	---*	---*	53	
549	do.	R	---	---	7	---	660	na	5.3	---	---*	---*	78	
550	do.	R	---	---	3	---	380	na	6.3	---	---*	---*	72	
551	do.	R	---	---	---*	---	340	na	6.3	---	---*	---*	89	
552	do.	R	---	---	3	---	290	na	---	---	---*	---*	64	
553	do.	R	---	---	---*	---	290	na	5.5	---	---*	---*	50	
554	Panned conc.	BC	---	---	---	na	na	na	2	---	na	---	26	Limestone; magnetite, quartz.
555	Stream sediment	R	---	---	3	---	170	na	5.4	---	---*	---*	61	
556	do.	R	---	---	---*	---	0.1%	na	8.6	---	---*	---*	53	
557	do.	R	---	2.6	8.4	6	220	na	14	---	---*	---*	56	
558	Panned conc.	BC	0.025	---	12	na	na	na	4	---	na	---	41	Rhyolite; biotite, magnetite, quartz.
560	Stream sediment	R	---	---	4	8.3	280	na	15	10	---*	---*	91	

Table 16.--Data for panned-concentrate and stream-sediment samples 543-558, 560, 562-563, 591, 593-594, 599-604, 606-610, from in and near the Crystal mineralized area, Grant Range RARE II area--Continued

Sample No.	Sample Type	Lab	Assay data: Au	Ag	As	Cu	F	Hg	Mo	Pb	Sb	W	Zn	Remarks
			ppm (unless otherwise noted)											
562	Stream sediment	R	---	---	5	---	160	na	10	10	---*	---*	54	
563	do.	R	---	---	6	7.7	310	na	14	---	---*	---*	65	
591	Panned conc.	BC	---	---	11	na	na	na	4	10	na	---	80	Limestone, rhyolite; biotite, magnetite, quartz.
593	Stream sediment	R	---	---	4	11	410	na	15	22	---	---*	130	
594	Panned conc.	BC	---	---	22	na	na	na	6	13	na	---	66	Limestone, rhyolite; biotite, magnetite, quartz.
599	Stream sediment	R	---	---	8.4	6	390	na	15	---	---	---*	87	
600	Panned conc.	BC	---	---	28	na	na	na	5	9	na	---*	95	Limestone, rhyolite; biotite, magnetite, quartz.
601	Stream sediment	R	---	0.38	18.3	14	430	na	18	---	---	---*	76	
602	do.	R	---	---	---	6.2	270	na	14	---	---	---*	57	
603	Panned conc.	BC	---	---	---	na	na	na	4	---	na	---	21	Limestone, rhyolite; biotite, magnetite, quartz.
604	Stream sediment	R	---	---	4	9	510	na	15	---	---	---*	61	
606	do.	R	---	---	10.5	9.5	350	na	20	---	---	---*	75	
607	do.	R	---	---	15	11	410	na	19	---	---	---*	75	
608	Panned conc.	BC	---	---	47	na	na	na	5	5	na	---	47	Limestone, rhyolite; magnetite, quartz.
609	Stream sediment	R	---	---	11.5	8.7	360	na	20	---	---	---*	73	
610	do.	R	---	---	25.5	12	420	na	21	---	3	---*	79	

Table 17.--Data for samples 559, 561, 564-590, 592, 595-598, 605, 611-613 from Crystal mineralized area, Grant Range RARE II area.

[---, not detected; na, not analyzed; *, analyzed by atomic absorption with lower detection limit. Analytical lab: BC, Bondar-Clegg; R, Reno Research Center. Mercury and thallium analyzed by Bondar-Clegg.]

Sample			Assay data												
	Type and/or		Au	Ag	As	Cu	F	Hg	Mo	Pb	Sb	Tl	W	Zn	
No.	length	Lab	ppm (unless otherwise noted)												Remarks
559	Chip, 60 in.	R	---	---	---*	---	0.14%	na	18	23	---*	na	---*	120	Dacite porphyry dike.
561	Chip, 48 in.	R	---	---	4	---	590	na	18	22	---*	na	---*	150	Dacite porphyry dike, 40 ft wide, traceable 60 ft, strike N. 60° E., dip 80° SE.; plagioclase phenocrysts.
564	Chip, random	BC	---	---	14	1	300	0.035	3	21	---	0.5	---	25	Ash flow tuff, silicified; chalcedony, quartz.
565	do.	BC	---	---	8	---	350	.01	---	8	---	.4	---	21	Ash flow tuff, silicified; vuggy jasper.
566	Chip random	BC	---	---	9	3	280	.015	---	19	---	.5	10	27	Ash flow tuff, silicified, vitrophyre.
567	do.	BC	---	---	12	---	260	.035	---	10	---	1	---	19	Ash flow tuff, silicified, flow banding; quartz.
568	do.	BC	0.01	---	20	4	1,700	.045	8	13	10	.2	---	16	Quartz breccia, vuggy; limestone, silicified.
569	do.	R	.094	0.97	70	7.1	94	.36	240	15	4	na	---	27	Rhyolite breccia; quartz.
570	do.	R	.185	.5	57	8.6	410	na	22	23	7	na	---	23	Limestone, brecciated, silicified; hematite.
571	Grab, 3-ft grid	R	.085	.68	0.022%	8.2	0.23%	na	33	11	24.8	1.2	---	73	Dump; breccia zone, 6 ft wide; limestone; calcite, clear and purple fluorite, clay.
572	Grab, 3-ft grid	R	---	---	21.3	---	130	.265	6.9	---	---*	---	---	44	Limestone; calcite veinlets.
573	Grab, 3-ft grid	R	---	---	.08%	23	88	.39	86	---	27	.7	---	700	Jasperoid, iron and manganese oxide stained; gossan.
574	Select	R	---	---	.171%	38	200	.39	220	---	25.5	2	---	0.11%	Dump; limestone, iron oxide stained, silicified; gossan.

Table 17.--Data for samples 559, 561, 564-590, 592, 595-598, 605, 611-613 from Crystal mineralized area, Grant Range RARE II area--Continued

Sample			Assay data												
No.	Type and/or length	Lab	Au	Ag	As	Cu	F	Hg	Mo	Pb	Sb	Tl	W	Zn	Remarks
			ppm (unless otherwise noted)												
575	Chip, random	R	---	---	0.02%	12	58	0.38	13	---	13	0.6	---	56	Jasperoid, iron oxide stained; limestone, silicified.
576	do.	BC	0.01	1.5	64	7	2,100	.075	14	17	7	.2	---	13	Jasperoid, brecciated; hematite, vuggy quartz.
577	do.	R	---	---	88	8	53	.25	26	15	12	.7	---	33	Jasperoid, iron and manganese oxide stained; limestone, silicified.
578	do.	R	---	---	78	6	92	.25	15	13	13	.5	---	26	Do.
579	do.	R	---	---	38	---	0.22%	.17	68	11	7	.2	---	23	Breccia pipe, 50 ft diameter, brecciated; fluorite, quartz.
580	do.	R	---	---	48	---	.56%	.08	92	27	5	1.2	36	76	Breccia pipe; rhyolite porphyry; gray fluorite, quartz.
581	Select	R	---	---	13	---	230	.04	---	---	---*	---	---	17	Jasperoid, iron oxide stained; limestone, silicified.
582	Chip, random	R	.255	.78	59	8	150	.21	14	---	7	---	---	12	Jasperoid, iron oxide stained; quartz veinlets and pods.
583	Select	R	---	1.33	41	9.7	120	.26	21	11	5	0.6	---	14	Jasperoid, iron oxide stained; limestone, silicified.
584	Chip, random	R	.043	.35	.014%	6.9	84	.2	60	---	13	.8	---	17	Jasperoid, brecciated, iron oxide stained, slickensides, vuggy; hematite.
585	do.	R	.039	.71	69	10	840	.26	32	12	10.8	.4	---	31	Jasperoid, brecciated, iron oxide stained, slickensides, vuggy; hematite, quartz pods and veinlets.
586	do.	R	---	.63	.01%	9.8	.14%	1	29	14	12	1.4	---	320	Jasperoid, brecciated, iron oxide stained, vuggy; gossan, hematite, quartz pods and veinlets.
587	do.	R	.189	2.02	86	12	330	.65	30	15	16	.4	---	35	Jasperoid, brecciated, iron oxide stained; calcite, quartz.
588	do.	R	---	---	61	14	91	.20	14	---	3	.4	---	16	Jasperoid, brecciated; cherty limestone; pyrite pseudomorphs.

Table 17.--Data for samples 559, 561, 564-590, 592, 595-598, 605, 611-613 from Crystal mineralized area, Grant Range RARE II area--Continued

Sample			Assay data												
No.	Type and/or length	Lab	Au	Ag	As	Cu	F	Hg	Mo	Pb	Sb	Tl	W	Zn	Remarks
			ppm (unless otherwise noted)												
589	Chip, random	R	---	---	0.012%	11	84	0.29	28	10	11.5	0.6	---	16	Limestone, silicified; pyrite pseudomorphs.
590	do.	R	---	---	65	14	150	.29	30	17	13.7	.5	---	40	Jasperoid, brecciated, iron oxide stained.
592	do.	R	---	---	---	---	74	na	6.5	14	---	na	---*	39	Quartzite, fractured.
595	do.	R	---	---	---	---	340	na	7.6	12	---	na	---*	32	Limestone, iron oxide stained; chert.
596	do.	R	---	---	---	---	620	na	19	18	---	na	---*	150	Dacite porphyry dike, traceable 6 ft, strike N. 20° W., dip 48° SW.; feldspar phenocrysts.
597	Chip, 48 in.	R	0.028	---	6	---	760	na	11	12	---	na	---*	180	Dacite porphyry dike-limestone contact, strike N. 20° W., dip 60° SW.
598	Chip, random	R	---	---	---	---	340	na	7.6	12	---	na	---*	32	Limestone; silica lenses.
605	do.	R	---	0.43	---	---	120	na	9.9	18	---	na	---*	61	Limestone, fine grained, fractured.
611	Chip, 37 in.	R	---	1.45	21	10	110	na	25	58	3	na	---*	72	Fault gouge, traceable 60 ft, strike N. 40° W., dip 85° NE.; limestone; gossan.
612	Chip random	R	---	.66	8.4	7	110	na	10	45	3	na	---*	56	Quartzite, fractured, iron oxide stained.
613	Chip, 30 in.	BC	.045	.5	199	5	na	na	8	---	14	na	---	11	Limestone, silicified; calcite, hematite.

Table 18.--Data for samples 614-617 from the Wadsworth Ranch area, Grant Range RARE II area.

[---, not detected; na, not analyzed. Analytical lab: BC, Bondar-Clegg; R, Reno Research Center.]

Sample			Assay data										
			Au	Ag	As	Cu	F	Mo	Pb	Sb	W	Zn	
No.	Type and/or length	Lab	ppm (unless otherwise noted)										Description
614	Chip, 54 in.	R	---	---	0.65%	---	480	10	43	19.6	32	16	Fault gouge, 1 1/2 ft wide, strike N. 30° W., dip vertical; limestone; clay, quartz.
615	Select	BC	5.7	7.11 oz/st	9.63%	339	na	21	1.24%	355	18	6,175	Dump; breccia zone, 2 ft wide, strike N. 60° E., dip 80° NW.; limestone; hematite, manganese, pyrite, vuggy quartz.
616	do.	BC	.22	6.8 oz/st	18.38%	23	na	2	7.25%	313	62	1.9%	Stockpile; limestone; arsenopyrite, calcite, galena, pyrite, quartz.
617	Grab, 3-ft grid	BC	.11	2.94 oz/st	8.95%	21	na	5	3.31%	228	32	16,220	Dump; limestone; quartz.

Table 19.--Sample data for samples 67, 76, 91, 96, 178, 204, 217, 221, 225, 246, 595, and 605 of granite and limestone from in and near the Grant Range RARE II area.

[---, not detected; na, not analyzed; *, analyzed by atomic absorption with lower detection limit. Analytical lab: BC, Bondar-Clegg; R, Reno Research Center.]

Sample			Assay data															
	Type and/or		$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	K_2O	MnO	Na_2O	P_2O_5	TiO_2	Au	Ag	F	Mo	W	
No.	length	Lab	%			ppm (unless noted)												Description
67	Chip, 24 in.	R	2.5	0.9	73.6	14.4%	1%	3.7%	230	3.6%	0.11%	0.11%	---	0.36	110	---	6	Granite.
76	Chip. 24 in.	R	3.57	1.1	72	14.4%	2.1%	3.6%	290	3.1%	.13%	.16%	0.073	.35	54	---	6	Granite, quartz veinlets.
91	Select	BC	2.19	.46	72.23	14.3%	1.66%	4.57%	0.03%	4.18%	.14%	.14%	na	na	na	na	na	Granite.
96	Chip, 54 in.	R	1.64	.7	75	14%	1.4%	3.4%	430	3.1%	.16%	.12%	---	---	170	---	---*	Do.
178	Chip, 24 in.	BC	na	na	75	na	na	na	na	na	na	na	.01	2.4	730	---	---	Granite, fractured; clay.
204	Chip, 36 in.	BC	na	na	72.5	na	na	na	na	na	na	na	---	7.4	630	7	---	Do.
217	Chip, 30 in.	BC	na	na	74.5	na	na	na	na	na	na	na	---	1.3	630	6	---	Granite, fractured, iron oxide stained.
221	Chip, 60 in.	BC	na	na	43	na	na	na	na	na	na	na	.025	1.68 oz/st	1,300	15	---	Do.
225	Chip, 28 in.	BC	na	na	74.5	na	na	na	na	na	na	na	---	---	600	5	---	Do.
246	Chip, 60 in.	BC	na	na	76	na	na	na	na	na	na	na	---	.7	430	2	---	Granite, fractured; argillic alteration.
595	Chip, random	R	48.5	38.5	18.7	.39%	.36%	.13%	550	110	.32%	170	---	---	340	7.6	---*	Limestone, iron oxide stained; chert.
605	do.	R	80.5	.6	11.6	690	550	440	160	64	---	25	---	.43	120	9.9	---*	Limestone, fine grained, fractured.

Appendix--Analytical labs, methods, and detection limits.

[Lab method: FA, fire assay; FA/AA, fire assay/atomic absorption; AA, atomic absorption; DCP, direct coupled plasma; SI, specific ion; FA/ICP, fire assay/inductively coupled plasma; ICP, inductively coupled plasma; Chem, chemical; spec, special.]

	Lab:	Barringer	Bondar-Clegg				Reno				
	Method:	FA	FA/AA	AA	DCP	SI	FA/ICP	ICP	AA	Chem	Spec
Element		ppm		ppm					ppm		
Antimony	Sb				5			30	2		
Arsenic	As				5			30	2		
Beryllium	Be							.1			
Bismuth	Bi				2			30			
Copper	Cu				1			6			
Fluorine	F					20				20	
Gold	Au	0.001	0.005				0.007				
Lead	Pb				5			10			
Manganese	Mn				1			.5			
Mercury	Hg			0.005							
Molybdenum	Mo				1			5			
Silver	Ag	.1	.2				.3				
Thallium	Tl			.2							
Tin	Sn				10			2	5		
Tungsten	W				10			30			5
Zinc	Zn				1			3			

Element	oxide	Whole rock analysis %		ppm	
Aluminum	Al_2O_3		0.05		100
Calcium	CaO	.05		400	
Iron	Fe_2O_3		.05		40
Magnesium	MgO	.05		300	
Manganese	MnO	.05		5	
Phosphorous	P_2O_5	.05		1,000	
Potassium	K_2O	.05		600	
Silicon	SiO_2	.01		100	
Sodium	Na_2O	.05		600	
Titanium	TiO_2	.01		40	

DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

OPEN FILE REPORT
MLA 31-88
PLATE 1

MINE AND PROSPECT MAP OF THE GRANT RANGE RARE II AREA, NYE COUNTY, NEVADA

BY

RICHARD F. KNESS, U.S. BUREAU OF MINES

1988