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MINING ENGINEERING STUDIES

IRON MOUNTAIN MINE PROPERTY
WEST SHASTA DISTRICT, CALIFORNIA

TECHNICAL REVIEW

Prepared for

IRON MOUNTAIN MINES, INC.

Sacramento, California

November 1981

KAISER ENGINEERS

CONFIDENTIAL

1652-00014

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IRON MOUNTAIN MINES, INC.

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Job No. 81164-001
Report No. 81-114-R

NOVEMBER 1981

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IRON MOUNTAIN MINES

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I. INTRODUCTION

Kaiser Engineers has been retained by Iron Mountain Mines, Inc. To perform geological and mining engineering studies on their Iron Mountain Mines property located in Shasta County, California. Kaiser Engineers submitted a proposal in August of 1981 which was subsequently accepted by Mr. T. W. Arman, President of Iron Mountain Mines.

A. Objectives

The objective of this work is to summarize and review data, ore reserve calculations, mining plans, milling plans and cost estimates prepared for the Iron Mountain Mine by others and to evaluate this information and determine its practicality. Pertinent reports, maps, figures and tables all containing applicable sections of the above information were obtained from the Sacramento, California, offices of Iron Mountain Mines for examination in Kaiser Engineer's, Oakland, California offices.

B. Scope of Services

The following scope of services was agreed upon between Iron Mountain Mines and Kaiser Engineers:

- o Summarize and review the status of land ownership and mineral rights control at the Iron Mountain Mine.
- o Summarize and review the methods of examination used to evaluate the deposit.

- Summarize and review the geology and mineralization of the deposit.
- Review the ore reserves calculations.
- Review proposed mining plans.
- Review proposed milling plans.
- Review Power availability plans.
- Review haulage plans.
- Review capital cost estimates prepared by others.
- Review operating cost estimates prepared by others.
- Prepare recommendations based on the items reviewed above.

C. History

The Iron Mountain Mine which is presently owned by Iron Mountain Mines Inc., Sacramento, California, is a strata bound massive sulfide located in the Klamath Mountains 15 miles northwest of Redding, California. The deposit was first found in about 1865 with the discovery of the large gossan zone overlying the massive sulfides. This discovery was made by a Mr. William Magee who, along with a Mr. Charles Camden, obtained the area of the deposit as a potential iron mine. No actual mining took place.

Discovery of silver in adjoining ledges around 1880 led to the operation of the property as a silver mine until 1894. The silver was concentrated in the gossan at the sulfide contact. The silver ore was mined from underground workings, then milled by staged crushing to minus 40 mesh followed by roasting and pan amalgamation to produce an amalgam from which the silver was recovered. Capacity of the mill was just under 1.7 tons per hour. Some gold was also recovered but records are sketchy.

In the latter part of 1894 British interests purchased the Iron Mountain Mine from the original owners. The value of the copper in the sulfides below the gossan was the primary attraction for the new owners. Mountain Mines Ltd. was organized by the British interests and in 1896 ownership passed to Mountain Copper Company Ltd. which operated the property under various recovery methods and schemes until the mid 1960's. The mine was subsequently closed down in the mid 1960's and remains dormant to the present time. Two ownership changes have occurred since the closing of the mine. Stauffer Chemical Company purchased the Iron Mountain Mine in 1967. With the exception of a small cement copper operation and a tentative sulfuric acid production plan no mining occurred under Stauffer Chemical Company ownership. In 1976 the property was acquired by Iron Mountain Mines and the cement copper operation continued for a short while.

Under the new owners, Mountain Copper Company, silver mining continued until 1897. Meanwhile in 1895 a large sulfide copper ore body was discovered on the property which led to increased capital investment, the building of a narrow gauge railroad from the SP main line, and the construction of a smelter at nearby Keswick, California. Both the railroad and the smelter were completed and put into operation in 1896. The capacity of the smelter was continuously increased until peak operational capacity was attained in 1904 at an average of 1,000 plus tons of ore per day. Beginning in the early 1900's smelting operations were slowly transferred to Martinez, California, and in 1907 the Keswick smelter was shut down. At its zenith in 1904 the Keswick plant had 5 water jacket blast furnaces with a capacity of 300 tons per day each, two 18 foot diameter Wright-McDougal roasters, 2 briquetting machines, a large oil-burning preheating unit, a hospital, a laboratory, a water pumping plant on the Sacramento River with a 16 inch pipeline to the smelter, a small power plant, and a railroad siding.

In 1915 the first copper flotation mill in California was completed at nearby Minnesota, California to treat copper ore from the property. Primary crushing was done at the portal of the No. 8 mine (see Fig. II-A-1) with the remainder of the ore processing taking place at the Minnesota mill. The mill consisted of a sizing trommel in line with a Hancock jig; drying cells for the jig concentrate; and both pebble mills and flotation cells for the jig tails. The grade of the mill product ran 7 to 8 percent copper for the jig concentrate and 12 to 18 percent copper for the flotation concentrate. This mill operated until March 1919 when it was closed because of low copper prices. In 1942 a new, 350-ton per day flotation mill was built at the mouth of the Richmond adit. This mill continued in operation until June of 1947, when all copper-zinc mining and milling operations were suspended on the property.

Pyrite ore was mined from the property beginning in 1906. This ore was sold to Pacific Coast Oil Company for the production of sulfuric acid for use in its Richmond refinery. About 1,000 tons per month were shipped for roasting with the process residues being returned to the Mountain Copper Company for recovery of the copper, gold and silver. The mining of pyrite ore was continued by Mountain Copper Company until the operations were terminated in 1962.

The surface gossan areas of the mine were exploited at various times for their silver content. Between 1879 and 1895 the gossan silver ore was mined and process by an amalgamation process discussed earlier. Mining of the gossans for gold-silver ore was again resumed in 1929 and continued until 1942 with processing by means of a cyanide plant at the mine.

More recently a cement copper precipitation process using outflow water from the mine workings has been in operation. Beginning in 1956 this recovery process was initially run by Mountain Copper Company and then by Stauffer Chemical Company and finally by Iron Mountain Mines to the present. The processing method consisted of a water collecting stainless steel pipe and gutter system feeding to scrap filled cementation tanks.

Because of the segmented nature of the Iron Mountain Mine ore body, the various parts were explored and developed separately, leading to their being named as separate mines. However, they are all in fact one ore body which has been subdivided by faulting. The various ore segment names and their major mineral commodity are listed in Table III-F-1.

Total historic production of the Iron Mountain Mine for the years between 1879 and 1977 is 10,070,000 tons. Details of this total mined tonnage and associated average grades are listed in Table III-F-1 and III-F-2.

II. RECOMMENDATIONS AND CONCLUSIONS

A. Recommendations

The factor which will ultimately determine whether the Iron Mountain Mine will become productive or not is that of economic viability. In order to adequately support decision-making, the following recommendations are made:

- Proven geological reserve tonnage estimates should be developed for the ore remaining in the Old Mine, Number 8 and Confidence-Complex ore body areas.

- Preliminary mining plan options should be developed for each of the known remaining ore bodies.

- In conjunction with these preliminary mining plans, mineable ore reserves should be calculated for all the inplace ore. In addition to the well documented Hornet, Mattie, Richmond and Brick Flat ore bodies, the Old Mine, Number 8 and Confidence bodies should be included.

- Average ore composition models for each of the ore bodies at Iron Mountain should be developed. Old mining, milling and smelting records should be very useful for this purpose. Additional laboratory testing is also necessary.

- Using the ore models as a basis, a preliminary milling circuit which will adequately treat the ore should be developed.

- Kaiser Engineers believes that an analysis of the ore reserves should be made as a basis for a sampling program. The purpose of the sampling program would be to provide representative samples for metallurgical test work. A complete mineralogical analysis to identify the minerals in the deposit would be the first step in outlining a process to maximize the recovery of metals from the deposit. This analysis would determine the distribution of the gold and silver and with which minerals the gold and silver are associated. The gold and silver associated with copper or zinc minerals could easily be recovered by flotation of the copper and zinc minerals. Gold and silver associated with the pyrite would require an extensive pyrometallurgical treatment and might not be economical on the scale proposed by Iron Mountain.

- The massive sulfide deposit has been successfully processed in the past and a conventional concentrator would produce a medium grade copper concentrate as presented in the milling plan, Section 5. This concentrate would require further treatment by a copper smelter and refinery to produce a final copper product and ultimate recovery of the gold and silver.

- The zinc concentrate produced from the massive sulfide would be low quality concentrate with less than 50% zinc and a high iron content. This concentrate would require further processing at a zinc refinery that had a goethite or jarosite precipitation process. A detailed cost analysis would be required to determine if the process would be economical.

- Gossans associated with massive sulfides have been successfully treated by heap leaching. Kaiser Engineers recommends that a test program be started to test the feasibility of heap leaching of the gossan ore and to determine the recovery of gold and silver and the quantity of reagents that would be consumed. This may prove to be the most feasible way for Iron Mountain to process the gossan.

- The gossan tailings could be processed along with the gossan ore. Careful test work would be required to determine the reagents required to recover the residual gold and silver.
- With the completion of the mining reserves and the preliminary mining and milling plans, updated capital and operating cost estimates need to be developed. These estimates should conform with the estimate definitions contained in the Appendix.
- Following the completion of capital and operating cost estimates a Return on Investment analysis (ROI) should be developed for selected mining rates. The outcome of this ROI analysis would be the selection of the best system for mining and milling the Iron Mountain ore body.

B. Conclusions

Because of the existence of certain incomplete links in the overall chain of analysis regarding the Iron Mountain Mine only limited conclusions can be drawn at this time. Listed below are the conclusions developed by Kaiser Engineers during the technical summary and review of all readily available data concerning the mineral deposits of the Iron Mountain Mine area:

- Interest in this property is well founded, not only because of the presence of inplace ore but also because of the high probability of discovering additional ore on the property.

- Iron Mountain Mines maintains an excellent position with respect to land control in the area. This position should prove very useful in future in terms of possible areas favorable to prospecting and discovery of additional ore. The control of this property also allows for a less disturbed and often better run mining operation.

- Relatively rapid improvement in the overall available ore reserve can be accomplished by substantiated reclassification of the remaining reserves in the Old Mine, Number 8 and Confidence-Complex ore areas.

- Additional improvement of the overall reserves can be made by further investigation of the recently discovered extension of the Hornet ore body its northerly side. Recent investigations should prove useful in this case.

- Over the years a wide variety of products have been produced from the various materials mined at Iron Mountain. In order to insure that the full potential of the materials available at Iron Mountain is realized a full mineralogical analysis of all available ore types is necessary. Such analysis should indicate the presence of basic and precious metals, and specific mineral compounds of interest, as well as the mode of occurrence for all.

- The massive sulfide deposit can be processed with flotation to recover copper and zinc concentrates. This could be done using conventional milling and flotation.

- The gossan and gossan tailings could be treated by heap leaching to recover gold and silver.

- Development of a more detailed preliminary mine plan to include the various ore areas away from the main sulfide zones and the subsequent calculation of a mineable ore reserve would be a great asset to this property.

- The proposed power project, if brought to fruition, would be an added asset to the mine in terms of defraying energy costs.

- No definite conclusions can be made concerning haulage at the mine because of a lack of definite mine plans. However, the existence of the tram facilities must be viewed as a possible future low cost link either in the ore transportation or concentrate handling circuits.

- Future estimates for capital and operating costs will be greater than the present estimates. However, recategorizing and increasing of ore reserves may favorably offset the cost estimate increase.

- The present ore tonnage is on the border line with regard to a go no-go mining situation. However, the addition of reserves as suggested above should provide the needed tonnage for a viable mining situation, provided that the extraction of the ore can be done in an economic manner.

III. THE PROJECT

A. Location

The Iron Mountain mine is located in Shasta County, California in the southeast quarter of the Weaverville, 7 1/2 minute quadrangle. Located at an average elevation of 2600 feet it is the southern most mine in the West Shasta copper-zinc mining district. (See Figures III-A-1 and III-A-2). The mine lies in the southeast area of the Klamath Mountain geological province with access by paved road from Redding, California, 17 miles to the southeast. Topography in the area consists of long rugged, spur ridges dissected by deep stream cut canyons which commonly form an irregular transverse drainage pattern.

B. Land Status

The property controlled by Iron Mountain Mines is 4400 acres of both feet and optioned land in the area of the adjoining corners of township 32 north, range 5 west; township 32 north, range 6 west and township 33 north, range 6 west. A number of patented mining claims, primarily located in Section 35, township 33 north, range 6 west combined with larger parcels of both purchased and optioned land in adjacent sections are all joined to form the total Iron Mountain Mines acreage. The optioned land accounts for roughly 26 percent of the total acreage and is located on the margins of the 2800 acres of fee land. The property extends from near the west side of the Sacramento River at the Matheson railroad siding, west and north approximately 4 miles to the eastern margins of the Whiskey Creek drainage. Figure III-B-1 shows in yellow an approximate outline of the Iron Mountain Mine property.

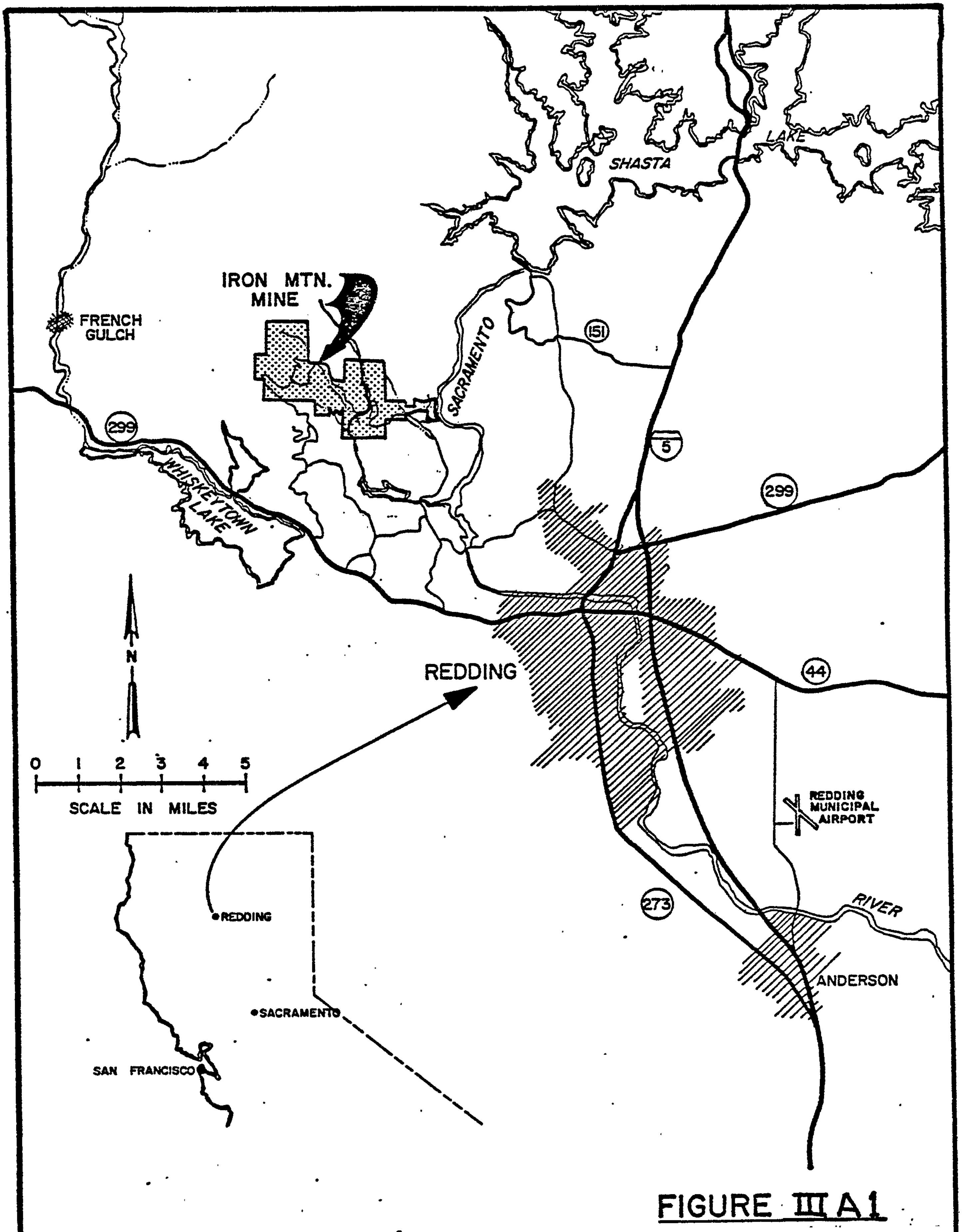

FIGURE III A1

LOCATION MAP

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IRON MOUNTAIN MINES

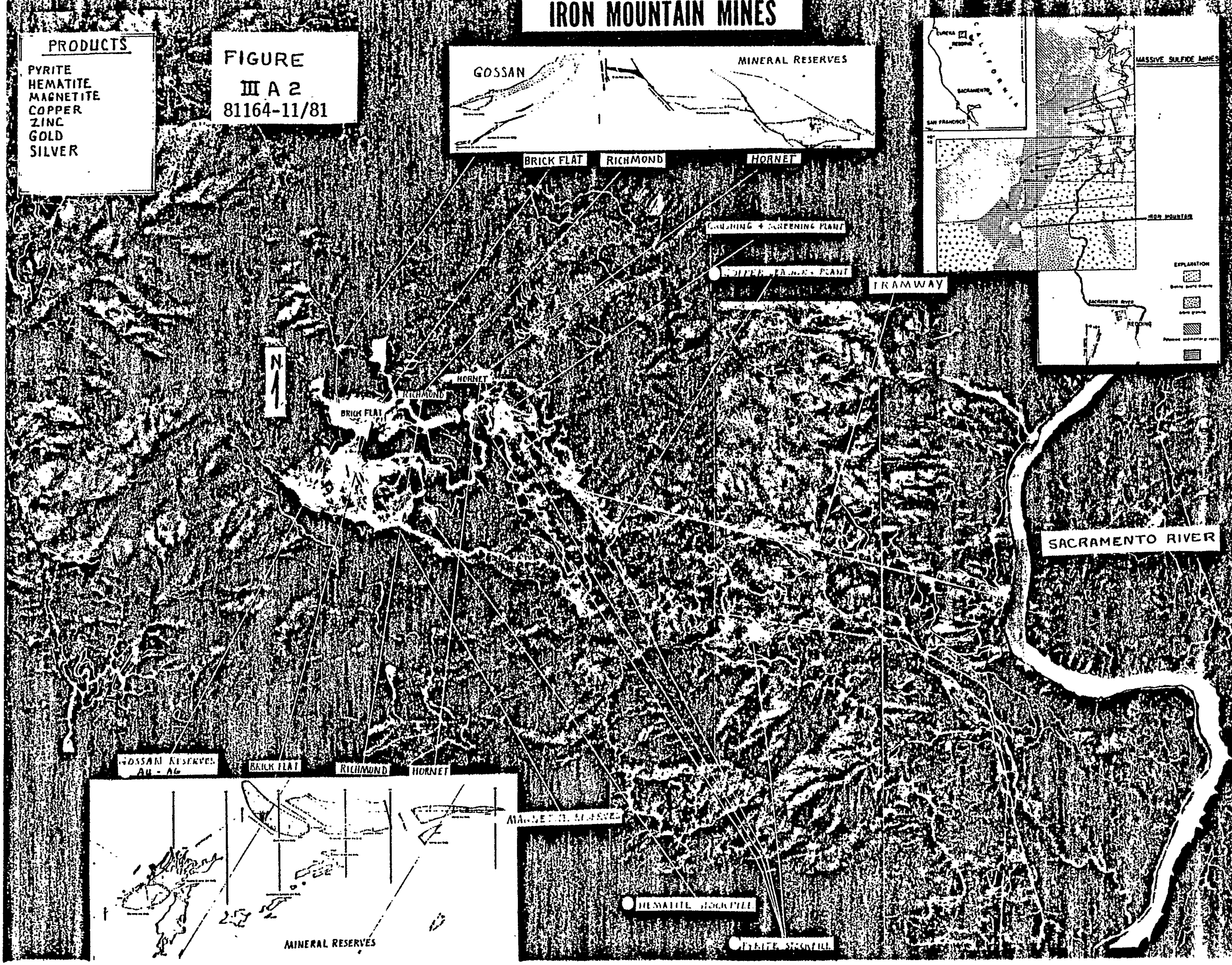

FIGURE
III A 2
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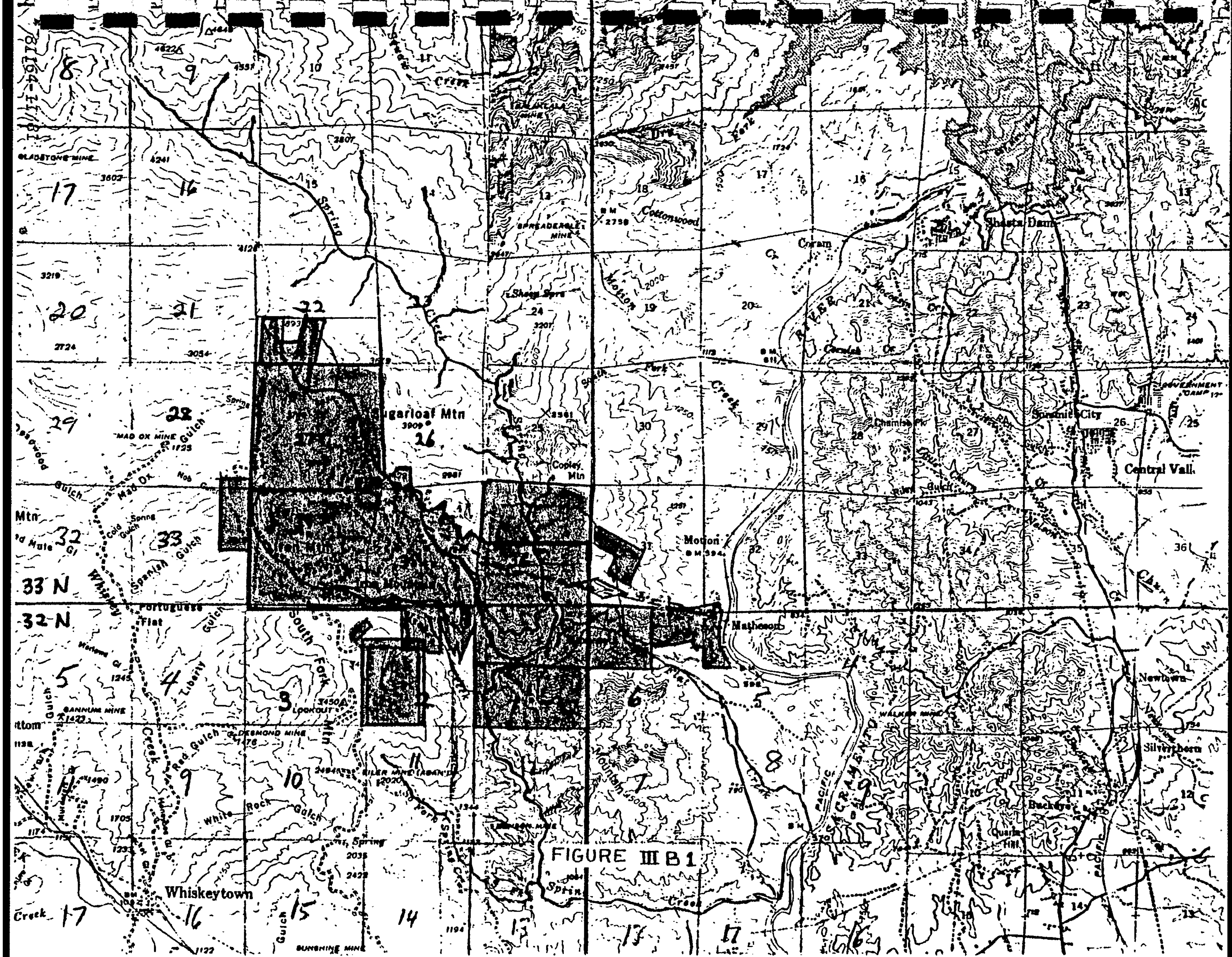


FIGURE III B1

C. . Deposit Exploration

The Iron Mountain Mine ore body has been examined both by surface and subsurface means. During the 80 years of mine operation underground drifting together with long hole drilling provided extensive data on the various segments of the ore body. However, in 1938 a disastrous slide destroyed the company offices wiping out a good portion of the on site underground information. Both surface-based diamond drilling and churn drilling were also used to to examine and evaluate the various segments of the Iron Mountain ore body. Drill hole assay results for both surface and underground operations were assembled by Mountain Copper Company and present ore reserves were developed. The most recent review of reserves was completed in late 1967 by Mountain Copper Company. Assay results for a total of 295 diamond drill holes are available for evaluation of the Brick Flat, Richmond Extension, Richmond and Mattie copper-zinc sulphide bodies at Iron Mountain. Of this total 6 are surface diamond drill holes and 289 are underground diamond drill holes from the old workings. A list of these drill holes, their intercepts and assays are shown in Appendix A. No data is presently available showing grade intercepts and ore volumes either prior to mining or remaining in the Old Mine, No. 8 and Confidence-Complex ore bodies.

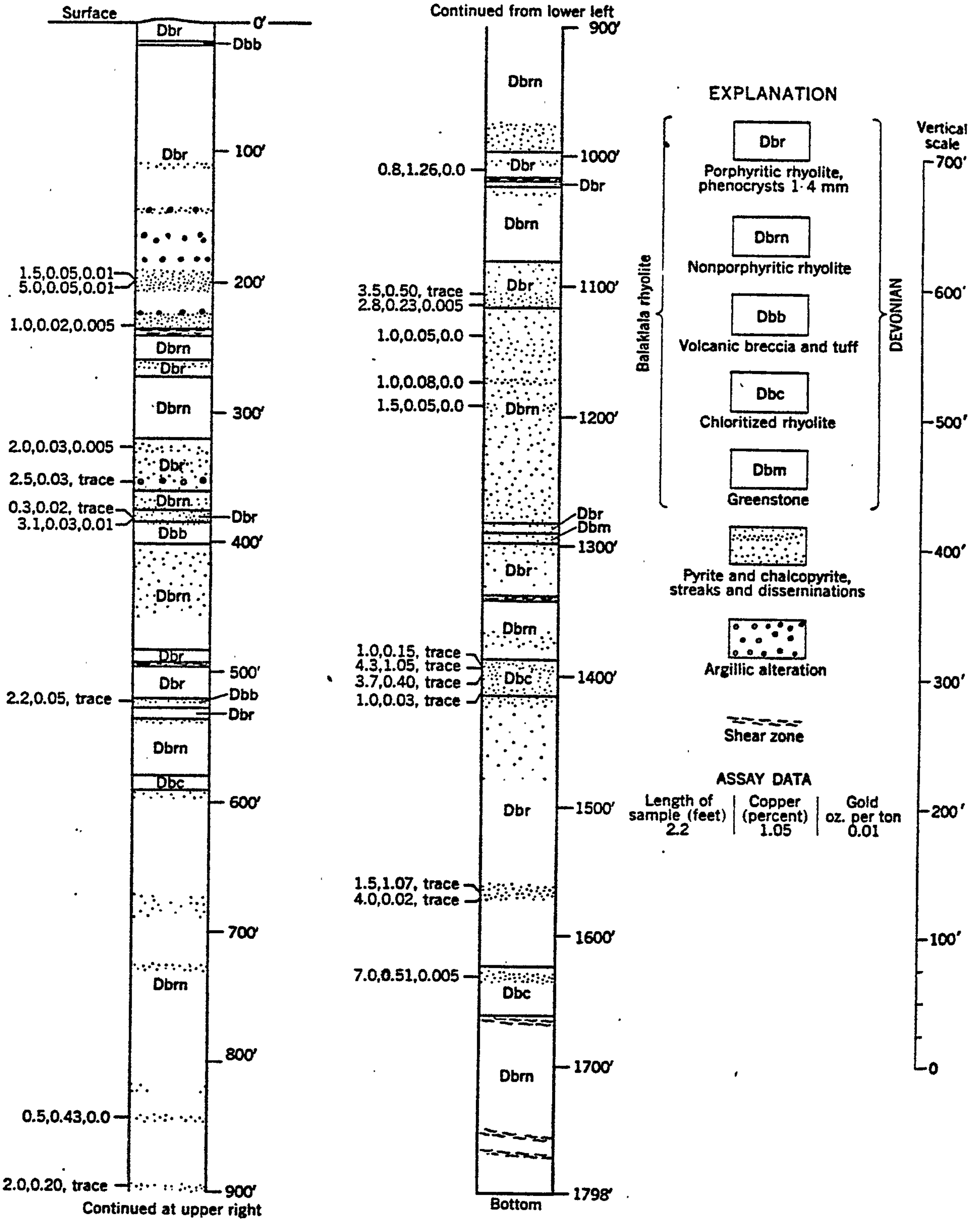
More recent exploration programs at the Iron Mountain Mine include a test of various geophysical methods for ore detection; a deep Richmond drill hole and mercury halo analysis.

Magnetometer, self-potential and electrical resistivity test lines were run over the Brick Flat ore body in 1951 and 1952 with mixed results. The magnetic survey appeared to offer the most potential.

During 1950 and 1951, a 1,798-foot exploration drill hole was put down by the U.S.G.S. in the vicinity of a syncline on the southeast side of the Iron Mountain mine. This drill hole (Figure III-C-1) located at the approximate mine coordinates 2900 north, 3650 east passed through numerous rhyolite intervals of the Balaklala formation throughout its entire length. Beginning on a bearing of north 42.5° west and a dip of minus 70.5° the hole deflected to a bearing of 57.5° east and a dip of minus 38° at its termination. Overall the top 1,000 feet of the hole is relatively straight with the majority of deflection taking place in the last 798 feet of the hole. Intermittent, broad to narrow bands of disseminated sulfides were present throughout the drill hole with some intervals containing slightly greater than one percent copper as indicated in Figure III-C-1. Silicargillic alteration of varying intensities is very common in the drill core, particularly in the high copper intervals of the drill hole.

Mercury halo detection surveys have apparently been run in the vicinity of the Iron Mountain mine. However, reports on such studies are presently unavailable.

Presently, the U.S. Geological Survey is conducting various geological analyses in the Iron Mountain Mine area to aid in reassessing and updating previous West Shasta District studies. These various analyses include surface mapping, structural investigations, petrography, geochemistry, mercury vapor studies, isotope studies and evaluation of regional geology. Particularly, recent structural and petrological work at Iron Mountain indicates the possible existence of additional sulfide ore down dropped on the westerly side of the Sugarloaf fault.



Graphic log of the U. S. Geological Survey diamond-drill hole at the Iron Mountain mine.

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FIGURE III C 1

D. Geology

Regionally the oldest formation in the area is the Copley Greenstone of middle Devonian age. This formation includes metamorphosed trachyitic lava flows, spilitic basalts, andesites, tuffs and breccias together with minor shale and rhyolitic tuff interbeds. The lower part of the formation is primarily massive flows, while the upper section is composed of abundant pyroclastics and pillow lavas. Total thickness ranges between 4000 and 6000 feet. Exposures of this formation are along the east and southwest sides of the West Shasta district.

Slightly younger than the Copley, the Middle Devonian Balaklala Rhyolite conformably overlies the greenstone, except in the eastern part of the West Shasta district where Balaklala-Copley interfingering is evident. The Balaklala formation is basically a metarhyolite composed of soda-rich lava flows, tuffs and pyroclastics. The lower part is characterized by weakly porphyritic rhyolite. A moderate quantity of subhedral to euhedral quartz phenocrysts occur in the middle part and strongly porphyritic ryholite with coarse (24 mm diameter euhedral quartz phenocrysts is present in the upper part of the formation. This unit is apparently the product of an in-line series of shallow volcanic vents and fissures. The Balaklala has a maximum thickness of about 3500 feet at the center of the mining district but thins considerably at the formation edges. Lying completely within the West Shasta district, this ryholite unit is an elongated northeast-southeast trending exposure about 1.5 miles wide. The upper part of the Balaklala middle unit is the predominant ore host within the district.

Overlying the Balaklala is the Middle Devonian Kennett Formation. This unit is composed of siliceous black shale with minor occurrences of tuff and limestone.

The basal shale of this unit grades directly into the lithic tuffs of the top of the underlying Balklala, making identification of a distinct contact between the two difficult. Minimum thickness is 865 feet with original thickness unknown due to extensive erosion. The Kennett Formation occurs as small irregular patches in the northern part of the West Shasta district.

The Bragdon formation of Mississippian age conformably overlies the Kennett. Composed of shale, conglomerate and sandstone, the Bragdon has an estimated thickness of 3500 feet. The Bragdon Formation outcrops along the western and northern border of the West Shasta district.

All of the Paleozoic units have been metamorphosed to some degree, with the Copley Greenstone exhibiting the greatest overall effect. This metamorphism is regional in extent and is likely the product of both shallow and at depth intrusive activity. Intruding all of the Paleozoic Formations in the area is a granitic pluton known as the Mule Mountain stock. This intrusive is a soda-rich, siliceous, albite granite, "Trondjhemite", with minor epidote and amphibole as accessory minerals. Emplacement apparently occurred during the Nevadan orogeny. It outcrops in the southeast corner of the district. In early reports the Mule Mountain and the Balaklala were often undifferentiated and mistakenly called "Alaskite".

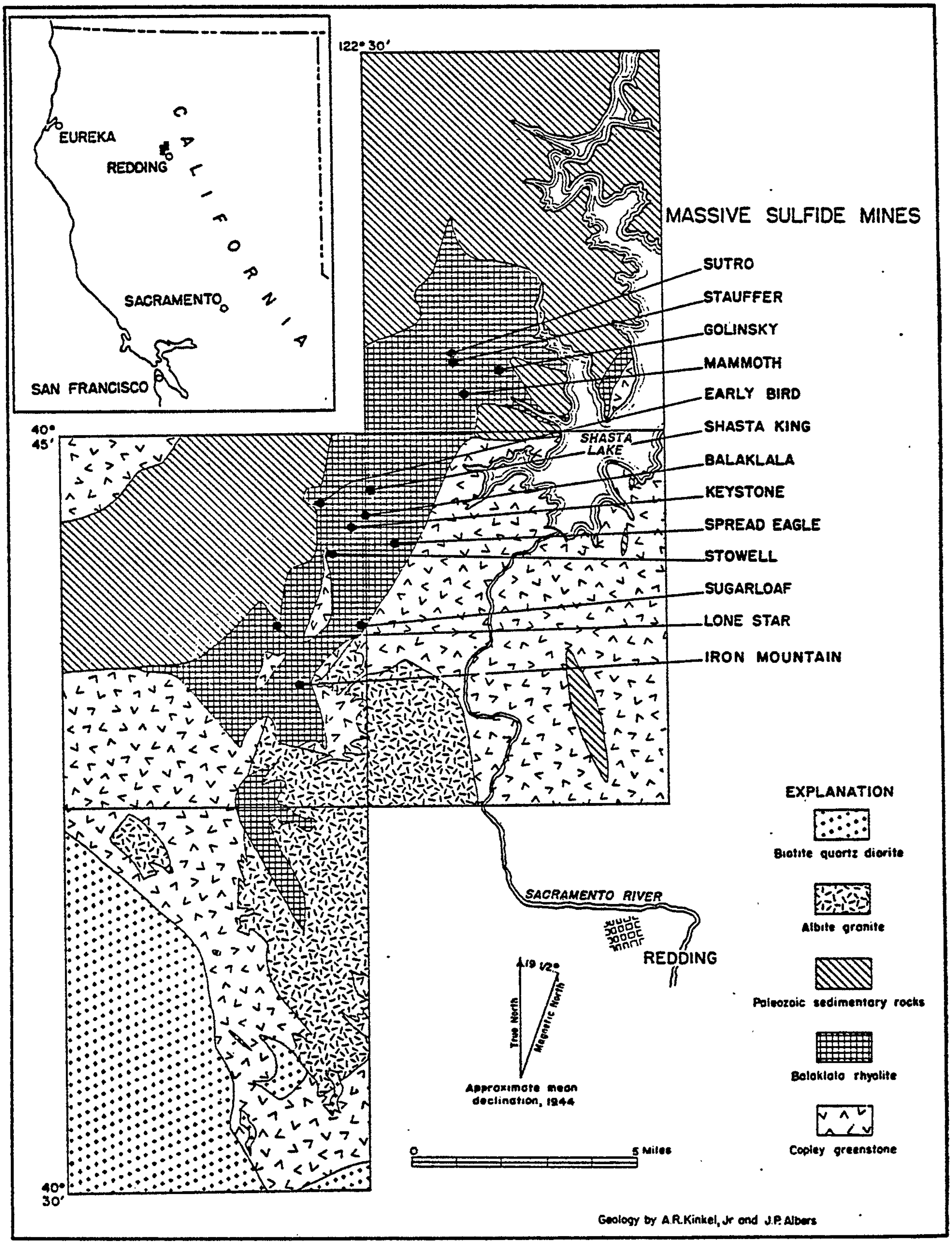
In the immediate area of the mine only three of the regional rock types are present, the Copley greenstone, the Balaklala rhyolite and the Mule Mountain granite.

Figure III-D-1 shows the regional geology of the west Shasta district and Figure

III-D-2 is a generalized sketch of the surface geology of the Iron Mountain mine. Special Report 14 of the California Division of Mines contains an excellent, detailed map of the Iron Mountain mine surface geology (see Appendix C) along with numerous cross sections originally developed by Mountain Copper Company.

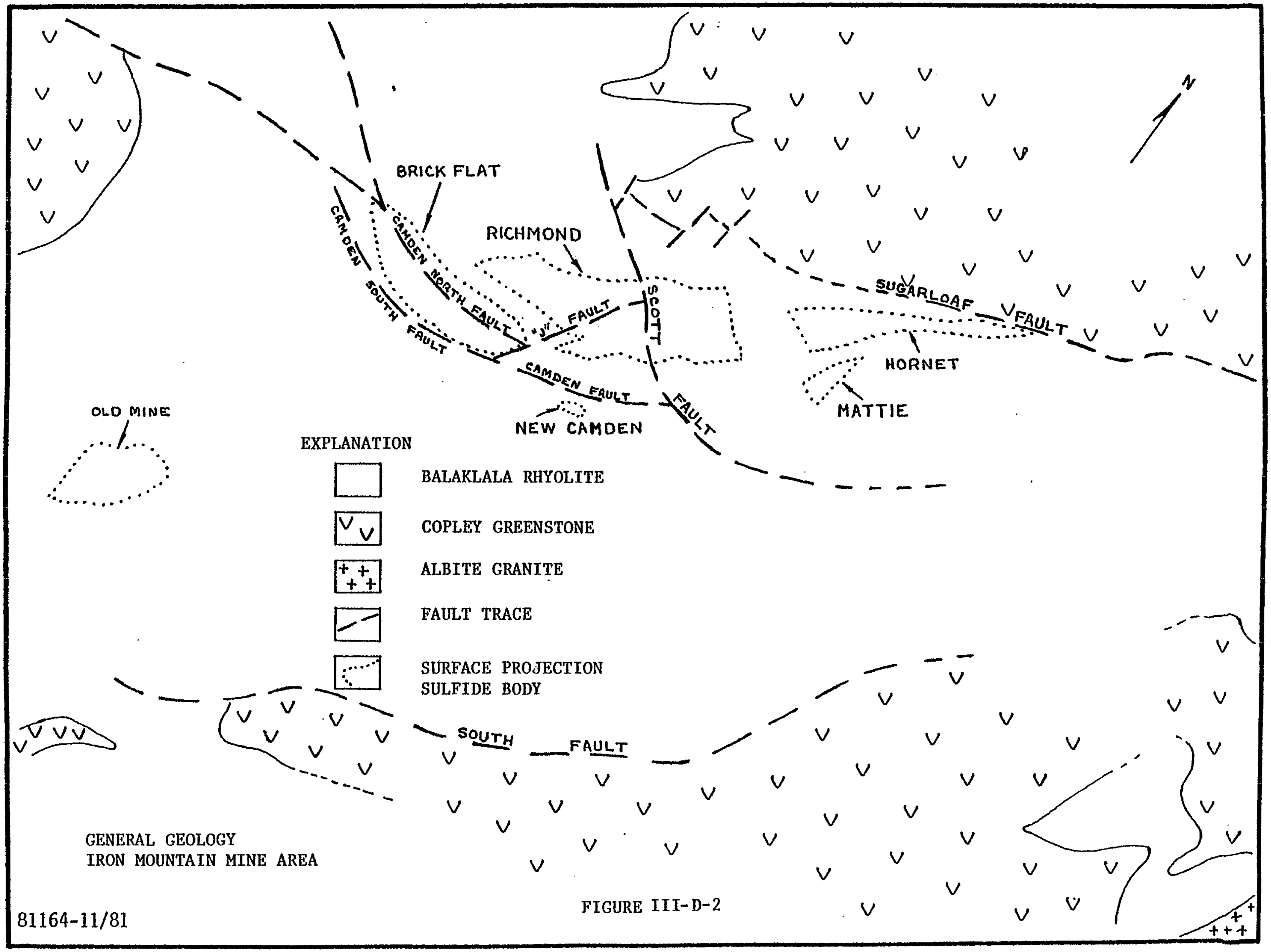
The primary regional structure of the district is a broad uplift created anticline that trends N 15^o East with very shallow plunges to both the north and south. The numerous small folds occurring on the flanks of this anticlinorium have been postulated as aiding in ore localization. This may or may not be wholly valid. In the Iron Mountain mine area an alternating series of northeasterly trending anticlines and synclines are present with a locally dominant syncline running either parallel to or on the long axis of the overall ore body. This feature begins on the southwest side of Slick Rock Creek (Figure III-D-2) and is quickly hidden beneath the tailings and gossan of the Old Mine area. Further northward the syncline axis appears between the traces of the Camden North fault and the "J" fault. To the east of the Scott fault the syncline axis is shifted slightly southward and has only limited surface exposure. However, the presence of anticlinal axis to both the north and south of the general ore body trend indicates the continued existence of a synclinal axis in this area.

Within the District faults are numerous, with two primary systems occurring along the directions N 20^o to 45^o W and N 60^o to 80^o E. The down throw side of these faults is typically the northerly side. Within the immediate Iron Mountain mine area there are seven individually named principal faults along with numerous other minor, short, fault traces. The seven principal faults are: Camden North, Camden South, Camden, "J", Scott, Sugarloaf and South. The three Camden faults, the "J" and the Scott are arcuate faults associated with the Brick Flat,



Map showing location of the West Shasta copper-zinc district and its generalized geologic setting.

FIGURE III D 1



GENERAL GEOLOGY
IRON MOUNTAIN MINE AREA

FIGURE III-D-2

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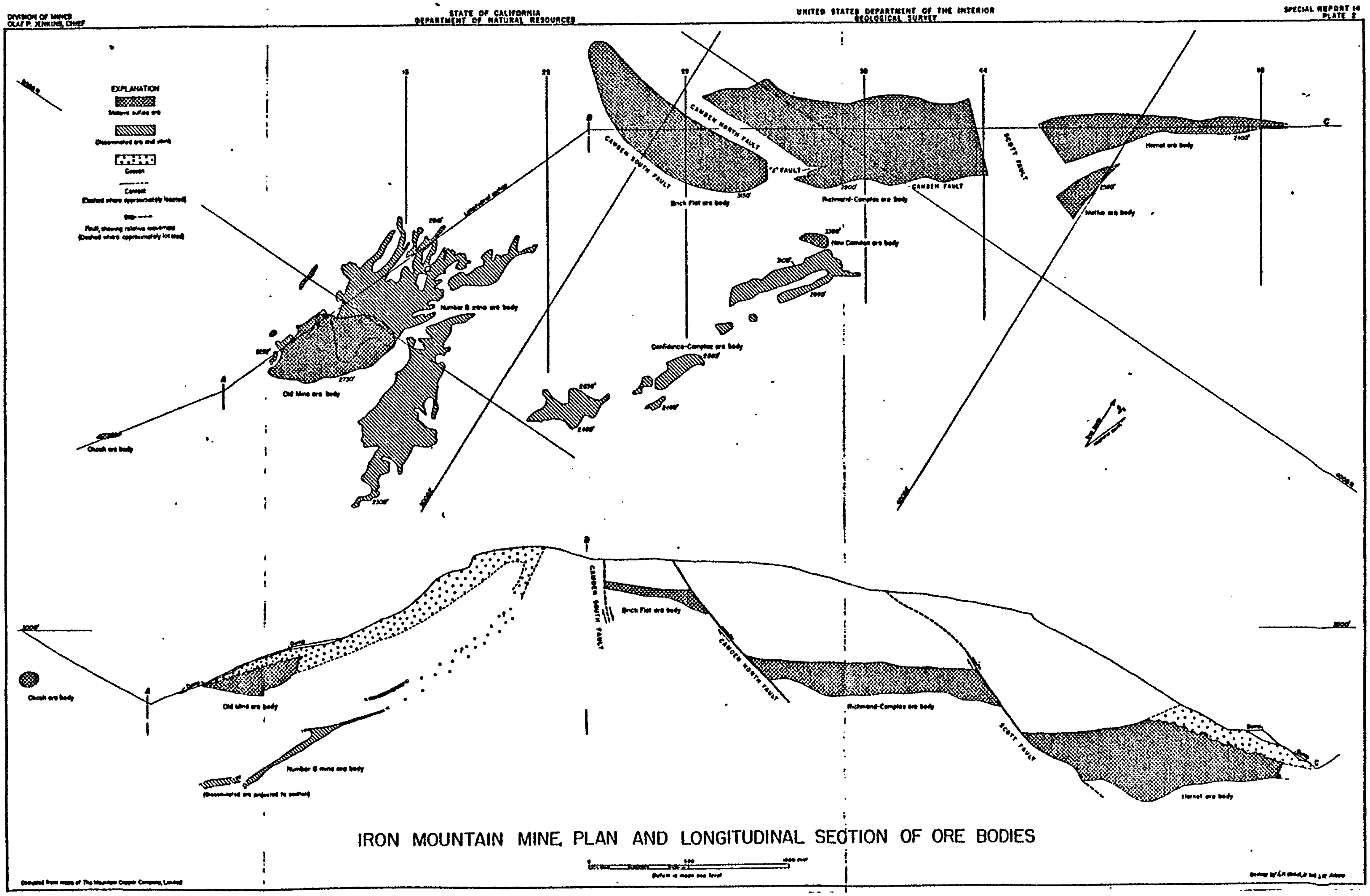
Richmond and Hornet ore bodies. The Sugarloaf and South faults are associated with a strong structural trend which strikes along a N 60° to 80° E direction on the north and south sides of the main axis of the massive sulfide bodies. Two generally subordinant fault sets trending roughly N 55° W and N 15° to 20° E cross the central part of the ore zone. Figures III-D-2 and III-D-3 show the locations of the primary faults both on surface and below ground.

E. Ore Mineralization

Two basic types of ore are present at the Iron Mountain mine. The chief ore is the massive pyrite bodies which contain chalcopyrite and sphalerite while the other is the zones of disseminated chalcopyrite and quartz-chalcopyrite veins common in shistose rock. Subordinate to and associated with these are gossan ore, secondary enrichment ore and magnetite ore. Originally the massive pyrite and pyrite-chalcopyrite-sphalerite bodies were one contiguous mass which was later dissected either by faulting or alteration due to partial exposure. The remaining segments of the original intact sulfide body, from east to west, are the Hornet, Mattie, Camden, Richmond-Complex Brick Flat and Old Mine. The basic trend of the ore bodies is southwesterly along a line just south of and subparallel to the Sugarloaf fault. An exception is the Old Mine ore body which lies more to the south of this direction trend. Further to the south of the Old Mine ore body, roughly 800 feet, is a very small vertical ore body known as the Okosh. Along the northern extension of the Sugarloaf fault and across the Boulder Creek drainage is a small massive sulfide pod known as the Busy Bee. Details as to depth, grade and tonnage are sparse for these two small bodies. Old maps show the apparent existence of drifts into the Okosh and Busy Bee. The various segments of the original sulfide body range in shape from the vertically oriented lenticular



IRON MOUNTAIN MINE, PLAN AND LONGITUDINAL SECTION OF ORE BODIES

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FIGURE III-D-3

shape of the Hornet and Okosh, through the cigar shape of the smaller Mattie and finally to the near horizontally oriented , roughly concave lenticular shape of the Richmond, Brick Flat and Old Mine bodies. Previous room and pillar mining has removed somewhere between 40 and 60 percent of the original Hornet, Mattie, Richmond and Richmond-Extension ore bodies. No figures are available concerning the percent of ore removed from the Old Mine ore body. Preliminary overburden removal has taken place over the Brick Flat deposit followed by the mining of 500,000 tons of sulfide ore for the Martinez acid plant. The Camden, Okosh and Busy Bee remain virtually unmined with only minor tonnages removed.

The zones of combined disseminated and vein ore are commonly irregular in shape but generally their lateral extent is several times greater than the thickness. These zones are known to occur below the Old Mine ore body, and also to the southeast of and below the elevation of the Brick Flat ore body. These two zones are known as the number 8 mine ore body and the confidence-complex ore body respectively. The Number 8 mine ore body plunges southward from beneath the Old Mine and is dissected into several tabular masses. The confidence-complex ore body consists of a series of thin small tabular en echelon bodies trending south southeast and plunging to the south. A drift map of the Iron Mountain Mine area indicates definite underground mining operations in the Number 8 and Confidence-Complex ore bodies. Information concerning extraction percentages and ore grades is contained within the existing historical mining records.

Mineralization in the massive bodies, in order of abundance, is pyrite, chalcopyrite, and sphalerite. Magnetite, galena, pyrrotite and tetrahedrite, also occur as minor accessory minerals. Overall, minor but recoverable gold and modest silver values are also present. In the past selective mining produced substantial gold and silver ore values. Gangue minerals of quartz and calcite both occur in very minor amounts as interstitial grains in sulfides . High grade copper-zinc mineralization occurs predominantly along the base and margins of the large massive sulfide bodies at Iron Mountain. Material ranging from low grade copper to barren pyrite commonly dominating the upper and central parts. Copper-zinc mineralization is often found throughout the thinner ore body segments.

Primary mineralization in the zones of disseminated ore is chalcopyrite and pyrite. The chalcopyrite occurs as grains, veinlets, small irregular masses or quartz-chalcopyrite veinlets. Pyrite occurs as small, scattered blebs throughout the disseminated areas. The Number 8 mine ore body is composed of disseminated masses with veinlets along the margins the quartz-chalcopyrite veinlets are more common to the Confidence-Comples ore body. Small, intense faults and shears have apparently served to control the emplacement of the disseminated ore particularly in the Number 8 mine ore body.

Gossan is the oxidized remnant of those parts of the original massive sulfide body exposed at surface. The gossan consists of limonite as jarosite and geothite, silica, relect nodules of massive pyrite. Minor amounts of gold and some silver silver usually occur near the base of the gossan. High grade gossan-silver ore was very important duirng the early life of the Iron Mountain Mine. The general character of the gossan can range between two distinct facies types, depending on the original pyrite content of the rock. Where pyrite was strongly disseminated in a host of rhyolite, the gossan consists of jarosite-goethite filled micro-casts after pyrite, all in a silica sponge which preserves the original texture of the rhyolite groundmass. This facies can grade quickly into either less pyratized unaltered rock or more massive gossan. At the other extreme of the two gossan facies types, original massive pyrite has been altered to masses of either jarosite-goethite sponge with quartz web-structures or amorphous jarosite-goethite. Locally, breccia of angular rock and vein quartz in a limonite matrix is also observed. The gossan after massive pyrite facies usually has rather abrupt boundaries. The gossan after disseminated pyrite occurs either as halo zones to the once massive pyrite or as independent zones in the host rhyolite.

Ocassionaly beneath the gossan and particularly in the area of the Old Mine ore body, a zone of secondary enrichment exists. Mineralization is commonly a thin layer of clay and black sulfides which contain copper and silver. These black sulfides are most likely chalcocite and acanthite. This enrichment zone is usually several feet thick and grades downward into massive pyrite.

Magnetite ore occurs as small pods adjacent to the main ore bodies. No magnetite of significance has been detected in the main massive sulfide bodies. Magnetite and hematite are the principal mineral components in these small pods. Three small magnetite bodies are known to exist about 700 feet south of the main mine area.

F. Ore Reserves

Using the results of assays and information developed during drilling, drifting and mining of the various segments of the Iron Mountain ore body, geological ore reserves were developed for both the massive sulfide and disseminated ores by Mountain Copper Company. Reserves of the gossan ore were developed through cooperation between engineers of Mountain Copper Company and Stauffer Chemical Company. Subsequent checks of these reserve figures have been made by Southwestern Engineering Company and Iron Mountain Mines Inc. In addition, various Mountain

Copper Company internal checks are evident. The result of the calculations and checks is the general agreement that there presently exists at Iron Mountain Mine roughly 12,000,000 tons of proven sulfide ore with minimum average grades of 1% copper, 2% zinc, 0.02 oz per ton gold and 1.6 oz per ton silver. An additional 2,000,000 tons of probable sulfide ore is also present. Proven gossan reserves are estimated at 3,050,000 tons of ore containing an average of 0.05 oz per ton gold and 1.5 oz per ton silver. Probable gossan ore is estimated at 3,000,000 tons. The combined proven geological reserves amount to 15,050,000 tons of proven sulfide and gossan ore contained within an area of roughly 300 acres. These reserves represent tonnages presently remaining in the Hornet, Mattie, Richmond Extension and the unmined Brick Flat ore bodies. No recent reserve figures have been developed for the three magnetite bodies. Remaining in place tonnages for the Old Mine, Number 8, Confidence-Complex, Camden, Busy Bee, Lone Star and Okosh massive sulfide bodies are listed in various data and reports received from Iron Mountain Mines. However, no reserve calculations for these deposits are available as backup. Limited backup assay data are available for the Camden and Okosh bodies. According to this information average copper grades for the Camden and Okosh are 1.01 percent and 3.43 percent respectively. No overall averages are readily available for the Old Mine, Number 8 and Confidence-Complex but general extension of adjacent data indicates average grades may approach one percent. Greater detail concerning the amounts of both proven and probable ore as presented by Iron Mountain Mines for all known ore bodies can be found in Table III-F-1.

In addition to the sulfide geological reserves, the geological ore reserves for the gossans are also shown on Table III-F-1. Figure III-F-1 shows the locations of all gossan masses considered in the reserve calculations. The various metal

TABLE III-F-1

MASSIVE SULFIDE AND GOSSAN IN-PLACE ORE SUMMARY

PRODUCED BY IRON MOUNTAIN MINES

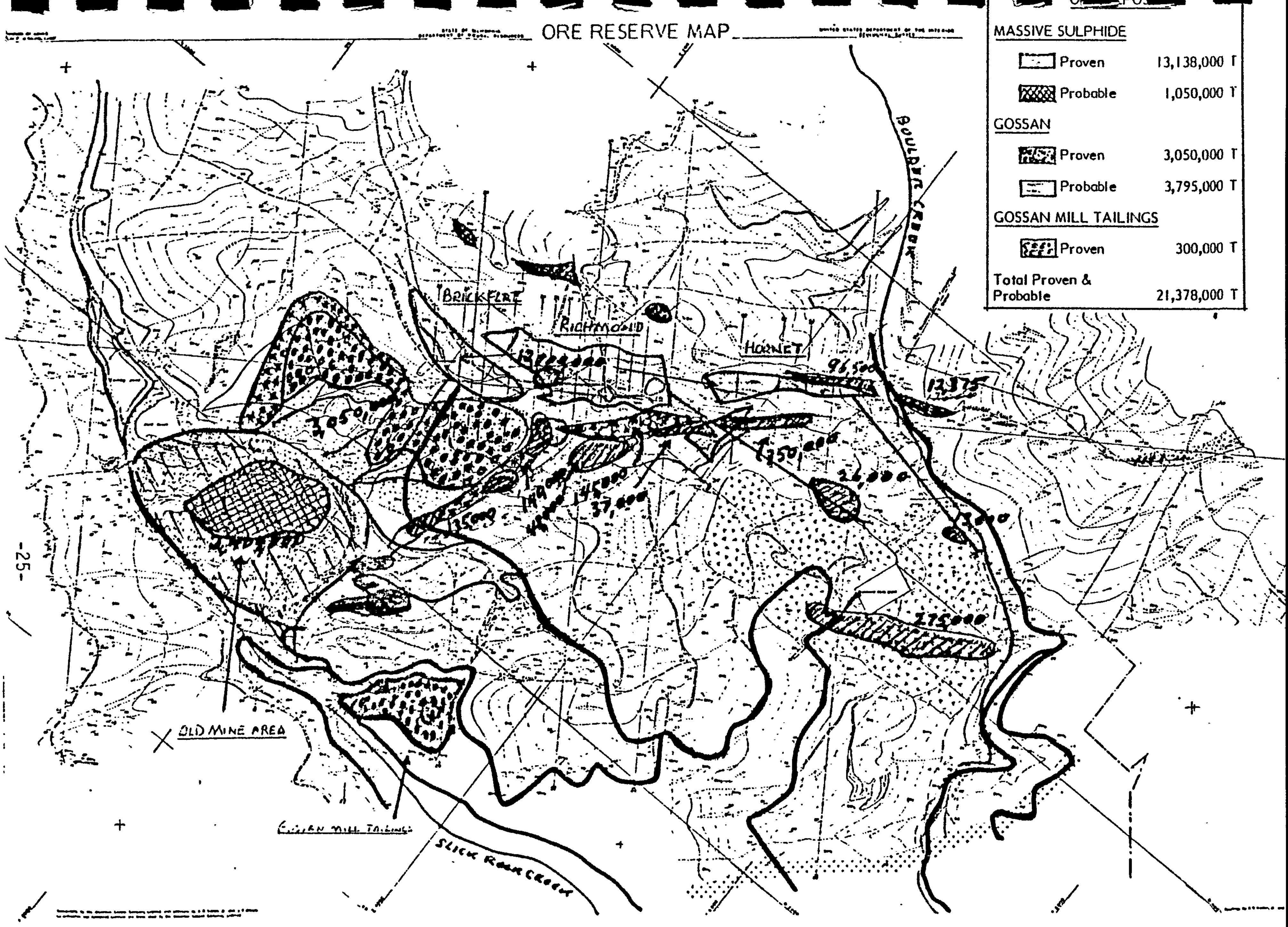
Estimated Inventory as of December 31, 1962

Original Tonnage, In-Place	Original In-Place Tonnage	Past Production	Remaining In-Place Proven	Probable
GROUP 1 - Massive sulfide				
Hornet -Mattie*	3,500,000	2,000,000	1,500,000	
Richmond	12,500,000	3,000,000	9,500,000	
Brick Flat	1,500,000	500,000	1,000,000	
Total Group 1	17,500,000	5,500,000	12,000,000	
GROUP 2 - Massive Suflide				
Camden	500,000	300,000	200,000	
Lone Star**	50,000	-	--	50,000
Okosh	23,000	-	23,000	
Busy Bee	250,000	-	250,000	
Total Group 2	823,000	300,000	473,000	50,000
GROUP 3 - Massive Sulfide				
Old Mine No. 8m Confidence & Complex	3,400,000	1,690,000	1,710,000	
Probable Additional Ore	-	-	-	1,000,000
Total Group 3	3,400,000	1,690,000	1,710,000	1,000,000
GROUP 4 - Gossan				
Slick Rock				
Group 3 Area	5,085,000	2,680,000	-	2,405,000
Brick Flat	3,050,000	-	3,050,000	
Boulder Creek Area	1,390,000	-	-	1,390,000
Total Group 4	9,525,000	2,680,000	3,050,000	3,795,000
SUMMARY - Remaining In-Place Ore				
Group 1			12,000,000	
Group 2			473,000	50,000
Group 3			1,710,000	1,000,000
Group 4			3,050,000	3,795,000
TONS SULFIDE ORE IN-PLACE			14,183,000	1,050,000
TONS GOSSAN ORE IN-PLACE			3,050,000	3,795,000
GRAND TOTAL TONS IN-PLACE			17,233,000	4,845,000

* Hornet Exploration, Diamond Drill Holes E6 and E7 indicate the presence of additional ore adjacent to, or an extension of, the Hornet ore body to the North West.

** Lone Star Exploration, very limited drilling was completed to determine additional ore beyond the out crop area of this deposit.

ORE RESERVE MAP



MASSIVE SULPHIDE		
☐	Proven	13,138,000 T
▩	Probable	1,050,000 T
GOSSAN		
▨	Proven	3,050,000 T
☐	Probable	3,795,000 T
GOSSAN MILL TAILINGS		
▨	Proven	300,000 T
Total Proven & Probable		21,378,000 T

GEOLOGIC MAP OF THE IRON MOUNTAIN MINE AREA, SHASTA COUNTY, CALIFORNIA

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FIGURE III-F-1

grades of the massive sulfide ore are apparently based on the average of the overall intercept values. The average grades of gold and silver for the gossans are estimated on the basis of churn drill hole data to be 0.05 oz per ton and 1.5 oz per ton respectively.

An inventory of the mined and in place metal content of the primary ore bodies, sulfide, gossan and magnetite, as proposed by Iron Mountain Mines is shown in Table III-F-2.

G. Mining Plans

Both underground and surface mining plans for the removal of the remaining ore have been suggested at various times throughout the active life of the mine area. However, no detailed mining plan has been produced to date. Some preliminary open pit drawings and calculations were prepared by Mountain Copper Co. in the early 1950's but no follow up detail is evident aside from the existing overburden removal above the Brick Flat ore body. A 1977 report by C. T. Hillman et al suggests either room and pillar or sublevel stoping as the mining method to be used but only only sketchy details are given. In the past, both room and pillar and sublevel stoping methods were used to remove the high grade copper-zinc zones within the massive sulfide bodies.

H. Milling Plans

Historically, various milling methods have been used on the Iron Mountain ores. These include crushing, roasting and pan amalgamation of the supergene silver ore; crushing concentration and primitave flotation of the copper; cyanidization of the gossans for gold and silver and roasting of the pyrite ore. More recently various standard flotation mill circuits have been proposed for treatment of the

TABLE III-F-2

CONTAINED METAL INVENTORY PREPARED BY IRON MOUNTAIN MINES

Tonnage, Production records and ownerships of Iron Mountain Mines. All figures in this tonnage and productions summary on the Iron Mountain ore deposits are based on past records reported in the State of California, Department of Natural Resources Bulletin 14; Geology and Base-Metal Deposits of West Shasta Copper-Zinc District, Shasta County, California, Geological Survey Professional Paper 285; and Mountain Copper Company files.

Major periods of mining activities and ownership were from 1879 to 1967 by Mountain Copper Company and 1967 to December 1976 by Stauffer Chemical Company. In 1976 Iron Mountain Mines, Inc. became the new owners of this property. The average tonnage, past production and ore grades (recovered values), and future production data are as follows:

TYPE OF ORE	Ore Mined (Tons)	Cu (lbs)	Zn (lbs)	Au (oz)	Ag (oz)	Fe (T)	S (T)
Massive Sulphide	1,690,000	(7.5%) 253,500,000	(2.5%) 84,500,000	(.04) 67,600	(1.0) 1,690,000	43%	47%
Massive Sulphide	3,860,000	(2.0%) 154,400,000	(3.5%) 270,200,000	-	-	43%	47%
Chalcopyrite	820,000	(3.5%) 57,400,000	(2.5%) 41,000,000	(.01) 8,200	(.04) 32,800	--	--
Gossan	2,683,000	-	-	(.073) 195,859	(8.3) 22,268,900	40%	0.2%
PAST PRODUCTION	9,108,000	465,300,000	395,900,000	271,659	23,991,700		

TYPE OF ORE	Not Mined or Processed (Tons)	Cu (lbs)	Zn (lbs)	Au (oz)	Ag (oz)	Fe (T)	S (T)
Massive Sulphide	14,233,000	(1.0%) 284,660,000	(2.0%) 569,320,000	(.02) 284,660	(1.6) 22,772,800	(43%) 6,120,190	(47%) 6,689,510
Gossan	6,845,000	-	-	(.05) 342,250	(1.5) 10,267,500	(40%) 2,738,000	0.2%
Gossan Mill Tailings	300,000	-	-	(.07) 21,000	(.3) 90,000	(40%) 120,000	0.2%
FUTURE PRODUCTION	21,378,000	284,660,000	569,320,000	647,910	33,130,300	8,978,190	6,689,510

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massive sulfide ores but no detailed analysis has been initiated. An example of a suggested mill and flotation circuit for 2500 tons of ore per day is shown in Figure II-H-1. A preliminary circuit has also been sketched out for the treatment of the present mine run-off water which contains appreciable amounts of copper and zinc in solution. This system would utilize ion exchange, solvent extraction and electrowinning or precipitation, to produce copper and zinc and possibly gold as a by-product.. A diagram of this ion exchange circuit is shown in Figure III-H-2 . Additionally, a 1500 ton per day hydrometallurgical plant for treatment of the remaining gossans has also been proposed. Historically the gossan ore was initially treated by cyanide leach methods which produced a large mass of tails. These tails are known to contain gold and silver. At present a separate hydrometallurgical operation has been proposed to reprocess these gossan tails. In addition other state-of the-art processes are being examined.

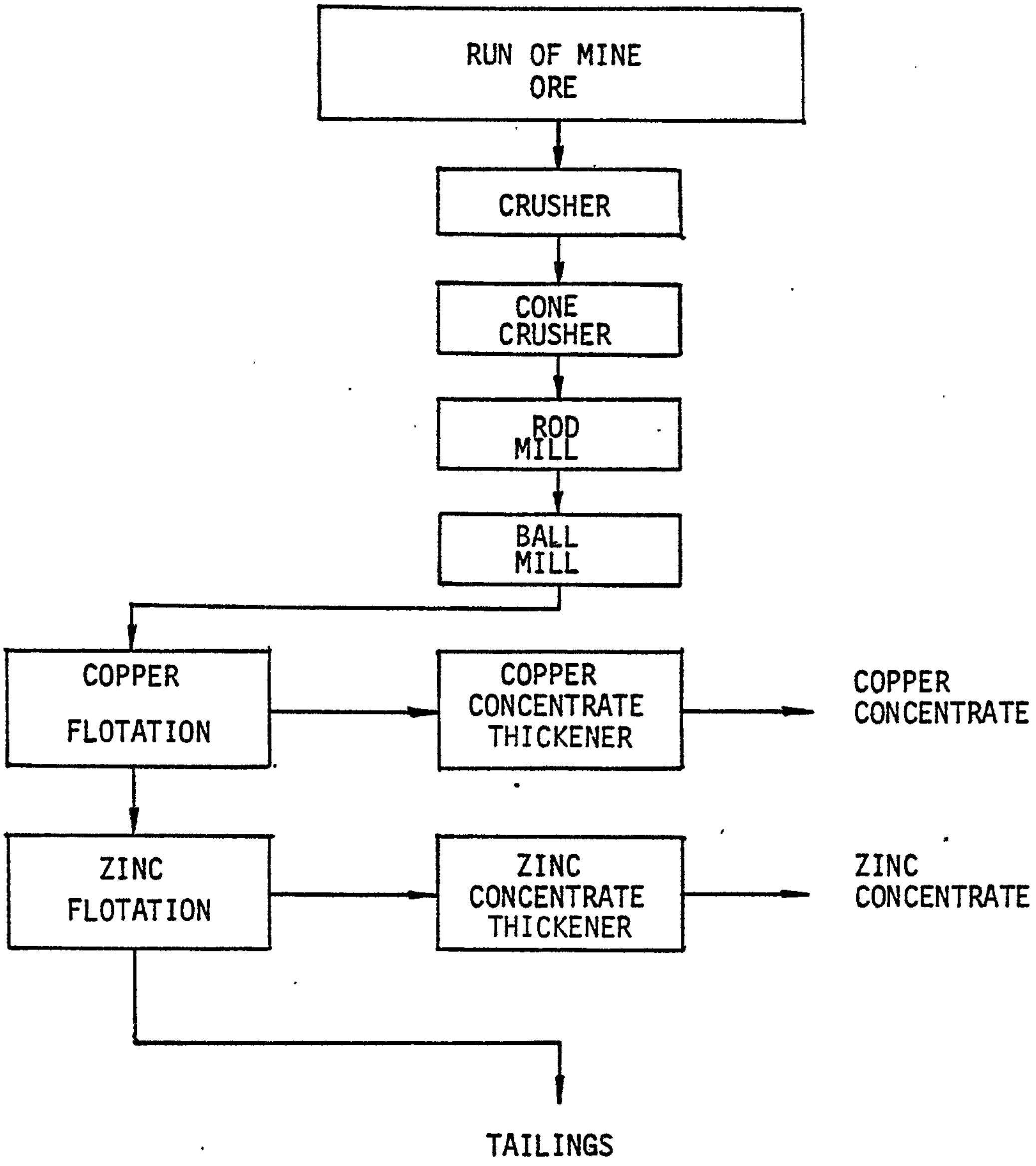
I. Power

At this time a 12 KVA line extends onto the property. This line is active and available for any future operations. In addition to the existing basic electrical service a proposal for a hydroelectric project on the property has been developed by Iron Mountain Mines in cooperation with the Federal Energy Regulatory Commission (FERC), various State of California entities, and Pacific Gas and Electric Company (PG&E).

The following permits, licenses, approvals and contracts have either been received or applied for:

FIGURE III-H-1

CONVENTIONAL FLOWSHEET FOR MASSIVE SULFIDE MILLING CIRCUIT



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FLOW DIAGRAM FOR HYPOTHETICAL MINE WATER TREATMENT PLANT

PRODUCED BY IRON MOUNTAIN MINES

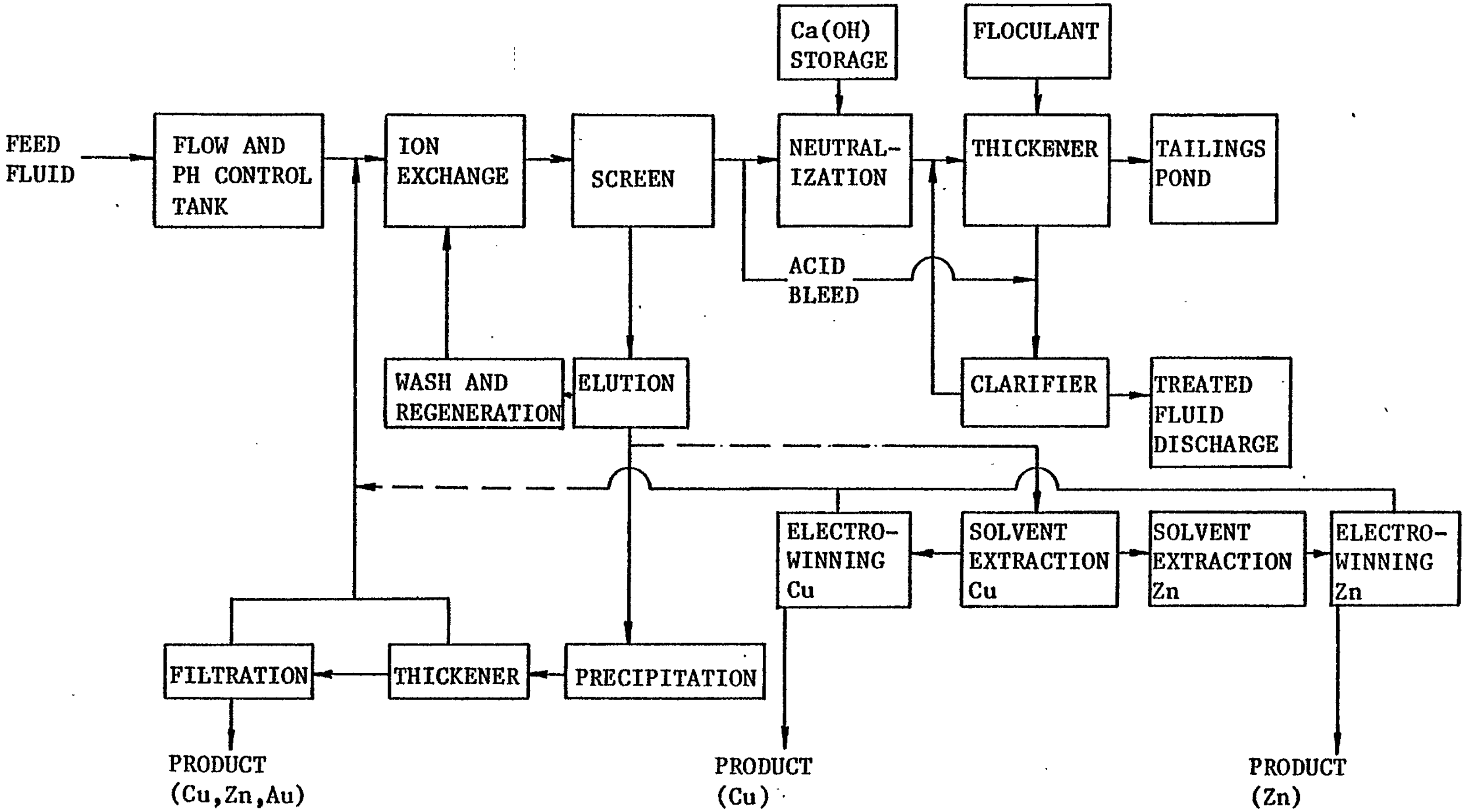

FIGURE III-H-2

- A preliminary Federal power project permit, (Federal Power Project (FPP) No. 4311-000) was issued in September 1981. Additionally, an application for licenses variance has been applied for based on the less than 5 MW power project exemption clause in the Federal requirements for a formal environmental impact report (EIR).

- Various State of California agencies have been contacted in pursuit of permits and approvals. These include the State Water Control Board (application July of 1981), California Department of Fish and Game and the Water Quality Control Board.

- A power purchase contract was signed with PG&E in July of 1981.

The proposed hydroelectric project consists of a small diversion dam on the Spring Creek drainage at elevation 1800 feet, two power generation houses one below the other and all interconnecting ancillary facilities. All construction permits will be applied for in Shasta County, California. A power generating capability of 15 to 20 million kwh is anticipated.

J. Haulage

Two different systems are available on the property to facilitate ore haulage. These is an existing system of mostly gravel and some black topped roads and an 18,000 foot aerial tramway. The road system on the property consists of roughly 2 miles of black topped road and approximately 8 to 10 miles of gravel and dirt roads. The tramway is capable of transporting 1000 tons per hour.

K. Cost Estimates

Basic cost estimates for both capital costs and operating costs have been developed by Iron Mountain Mines. These estimates include costs for development, mining, milling and the various support entities. These estimates are shown in Tables III-K-1 and III-K-2.

TABLE III-K-1

MASSIVE SULFIDE/GOSSAN ORE RESERVES

CAPITAL COST ESTIMATE (1981 DOLLARS)

PREPARED BY IRON MOUNTAIN MINES

Pre Production Mine Costs	Massive Sulfide	Gossan	Combined Total
Heavy Equipment (1)	$ 4,000,000	$ -	$ 4,000,000
Exploration Development (1)	500,000	-	500,000
Environmental	250,000	25,000	275,000
Contingencies	400,000	75,000	475,000
TOTAL COSTS	$ 5,150,000	$ 100,000	$ 5,250,000
Processing (Mill) Equipment (1)			
Crushing	$ 1,000,000	$ -	$ 1,000,000
Grinding	2,750,000	150,000	2,900,000
Flotation	2,200,000	-	2,000,000
Leaching	-	300,000	300,000
Electrolytic	-	550,000	550,000
Filtering	250,000	-	250,000
Chemical & Reagents	500,000	225,000	725,000
Tailings Disposal & Neutralization	2,000,000	750,000	2,750,000
Buildings	750,000	150,000	900,000
Contingency	1,250,000	300,000	1,550,000
TOTAL COSTS	$10,500,000	$2,425,000	$12,925,000
Supporting Facilities Roads, Drainage, Reclamation, etc.	250,000	250,000	500,000
Total Capital Investment	$15,900,000	$2,775,000	$18,675,000
Working Capital (2)	2,750,000	1,650,000	4,400,000
TOTAL CASH REQUIREMENTS	$18,650,000	$4,425,000	$23,075,000

(1) Gossan ore is part of the overburden so the bulk of the minimized processing equipment is charged against the massive sulfide operation.

(2) First six months working capital before sales of concentrates or by product credit.

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FIGURE III-K-2

COMBINED MASSIVE SULFIDE/GOSSAN ORE RESERVES

OPERATING COST ESTIMATE (1981 DOLLARS)

PRODUCED BY IRON MOUNTAIN MINES

	Year 1 thru 5	Year 6 thru 10	Year 11 thru 15	Combined Total Cost 15 Years
OPERATING COSTS				
Overburden Removal (Sulfide) (1)	$ 32,500,000	$ 32,500,000		$ 65,000,000
Overburden Removal (Gossan) (1)	50,000	50,000		100,000
Mining Costs (Sulfide) (1)	4,000,000	4,000,000	4,000,000	12,000,000
Mining Costs (Gossan) (1)	762,500	762,500		1,525,000
Recovery & Concentrating (2)	11,263,500	11,263,500	8,000,000	30,527,000
Smelting & Refining (3)	33,070,000	33,070,000	33,070,000	99,210,000
Environmental	500,000	500,000	375,000	1,375,000
Supervisory & Maintenance	2,000,000	2,000,000	1,625,000	5,625,000
Administration Overhead (4)	1,500,000	1,500,000	1,250,000	4,250,000
Contingency	3,000,000	3,000,000	2,500,000	8,500,000
Total Operating Costs	$ 88,646,000	$ 88,646,000	$ 50,820,000	$ 228,112,000
NON OPERATING COSTS (5)				
Dept., Sales, Admn., etc.	6,025,000	6,025,000	4,500,000	16,550,000
Royalties	3,000,000			3,000,000
Total Non-Operating Costs	9,025,000	6,025,000	4,500,000	19,550,000
TOTAL OPERATING & NON-OPERATING COSTS	$ 97,671,000	$ 94,671,000	$ 55,320,000	$ 247,662,000
By Product Credit				
Massive Sulfide (6)	180,000,000	180,000,000	180,000,000	540,000,000
Gossan in Overburden (7)	144,112,000	144,112,000		288,224,000
Total By Product Credit	$324,112,000	$324,112,000	$180,000,000	$ 828,224,000
NET OPERATING COST OR PROFIT (8)	$226,441,000	$229,441,000	$124,680,000	$ 580,562,000

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IV. REVIEW OF THE PROJECT

The review of both the data and calculations of Mountain Copper Co,, Stauffer Chemical Co., Iron Mountain Mines and others was conducted in Kaiser Engineers Oakland offices using material gathered at the Iron Mountain Mines offices in Sacramento, California.

A. Methodology

The purpose of this review is to examine the reliability of both data and calculations provided by Iron Mountain Mines and also to evaluate the feasibility of mining the remaining Iron Mountain ore. The procedure for review and evaluation has been to first develop an overall familiarity with the project by general inspection, followed by detailed analysis of selected elements within the project, and finally an overall critique of the project as a whole.

The methods used for reviewing the data, calculations and feasibility are those generally accepted by professional geological and professional mining engineers and the mining industry at large.

B. Observations

The following individual sections are detailed observations concerning various aspects of the Iron Mountain Mine. These points and comments are arranged with regard to their occurrence in the overall project description, Section III.

1. Exploration Methods

The known massive sulfide bodies, the disseminated ore zones and the gossan ore bodies have all received rather intense scrutiny by means of drilling, drifting or various exploration techniques.

Additionally, both surface and subsurface geology of the overall mine area along with a locally detailed thin section study of the Hornet body have been undertaken. These various projects have served to produce a great deal of data for the area immediately around the Iron Mountain Mine Ore body.

With the exception of the USGS exploratory diamond drill hole, completed in 1951, no other apparently at-depth, detailed information has been developed on the property. In this hole a number of disseminated sulfide zones with copper grade greater than 1 percent are present. Considering that these zones exist in an area of known strata bound massive sulfide deposition (see Section B-2 below) this information should prompt considerable interest in the possible existence of massive sulfide bodies either at depth or at other favorable near surface sites on the property. Figure B-1-1. is a generalized log of that hole with assay data included.

During 1951 and 1952 geophysical investigations were conducted over the Iron Mountain mine area. Three methods of detection were tested: electrical resistivity, natrual potential and magnetometer. None proved very successful. Resistivity results were of doubtful value; natural potential failed to provide more than a possible prospecting guide and magnetic readings became erratic over shallow bodies. The same may not be true for magnetic surveys over more deeply buried ore bodies. Perhaps a gravity survey would prove useful, but again, depth of the ore body might be a limiting factor. Seismic response of the massive sulfide bodies should also be tested as a possible tool for detection of additional ore.

Mercury detection surveys have proven successful in various areas of Canada and should be equally suited to the detection of ore in the West Shasta District. In the immediate Iron Mountain mine area detection of additional ore bodies may be masked by the existence of possible known ore body mercury halos. However, this problem should diminish with distance from the known occurrences of ore.

2. Geology

Through the years a misconception concerning the proposed emplacement of the ore appears to have been perpetuated. The idea that the massive sulfides replaced the rhyolite is not compatable with the fact the West Shasta mining district is an island-arc depositional province. In such an environment, the strata bound massive sulfides are emplaced contemporaneously with the host rock in a submarine environment. They are formed from hydrothermal brines and gases discharged from shallow intrusive sources. The very composition of the Iron Mountain Mine massive sulfide ore bodies, their sharp contacts, the Balaklala rhyolite, the zoning of the copper zinc values, the presence of peripheral disseminated pyrite and the general overall setting of the Balaklala within a seafloor-volcanics complex (greenstone) are all prima facie evidence of the true nature of the ore deposit and its method of emplacement. These types of deposits are commonly formed during a repetitive cycle of activity with sulfide bodies present at various depths in the produced volcanic pile. Often the volcanic feeder vent is obscure because of the nature of material deposition and the environmental in which it is deposited.

The assumption that both folding and fault structures have contributed to the emplacement control of the ore bodies has proved to be of limited success in the location of new ore bodies. With the exception of the disseminated ore bodies it appears just as likely that the massive sulfide ore bodies could have exercised limited primary control over the local folding and faulting patterns in the Iron Mountain Mine area. In particular, a definite arcuate fault trace pattern involving the Camden and Scott faults is evident over the main ore segments of Hornet, Richmond and Brick Flat. Also the fact that most evidence of fault movement is post-ore adds to the evidence os some possible ore control over structure. With regard to folding, a rigid massive sulfide body tend to align along the long axis of a fold, a probable path of least resistance for a forming fold pattern. Of course, as these structural features become more active they would tend to over-ride the effects of an implace massive sulfide body and eventual ore deformation would occur. In any case, the results of using anomalous or favorable fault and fold patterns as a guide to ore, no matter whether pre or post mineral, would hopefull be the discovery of ore.

3. Method of Ore Estimation

The ore body volumes were developed using what was called the Prismoidal formula. In fact, the formula used was simpsons Rule for Irregular Areas after conversion for use as a volume formula. The Simpson Rule is the proper choice as the Prismoidal formula is for use on single prismoids only and its application in this case would reduce the calculated volume by roughly one-half.

The specific gravity constants of 11 cubic feet per ton for overburden and 7 cubic feet per ton for ore, are stated during the course of the reserve calculations with no apparent backup available. It is assumed that these numbers were developed by Mountain Copper Company. Calculation of the specific gravity of hypothetical sulfide ore containing 90% pyrite, 4% quartz, 3% chalcopyrite and 3% sphalerite gives a specific gravity of 6.6 cubic feet per ton which tends to confirm the specific gravity figure used in the reserve calculations. The figures of 165 pounds per cubic foot for gossan and 275 pounds for sulfide ore mentioned in both the U.S.G.S. Professional Paper 285 and the California Division of Mines special Report 14 also add support to the specific gravity figures used.

Random checks of the cross section areas used in the reserve calculations are in reasonable agreement with original area values used. The check values are always slightly higher than the original square footages used for the actual volume calculations.

Separate tonnage calculations should have been developed for each of the sulfide bodies. This was not done in the case of either the Brick Flat and Richmond ore bodies or the Hornet and Matties bodies. However, the overall reserves should not be greatly effected by the difference between calculating a tonnage for each ore body and calculating the combined tonnage of adjacent ore bodies.

The grade distribution within the ore appears to have been made on a simple overall weighted average basis. Ideally, a grade distribution based on physical position of the samples within the ore body would have been a better method.

The reserve figures as developed are dry short tons of proven geological ore and further refinement will be necessary to determine the actual mineable reserves which depend upon the mining method utilized. Basically the method of sulfide ore reserve calculation is sound and the mathematics used is accurate. The only point of contention arises with concern over the manner of grade distribution in the individual sulfide ore bodies.

The gossan geological ore reserve as developed by mining engineers of both Mountain Copper Company and Stauffer Chemical Company appear accurate and well developed with regard to calculation of volumes, determination of ore grades and distribution of those grades in individual gossan ore bodies. In the Boulder and Slick Rock drainages the existence of a total of 3.8 million tons of gossan ore has been estimated. However, the lack of sufficient supportive data necessitates the relegation of these reserves to the category of possible geological reserves.

In various reports the presence of platinum has been noted; particularly in the gossans. Since information concerning the presence of platinum is sketchy and detection of platinum is difficult and often questionable or suspect it is best that the presence of this precious metal remain a footnote.

Mineable in-place geological ore reserves tonnages for the remaining unmined ore bodies (Old Mine, Number 8 and Confidence-Complex) at Iron Mountain are available but with no definite backup calculations. The backup of this tonnage and its subsequent shift to a proven geological status could substantially add to the overall reserves at Iron Mountain Mine and ultimately to the mineable reserves.

4. Mining Plan

To date only suggested mining plans have been presented for the Iron Mountain Mine ore remaining in place. These plans have involved simple descriptions and preliminary drawings but no detailed plan involving both engineering and economic evaulation is available. Because of the nearness of the sulfide bodies to the surface an open pit mining scheme will be the most likely method of ore extraction.

An exception to the open pit mining scheme may be the small ore pods such as the Busy Bee and Okosh which are far removed from the main ore area. These may be mined underground.

5. Milling Plan

Our observations concerning the metallurgical processing of the massive sulfide, gossan and gossan tailings material are as follows:

- Massive Sulfide

The most complete discussion of the metallurgical treatment of the ore from the massive sulfide deposit is presented in a report on the West Shasta District by Hillman, Schumacher, and Gosing (Sept. 1977). They recommend a typical milling process using a cone crusher, rod and ball mills, and flotation cells to recover the copper and zinc concentrates. In their discussion they project the following concentrates, grades and recoveries:

	Grade	Recovery
Copper	20%	85%
Gold	0.2 oz/ton	50%
Silver	9.9 oz/ton	50%

Zinc Concentrate

	Grade	Recovery
Zinc	48%	52%

Better identification of the method of occurrence of the gold and silver may allow for increased recoveries of those metals.

The general flowsheet recommended by Hillman could be adapted to the Iron Mountain ore and could realistically produce the copper and zinc concentrates.o

- Gossan Ore

It is proposed by Iron Mountain Mines to hydrometallurgically recover the gold and silver from the gossan ore. Gossan ores associated with massive sulfide deposits have been successfully heap leached to recover gold and silver. The heap leaching process is often used in small mining operations because it is an uncomplicated process and does not require a large capital-intensive plant.

The gossan ore would be placed in piles and leached with a calcium hydroxide-sodium cyanide solution. The gold and silver enriched leach solution would be collected from the piles and pumped to adsorption columns to remove the gold and silver. The adsorption columns would be periodically stripped, and the gold and silver would be recovered in a simple electrolytic cell. The precious metal cathode would be fluxed and melted in a small furnace to produce dore' bullion. The recovery for this process would be 60-65% of the gold and silver in the ore.

- Gossan Tailings

This material will be is the equivalent of a pre-sorted gossan ore and will be treated in exactly the same manner as the gossan ore.

Table IV-B-5.1. shows the expected head grades, recoveries, and concentrate production that could be expected if a 2250 ton/d concentrator were erected at Iron Mountain.

6. Capital Cost Estimate

An examination of the capital cost estimate prepared by Iron Mountain Mines was made. It is our opinion that the costs presented are generally lower than are to be expected. Ten individual capital cost categories were examined as follows:

- Access - cost of additional roads.
- Exploration - deposit investigation
- Preproduction - exposure of ore prior to mining.
- Mine Plant - mine facilities to include water supply, drainage, communications, fueling, electrical, shops, laboratory, offices and other general construction.
- Mine Equipment - heavy mobile equipment and ancillary requirements
- Mill Facilities - facilities for ore crushing and processing to produce concentrates
- Environmental - mitigation of the project's initial environmental impact.
- Engineering and Construction Management - contract and engineering fees.
- Working Capital - cash on hand
- Contingency - miscellaneous cost items and unforseen expenses not covered in the above categories.

TABLE IV-B. 5. 1.

ESTIMATED RECOVERIES

HYPOTHETICAL 2250 ton/day MILL AT IRON MOUNTAIN

Product	Tons Ore per Day Processed	Average Grade in Ore	Estimated Recovery(1)	Contained Metal, Yearly	Concentrate Produced, Yearly
Cu	2250	2%	85%	13,579 t/yr	
Au		0.04 oz/t	50%	15,975 oz/yr	
Ag		1.6 oz/t	50%	639,000 oz/yr	
Copper Concentrate					67,895 t/yr
Grade of Concentrate:			20% Cu, 0.23 oz/ Au, 9.4 oz/t Ag.		
Zn	2250	3%	52%		
Zinc Concentrate					25,985 t/yr
Grade of Concentrate:			48%		

1. Per Hillman, Schumacher, Gosing (1977). See Section IV-5.

The following comments are a result of the examination of the individual cost categories as related to the Iron Mountain Mines estimate. The Iron Mountain Mines estimate was escalated to January 1981.

- Some of the individual cost categories in the Iron Mountain Mines estimate are not strictly equivalent to the comparison categories but are rather combinations and have been treated accordingly.

- The Iron Mountain Mines categories for heavy equipment and support facilities are moderately underestimated.

- Certain waste removal has taken place over the Brick Flat ore body in preparation for mining but additional preproduction stripping must be assumed which will necessarily increase costs.

- Even with the presently available data from past mine operations a limited amount of exploration will be required for confirmation and will add to costs.

- It is uncertain whether or not spares and supplies have been included in the heavy equipment category. If these are absent, costs need to increased.

- The support facility estimate could be considered reasonable if applied only to roads, minor structures and drainage but the addition of reclamation requires a greater cost than is applied. Additionally, reclamation is more properly a part of the environmental costs.

- The environmental cost presented appears reasonable.
- No cost is apparently estimated for the mine plant although a portion of this cost may exist under the support facilities section of the Iron Mountain Mine estimate. This cost needs to be added.
- No cost is apparently estimated for engineering and construction management. This cost needs to be added.
- The estimate for the concentrator was low compared with our experience with two recent copper concentrator capital cost estimates.
- The estimated working capital appears more than adequate to cover 30 days of general operating and administrative costs for both the mine and mill.
- The contingency figures are strictly percentages of the other estimated values and as such would adjust upward with escalation of the specific capital cost categories.
- A geological reserve tonnage is the basis for these capital costs and as such need adjustment to reflect mineable reserves.
- Backup for the capital costs is limited.

- The overburden waste removal costs are substantially over-estimated.
- The ore mining costs are substantially under-estimated.
- The estimated milling costs are definitely low when compared with similar milling operations of equivalent size and type.
- Environmental costs as estimated are reasonable.
- Supervisory and maintenance costs, which are assumed to be the equivalent of general operating costs, are moderately underestimated.
- Administration overhead costs, which are apparently equivalent to the administrative cost category, are substantially under estimated.
- The contingency figure developed by Iron Mountain Mines is a percentage of the operating costs and as such it will change with any cost adjustments. The contingency used increases the operating cost to a more realistic figure.
- Backup for the estimated operating costs is limited.
- Smelting and refining costs should not be included as operating costs because these are better defined as penalties against the profits of the operating facility.
- All of these costs are calculated against a geological reserve tonnage which may or may not be the actual mineable tonnages.

8. Revenues

Although expected project revenues have been developed by Iron Mountain Mines, checking or review of these values by Kaiser Engineers is beyond the scope of this report.

9. Products

As a result of an active mining and milling program at the Iron Mountain Mine certain basic products will be produced for marketing. It is not the intention of Kaiser Engineers to produce an in-depth marketing analysis for each of these products but rather to provide a general list of potential saleable products. The following list of basic mine products are presented in order of general abundance.

- Iron Oxides - The gossans represent a large source of iorn oxides mixed with silica.
- Pyrite - The massive sulfide bodies are essentially large pyrite bodies with associated metals. This pyrite could be sold for reduction to sulfuric acid or iron and sulfur with the residues returned for their gold and silver content.
- Copper Concentrate - Copper concentrates would come from the milling of the sulfide ore.

- Copper Precipitates - Precipitation of cement copper would come from the metallurgical processing of the mine waters.
- Zinc Concentrates - Zinc concentrates would be produced from the sulfides.
- Gold - Silver Dore' - In addition to its other value the gossan also represents a source of gold and silver.
- Magnetite - Discrete bodies of magnetite exist adjacent to the sulfides and may be mineable.
- Crushed Rock - A large volume of crushed rock of varying size fractions will be available from both the mill and the mine. This material will range in size from very coarse to sand particles.

V APPENDIX

A. Selected available Iron Mountain Mine drill hole data.

B. Bibliography

  1. List of data available at Iron Mountain Mines office in Sacramento.
  2. Other publications and articles pertaining to Iron Mountain Mines and the West Shasta Mining District.

C. Detailed geological map of the immediate Iron Mountain Mine surface area.

A.

Selected Available Iron Mountain Mines Drill Hole Data

APPENDIX A

WEIGHTED AVERAGE OF ENTIRE UPPER RICHMOND OREBODY

D.D.Hole	Thickness of ore (Feet)	% Cu	Product	% Zn	Product
R.E.124-S	49	2.01	98.49	2.39	117.11
R.E.135-S	46	1.85	85.10	2.99	137.54
R.E.144-S	16	1.21	19.36	0.80	12.80
R.E.145-S	29	1.57	45.53	1.11	32.19
R.E.209-S	3	0.65	1.95	0.62	1.86
R.E.210-S	140	0.40	56.00	0.85	119.00
R.E.211-S	40½	2.03	82.22	1.88	76.14
R.E.213-S	70	0.89	62.30	0.96	67.20
R.E.214-S	46	2.17	99.82	1.38	63.48
R.E.215-S	41	0.67	27.47	0.42	17.22
R.E.216-S	20	1.76	35.20	2.37	47.40
R.E.217-S	44½	0.38	16.91	1.46	64.97
R.E.219-S	62	0.58	35.96	0.82	50.84
R.E.220-S	29	1.21	35.09	0.65	18.85
	636		701.40		826.60

Weighted Average 1.10% Cu 1.30% Zn

APPENDIX B

ASSAYS OF DIAMOND DRILL HOLES E-6 AND E-7

D.D.Hole	Distance (Feet)	% Cu	Product	% Zn	Product
E-6	0-10*	0.10	--	0.35	--
	10-19*	0.08	--	0.17	--
	177-180	0.10	.30	0.25	0.75
	180-185	0.20	1.00	0.10	.50
	185-190	0.20	1.00	0.27	1.35
	190-195	0.25	1.25	3.76	18.80
	195-200	0.45	2.25	4.19	20.95
	200-205	0.32	1.60	6.35	31.75
	205-210	0.40	2.00	2.86	14.30
	210-215	0.52	2.60	1.45	7.25
	215-220	0.45	2.25	2.45	12.25
	220-225	0.45	2.25	3.06	15.30
	225-230	0.27	1.35	0.93	4.65
	230-235	0.35	1.75	0.70	3.50
	58		19.60		131.35
	Average:	0.34% Cu	2.26% Zn		
E-7	0-10	0	--	0.13	--
	10-20	0.10	--	0.13	--
	20-28*	0.25	--	0.13	--
	190-200	0.35	3.50	0.81	8.1
	200-210	0.45	4.50	1.02	10.2
	20		8.00		18.3
	Average:	0.40% Cu	0.91% Zn		

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* Hole E-6 was in Richmond orebody for 19 feet before passing into the Scott fault; hole E-7 for 28 feet.

APPENDIX A

Diamond Drill Logs and Assays

		% Rec.	S	Cu.	Zn.
Mt. Doe 52	Elevation Collar 3345 Elevation Bottom 2844				
3083-3035	Heavy sulfide		48.0*	.30*	.50*
✓ Mt. Doe 54	Elevation Collar 3339 Elevation Bottom 2975				
3109-3003	Massive sulfide, no Cu. minerals visible, ore like Hornet.		48.0*	.30*	.50*
✓ RE 5	Elevation Collar 3345 Elevation Bottom 2952				
3134-3129	Sulfide		46.0*	.70*	.50*
✓ RE 6	Elevation Collar 3346 Elevation Bottom 3004				
3031-3004	Sulfide, hole abandoned in sulfur		48.0*	.30*	.50*
RE 120	Elevation Collar 3385 Elevation Bottom 2759				
2935-2878	Sulfide - Richmond Extension		28.9	.80	1.20
✓ RE 124	Elevation Collar 3348 Elevation Bottom 2814				
3141-3136	Sulfide not logged		31.8	.55	1.04
3136-3131			38.7	2.08	.80
3131-3126			39.5	3.27	2.36
3126-3121			44.7	3.69	3.22
3121-3116			45.4	2.88	3.22
3116-3111			45.3	2.83	3.50
3111-3106			46.2	.55	1.48
3106-3101			46.5	.64	1.66
3101-3096			45.6	.74	1.62
3096-3091			45.8	.89	1.76
✓ RE 135	Elevation Collar 3353 Elevation Bottom 3112				
3169-3149	Sulfiderich in Cu.	20	47.10	4.14	3.24
3149-3143	Sulfide, granular, less Cu.	10	47.25	.81	2.45
3143-3130	Sulfide, granular	20	44.75	.30	2.79
3130-3122	Sulfide, granular, with quartz	50	40.97	.20	2.22
3122-3112	Contact mass. Quartz rich in pyrite	60	26.96	.25	1.80
✓ RE 144	Elevation Collar 3346 Elevation Bottom 3115				
3226-3223	Sulfide, granular, some quartz	30	N.A.	.35	.16
3223-3221	Alaskite	100	N.A.	.05	B
3221-3216	Sulfide, fine grained, some quartz	80	N.A.	1.31	.97
3216-3205	Sulfide, fine grained to 3210, quartz, granular to 3205	80	N.A.	.61	.50
✓ RE 145	Elevation Collar 3341 Elevation Bottom 3110				
3193-3191	Sulfide, quartz bands	100	44.0*	.61	.13
3191-3186	Sulfide, quartz bands	90	44.0*	1.62	.38
3186-3174	Sulfide, quartz, irridescent luster on cleavages	90	44.0*	3.23	1.04
3174-3164	Sulfide, quartz	100	44.0*	.51	2.08
✓ RE 146	Elevation Collar 3364 Elevation Bottom 2954				
3238-3230	Sulfide, some quartz	80	20.3*	.15	1.65
✓ RE 205	Elevation Collar 3371 Elevation Bottom 3122				
3218-3214	Nearly mass sulfide, repl. quartz porphyry		Not Assayed		
3214-3208	Pyritic quartz porphyry with 25-75% pyrite	50	"	"	

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*Indicates estimated assay

		% Rec.	S	Cu.	Zn.
✓ RE 209	Elevation Collar 3333 Elevation Bottom 3103				
3189-3186	Sulfide, granular	100	40.0*	.64	.62
3164-3163	Sulfide, repl. quartz porphyry	100	N.A.	3.64	B
✓ RE 210	Elevation Collar 3333 Elevation Bottom 3015				
3200-3127	Mined Out				
3127-3122	Sulfide, granular	100	48.0*	.11	.05
3122-3117	Sulfide, granular	100	48.0*	.11	.02
3117-3112	Sulfide, very granular	100	48.0*	.11	.46
3112-3108	Sulfide, fine grained	100	48.0*	.16	.74
3108-3100	Sulfide, granular	45	48.0*	.11	1.15
3100-3095	Sulfide, granular	90	48.0*	.42	.90
3095-3091	Sulfide, granular	100	48.0*	.11	.51
3091-3085	Sulfide, granular	100	48.0*	.16	.16
3085-3078	Sulfide, granular, repl. quartz porphyry, quartz pheno.	100	48.0*	.11	B
3078-3073	Sulfide, fine grained	100	48.0*	.11	.44
3073-3070	Sulfide, fine grained	100	48.0*	.16	.51
3070-3065	Sulfide, granular	100	48.0*	Tr.	.15
3065-3061	Sulfide, partial repl. qtz. porphyry, contact	100	N.A.	Tr.	.31
✓ RE 211	Elevation Collar 3353 Elevation Bottom 3113				
3168-3149	Mined Out				
3149-3140.5	Sulfide repl. qtz. porphyry, fine grained, cu.	28	45.0*	4.20	.87
3140.5-3137.5	No core	-0-	45.0*	N.A.	N.A.
3137.5-3132	Sulfide, coarse grained	45	45.0*	.11	.62
3132-3127.5	Sulfide, coarse grained, incompl. repl. 3130-3127.5	45	45.0*	.47	2.13
✓ RE 213	Elevation Collar 3332 Elevation Bottom 3132				
3222-3152	Mined Out				
✓ RE 214	Elevation Collar 3333 Elevation Bottom 3154				
3233-3227	Sulfide, granular, qtz. seams, little visible cu.	75	45.0*	.70*	1.50*
3227-3219	Sulfide, granular, quartz, zinc	40	45.0*	.70*	1.50*
3219-3213	Sulfide, fine grained, chalcocite & chalcopyr in seams	90	45.0*	.70*	1.50*
3213-3212	No core - sulfide		45.0*	.70*	1.50*
3212-3208	Sulfide, fine grained, cu., zn., qtz pheno. @ 3209.5	75	45.0*	.70*	1.50*
3208-3203	Sulfide, fine grained	30	45.0*	.70*	1.50*
3203-3196	Sulfide, granular, quartz, copper	100	45.0*	.70*	1.50*
3196-3195	Waste stringer, some dissem. pyrite	100	Not Assayed		
3195-3187	Sulfide, granular, mostly pyr. in siliceous matrix	90	Not Assayed		
✓ RE 215	Elevation Collar 3335 Elevation Bottom 3134				
3201-3145	Mined Out				
✓ RE 216	Elevation Collar 3335 Elevation Bottom 3136				
3165-3145	Mined Out				
✓ RE 217	Elevation Collar 3329 Elevation Bottom 3168				
3224-3191	Mined Out				
3191-3184	Sulfide, fine grained, compact	20	45.0*	1.00	.44
3184-3180	Sulfide, fine grained, compact	80	45.0*	.58	2.51
✓ RE 219	Elevation Collar 3340 Elevation Bttom 3069				
3149-3138	Mined Out				
3138-3129	Sulfide, fine grained, copper, zinc	55	48.0*	.50	2.08
3129-3125	Sulfide, fine grained, copper, zinc	60	48.0*	.35	.67
3125-3119	Sulfide, fine grained, copper, zinc	85	48.0*	.20	1.23

*Indicates estimated assay

		% Rec.	S	Cu.	Zn.
RE 219 Contd.					
3119-3114	Sulfide, fine grained, copper, zinc	100	48.0*	.20	1.08
3114-3106	Sulfide, fine grained, copper, zinc	90	48.0*	.10	1.13
3106-3198	Sulfide, granular	90	48.0*	.10	.21
3198-3089	Sulfide, granular	60	48.0*	.10	.31
3089-3087	Sulfide, granular	50	48.0*	.30	.28
RE 220	Elevation Collar 3339 Elevation Bottom 3162				
3201-3124	Mined Out				
3124-3035	Sulfide assumed - Bottomed in ore		48.0*	.30*	.50*
BF 1	Elevation Collar 3212 Elevation Btoom 3176				
3211-3179	Mined Out				
BF 1A	Elevation Collar 3212 Elevation Bottom 3175				
3212-3199	Mined Out				
BF 2	Elevation Collar 3214 Elevation Bottom 3094				
3200-3135	Mined Out				
3135-3124	Sulfide	50	48.5	.21	.50*
3124-3114	Sulfide	50	50.1	.22	.50*
3114-3112	Sulfide	75	43.4	.10	.50*
BF 3	Elevation Collar 3114 Elevation Bottom 3071				
3194-3130	Mined Out				
3130-3129	Sulfide	80	49.4	.22	.50*
3129-3119	Sulfide	40	50.3	.20	.50*
3119-3109	Sulfide	40	49.9	.33	.50*
3109-3099	Sulfide	40	50.5	.26	.50*
3099-3091	Sulfide	90	49.5	.12	.50*
3091-3082	Sulfide	90	48.9	.22	.50*
3082-3075	Sulfide	50	43.6	.11	.50*
BF 4	Elevation Collar 3216 Elevation Bottom 3091				
3194-3131	Mined Out				
3131-3127	Sulfide	95	47.2	.25	.50*
BF 5	Elevation Collar 3219 Elevation Bottom 3159				
3219-3166	Mined Out				
BF 5A	Elevation Collar 3221 Elevation Bottom 3192				
3219-3196	Mined Out				
BF 6	Elevation Collar 3220 Elevation Bottom 3124				
3217-3164	Mined Out				
3165-3164	Sulfide		48.6	.83	1.50*
3164-3154	Sulfide, granular, some quartz	80	41.4	.24	1.50*
3154-3151	Quartz with dissem. pyrite	5	Not Assayed		1.50*
3151-3141	Sulfide, sugary, more quartz		38.5	.16	1.50*
BF 6A	Elevation Collar 3222 Elevation Bottom 3178				
3220-3201	Mined Out				
BF 10	Elevation Collar 3227 Elevation Bottom 3132 Waste Hole				
BF 11	Elevation Collar 3227 Elevation Bottom 3202	--			
3227-3211	Mined Out				

*Indicates estimated assay

		% Rec.	S	Cu.	Zn.
✓ BF 12	Elevation Collar 3230 Elevation Bottom 3155				
3209-3180	Mined Out				
3180-3175	Sulfide, some quartz	87	39.7	.19	1.9
3175-3170	Sulfide, some quartz	87	39.4	.39	1.8
3170-3167	Sulfide, some quartz	20	44.1	.34	1.6
✓ BF 13	Elevation Collar 3229 Elevation Bottom 3139				
3196-3159	Mined Out				
3159-3154	Sulfide, sugary	70	49.1	.45	1.7
3154-3152	Sulfide, sugary	100	48.2	.24	1.7
3152-3151	Sulfide, grades to 50% quartz	100	25.4	.78	2.6
✓ BF 14	Elevation Collar 3229 Elevation Bottom 3139				
3171-3153	Mined Out				
✓ BF 15	Elevation Collar 3229 Elevation Bottom 3163				
3186-3173	Mined Out				
✓ BF 16	Elevation Collar 3233 Elevation Bottom 3184				
3221-3193	Mined Out				
✓ BF 17	Elevation Collar 3264 Elevation Bottom 3176				
	Waste Hole				
✓ BF 18	Elevation Collar 3264 Elevation Bottom 3249				
3264-3262	Sulfide - some sulfide mined before hole drilled				
✓ BF 19	Elevation Collar 3264 Elevation Bottom 3214				
3261-3237	Mined Out				
✓ BF 20	Elevation Collar 3264 Elevation Bottom 3174				
3191-3186	Sulfide		45.6	1.59	3.2
✓ BF 21	Elevation Collar 3331 Elevation Bottom 3171				
3198-3192	Sulfide, 50% quartz	85	23.1	.34	.5
3192-3187	Sulfide, 40% quartz	68	36.4	.20	.9
3187-3184	Sulfide, 40% quartz	68	39.5	.21	1.0
✓ BF 22	Elevation Collar 3337 Elevation Bottom 3136				
3209-3184	Mined Out				
3184-3181	Sulfide, fine grained	80	46.2	1.63	3.0
3181-3177	Sulfide, fine grained	80	44.3	1.09	4.8
3177-3174	Sulfide, much quartz	70	24.0	.48	.3
3174-3172	Sulfide, much quartz	70	37.1	.37	.3
3172-3165	Sulfide much quartz, sugary	70	41.6	.14	1.6
3165-3162	Sulfide, fine grained	70	43.6	.67	5.25
3162-3157	Sulfide, much quartz	95	37.1	.10	1.93
3157-3152	Sulfide, much quartz	95	37.4	.19	1.15
✓ BF 23	Elevation Collar 3364 Elevation Bottom 3074				
	Waste Hole				
✓ BF 24	Elevation Collar 3362 Elevation Bottom 3191				
	Waste Hole				
✓ BF 25	Elevation Collar 3375 Elevation Bottom 3228				
	Waste Hole				

*Indicates estimated assay

			% Rec.	S	Cu.	Zn.
BF 26	Elevation Collar 3375 Elevation Bottom 3203					
	Waste Hole					
BF 27	Elevation Collar 3203 Elevation Bottom 3163					
3184-3176	Mined Out					
BF 28	Elevation Collar 3202 Elevation Bottom 3117					
3152-3148	Sulfide		15	48.7	2.23	1.2
3148-3140	Sulfide		85	49.1	1.80	.7
3140-3132	Sulfide		50	49.6	.32	.7
3132-3128	Sulfide		90	45.6	.03	1.0
BF 29	Elevation Collar 3304 Elevation Bottom 3165					
3212-3204	Sulfide		20	37.3	.54	1.3
3204-3199	Sulfide		40	21.4	.03	2.2
3199-3194	Sulfide		40	30.0	.17	3.6
3194-3191	Sulfide		75	40.7	.27	1.5
3191-3187	Sulfide		80	37.5	3.09	2.1
BF 30	Elevation Collar 3305 Elevation Bottom 3147					
3223-3221	Sulfide		75	40.8	3.06	1.3
3221-3219	Broken rhyolite, shows faulting - not sampled		80			
3219-3214	Sulfide, copper, zinc		95	44.3	1.00	1.3
3214-3209	Sulfide, copper, zinc		95	44.6	1.12	1.7
3209-3203	Sulfide, copper, zinc		95	45.1	.30	2.0
3203-3197	Sulfide, copper, zinc		50	45.4	.40	1.3
3197-3189	Sulfide, copper, zinc		50	46.3	.28	4.3
3189-3180	Sulfide, copper, zinc		55	47.6	.40	5.8
3180-3172	Sulfide, copper, zinc, granular		60	39.8	2.15	2.1
3172-3167	Sulfide, copper, zinc, granular		85	41.1	2.58	4.3
3167-3162	Sulfide, copper, zinc, granular		85	26.5	2.06	3.4
3162-3158	Sulfide, copper, zinc, granular		95	31.2	3.44	3.4
BF 31	Elevation Collar 3210 Elevation Bottom 3145					
3176-3165	Mined Out					
3165-3160	Sulfide		20	48.1	2.90	2.8
3160-3153	Sulfide, granular from 3155-3153		20	44.0	1.07	2.4
BF 32	Elevation Collar 3210 Elevation Bottom 3144					
3179-3149	Mined Out					
3149-3144	Sulfide, badly broken, fault zone?	Sludge -	25	49.9	.80	2.2
BF 33	Elevation Collar 3208 Elevation Bottom 3293					
3145-3141	Sulfide		40	44.8	1.03	2.1
(3143-3138)	No core recovered 3141-3136	Sludge -		40.4	.37	4.6
3136-3128	Sulfide, granular, badly broken		40	44.6	1.10	6.5
3128-3122	Sulfide, granular, badly broken		40	45.0	1.60	6.0
3122-3117	Sulfide, granular, badly broken		40	49.5	2.02	1.6
3117-3112	Sulfide, granular, badly broken		25	47.4	.30	1.5
3113-3108	No core recovered 3112-3108	Sludge -		48.6	1.30	1.5
3108-3100	Sulfide, granular, badly broken		20	44.1	.40	5.1
BF 34	Elevation Collar 3232 Elevation Bottom 3146					
3206-3185	Mined					
3185-3182	Sulfide, copper, looks brecciated		96	44.6	2.2	.15
3182-3172	Sulfide, copper, fine grained to granular		17	48.4	3.10	2.4
3172-3164	Sulfide, more granular, more quartz		25	44.8	1.30	2.5
3164-3158	Sulfide, granular		20	47.4	1.00	2.6
3158-3156	Sulfide, low grade		40	32.8	.99	1.0

*Indicates estimated assav

		% Rec.	S	Cu.	Zn.
✓ BF 35	Elevation Collar 3232 Elevation Bottom 3184				
3186-3184	Mined Out- Hole abandoned in ore. Assume 40' ore remaining		46.0*	1.25*	1.50*
✓ BF 36	Elevation Collar 3232 Elevation Bottom 3128				
3160-3149	Sulfide, badly broken	18	46.5	.37	.7
3149-3139	Sulfide, badly broken	4	45.1	1.06	.8
3139-3138	Sulfide, badly broken	20	47.5	1.10	1.5
3138-3128	Sulfide, badly broken	2	47.4	3.10	1.1
	Hole abandoned in ore				
✓ BF 37	Elevation Collar 3304 Elevation Bottom 3164				
3232-3209	Sulfide, broken	20	46.7	1.4	3.3
3209-3201	Sulfide, broken	6	48.7	1.9	1.3
3201-3194	Sulfide, broken, quartz	70	42.1	1.8	3.6
3194-3190	Sulfide, broken, 40% quartz	30	30.4	1.4	1.2
3190-3185	Grades from 60% sulfide to 15% sulfide	55	19.0	.7	2.3
✓ BF 38	Elevation Collar 3305 Elevation Bottom 3151				
3192-3183	Sulfide, broken	30	46.4	2.0	.3
3183-3176	Sulfide, broken	45	48.5	3.0	.5
3176-3170	Sulfide, broken	45	48.5	1.6	1.1
3170-3166	Sulfide, high quartz	70	17.2	.3	1.1
✓ BF 39	Elevation Collar 3304 Elevation Bottom 3179				
3235-3224	Sulfide, broken	15	33.5	1.7	.5
3224-3219	Sulfide, broken, quartz	10	32.5	.7	2.5
3219-3213	Sulfide, zinc	50	42.9	1.1	5.3
3213-3203	Sulfide, broken, granular, some quartz	95	43.0	.9	6.7
3203-3201	Sulfide, broken, granular, more quartz	40	42.2	.9	3.6
3201-3189	50% Sulfide, 50% Quartz and rhy.	10	25.3	.5	5.2
✓ BF 40	Elevation Collar 3304 Elevation Bottom 3188				
3231-3229	Sulfide, good, badly broken	30	47.8	1.8	4.6
3229-3224	Sulfide, quartz str.	85	37.9	.6	.2
3224-3222	Sulfide, good	95	50.6	.4	.5
3222-3216	Sulfide,	60	43.2	.9	.7
3216-3213	Sulfide, 15% quartz	95	33.9	.7	1.2
3213-3212	Sulfide, quartz	80	36.3	.5	1.0
3212-3209	50% Sulfide, 50% quartz, not sampled	80	20.0*	.5*	1.0*
3209-3208	Sulfide	85	44.0	.5	1.0
3208-3204	Low grade sulfide, not assayed	87			
✓ BF 41	Elevation Collar 3304 Elevation Bottom 3190				
3228-3223	Sulfide, some copper	30	42.5	1.5	5.5
3223-3221	70% Sulfide, 30% Quartz, not assayed	40	25.0*	1.5*	2.5*
3221-3220	70% Sulfide, 30% Quartz, good copper, zinc	40	24.7	2.5	2.5
3220-3219	70% Sulfide, 30% Quartz, not assayed	40	25.0*	1.0*	2.0*
3219-3218	Sulfide, 15% Quartz	60	32.6	.4	2.2
3218-3214	Sulfide, 15% Quartz	60	38.7	.9	5.4
3214-3212	Sulfide, coarse grained	70	39.8	.8	2.2
3212-3210	50-70% sulfide, gouge @ 3210, not assayed	70	30.0*	.5*	2.0*
3210-3209	Sulfide, 5% quartz	60	32.5	.4	2.3
3209-3204	50% Sulfide, badly broken, gouge, not assayed	50	20.0*	.4*	.5*
3204-3202	Sulfide	60	44.2	.4	.4
3202-3198	25% Sulfide, some zinc, not sampled	10	-	-	-

*Indicated estimated assay

		% Rec.	S	Cu.	Zn.
✓ BF 42	Elevation Collar 3304 Elevation Bottom 3179				
3235-3227	Sulfide, good	40	47.1	.3	.8
3227-3220	Sulfide, good	40	48.0	.4	4.8
3220-3218	25% Sulfide, not sampled	30	12.0*	.3*	.5*
3218-3213	Sulfide, 30% quartz, not sampled	20	30.0*	.2*	.5*
3213-3208	Sulfide, copper, zinc	30	39.8	.2	1.8
3208-3206	Sulfide, low quartz	30	41.8	.2	.8
3206-3204	Sulfide, some quartz, zinc	30	39.5	.5	3.3
3204-3202	50% Sulfide, not sampled	30	25.0*	.4*	1.0*
3202-3200	Sulfide, some quartz	30	36.4	.3	3.6
✓ BF 43	Elevation Collar 3305 Elevation Bottom 3198				
3243-3240	Sulfide	40	47.0	1.6	.5
3240-3235	Sulfide, zinc	100	47.1	1.4	2.0
3235-3230	Sulfide, zinc	100	48.3	2.9	3.7
3230-3224	Sulfide, copper	100	48.3	3.6	.5
3224-3222	Sulfide, coarse grained	85	48.3	2.4	.4
3222-3221	Sulfide, 15-20% quartz, not sampled	85	40.0*	.5*	.5*
3221-3218	Sulfide, coarse grained, some quartz	90	40.8	.7	2.3
3218-3216	Sulfide, 30% quartz, not sampled	90	35.0*	.5*	.4*
3216-3213	Sulfide, coarse grained	90	47.8	1.0	.4
✓ BF 44	Elevation Collar 3307 Elevation Bottom 3132 Waste Hole				
✓ BF 45	Elevation Collar 3307 Elevation Bottom 3182				
3244-3235	Sulfide, coarse, some copper, quartz	7	39.0	.9	.3
3235-3222	Sulfide, fine grained, copper	40	46.2	2.9	.4
3222-3219	Rhy., dissem. pyrite, not sampled	15	25.0*	.4*	.5*
3219-3212	Sulfide, 10% quartz	5	29.8	.2	.7
3212-3202	Sulfide, copper, zinc	67	45.5	1.5	.7
3202-3192	Sulfide, copper, zinc	42	47.5	.6	1.7
3192-3190	Core lost, reported as ore		45.0*	.55*	1.7*
✓ BF 46	Elevation Collar 3307 Elevation Bottom 3144				
3153-3147	Sulfide, medium grained, broken, copper	12	31.8	1.2	.3
3147-3138	Sulfide, broken, copper, zinc	90	42.5	3.1	.4
✓ BF 47	Elevation Collar 3308 Elevation Bottom 3103 Waste Hole				
✓ BF 48	Elevation Collar 3309 Elevation Bottom 3181				
3254-3249	Sulfide, coarse grained, copper, some quartz	60	41.8	2.9	.03
3249-3243	Sulfide, fine grained, copper	40	46.8	1.1	.02
3243-3238	Sulfide, fine grained, copper	40	45.0	3.3	6.4
3238-3230	Sulfide, fine grained, copper	50	46.0	4.2	.8
3230-3221	Sulfide	35	38.8	1.4	.1
3221-3219	Sulfide, coarse, 3% quartz, copper, zinc	88	35.7	1.0	.9
3219-3214	Sulfide, high quartz	75	25.5	.4	2.6
3214-3213	Grey rhy., widely dissem pyr., not sampled	75			
3213-3210	Heavy sulfide, high quartz	75	14.8	.2	.4
3210-3207	Light grey rhy., scattered sulfide, not sampled	75			
3207-3201	High quartz to 50% sulfide	20	17.3	.2	1.5
3201-3197	60% sulfide, copper, zinc	30	27.5	1.4	2.3
✓ BF 49	Elevation Collar 3308 Elevation Bottom 3209				
3254-3250	Sulfide, fine grained	50	46.1	1.1	.7
3250-3243	Sulfide, fine grained	50	46.0	1.3	.6

*Indicates estimated assay

		% Rec.	S	Cu.	Zn.
✓BF 49 Contd.					
3243-3237	Sulfide	55	46.0	1.1	.4
3237-3232	Low sulfide, high quartz, some cu., zn., not sampled	90	25.0*	.6*	.8*
3232-3229	90% sulfide, copper, zinc	65	28.8	.3	2.3
3229-3225	90% sulfide, copper, zinc	65	32.0	1.3	7.4
3225-3224	Sulfide, quartz	75	38.7	1.4	2.3
✓BF 50	Elevation Collar 3309 Elevation Bottom 3214				
3238-3235	Sulfide, granular	50	44.4	.7	Tr.
✓BF 51	Elevation Collar 3308 Elevation Bottom 3199 Waste Hole				
✓BF 52	Elevation Collar 3307 Elevation Bottom 3245				
3280-3267	Sulfide, granular	8	45.1	.3	.1
✓BF 53	Elevation Collar 3306 Elevation Bottom 3241				
3273-3259	Sulfide, fine grained, high copper	35	46.0	3.2	.5
✓BF 54	Elevation Collar 3307 Elevation Bottom 3205				
3258-3252	Sulfide, broken, granular, high copper	25	43.8	7.1	.1
3252-3242	Sulfide, dense, fine grained, high copper	3	46.0	7.0	.1
3242-3232	Sulfide, dense, fine grained, high copper	20	46.1	6.0	.1
3232-3226	Sulfide, dense, fine grained, high copper	25	46.1	4.8	2.8
3226-3222	Light green rhy., heavy band pyr., not sampled		30.0*	1.0*	.9*
3222-3219	90% Sulfide, coarse, copper		37.7	1.95	.9
✓BF 55	Elevation Collar 3307 Elevation Bottom 3117 Waste Hole				
✓BF 56	Elevation Collar 3383 Elevation Bottom 3208 Waste Hole				
✓BF 57	Elevation Collar 3381 Elevation Bottom 3206 Waste Hole				
✓BF 58	Elevation Collar 3380 Elevation Bottom 3208 Waste Hole				
✓BF 59	Elevation Collar 3379 Elevation Bottom 3264 Waste Hole				
✓BF 60	Elevation Collar 3239 Elevation Bottom 3139 Waste Hole				
✓BF 61	Elevation Collar 3242 Elevation Bottom 2972 Waste Hole				

APPENDIX B

TRIAL I

							Foot Assay Product			Average Assay					Ton Assay Product		
△	Hole	Ft.	S	Cu.	Zn.	Av. Thick	S	Cu.	Zn.	S	Cu.	Zn.	Area△ Volume	Tons	S	Cu.	Zn.
1	BF22	32	39.3	.50	2.25		1,258	16.00	72.00								
	RE135	57	42.2	1.68	2.65		2,405	95.76	151.05								
	BF35	40*	46.0*	1.25*	1.50*		1,840	50.00	60.00								
		129				43.0	5,503	161.76	283.05	42.7	1.25	2.19	2,450	15,050	642,635	18,813	32,960
													105,350				
2	BF22	32	39.3	.50	2.25		1,258	16.00	72.00								
	BF35	40*	46.0*	1.25*	1.50*		1,840	50.00	60.00								
	BF34	29	45.9	1.88	2.19		1,331	54.52	63.51								
		101				33.7	4,429	120.52	195.51	43.9	1.19	1.94	1,225				
													41,283	5,898	258,922	7,019	11,442
3	BF22	32	39.3	.50	2.25		1,258	16.00	72.00								
	BF34	29	45.9	1.88	2.19		1,331	54.52	63.51								
	RE209	3	40.0*	.64	.62		120	1.92	1.86								
		64				21.3	2,709	72.44	137.37	42.3	1.13	2.15	1,225				
													26,093	3,728	157,694	4,213	8,015
4	BF22	32	39.3	.50	2.25		1,258	16.00	72.00								
	RE209	3	40.0*	.64	.62		120	1.92	1.86								
	BF21	14	31.3	.26	.75		438	3.64	10.50								
		49				16.3	1,816	21.56	84.36	37.1	.44	1.72	1,800				
													29,340	4,191	155,486	1,844	7,209
5	BF22	32	39.3	.50	2.25		1,258	16.00	72.00								
	BF21	14	31.3	.26	.75		438	3.64	10.50								
	BF29	25	33.1	.74	2.09		828	18.50	52.25								
		71				23.7	2,514	38.14	134.75	35.4	.54	1.90	1,350				
													31,995	4,571	161,813	2,468	8,685
6	BF22	32	39.3	.50	2.25		1,258	16.00	72.00								
	BF29	25	33.1	.74	2.09		828	18.50	52.25								
	BF30	65	40.8	1.25	2.97		2,652	81.25	193.05								
		122				40.7	4,738	115.75	317.30	38.8	.95	2.60	3,050				
													124,135	17,734	688,079	16,847	46,108

*Assumed

△	Hole	Ft.	S	Cu.	Zn.	Av. Thick	Foot Assay Product			Average Assay			Area △	Tons	Ton Assay Product		
							S	Cu.	Zn.	S	Cu.	Zn.	Volume		S	Cu.	Zn.
7	BF22	32	39.3	.50	2.25		1,258	16.00	72.00								
	BF30	65	40.8	1.25	2.97		2,652	81.25	193.05								
	RE135	57	42.2	1.68	2.65		2,405	95.76	151.05								
		154				51.3	6,315	193.01	416.10	41.0	1.25	2.70	2,825 144,923	20,703	848,823	25,879	55,898
8	BF29	25	33.1	.74	2.09		828	18.50	52.25								
	BF21	14	31.3	.26	.75		438	3.64	10.50								
	BF43	30	46.0	1.98	1.44		1,380	59.40	43.20								
		69				23.0	2,646	81.54	105.95	38.3	1.18	1.54	1,525 35,075	5,011	191,921	5,913	7,717
9	BF29	25	33.1	.74	2.09		828	18.50	52.25								
	BF43	30	46.0	1.98	1.44		1,380	59.40	43.20								
	BF42	35	39.2	.29	1.99		1,372	10.15	69.65								
		90				30.0	3,580	88.05	165.10	39.8	.98	1.83	1,650 49,500	7,071	281,426	6,930	12,940
10	RE214	37	45.0*	.70*	1.50*		1,665	25.90	55.50								
	BF30	65	40.8	1.25	2.97		2,652	81.25	193.05								
	BF29	25	33.1	.74	2.09		828	18.50	52.25								
		127				42.3	5,145	125.65	300.80	40.5	.99	2.37	2,125 89,888	12,841	520,061	12,713	30,433
11	RE214	37	45.0*	.70*	1.50*		1,665	25.90	55.50								
	BF29	25	33.1	.74	2.09		828	18.50	52.25								
	BF42	35	39.2	.29	1.99		1,372	10.15	69.65								
		97				32.3	3,865	54.55	177.40	39.8	.56	1.83	1,200 38,760	5,537	220,373	3,101	10,133
12	RE214	37	45.0*	.70*	1.50*		1,665	25.90	55.50								
	BF42	35	39.2	.29	1.99		1,372	10.15	69.65								
	BF39	46	34.9	.99	4.05		1,605	45.54	186.30								
		118				39.3	4,642	81.59	311.45	39.3	.69	2.64	875 34,388	4,913	193,081	3,390	12,970

*Assumed

							Foot Assay Product			Average Assay				Ton Assay Product			
Δ	Hole	Ft.	S	Cu.	Zn.	Av. Thick	S	Cu.	Zn.	S	Cu.	Zn.	Area Δ Volume	Tons	S	Cu.	Zn.
13	BF30	65	40.8	1.25	2.97		2,652	81.25	193.05								
	RE214	37	45.0*	.70*	1.50*		1,665	25.90	55.50								
	BF39	46	34.9	.99	4.05		1,605	45.54	186.30								
		148				49.3	5,922	152.69	434.65	40.0	1.03	2.94	1,675				
													82,578	11,796	471,840	12,150	34,680
14	BF30	65	40.8	1.25	2.97		2,652	81.25	193.05								
	BF39	46	34.9	.99	4.05		1,605	45.54	186.30								
	BF37	42	44.7	1.56	2.76		1,877	65.52	115.92								
		153				51.0	6,134	192.31	495.27	40.1	1.26	3.24	2,150				
													109,650	15,664	628,126	19,737	50,751
15	BF30	65	40.8	1.25	2.97		2,652	81.25	193.05								
	BF37	42	44.7	1.56	2.76		1,877	65.52	115.92								
	BF38	22	47.7	2.21	.55		1,049	48.62	12.10								
		129				43.0	5,578	195.39	321.07	43.2	1.51	2.49	1,225				
													52,675	7,525	325,080	11,363	18,737
16	BF30	65	40.8	1.25	2.97		2,652	81.25	193.05								
	BF38	22	47.7	2.21	.55		1,049	48.62	12.10								
	RE135	57	42.2	1.68	2.65		2,405	95.76	151.05								
		144				48.0	6,106	225.63	356.20	42.4	1.57	2.47	2,750				
													132,000	18,857	799,537	29,605	46,577
17	BF43	30	46.0	1.98	1.44		1,380	59.40	43.20								
	RE146	8	20.3*	.15	1.65		162	1.20	13.20								
	BF50	3	44.4	.69	.03		133	2.07	.09								
		41				13.7	1,675	62.67	56.49	40.9	1.53	1.38	1,525				
													20,893	2,984	122,046	4,566	4,118
18	BF43	30	46.0	1.98	1.44		1,380	59.40	43.20								
	BF50	3	44.4	.69	.03		133	2.07	.09								
	BF42	35	39.2	.29	1.99		1,372	10.15	69.65								
		68				22.7	2,885	71.62	112.94	42.4	1.05	1.66	2,750				
													62,425	8,918	378,123	9,364	14,804

*Assumed

							Foot Assay Product			Average Assay					Ton Assay Product		
Δ	Hole	Ft.	S	Cu.	Zn.	Av Thick	S	Cu.	Zn.	S	Cu.	Zn.	Area/Δ Volume	Tons	S	Cu.	Zn.
19	BF42	35	39.2	.29	1.99		1,372	10.15	69.65								
	BF50	3	44.4	.69	.03		133	2.07	.09								
	BF41	19	35.0	1.07	3.61		665	20.33	68.59								
		57				19.0	2,170	32.55	138.33	38.1	.57	2.43	1,775				
													33,725	4,817	183,528	2,746	11,705
20	BF42	35	39.2	.29	1.99		1,372	10.15	69.65								
	BF41	19	35.0	1.07	3.61		665	20.33	68.59								
	BF39	46	34.9	.99	4.05		1,605	45.54	186.30								
		100				33.3	3,642	76.02	324.54	36.4	.76	3.25	1,875				
													62,438	8,920	324,688	6,779	28,990
21	BF39	46	34.9	.99	4.05		1,605	45.54	186.30								
	BF41	19	35.0	1.07	3.61		665	20.33	68.59								
	BF40	23	39.1	.79	1.11		899	18.17	25.53								
		88				29.3	3,169	84.04	280.42	36.0	.96	3.18	1,875				
													54,938	7,848	282,528	7,534	24,957
22	BF39	46	34.9	.99	4.05		1,605	45.54	186.30								
	BF40	23	39.1	.79	1.11		899	18.17	25.53								
	BF37	42	44.7	1.56	2.76		1,877	65.52	115.92								
		111				37.0	4,381	129.23	327.75	39.5	1.16	2.95	1,150				
													42,550	6,079	240,121	7,052	17,933
23	BF37	42	44.7	1.56	2.76		1,877	65.52	115.92								
	BF40	23	39.1	.79	1.11		899	18.17	25.53								
	BF38	22	47.7	2.21	.55		1,049	48.62	12.10								
		87				29.0	3,815	132.31	153.55	43.8	1.52	1.76	1,025				
													29,725	4,246	185,975	6,454	7,473
24	BF41	19	35.0	1.07	3.61		665	20.33	68.59								
	BF50	3	44.4	.69	.03		133	2.07	.09								
	BF52	13	45.1	.30	.11		586	3.90	1.43								
		35				11.7	1,384	26.30	70.11	39.5	.75	2.00	2,050				
													23,985	3,426	135,327	2,570	6,852

*Assumed

							Foot Assay Product			Average Assay					Ton Assay Product		
Δ	Hole	Ft.	S	Cu.	Zn.	Av Thick	S	Cu.	Zn.	S	Cu.	Zn.	Area Δ Volume	Tons	S	Cu.	Zn.
25	BF41	19	35.0	1.07	3.61		665	20.33	68.59								
	BF52	13	45.1	.30	.11		586	3.90	1.43								
	BF49	30	36.2	1.01	1.73		1,086	30.30	51.90								
		62				20.7	2,337	54.53	121.82	37.7	.88	1.96	1,425 29,498	4,214	158,868	3,708	8,259
26	BF41	19	35.0	1.07	3.61		665	20.33	68.59								
	BF49	30	36.2	1.01	1.73		1,086	30.30	51.90								
	BF40	23	39.1	.79	1.11		899	18.17	25.53								
		72				24.0	2,650	68.80	146.02	36.8	.96	2.03	1,700 40,800	5,829	214,507	5,596	11,833
27	BF40	23	39.1	.79	1.11		899	18.17	25.53								
	BF49	30	36.2	1.01	1.73		1,086	30.30	51.90								
	BF48	40	40.8	2.20	1.36		1,632	88.00	54.40								
		93				31.0	3,617	136.47	131.83	38.9	1.47	1.42	1,625 50,315	7,196	279,924	10,578	10,218
28	BF40	23	39.1	.79	1.11		899	18.17	25.53								
	BF48	40	40.8	2.20	1.36		1,632	88.00	54.40								
	BF38	22	47.7	2.21	.55		1,049	48.62	12.10								
		85				28.3	3,580	154.79	92.03	42.1	1.82	1.08	1,475 41,743	5,963	251,042	10,853	6,440
29	BF38	22	47.7	2.21	.55		1,049	48.62	12.10								
	BF48	40	40.8	2.20	1.36		1,632	88.00	54.40								
	BF45	54	41.8	1.31	.67		2,257	70.74	36.18								
		116				38.7	4,938	207.36	102.68	42.6	1.79	.89	1,775 68,693	9,813	418,034	17,565	8,734
30	BF38	22	47.7	2.21	.55		1,049	48.62	12.10								
	BF45	54	41.8	1.31	.67		2,257	70.74	36.18								
	RE145	29	44.0*	1.83	1.21		1,276	53.07	35.09								
		105				35.0	4,582	172.43	83.37	43.6	1.64	.79	325 11,375	1,625	70,850	2,665	1,284

*Assumed

							Foot Assay Product			Average Assay					Ton Assay Product		
△	Hole	Ft.	S	Cu.	Zn.	Av Thick	S	Cu.	Zn.	S	Cu.	Zn.	Area△ Volume	Tons	S	Cu.	Zn.
31	RE145	29	44.0*	1.83	1.21		1,276	53.07	35.09								
	BF45	54	41.8	1.31	.67		2,257	70.74	36.18								
	BF46	15	38.2	2.34	.36		573	35.10	5.40								
		98				32.7	4,106	158.91	76.67	41.9	1.62	.78	1,475 48,233	6,890	288,691	11,162	5,374
32	BF49	30	36.2	1.01	1.73		1,086	30.30	51.90								
	BF52	13	45.1	.30	.11		586	3.90	1.43								
	BF53	14	46.0	3.19	.50		644	44.66	7.00								
		57				19.0	2,316	78.86	60.33	40.6	1.38	1.06	1,725 32,775	4,682	190,089	6,461	4,963
33	BF49	30	36.2	1.01	1.73		1,086	30.30	51.90								
	BF53	14	46.0	3.19	.50		644	44.66	7.00								
	BF48	40	40.8	2.20	1.36		1,632	88.00	54.40								
		84				28.0	3,362	162.96	113.30	40.0	1.94	1.35	2,975 83,300	11,900	440,000	21,340	14,850
34	BF48	40	40.8	2.20	1.36		1,632	88.00	54.40								
	BF53	14	46.0	3.19	.50		644	44.66	7.00								
	BF54	39	43.4	5.42	.65		1,693	211.38	25.35								
		93				31.0	3,969	344.04	86.75	42.7	3.70	.93	5,375 166,625	23,803	1,016,388	88,071	22,137
35	BF48	40	40.8	2.20	1.36		1,632	88.00	54.40								
	BF54	39	43.4	5.42	.65		1,693	211.38	25.35								
	BF45	54	41.8	1.31	.67		2,257	70.74	36.18								
		133				44.3	5,582	370.12	115.93	42.0	2.78	.87	2,800 124,040	17,720	744,240	49,262	15,416
36	BF45	54	41.8	1.31	.67		2,257	70.74	36.18								
	BF54	39	43.4	5.42	.65		1,693	211.38	25.35								
	BF46	15	38.2	2.34	.36		573	35.10	5.40								
		108				36.0	4,523	317.22	66.93	41.9	2.94	.62	2,875 103,500	14,786	619,533	43,471	9,167

*Assumed

						Av	Foot Assay Product			Average Assay					Ton Assay Product		
∆	Hole	Ft.	S	Cu.	Zn.	Thick	S	Cu.	Zn.	S	Cu.	Zn.	Area∆ Volume	Tons	S	Cu.	Zn.
37	BF53	14	46.0	3.19	.50		644	44.66	7.00								
	BF54	39	43.4	5.42	.65		1,693	211.38	25.35								
		25*	44.0*	4.00*	.55*		1,100	100.00	13.75								
		78				26.0	3,437	356.04	46.10	44.1	4.56	.59	1,025				
													26,650	3,807	167,889	17,360	2,246
38	BF52	13	45.1	.30	.11		586	3.90	1.43								
	BF53	14	46.0	3.19	.50		644	44.66	7.00								
		13*	45.0*	2.00*	.30*		585	26.00	3.90								
		40				13.3	1,815	74.56	12.33	45.4	1.86	.31	375				
													4,988	713	32,370	1,326	221
39	BF50	3	44.4	.69	.03		133	2.07	.09								
	BF52	13	45.1	.30	.11		586	3.90	1.43								
		8*	44.7*	.40*	.10*		358	3.20	.80								
		24				8.0	1,077	9.17	2.32	44.9	.38	.10	900				
													7,200	1,029	46,202	391	103
40	BF46	15	38.2	2.34	.36		573	35.10	5.40								
	BF54	39	43.4	5.42	.65		1,693	211.38	25.35								
		25*	41.0*	3.00*	.50*		1,025	75.00	12.50								
		79				26.3	3,291	321.48	43.25	41.7	4.07	.55	1,325				
													34,848	4,978	207,583	20,260	2,738
41	RE135	57	42.2	1.68	2.65		2,405	95.76	151.05								
	BF38	22	47.7	2.21	.55		1,049	48.62	12.10								
	BF46	15	38.2	2.34	.36		573	35.10	5.40								
		94				31.3	4,027	179.48	168.55	42.8	1.91	1.79	6,525				
													204,233	29,176	1,248,733	55,726	52,225
42	RE135	57	42.2	1.68	2.65		2,405	95.76	151.05								
	BF36	32	46.3	1.39	.87		1,482	44.48	27.84								
		40*	44.0*	1.50*	1.50*		1,760	60.00	60.00								
		129				43.0	5,647	200.24	238.89	43.8	1.55	1.85	575				
													24,725	3,532	154,702	5,475	6,534

*Assumed

							Foot Assay Product			Average Assay					Ton Assay Product		
△	Hole	Ft.	S	Cu.	Zn.	Av Thick	S	Cu.	Zn.	S	Cu.	Zn.	Area△ Volume	Tons	S	Cu.	Zn.
43	BF36	32	46.3	1.39	.87		1,482	44.48	27.84								
	BF35	40*	46.0*	1.25*	1.50*		1,840	50.00	60.00								
	RE135	57	42.2	1.68	2.65		2,405	95.76	151.05								
		129				43.0	5,727	190.24	238.89	44.4	1.47	1.85	1,525				
													65,575	9,368	415,939	13,771	17,331
44	BF20	5	45.6	1.59	3.20		228	7.95	16.00								
	BF21	14	31.3	.26	.75		438	3.64	10.50								
	RE209	3	40.0*	.64	.62		120	1.92	1.86								
		22				7.3	786	13.51	28.36	35.7	.61	1.29	725				
													5,293	756	26,989	461	975
45	BF20	5	45.6	1.59	3.20		228	7.95	16.00								
	RE209	3	40.0*	.64	.62		120	1.92	1.86								
	BF31	12	45.7	1.83	2.57		548	21.96	30.84								
		20				6.7	896	31.83	48.70	44.8	1.59	2.44	750				
													5,025	718	32,166	1,142	1,752
46	BF31	12	45.7	1.83	2.57		548	21.96	30.84								
	RE209	3	40.0*	.64	.62		120	1.92	1.86								
	BF34	29	45.9	1.88	2.19		1,331	54.52	63.51								
		44				14.7	1,999	78.40	96.21	45.4	1.78	2.19	1,100				
													16,170	2,310	104,874	4,112	5,059
47	BF31	12	45.7	1.83	2.57		548	21.96	30.84								
	BF34	29	45.9	1.88	2.19		1,331	54.52	63.51								
	BF35	40*	46.0*	1.25*	1.50*		1,840	50.00	60.00								
		81				27.0	3,719	126.48	154.35	45.9	1.56	1.91	1,325				
													35,775	5,110	234,539	7,972	9,760
48	BF31	12	45.7	1.83	2.57		548	21.96	30.84								
	BF35	40*	46.0*	1.25*	1.50*		1,840	50.00	60.00								
	BF32	5	49.9	.80	2.20		250	4.00	11.00								
		57				19.0	2,638	75.96	101.84	46.3	1.33	1.79	1,375				
													26,125	3,732	172,792	4,964	6,680

*Assumed

							Foot Assay Product			Average Assay					Ton Assay Product		
△	Hole	Ft.	S	Cu.	Zn.	Av Thick	S	Cu.	Zn.	S	Cu.	Zn.	Area/△ Volume	Tons	S	Cu.	Zn.
49	BF32	5	49.9	.80	2.20		250	4.00	11.00								
	BF35	40*	46.0*	1.25*	1.50*		1,840	50.00	60.00								
	RE211	21	45.0*	1.50*	1.50*		945	31.50	31.50								
		66				22.0	3,035	85.50	102.50	46.0	1.30	1.55	850				
													18,700	2,671	122,866	3,472	4,140
50	RE211	21	45.0*	1.50*	1.50*		945	31.50	31.50								
	BF35	40*	46.0*	1.25*	1.50*		1,840	50.00	60.00								
	BF36	32	46.3	1.39	.87		1,482	44.48	27.84								
		93				31.0	4,267	125.98	119.34	45.9	1.35	1.28	900				
													27,900	3,986	182,957	5,381	5,102
51	BF33	45	45.3	.99	4.04		2,039	44.55	181.80								
	RE211	21	45.0*	1.50*	1.50*		945	31.50	31.50								
	BF36	32	46.3	1.39	.87		1,482	44.48	27.84								
		98				32.7	4,466	120.53	241.14	45.6	1.23	2.46	625				
													20,438	2,919	133,106	3,590	7,181
52	BF20	5	45.6	1.59	3.20		228	7.95	16.00								
	BF16	-	-	-	-		-	-	-								
	BF15	-	-	-	-		-	-	-								
		5				1.7	228	7.95	16.00	45.6	1.59	3.20	1,250				
													2,125	304	13,862	483	973
53	BF31	12	45.7	1.83	2.57		548	21.96	30.84								
	BF20	5	45.6	1.59	3.20		228	7.95	16.00								
	BF15	-	-	-	-		-	-	-								
		17				5.7	776	29.91	46.84	45.6	1.76	2.76	1,200				
													6,840	977	44,551	1,720	2,697
54	BF15	-	-	-	-		-	-	-								
	BF31	12	45.7	1.83	2.57		548	21.96	30.84								
	BF14	-	-	-	-		-	-	-								
		12				4.0	548	21.96	30.84	45.7	1.83	2.57	1,175				
													4,700	671	30,665	1,228	1,724

*Assumed

							Foot Assay Product			Average Assay					Ton Assay Product		
△	Hole	Ft.	S	Cu.	Zn.	Av Thick	S	Cu.	Zn.	S	Cu.	Zn.	Area △ Volume	Tons	S	Cu.	Zn.
55	BF31	12	45.7	1.83	2.57		548	21.96	30.84								
	BF14	-	-	-	-		-	-	-								
	RE124	45	44.2	1.95	2.18		1,989	87.75	98.10								
		57				19.0	2,537	109.71	126.94	44.5	1.92	2.26	2,000 38,000	5,429	241,591	10,424	12,270
56	BF31	12	45.7	1.83	2.57		548	21.96	30.84								
	RE124	45	44.2	1.95	2.18		1,989	87.75	98.10								
	BF32	5	49.9	.80	2.20		250	4.00	11.00								
		62				20.7	2,787	113.71	139.94	45.0	1.83	2.26	2,300 47,610	6,801	306,045	12,446	15,370
57	BF32	5	49.9	.80	2.20		250	4.00	11.00								
	BF33	45	45.3	.99	4.04		2,039	44.55	181.80								
	RE124	45	44.2	1.95	2.18		1,989	87.75	98.10								
		95				31.7	4,278	136.30	290.90	45.0	1.43	3.06	1,300 41,210	5,887	264,915	8,418	18,014
58	BF32	5	49.9	.80	2.20		250	4.00	11.00								
	BF33	45	45.3	.99	4.04		2,039	44.55	181.80								
	RE211	21	45.0*	1.50*	1.50*		945	31.50	31.50								
		71				23.7	3,234	80.05	224.30	45.6	1.13	3.15	800 18,960	2,709	123,530	3,061	8,533
59	BF33	45	45.3	.99	4.04		2,039	44.55	181.80								
	RE124	45	44.2	1.95	2.18		1,989	87.75	98.10								
		45*	44.5*	1.40*	3.00*		2,002	63.00	135.00								
		135				45.0	6,030	195.30	414.90	44.7	1.45	3.07	375 16,875	2,411	107,772	3,496	7,402
60	BF12	13	40.6	.30	1.79		528	3.90	23.27								
	BF11	-	-	-	-		-	-	-								
	BF16	-	-	-	-		-	-	-								
		13				4.3	528	3.90	23.27	40.6	.30	1.79	1,350 5,805	829	33,657	249	1,484

*Assumed

							Foot Assay Product			Average Assay					Ton Assay Product		
△	Hole	Ft.	S	Cu.	Zn.	Av. Thick	S	Cu.	Zn.	S	Cu.	Zn.	Area △ Volume	Tons	S	Cu.	Zn.
61	BF12	13	40.6	.30	1.79		527.80	3.90	23.27								
	BF15																
	BF16																
		13				4.3	527.80	3.90	23.27	40.6	.30	1.79	1,300				
													5,590	799	32,439	240	1,430
62	BF12	13	40.6	.30	1.79		527.80	3.90	23.27								
	BF13	8	45.9	.44	1.81		367.20	3.52	14.48								
	BF15																
		21				7.0	895.00	7.42	37.75	42.6	.35	1.80	1,200				
													8,400	1,200	51,120	420	2,160
63	BF13	8	45.9	.44	1.81		367.20	3.52	14.48								
	BF14																
	BF15																
		8				2.7	367.20	3.52	14.48	45.9	.44	1.81	1,250				
													3,375	474	21,757	209	858
64	BF11																
	BF12	13	40.6	.30	1.79		527.80	3.90	23.27								
	RE217	11	45.0*	.85	1.19		495.00	9.35	13.09								
		24				8.0	1,022.80	13.25	36.36	42.6	.55	1.52	1,000				
													8,000	1,143	48,692	629	1,737
65	BF6	11	42.1	.29	1.50*		463.10	3.19	16.50								
	BF12	13	40.6	.30	1.79		527.80	3.90	23.27								
	RE217	11	45.0*	.85	1.19		495.00	9.35	13.09								
		35				11.7	1,465.90	16.44	52.86	42.5	.47	1.51	2,625				
													30,713	4,388	186,490	2,062	6,626
66	BF6	11	42.1	.29	1.50*		463.10	3.19	16.50								
	BF12	13	40.6	.30	1.79		527.80	3.90	23.27								
	RE216																
		24				8.0	990.90	7.09	39.77	41.3	.30	1.66	4,200				
													33,600	4,771	197,042	1,431	7,920

*Assumed

							Foot Assay Product			Average Assay					Assay Product		
△	Hole	Ft.	S	Cu.	Zn.	Av Thick	S	Cu.	Zn.	S	Cu.	Zn.	Area△ Volume	Tons	S	Cu.	Zn.
67	BF12	13	40.6	.30	1.79		527.80	3.90	23.27								
	BF13	8	45.9	.44	1.81		367.20	3.52	14.48								
	RE216																
		21				7.0	895.00	7.42	37.75	42.6	.35	1.80	1,100				
													7,700	1,100	46,860	385	1,980
68	BF13	8	45.9	.44	1.81		367.20	3.52	14.48								
	BF14																
	RE216																
		8				2.7	367.20	3.52	14.48	45.9	.44	1.81	1,150				
													3,105	443	20,334	195	802
69	BF14																
	RE124	45	44.2	1.95	2.18		1,989.00	87.75	98.10								
	RE216																
		45				15.0	1,989.00	87.75	98.10	44.2	1.95	2.18	800				
													12,000	1,712	75,670	3,338	3,732
70	BF6	11	42.1	.29	1.50*		463.10	3.19	16.50								
	RE215																
	RE216																
		11				3.7	463.10	3.19	16.50	42.1	.29	1.50	1,250				
													4,625	660	27,786	191	990
71	BF5																
	BF6	11	42.1	.29	1.50*		463.10	3.19	16.50								
	RE217	11	45.0*	.85	1.19		495.00	9.35	13.09								
		22				7.3	958.10	12.54	29.59	43.6	.57	1.35	3,175				
													23,178	3,311	144,360	1,887	4,470
72	BF1																
	BF2	23	48.7	.21	.50*		1,120.10	4.83	11.50								
	RE213																
		23				7.7	1,120.10	4.83	11.50	48.7	.21	.50	1,725				
													13,283	1,898	92,433	399	949

*Assumed

						Av	Foot Assay Product			Average Assay					Ton Assay Product		
△	Hole	Ft.	S	Cu.	Zn.	Thick	S	Cu.	Zn.	S	Cu.	Zn.	Area △ Volume	Tons	S	Cu.	Zn.
73	BF2	23	48.7	.21	.50*		1,120.10	4.83	11.50								
	BF5																
	RE213																
		23				7.7	1,120.10	4.83	11.50	48.7	.21	.50	900				
													6,930	989	48,164	208	495
74	BF2	23	48.7	.21	.50*		1,120.10	4.83	11.50								
	BF5																
	BF6	11	42.1	.29	1.50*		463.10	3.19	16.50				2,950				
		34				11.3	1,583.20	8.02	28.00	46.6	.24	.82	33,335	4,762	221,909	1,143	3,905
75	BF2	23	48.7	.21	.50*		1,120.10	4.83	11.50								
	BF3	55	49.0	.22	.50*		2,695.00	12.10	27.50								
	BF6	11	42.1	.29	1.50*		463.10	3.19	16.50								
		89				29.7	4,278.20	20.12	55.50	48.1	.23	.62	3,850				
													114,345	16,335	785,714	3,757	10,128
76	BF3	55	49.0	.22	.50*		2,695.00	12.10	27.50								
	BF4	4	47.2	.25	.50*		188.80	1.00	2.00								
	RE215																
		59				19.7	2,883.80	13.10	29.50	48.9	.22	.50	3,700				
													72,890	10,413	509,196	2,291	5,207
77	BF1																
	BF22																
	RE219	51	48.0	.22	.95		2,448.00	11.22	48.45								
		51				17.0	2,448.00	11.22	48.45	48.0	.22	.95	4,125				
													70,125	10,018	480,864	2,204	9,517
78	BF1																
	BF2	23	48.7	.21	.50*		1,120.10	4.83	11.50								
	RE219	51	48.0	.22	.95		2,448.00	11.22	48.45								
		74				24.7	3,568.10	16.05	59.95	48.2	.22	.81	3,175				
													78,423	11,203	539,985	2,465	9,074

*Assumed

						Av	Foot Assay Product			Average Assay					Ton Assay Product		
△	Hole	Ft.	S	Cu.	Zn.	Thick	S	Cu.	Zn.	S	Cu.	Zn.	Area △ Volume	Tons	S	Cn.	Zn.
79	BF2	23	48.7	.21	.50*		1,120.10	4.83	11.50								
	RE210	62	48.0*	.14	.43		2,976.00	8.68	26.66								
	RE219	51	48.0*	.22	.95		2,448.00	11.22	48.45								
		136				45.3	6,544.10	24.73	86.61	48.1	.18	.64	3,300				
													149,490	21,356	1,027,224	3,844	13,668
80	BF2	23	48.7	.21	.50*		1,120.10	4.83	11.50								
	BF3	55	49.0	.22	.50*		2,695.00	12.10	27.50								
	RE210	62	48.0	.14	.43		2,976.00	8.68	26.66								
		140				46.7	6,791.10	25.61	65.66	48.5	.18	.47	925				
													43,198	6,171	299,294	1,111	2,900
81	BF3	55	49.0	.22	.50*		2,695.00	12.10	27.50								
	BF4	4	47.2	.25	.50*		188.80	1.00	2.00								
	RE210	62	48.0*	.14	.43		2,976.00	8.68	26.66								
		121				40.3	5,859.80	21.78	56.16	48.4	.18	.46	1,025				
													41,308	5,901	285,608	1,062	2,714
82	BF27																
	BF28	24	48.6	1.08	.80		1,166.40	25.92	19.20								
	*	16	47.0	.75	.75		752.00	12.00	12.00								
		40				13.3	1,918.40	37.92	31.20	48.0	.95	.78	475				
													6,318	903	43,344	858	704
83	BF27																
	BF28	24	48.6	1.08	.80		1,166.40	25.92	19.20								
	RE219	51	48.0*	.22	.95		2,448.00	11.22	48.45								
		75				25.0	3,614.40	37.14	67.65	48.2	.50	.90	1,300				
													32,500	4,634	223,359	2,317	4,171
84	BF28	24	48.6	1.08	.80		1,166.40	25.92	19.20								
	RE219	51	48.0*	.22	.95		2,448.00	11.22	48.45								
	Mt.D54	106	48.0*	.30*	.50*		5,088.00	31.80	53.00								
		181				60.3	8,702.40	68.94	120.65	48.1	.38	.67	2,625				
													158,288	22,613	1,087,685	8,593	15,151

*Assumed

							Foot Assay Product			Average Assay					Ton Assay Product		
Δ	Hole	Ft.	S	Cu.	Zn.	Av Thick	S	Cu.	Zn.	S	Cu.	Zn.	Area Δ Volume	Tons	S	Cu.	Zn.
85	RE210	62	48.0*	.14	.43		2,976.00	8.68	26.66								
	RE219	51	48.0*	.22	.95		2,448.00	11.22	48.45								
	Mt.D54	106	48.0*	.30*	.50*		5,088.00	31.80	53.00								
		219				73.0	10,512.00	51.70	128.11	48.0	.24	.58	5,325				
													388,725	55,532	2,665,536	13,328	32,209
86	RE210	62	48.0*	.14	.43		2,976.00	8.68	26.66								
	RE220	89	48.0*	.30*	.50*		4,272.00	26.70	44.50								
	Mt.D54	106	48.0*	.30*	.50*		5,088.00	31.80	53.00								
		257				85.7	12,336.00	67.18	124.16	48.0	.26	.48	5,250				
													449,925	64,275	3,085,200	16,712	30,852
87	BF4	4	47.2	.25	.50*		188.80	1.00	2.00								
	RE210	62	48.0*	.14	.43		2,976.00	8.68	26.66								
	RE220	89	48.0*	.30*	.50*		4,272.00	26.70	44.50								
		155				51.7	7,436.80	36.38	73.16	48.0	.23	.47	3,525				
													182,243	26,035	1,249,680	5,988	12,236
88	BF4	4	47.2	.25	.50*		188.80	1.00	2.00								
	RE6	27	48.0*	.30*	.50*		1,296.00	8.10	13.50								
	RE220	89	48.0*	.30*	.50*		4,272.00	26.70	44.50								
		120				40.0	5,756.80	35.80	60.00	48.0	.30	.50	5,975				
													239,000	34,143	1,638,864	10,243	17,072
89	BF28	24	48.6	1.08	.80		1,166.40	25.92	19.20								
	Mt.D 52	48	48.0*	.30*	.50*		2,304.00	14.40	24.00								
	*	36*	48.3*	.50*	.70*		1,738.80	18.00	25.20								
		108				36.0	5,209.20	58.32	68.40	48.2	.54	.63	4,075				
													146,700	20,957	1,010,127	11,317	13,203
90	BF28	24	48.6	1.08	.80		1,166.40	25.92	19.20								
	Mt.D 52	48	48.0*	.30*	.50*		2,304.00	14.40	24.00								
	Mt.D 54	106	48.0*	.30*	.50*		5,088.00	31.80	53.00								
		178				59.3	8,558.40	72.12	96.20	48.1	.41	.54	5,400				
													320,220	45,746	2,200,383	18,756	24,703

*Assumed

							Foot Assay Product			Average Assay					Ton Assay Product		
△	Hole	Ft.	S	Cu.	Zn.	Av Thick	S	Cu.	Zn.	S	Cu.	Zn.	Area /△ Volume	Tons	S	Cu.	Zn.
91	RE220	89	48.0*	.30*	.50*		4,272.00	26.70	44.50								
	Mt. D52	48	48.0*	.30*	.50*		2,304.00	14.40	24.00								
	Mt. D54	106	48.0*	.30*	.50*		5,088.00	31.80	53.00								
		243				81.0	11,664.00	72.90	121.50	48.0	.30	.50	4,700				
													380,700	54,385	2,610,480	16,316	27,193
92	RE6	27	48.0*	.30*	.50*		1,296.00	8.10	13.50								
	RE220	89	48.0*	.30*	.50*		4,272.00	26.70	44.50								
	Mt. D52	48	48.0*	.30*	.50*		2,304.00	14.40	24.00								
		164				54.7	7,872.00	49.20	82.00	48.0	.30	.50	1,280				
													700,160	100,020	4,800,960	30,010	50,010
93	RE6	27	48.0*	.30*	.50*		1,296.00	8.10	13.50								
	Mt. D52	48	48.0*	.30*	.50*		2,304.00	14.40	24.00								
	*	37	48.0*	.30*	.50*		1,776.00	11.10	18.50								
		112				37.3	5,376.00	33.60	56.00	48.0	.30	.50	2,775				
													103,508	14,786	709,728	4,436	7,393
94	BF6	11	42.1	.29	1.50*		463.10	3.19	16.50								
	BF3	55	49.0	.22	.50*		2,695.00	12.10	27.50								
	RE215																
		66				22.0	3,158.10	15.29	44.00	47.9	.23	.67	875				
													19,250	2,750	131,725	633	1,843

*Assumed

Holes #1 thru #70

AUGUST 10, 1943

COMPLETE DIAMOND DRILL AND WEIGHTED ASSAY LOG OF RICHMOND EXTENSION COPPER - ZINC ORE ZONE

	No. Hole	Bearing	Vert. Angle	Elev. Collar	Coordinates of Collar of Hole		Location Ore Zone in Hole	Elev. Bottom of Ore	Elev. Top of Ore	Ore Thickness	H.P.* Bottom of Ore	H.P.* Top of Ore	% Cu	% Zn	% S	Oz Gold	Oz Silver
SURFACE	1		90°	3198.5	N4156.08	E2840.75	361-403	2795	2838	42			2.66	2.26	44.82	0.030	0.95
	2		90-00	3070.6	N4020.41	E2684.37	442-497	2773	2828	54			0.85	0.48	46.80	0.024	1.94
	3 ?		90-00	3346.0	N4291.71	E2439.87	No Ore										
	4		90-00	3347.8	N3821.49	E2341.54	552-605	2743	2796	53			3.67	4.30	45.77	0.025	2.40
	5		90-00	3344.6	N3646.22	E2099.36	210-215	3130	3135	5			0.70			0.010	1.10
	6		90-00	3346.2	N3736.85	E2401.96											
UNDERGROUND	7	N70°57'W	+65-08	2722.2	N4149.23	E2873.93	95-125	2808	2835	27	39	53	0.76	2.18	47.63	0.000	0.55
	8	N66°03'W	+29-00	2720.2	N4149.86	E2872.62	No Ore										
	9	S53°42'W	+57-00	2721.1	N4146.99	E2874.49	90-140	2797	2847	42	49	76	1.22	3.10	49.33	0.002	0.87
	10	S 2°43'W	+56-30	2723.3	N4145.69	E2874.97	No Ore										
	11	S43°47'W	-39-00	2711.1	N4146.09	E2874.00	No Ore										
	12	N70°57'W	+47.30	2721.2	N4149.31	E2673.52	140-170	2824	2848	22	.95	118	2.45	1.09	46.63	0.010	1.14
	13	N10°24'E	+65-30	2723.8	N4155.57	E2882.35	100-140	2815	2851	36	41	60	0.89	3.52	48.07	Tr	1.23
	14	N 7°37'W	+45-30	2721.8	N4156.08	E2881.26	140-190	2821	2854	33	100	135	0.94	1.73	47.16	Tr	0.84
	15	N61°00'E	+60.00	2720.9	N4153.65	E2883.39	No Ore										
	16	N21°29'W	+47.17	2724.5	N4059.01	E2740.79	100-190	2799	2858	66	68	128	2.89	2.48	48.81	0.004	1.78

* Horizontal Projection

COMPLETE DIAMOND DRILL AND WEIGHTED ASSAY LOG OF RICHMOND EXTENSION COPPER - ZINC ORE ZONE

UNDERGROUND

No. Hole	Bearing	Vert. Angle	Elev. Collar	Coordinates of Collar of Hole		Location Ore Zone in Hole	Elev. Bottom of Ore	Elev. Top of Ore	Ore Thick-ness	H.P.* Bott-om of Ore	H.P.* Top of Ore	% Cu	% Zn	% S	Oz Gold	Oz Silver
17	N73°09'W	+50.00	2724.0	N4054.97	E2737.54	130-160	2833	2848	23	82	103	1.34	4.15	47.28	0.010	1.65
18	S60°57'W	+65.00	2725.8	N4053.09	E2738.60	90-100	2807	2816	9	39	44	0.61	1.50	47.40		
19	S 4°10'W	+55.00	2724.0	N4052.17	E2740.65	120-150	2823	2848	25	69	86	1.33	1.01	46.50		
20	N87°21'E	+59-00	2727.3	N4057.15	E2743.75	80-110	2796	2822	26	42	58	1.41	1.96	46.16		
21	N15°13'E	+65-00	2727.3	N4058.43	E2755.50	90-120	2809	2836	27	37	51	2.12	2.93	47.40		
22	N45°43'W	+47-00	2723.6	N4057.12	E2738.95	130-180	2819	2856	37	89	123	2.18	2.30	47.36		
23	N50°43'W	+25-00	2723.1	N4058.75	E2737.49	No Ore										
24	N62°22'W	+45.00	2723.4	N3950.59	E2592.76	120-140	2810	2827	17	83	101	0.86	1.10	49.70		
25	N 0°10'E	+50-00	2724.0	N3953.50	E2600.15	110-120	2809	2817	8	70	77	1.16	0.87	50.20		
26	N20°10'W	+50.00	2724.3	N3953.44	E2599.00	100-130	2801	2825	24	64	84	1.44	0.37	45.70		
27	N81°20'E	+55-00	2723.3	N3951.20	E2602.82	100-140						1.45	2.14	48.80		
28	N34°39'E	+48-15	2723.51	N3952.97	E2601.80	110-140						1.67	1.92	50.60		
29	S 2°23'E	+51-15	2724.03	N3944.81	E2597.48											
30	S61°34'W	+55-00	2783.26	N3946.23	E2594.80											
31	S35°24'E	-5°19'	2716.66	N3936.79	E2606.71											

* Horizontal Projection

Respectfully submitted
Robert J. Burgess

COMPLETE DIAMOND DRILL AND WEIGHTED ASSAY LOG OF RICHMOND EXTENSION COPPER-ZINC ORE ZONE

NO. HOLE	BEARING	VERT. ANGEL	ELEV. COLLAR	COORDINATES OF COLLAR OF HOLE		LOCATION ORE ZONE IN HOLE	ELEV. BOTTOME OF ORE	ELEV. TOP OF ORE	ORE THICK-NESS	H.P.* BOTT-OM OF ORE	H.P.* TOP OF ORE	% CU	% ZN	% S	OZ. GOLD	OZ. SILVER
17	N73°09'W	50.00	2724.0	N4054.97	E2737.54	130-160	2833	2848	23	82	103	1.34	4.15	47.28	0.010	1.65
18	S60°57'W	65.00	2725.8	N4053.09	E2738.60	90-100	2807	2816	9	39	44	0.61	1.50	47.40	0.020	0.90
19	S 4°10'W	55.00	2724.0	N4052.17	E2740.65	120-150	2823	2848	25	69	86	1.33	1.01	46.50	0.013	1.43
20	N87°21'E	59-00	2727.3	N4057.15	E2743.75	80-110	2796	2822	26	42	58	1.41	1.96	46.16	0.020	1.15
21	N15°13'E	65-00	2727.3	N4058.43	E2755.50	90-120	2809	2836	27	37	51	2.12	2.93	47.40	0.020	1.27
22	N45°43'W	47-00	2723.6	N4057.12	E2738.95	130-180	2819	2856	37	89	123	2.18	2.30	47.36	0.018	2.05
23	N50°43'W	25-00	2723.1	N4058.75	E2737.49	No Ore										
24	N62°22'W	45.00	2723.4	N3950.59	E2592.76	120-140	2810	2827	17	83	101	0.86	1.10	49.70	0.020	1.45
25	N 0°10'E	50-00	2724.0	N3953.50	E2600.15	110-120	2809	2817	8	70	77	1.16	0.87	50.20	0.020	2.00
26	N20°10'W	50-00	2724.3	N3953.44	E2599.00	100-130	2801	2825	24	64	84	1.44	0.37	45.70	0.020	1.56
x 27	N81°20'E	55-00	2723.3	N3951.20	E2602.82	100-140	2805	2837	32	58	81	1.45	2.14	48.80	0.015	1.31
x 28	N34°39'E	48-15	2723.51	N3952.97	E2601.80	100-140	2804	2826	22	55	86	1.67	1.92	50.60	0.026	1.67
29	S 2°23'E	51-15	2724.03	N3944.81	E2597.48	130-170	2826	2856	30	81	107	1.54	1.86	49.60	0.012	1.105
30	S61°34'W	55-00	2723.26	N3946.23	E2594.80	110-140	2813	2838	25	63	81	2.09	1.11	45.90	0.022	1.85
31	S35°24'E	-5°19'	2716.66	N3936.79	E2606.71	No Ore										
32	S48°16'W	45°	2722.60	N3896.40	E2452.72	50-140	2774	2823	42	51	98	1.29	2.11	40.37	0.020	1.79
33	N90° 0'W	50°	2722.40	N3898.33	E2452.09	50-100	2761	2800	39	34	65	1.35	0.74			
34	S10°51'W	44°07	2723.91	N3894.18	E2454.25	No Ore										

* Horizontal Projection

RJB:IG

Respectfully Submitted

Robert J. Burgess

September 24, 1943

COMPLETE DIAMOND DRILL AND WIGHTED ASSAY LOG OF RICHMOND EXTENSION COPPER - ZINC ORE ZONE

Continuation of Log sent in August 10, 1943

No. Hole	Bearing	Vert. Angle	Elev. Collar	Coordinates of Collar of Hole		Location Ore Zone in Hole	Elev. Bottom of Ore	Elev. Top of Ore	Ore Thickness	H.P.# Bottom of Ore	H.P.* Top of Ore	% Cu	% Zn	% S
27	N31°20'E	55-00	2723.0	N3951.20	E2602.82	100-140	2805	2837	32	58	81	1.45	2.14	48.80
28	N34°39'E	48-15	2723.51	N3952.97	E2601.80	100-140	2804	2826	22	55	86	1.67	1.92	50.60
29	S 2°23'E	51-15	2724.03	N3944.81	E2597.48	130-170	2826	2856	30	81	107	1.54	1.86	49.60
30	S61°34'W	55-00	2783.26	N3946.23	E2594.80	110-140	2813	2838	25	63	81	2.09	1.11	45.90
31	S35°24'E	-5°19'	2716.66	N3936.79	E2606.71	No Ore								
32	S48°16'E	45°	2722.60	N3896.40	E2452.72	50-140	2774	2823	42	51	98	1.29	2.11	40.37
33	N90°0'W	50°	2722.40	N3898.33	E2452.09	50-100	2761	2800	39	34	65	1.35	0.74	

* Horizontal Projection

Respectfully Submitted

Robert J. Burgess

Robert J. Burgess

OCTOBER 24, 1944

COMPLETE DIAMOND DRILL AND FOOT ASSAY LOG OF RICHMOND EXTENSION

NO. HOLE	BEARING	VERT. ANGLE	ELEV. COLLAR	COORDINATES OF COLLAR OF HOLE		LOCATION ORE ZONE IN HOLE	ELEV. BOTTOM OF ORE	ELEV. TOP OF ORE	ORE THICKNESS	H.P.* BOTTOM OF ORE	H.P.* TOP OF ORE	% CU	% ZN	% S
35	S36°58'30"E	+ 4°30'	2718.6	N3937.40	E2606.23	37- 71	2721	2724	3	37	71	0.10	0.27	47.8
36	S34°17'00"E	+21°00'	2719.9	N3937.18	E2606.03	32-112	2731	2760	29	30	105	0.13	0.55	43.7
37	S60°33'42"E	+30°30'	2721.3	N3891.16	E2459.89	70-210	2757	2828	~~20~~ 71	60	161	0.16	0.84	45.2
38	S 2°32'40"E	+41°30'	2722.6	N3888.76	E2458.26	No Ore								
39	S62°48'30"W	+41°30'	2726.7	N3882.95	E2392.37	34-105	2749	2810	61	26	79	1.58	3.95	46.0
40	N59°50'30"E	+40°00'	2724.2	N3887.01	E2394.24	29-100	2743	2888	45	22	77	1.62	3.83	41.7
41	S33°25'30"E	-24°30'	2716.21	N3937.75	E2605.26	No Ore								
42	S69°23'00"E	+80°45'	2816.40	N4127.29	E2798.70	0- 8	2816	2824	8	0	1.3	1.35	2.39	
*						16- 26	2832	2842	10	2.6	4.2	1.30	0.13	
43	N54°39'00"E	+44°30'	2814.7	N4129.28	E2795.55	0- 17	2815	2827	12	0	12.1	3.45	1.79	47.3
45	S57°12'00"E	+28°45'	2813.1	N4125.88	E2800.53	0- 21	2813	2823	10	0	18.4	1.18	1.41	48.2
46	S42°34'00"E	+ 4°45'	2811.9	N4124.03	E2795.6	0- 50	2812	2816	4	0	50	1.78	2.67	46.3
46A	N55°48'00"E	+ 2°30'	2811.8	N4129.72	E2794.79	0- 10	2812	2812		0	10	2.45	3.35	
47	S20°46'00"E	+68°30'	2748.8	N3879.50	E2436.1	0- 30	2749	2777	28	0	11	0.61	3.53	35.3
*						70-105	2813	2846	33	26	39	0.37	2.10	34.1
48	S33°11'00"E	+41°00'	2748.8	N3879.30	E2433.4	30-65	2768	2792	24	22	39	0.99	3.75	37.1
49	S32°39'00"E	+ 6°30'	2746.9	N3878.0	E2432.6	No Ore								
50	S26°45'00"E	+69°00'	2747.2	N3881.45	E2434.75	0- 40	2747	2784	37	0	14	1.41	2.70	43.6
*						40- 65	2784	2808	24	14	23	0.59	0.34	48.2
51	S56°24'00"E	+ 5°00'	2747.7	N3880.1	E2430.6	No Ore								
52	S56°20'00"E	+16°30'	2748.2	N3880.5	E2431.2	0- 10	2748	2756	8	0	6	0.22	2.13	

* Horizontal Projection

PPX:IO
cc Wm.P.Kett
cc J.G.Huseby
cc C.E.McClung

DECEMBER 29, 1944

COMPLETE DIAMOND DRILL AND FOOT ASSAY LOG OF RICHMOND EXTENSION

NO. HOLE	BEARING	VERT. ANGLE	ELEV. COLLAR	COORDINATES OF COLLAR OF HOLE		LOCATION ORE .ONE IN HOLE	ELEV. BOT-TOM OF ORE	ELEV. TOP OF ORE	ORE THICK-NESS	H.P.* BOT-TOM OF ORE	H.P.* TOP OF ORE	% CU	% ZN	% S
53	N26°01' W	+41°-00'	2758.49	N3934.33	E2438.76	0- 40	2758.5	2784.7	26.2	0	30.2	1.35	4.30	45.2
54	N10°39' W	+78°-30'	2757.50	N3933.11	E2439.29	0- 45	2757.5	2801.6	44.1	0	9.0	1.98	6.60	44.3
55	N13°49' E	+28°-15'	2758.01	N3934.63	E2440.05	0-185	2758.0	2845.6	87.6	0	163.0	1.55	3.46	47.6
56	N12°05' E	+59°-30'	2757.57	N3933.57	E2440.00	0- 55	2757.6	2805.0	47.4	0	27.9	1.95	3.82	46.5
57	N24°29' W	+ 3°-00'	2747.89	N3919.06	E2437.51	No Ore								
58	N56°11' W	+ 3°-00'	2747.71	N3915.91	E2437.65	No Ore								
59	N21°24' W	+25°-00'	2750.29	N3917.79	E2438.29	0- 10 30-135	2750.3 2763.0	2754.6 2820.0	4.3 57.0	0 27.2	9.1 122.4	1.44 2.93	1.65 4.83	45.9 40.0
60	S11°37' E	+45°-30'	2752.90	N3906.60	E2444.40	0-70	2752.9	2802.8	49.9	0	49.6	1.41	2.32	49.3
61	S12°51' E	+15°-30'	2751.41	N3903.60	E2445.28	0-45	2751.4	2763.4	12.0	0	43.4	1.48	4.33	45.2
62	S45°00' W	+20°-00'	2757.24	N3895.27	E2363.83	0-160	2757.2	2811.9	54.7	0	150.4	2.25	7.10	44.0
63	S11°40' W	+ 4°-00'	2755.31	N3894.36	E2365.66	0- 60	2755.3	2759.5	4.2	0	59.9	1.70	10.04	47.1
64	N77°40' W	-37°-30'	2753.17	N3899.20	E2363.96	No Ore								
65	N25°24' W	+ 5°-00'	2755.53	N3902.48	E2365.91	0- 20	2755.5	2757.2	1.7	0	19.9	1.75	5.90	47.8
66	N76°21' W	0°-00'	2755.06	N3900.92	E2362.69	0- 30	2755.1	2755.1	0	0	30.0	1.45	3.52	50.0
67	N25°44' W	+20°-00'	2757.49	N3901.99	E2366.09	0-100	2757.5	2791.7	34.2	0	94.0	1.64	5.41	47.3
68	N72°32' W	+19°-45'	2757.75	N3900.92	E2363.22	0-170	2757.7	2815.1	57.4	0	160.0	2.98	7.79	44.0
69	S45°10' W	-27°-30'	2753.88	N3895.35	E2364.01	No Ore								
70	S62°33' W	+ 0°-30'	2755.65	N3896.15	E2363.27	0- 35	2755.6	2756.0	0.3	0	35.0	1.89	3.65	

PPK:IG

cc Wm.F.Kett, J.G.Huseby, J.M.Basham, C.W.McClung

Page 6

Continued

IRON MOUNTAIN MINES

DIAMOND DRILL DATA
RICHMOND EXTENSION

Diamond Drill and Assay data on part of the Richmond Extension (RE) series drill holes. This data has been compiled from existing records and will corralate to the 1963 cross sectional maps indicating drill holes on the Richmond, Hornet and part of the Mattie ore bodies. Both surface and underground drilling are included.

RE	Thickness of Ore or		ASSAY VALUE	
Hole No.	Location in Hole		Cu.	Zn.
~~71~~			3.4	8.5
72✓		0 - 130	.5	1.7
73	10'	60 - 70	2.14	5.30
74✓	20'	0 - 130	1.25	2.24
75✓	225'	0 - 225	.40	.90
76✓	17'	0 - 17	1.39	.75
77✓	30'	0 - 30	1.21	2.8
78✓	30'	0 - 30	.72	1.1
79✓	18'	0 - 18	1.2	.7
80✓	90'	0 - 90	1.1	.9
81✓	90'	0 - 90	1.1	.9
81✓	30'	0 - 30	1.1	1.1
82✓	40'	0 - 40	1.	2.2
83	75'	0 - 75	1.4	1.3
84✓		0 - 120	.2	.6
85✓	60'	0 - 60	1.2	3.3
86✓	35'	0 - 35	1.2	3.2
87✓	40'	0 - 40	11.1	1.1
88✓	80'	0 - 80	1.4	6.1
89✓	55'	0 - 55	4.21	5.09
90✓	75'	0 - 75	3.02	10.71
91✓	60'	0 - 60	2.95	10.56
93	20'	0 - 20	.31	1.04
94	40'	0 - 40	.55	1.45
95	75'	0 - 75	1.51	2.46
96✓	70'	0 - 70	2.17	4.57
97	20'	80 - 100	2.52	4.25
98✓	15'	0 - 15	.15	1.0
99✓	5'	0 - 5	.90	2.05
101✓	46'	0 - 46	2.15	2.17
101A✓	205'	0 - 205	1.25	1.43
102	10'	0 - 10	1.67	2.20
103✓	80	0 - 80	.41	1.53
104✓	155'	0 - 155	4.39	4.72
105✓	110'	0 - 110	3.40	6.52
106✓	60'	10 - 70	1.77	3.19

N MOUNTAIN MINES - Diamond Drill Data, Richmond Extension

RE	Thickness of Ore or		ASSAY VALUE	
Hole No.	Location in Hole		Cu.	Zn.
107 ✓	75'	0 - 75	1.35	5.22
108 ✓	70'	0 - 70	2.9	4.48
109 ✓	60'	0 - 60	2.10	8.09
110 ✓	40'	0 - 40	2.51	3.2
111 ✓	40'	0 - 40	.82	1.2
112 ✓	28'	0 - 28	2.49	4.18
113 ✓	30'	0 - 30	1.01	2.81
114 ✓	40'	0 - 34	.4	.91
115 ✓	87'	0 - 87	.61	1.27
116 ✓	92'	0 - 92	1.96	.73
117 ✓	55'	0 - 55	.8	1.3
118 ✓	110'	0 - 110	1.3	1.4
119 ✓	120'	0 - 120	2.92	1.81
120	Brick Flat			
121 ✓	40'	10 - 50	4.2	6.3
122 ✓	20'	10 - 30	2.21	8.1
123 ✓	50'	0 - 50	2.2	5.21
✓124 ✓	Brick Flat			
125 ✓	30'	0 - 30	.67	1.32
126 ✓	7'	35 - 42	Pyrite	35' - 42'
127 ✓	7'	75 - 82	Pyrite	
128 ✓	50'	0 - 50	.91	.92
129 ✓	70'	0 - 70	1.82	1.91
130 ✓	70'	0 - 70	4.29	7.25
131 ✓	145'	0 - 145	3.96	4.32
132 ✓	320'	0 - 320	2.72	3.56
133 ✓	90'	0 - 90	2.03	1.43
134 ✓	40'	20 - 60	1.3	.52
✓135 ✓	Brick Flat			
136	1'	17 - 18	Pyrite	17' - 18'
137 ✓	90'	0 - 90	.2	.75
138 ✓				
139	60'	0 - 60	1.2	1.4
140 ✓	20'	0 - 20	2.5	4.37
~~141~~	—	—	—	—
142 ✓	230'	0 - 230	1.61	2.45
143	75'	0 - 75	.51	1.45
✓144 ✓	Brick Flat			
✓145 ✓	Brick Flat			
✓146 ✓	Brick Flat			
✓147 ✓	50'	0 - 50	1.61	6.04
✓148		10 - 25	.61	2.51
149	572'		X	
150	495'		X	
151	290'		X	
152	352'		X	
153	14'	0 - 14	.56	.48
154 ✓	10'	0 - 10	.30	1.16
155 ✓	20'	0 - 20	.25	.55

RE Hole No.	Thickness of Ore or Location in Hole		ASSAY VALUE	
			Cu.	Zn.
~~156~~	-	- - -	-	-
157✓	30'	0 - 30	.51	2.60
158✓	10'	0 - 10	.71	2.52
159✓	20'	0 - 20	1.91	1.54
160 ✓	25'	0 - 25	.50	.74
161 ✓	20'	0 - 20	.47	1.19
162 ✓	20'	0 - 20	.68	.69
163✓	25'	0 - 25	.23	.71
✓164	30'	0 - 30	.22	1.43
✓165	40'	0 - 40	.26	.32
✓166	10'	70 - 80	.67	22.81
✓167	30'	0 - 30	.67	5.51
168	40'	0 - 40	7.34	1.11
✓~~169~~				
✓170	50'	0 - 50	3.25	24.61
✓171	30'	0 - 30	.18	.20
✓172	80'	0 - 80	.39	1.50

Continued

HOLES #173 THRU #203

(CONTINUED)

IRON MOUNTAIN MINES
Richmond Extension
RE 173 - 203

Diamond Drill Logs and Assays

	% Rec.	S	Cu.	Zn.
✓RE-173				
0-10			.30	1.86
10-15			.86	2.94
20-26			.40	1.24
26-45			.30	.90
45-52			.25	.65

End of hole 56'

Driller's Log:
0-20 Ore (Sulphide)
20-56 Waste

✓RE-174				
0-10			.30	3.46
10-20			.50	2.71
20-27			.30	2.07
27-35			.30	.65
35-42			.86	1.55
42-56			.30	.23

End of hole 56'

Driller's Log:
0-27 Ore (Sulphide)
27-56 Waste

✓RE-175				
0-10			1.56	4.85
10-20			1.46	4.49

End of hole 35'

Driller's Log:
0-27 Ore (Sulphide)
27-28 Waste
28-35 Ore (Sulphide)

✓RE-176				
0-10			1.01	3.98
10-20			1.71	3.88
20-30			.96	3.73
30-40			3.13	1.75
40-50			3.23	.96
50-60			.50	.89
60-70			1.31	5.30
70-80			.15	.13

End of hole 80'

Driller's Log:
0-21 Ore (Sulphide)
21-25 Ore & waste mixed
25-28 Ore (Sulphide)
58-80 Waste

✓RE-177				
0-10			1.92	7.34
10-20			.85	4.11
20-30			3.33	3.53
30-40			3.08	4.52
40-50			2.62	2.64
50-60			1.97	3.17
60-70			.10	.02
70-76			0.25	0.48

End of hole 85'

Driller's Log:
0-76 Ore (Sulphide)
76-85 Waste

Diamond Drill Logs and Assays

	% Rec.	S	Cu.	Zn.
✓ RE-178				
0-10			0.81	3.48
10-20			1.87	6.80
30-40			1.56	2.89
40-50			1.26	1.19
50-60			0.81	0.48
60-70			0.81	0.36
70-80			0.76	0.25
80-90			0.76	0.33
90-110			1.72	0.46
110-120			1.26	0.43
120-130			1.92	0.28
130-140			0.81	0.30
140-155			0.71	0.20

End of hole 155'

Driller's Log:

0-134	Ore (Sulphide)
134-155	Waste

	% Rec.	S	Cu.	Zn.
✓ RE-179				
10-20			0.55	2.38
20-40			0.20	0.23

End of hole 40'

Driller's Log:

0-24	Ore (Sulphide)
24-40	Waste

	% Rec.	S	Cu.	Zn.
✓ RE-180				
0-10			0.76	8.27
10-50			1.46	2.28
50-60			1.16	1.60
60-80			0.91	0.99

End of hole 80'

Driller's Log:

0-64	Ore (Sulphide)
64-80	Waste

	% Rec.	S	Cu.	Zn.
✓ RE-181				
0-10			1.11	2.77
10-20			1.01	1.42
20-30			0.55	0.89
30-40			0.20	0.23

End of hole 40'

Driller's Log:

0-17	Ore (Sulphide)
17-40	Waste

	% Rec.	S	Cu.	Zn.
✓ RE-182				
0-10			0.86	1.80
10-20			0.81	0.86
20-30			0.71	2.03
40-50			0.25	0.69
50-60			0.66	1.95
60-70			0.35	1.32
70-80			0.66	1.98
80-90			0.86	1.45
90-100			0.76	1.35
100-111			0.50	1.65

End of hole 111'

Driller's Log:

0-104	Ore (Sulphide)
104-111	Waste

Diamond Drill Logs and Assays

	% Rec.	S	Cu.	Zn.
✓RE-183				
0-10			3.08	2.66
10-20			3.18	2.11
20-30			3.53	1.80
30-40			3.18	1.02
50-60			0.50	0.20

End of hole 60'

Driller's Log:

0-45	Ore (Sulphide)
45-60	Waste

	% Rec.	S	Cu.	Zn.
✓RE-184				
0-10			1.47	1.63
10-20			1.42	1.53
20-30			1.37	1.42
30-40			0.96	0.71
40-50			0.51	0.31

End of hole 55'

Driller's Log:

0-39	Ore (Sulphide)
39-55	Waste

	% Rec.	S	Cu.	Zn.
✓RE-185				
0-10			0.61	0.51
10-20			0.81	0.61
20-30			1.32	1.53
30-40			0.76	1.33
40-50			1.72	0.71
50-60			0.81	0.41
60-70			1.42	0.82
70-80			1.42	1.23
80-90			1.06	0.82
90-100			0.86	0.61

End of hole 100'

Driller's Log:

0-80	Ore (Sulphide)
80-100	Waste

	% Rec.	S	Cu.	Zn.
RE-186				
0-10			0.96	1.12
10-20			0.66	0.61
20-30			1.06	0.82
30-40			1.67	1.43
40-50			1.77	1.33
50-60			1.06	0.82

End of hole 70'

Driller's Log:

0-45	Ore (Sulphide)
45-47	Waste
47-58	Ore (Sulphide)
58-70	Waste

✓RE-187

No samples assayed

End of hole 13'

Driller's Log:

0-13	Waste

	% Rec.	S	Cu.	Zn.
✓RE-188				
0-10			0.96	6.33

End of hole 23'

Driller's Log:

0-8	Ore (Sulphide)
8-23	Waste

Diamond Drill Logs and Assays

	% Rec.	S	Cu.	Zn.
✓RE-189				
0-10			0.61	9.68
10-20			0.86	3.57
20-30			1.62	4.62
30-40			1.37	2.17
40-50			0.66	4.52
50-60			0.81	5.77
60-70			0.66	9.57
70-80			0.61	6.20
80-90			0.71	7.86
90-100			0.51	5.80
100-110			0.66	3.93
110-120			0.71	3.62
120-130			0.61	5.06
130-135			0.56	5.26
135-155			0.25	2.40

End of hole 155'

Driller's Log:

0-135	Ore (Sulphide)
135-155	Waste

✓RE-190---Driller's Log:

0-23	Ore
23-66	Waste

✓RE-191---Driller's Log:

0-23	Ore
23-25	Waste

	% Rec.	S	Cu.	Zn.
✓RE-192				
0-10			0.35	1.46
10-20			0.25	0.67
20-30			0.20	0.10
40-50			0.15	---
50-60			0.10	0.39
60-70			0.25	0.08
70-80			0.20	0.08

End of hole 85'

Driller's Log:

0-85	Waste

	% Rec.	S	Cu.	Zn.
✓RE-193				
-25			2.68	0.52

End of hole 35'

Driller's Log:

0-35	Ore (Sulphide)

✓RE-194

Drain hole - No assays

	% Rec.	S	Cu.	Zn.
✓RE-195				
0-10			2.41	4.01
10-20			2.25	3.26
20-30			2.68	4.56
40-70			0.86	1.22

End of hole 90'

Driller's Log:

0-75	Ore (Sulphiae)
75-90	Waste

Diamond Drill Logs and Assays

	% Rec.	S	Cu.	Zn.
✓RE-196				
0-10			0.71	0.89
10-20			0.86	0.95
20-25			0.91	1.03

End of hole 25'

Driller's Log:
0-25 Waste

✓RE-197				
10-20			1.71	1.81
20-30			2.89	7.61
30-40			3.21	7.48
40-50			3.26	6.26
50-60			2.78	4.19
60-67			1.07	2.10
67-77			1.12	1.74
77-90			0.64	0.93

End of hole 90'

Driller's Log:
0-67 Ore (Sulphide)
67-90 Waste

✓RE-198				
0-10			4.49	2.17
10-20			3.64	5.35
20-30			2.52	5.21
30-40			1.28	13.91
40-50			1.82	5.37
50-60			1.07	3.68
60-70			0.32	0.42
70-75			0.05	Trace

End of hole 75'

Driller's Log:
0-63 Ore (Sulphide)
63-75 Waste

RE-199				
0-10			1.82	2.45
10-20			0.43	2.28
20-30			0.27	0.47
30-40			0.21	---
40-60			0.16	---

End of hole 60'

Driller's Log:
0-22 Ore (Sulphide)
22-60 Ore & waste mixed

✓RE-200				
0-10			1.93	1.06
10-20			1.82	0.93
20-30			1.98	1.53

End of hole 35'

Driller's Log:
0-35 Ore (Sulphide)

✓RE-201
0-90 Ore (Sulphide)

✓RE-202
0-75 Ore & waste streaks

Diamond Drill Logs and Assays

	% Rec.	S	Cu.	Zn.
E-203✓				
5-10			1.28	1.57
10-20			2.09	6.34
20-30			3.00	6.76
30-40			2.14	7.96
40-50			1.93	6.42
50-75			1.50	5.14

End of hole 75'

Driller's Log:

0-5	Waste
5-53	Ore (Sulphide)
53-75	Waste

THE MOUNTAIN COPPER COMPANY, LTD.

MEMORANDUM

FROM
THE MOUNTAIN COPPER CO., LTD.
MATHESON.
SHASTA COUNTY. CALIFORNIA
Engineering Department

TO
THE MOUNTAIN COPPER CO., LTD.
Mr. Wm. F. Lett
San Francisco, Calif.
Feb. 15, 1945

DIAMOND DRILLING CAMPAIGN

The following is the information on Diamond Drill Holes R.E. # 74 and R.E. # 75 surveyed Feb. 14, 1945.

R. E. #74

Coordinates of Collar	N 3971.05
	E 2597.25
Elevation of Collar	2758.90
Bearing	S 56° 09' E
Dip	±43° 30'
(0' - 153') ORE	
Coordinates of Contact	N 3907.3
	E 2692.5
Elevation of Contact	2857.6
(153' - 175') WASTE	
Coordinates of Bottom	N 3900.4
	E 2702.7
Elevation of Bottom	2879.3

R. E. #75

Coordinates of Collar	N 3970.32
	E 2597.19
Elevation of Collar	2757.45
Bearing	S 55° 57' E
Dip	±12° 30'
(0' - 225') ORE	
Coordinates of 1st. Contact	N 3846.8
	E 2778.5
Elevation of " "	2806.2
(225' - 240') WASTE	
Coordinates of 2nd Contact	N 3838.5
	E 2790.6
Elevation of " "	2809.5
(240' - 255') ORE	
Coordinates of Bottom	N 3830.3
	E 2803.7
Elevation of Bottom	2812.7

NOTE: R.E. #75 bottomed in ore. Footwall has been determined by previous drilling.

Respectfully submitted,

THE MOUNTAIN COPPER COMPANY, LTD.

MEMORANDUM

FROM
THE MOUNTAIN COPPER CO., LTD.
MATHESON.
SHASTA COUNTY. CALIFORNIA
Engineering Dept.
March 1, 1945

TO
THE MOUNTAIN COPPER CO., LTD.
Mr. Wm. F. Kett
San Francisco, Calif.

DIAMOND DRILLING CAMPAIGN

Following is the information on Diamond Drill Holes R.E. #79, R.E. #80, R.E. #81, and R.E. #82 surveyed Feb. 28, 1945.

R.E. #79
Coordinates of Collar----------------------N 4247.0
E 2727.8
Elevation of Collar---------------------- 2848.7
Bearing-----------------------------------N 12° 53' W
Dip---------------------------------------+ 22° 00'

(0'-18') ORE
Coordinates of Contact--------------------N 4263.3
E 2724.1
Elevation of Contact---------------------- 2855.4

(18'-30') WASTE
Coordinates of Bottom---------------------N 4274.1
E E 2721.6
Elevation of Bottom----------------------- 2859.9

R.E. #80
Coordinates of Collar----------------------N 4072.1
E 2687.9
Elevation of Collar---------------------- 2811.8
Bearing-----------------------------------N 27° 30' W
Dip---------------------------------------+ 1° 30'

(0'-90') ORE
Coordinates of Contact--------------------N 4151.9
E 2646.3
Elevation of Contact---------------------- 2814.2

(90'-115') WASTE
Coordinates of Bottom---------------------N 4174.1
E 2634.8
Elevation of Bottom----------------------- 2814.8

THE MOUNTAIN COPPER COMPANY, LTD.

MEMORANDUM

FROM
THE MOUNTAIN COPPER CO., LTD.
MATHESON.
SHASTA COUNTY. CALIFORNIA

TO
THE MOUNTAIN COPPER CO., LTD.

DIAMOND DRILLING CAMPAIGN
(Cont'd)

R.E. #81

Coordinates of Collar------------------------N 4070.3
E 2688.9
Elevation of Collar------------------------ 2815.8
Bearing------------------------------------N 25° 09' W
Dip--+ 60° 00'

(0'-41') ORE
Coordinates of Contact---------------------N 4088.9
E 2680.2
Elevation of Contact---------------------- 2851.3

(41'-60') WASTE
Coordinates of Bottom----------------------N 4097.4
E 2676.2
Elevation of Bottom----------------------- 2837.8

R.E. #82

Coordinates of Collar------------------------N 4062.2
E 2693.7
Elevation of Collar------------------------ 2811.7
Bearing------------------------------------S 28° 04' E
Dip--+ 3° 00'

(0'-65') ORE
Coordinates of Bottom----------------------N 4004.9
E 2724.2
Elevation of Bottom----------------------- 2815.1

This hole was drilled in ore for its entire depth and was not carried to a contact. It was drilled for assay samples.

Respectfully submitted,

Paul Kraai

THE MOUNTAIN COPPER COMPANY, LTD.

MEMORANDUM

FROM
THE MOUNTAIN COPPER CO., LTD.
MATHESON.
SHASTA COUNTY. CALIFORNIA
Engineering Dept.

TO
THE MOUNTAIN COPPER CO., LTD.
Mr. Wm. F. Kett
San Francisco, Calif.
February 24, 1945

DIAMOND DRILLING CAMPAIGN

The following is information on Diamond Drill Holes R.E. #76, R.E. #77, and R.E. #78 surveyed Feb. 19, 1945

R.E. #76:

Coordinates of Collar------------------------N 4245.67
E 2725.43
Elevation of Collar------------------------ 2847.71
Dip--- ±3° 30'
Bearing--------------------------------------N 60° 28'W

(0-17') ORE
Coordinates of Contact---------------------N 4254.1
E 2710.6
Elevation of Contact---------------------- 2848.7

(17'-40') WASTE
Coordinates of Bottom---------------------N 4265.4
E 2690.7
Elevation of Bottom----------------------- 2850.1

R.E. #77 :

Coordinates of Collar------------------------N 4246.42
E 2731.06
Elevation of Collar------------------------ 2847.65
Bearing--------------------------------------N 39° 44'E
Dip--- ± 3° 30'

(0'-29') ORE
Coordinates of Contact---------------------N 4268.7
E 2749.6
Elevation of Contact---------------------- 2849.6

(29'-45') WASTE
Coordinates of Bottom---------------------N 4280.9
E 2759.8
Elevation of Bottom----------------------- 2850.5

THE MOUNTAIN COPPER COMPANY, LTD.

MEMORANDUM

FROM
THE MOUNTAIN COPPER CO., LTD.
MATHESON.
SHASTA COUNTY, CALIFORNIA

TO
THE MOUNTAIN COPPER CO., LTD.

DIAMOND DRILLING CAMPAIGN
(Cont'd.)

R.E. #78:

Coordinates of Collar	N	4246.99
	E	2727.81
Elevation of Collar		2847.58
Bearing	N	12° 53' W
Dip		± 3° 30'
(0'-14') ORE		
Coordinates of Contact	N	4260.6
	E	2724.7
Elevation of Contact		2848.5
(14'-30') WASTE		
Coordinates of Bottom	N	4276.1
	E	2721.1
Elevation of Bottom		2849.4

Respectfully submitted,

Paul Kraai

THE MOUNTAIN COPPER COMPANY, LTD.

MATTIE LABORATORY SCRATCH SHEET

DATE Nov. 10, 1944

Mine Samples

LE#	DESCRIPTION	% Cu	% ZN	% S	OTHER
	1 Mine Car Sample date ? probably 10/1	1.12	2.94		
45	2 " " " " " " 10/2	1.60	2.86		
	3 J23 20'-30' Sldg 10/31 Sulfide	0.20	1.10		
6	4 " 30'-45' " " Waste	0.15	0.71		
	5 R.E. 7 cars No date —	1.44	2.40		
75	6 " 7 " " " —	1.29	2.68		
5	7 " 10 " " " —	1.81	3.79		
	8				
	9				
	10				
	11				
	12 cc: - CWH-PRK-WFK-JGH-RKM				
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ASSAYER H. Kenneth McCallum

THE MOUNTAIN COPPER CO., LTD.

MATTIE LABORATORY SCRATCH SHEET

DIAMOND DRILLS

L SAMPLES MARKED R.E.#84 [illegible] ON PREVIOUS
PORTS SHOULD BE 'J BLOCK # 24'

DATE APRIL 24, 1945

No.		DESCRIPTION		% CU	% ZN	% S	OTHER
284	1	J BLOCK #24	120'-130'	0.15	0.52		
5	2	" " "	130'-140'	0.23	0.52		
286	3	" " "	140'-150'	0.05	0.23		
	4	" " "	150'-160'	0.05	0.25		
288	5	" " "	160'-1708	TRACE	0.15		
9	6	" " "	170'-180'	0.05	0.15		
90	7	" " "	180'-190'	0.10	0.08		
91	8	" " "	190'-200'	0.10	0.12		
2	9	" " "	200'-210'	0.05	0.12		
293	10	" " "	210'-220'	0.05	0.03		
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	12						
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	14						
	15	C: PPK: WFK: JGH: EMB: RKM: CWM: : : : : :					
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R. KENNETH McCALLUM by H.E.C.
ASSAYER

THE MOUNTAIN COPPER CO., LTD.

MATTIE LABORATORY SCRATCH SHEET

DATE APRIL 19, 1945

DIAMOND DRILLS

No.		DESCRIPTION	% CU	% ZN	% S	OTHER
3	1	J-24 ~~R. B. #84~~ 80' - 90'	0.10	0.90		
174	2	" " " 90' -100'	0.10	0.67		
5	3	" " " 100' -110'	0.20	0.67		
176	4	" " " 110' -120'	0.25	0.67		
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	6					
	7					
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	11					
	12					
	13					
	14	✓ C: PPK: WFK: JGH: EMB: RKM: CWM: : : :				
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R. KENNETH McCALLUM BY H. E. C.
ASSAYER

THE MOUNTAIN COPPER CO., LTD.

MATTIE LABORATORY SCRATCH SHEET

DIAMOND DRILL SAMPLES J BLOCK # 25

DATE MAY 15, 1945

o.		DESCRIPTION	% CU	% ZN	% S	OTHER
14	1	J BLOCK # 25 100' - 110'	0.60	0.32		
	2	" " " 110' - 120'	0.30	0.68		
	3	" " " 120' -x130'	0.45	0.58		
17	4	" " " 1508 - 140'	0.40	0.51		
	5	" " " 140' - 150'	0.35	0.36		
58	6	" " " 150' - 160'	0.20	0.19		
	7	" " " 160' - 170'	0.20	0.36		
60	8	" " " 170' - 180'	0.45	0.19		
	9	" " " 180' - 190'	0.40	0.24		
	10					
	11					
	12					
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	14					
	15	C: PPK: WFK: JGH: EMB: RKM: CWM: : : : :				
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R. KENNETH McCALLUM by H.E.C.

ASSAYER

R. J. KETT
Assistant Manager

THE MOUNTAIN COPPER CO., LTD.

MATTIE LABORATORY SCRATCH SHEET

DIAMOND DRILL SAMPLES 'J BLOCK #25'

DATE MAY 11, 1945

No.	DESCRIPTION	% CU	% ZN	% S	OTHER
98	1 J BLOCK # 25 60' - 70'	0.10	0.65		
	2 " " " 70' - 80'	0.10	0.65		
00	3 " " " 80' - 90'	0.10	0.80		
	4 " " " 90' -100'	0.71	0.27		
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	20 C: PPK: WFK: JGH: RKM: EMB: CWM:				
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R. KENNETH McGALLIGH by H. E. C.

THE MOUNTAIN COPPER CO., LTD.

MATTIE LABORATORY SCRATCH SHEET

DATE MAY 9, 1945

DIAMOND DRILL J BLOCK #25

NO.	DESCRIPTION	% CU	% ZN	% S	OTHER
1	J BLOCK #25 0' - 10'	0.20	1.89		
2	" " " 10' - 20'	0.15	1.94		
3	" " " 20' - 30'	0.15	1.11		
4	" " " 30' - 40'	0.10	0.49		
5	" " " 40' - 50'	0.10	0.72		
6	" " " 50' - 60'	0.10	0.49		
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14	C: PPK: WFK: JGH: RHM: EMB: CWM: : : :				
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R. KENNETH McCALLUM by H.E.C.
ASSAYER

THE MOUNTAIN COPPER CO., LTD.

RICHMOND EXTENSION LABORATORY REPORT

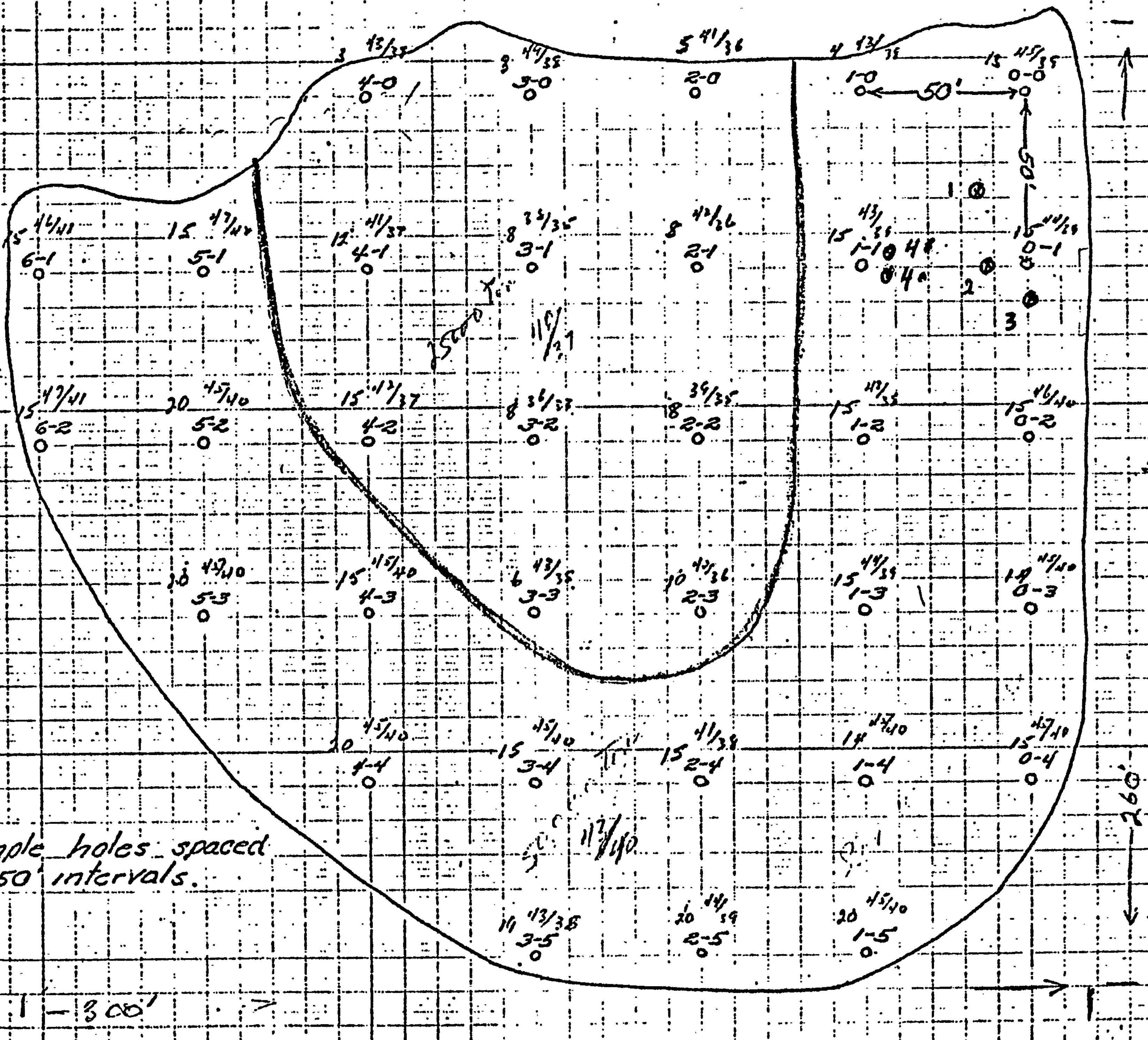
DATE Sept. 26, 1944

FILE NO	HOLE NO	DIST FROM COL	TYPE	SAMPLE WT	MATERIAL	ASSAYS %		
						CU	ZN	S
8899	J Blk. #19	50-60	s ldg		Sulfide	1.69	2.92	47.17
8900	"	60-70	"		"	1.16	5.10	45.53
8901	"	70-80	"		"	1.27	2.25	46.35
8902	J Blk #20	0-10	"		"	0.10	0.32	50.11
8903	"	10-20	"		"	0.10	0.70	49.95
8904	"	20-30	"		"	0.10	0.51	48.87
8905	"	30-40	"		"	0.10	0.79	48.39
8906	"	40-50	"		"	0.26	1.38	47.71
8907	RE #43	30-35	"		"	0.26	2.08	45.38
8908	"	35-40	"		"	1.15	3.80	45.62
8909	"	40-45	"		"	1.55	4.68	46.58
8910	"	45-50	"		"	1.65	6.25	46.30
8911	"	50-55	"		"	1.10	3.26	31.98
8912	"	55-60	"		Mixed	0.60	3.05	21.36
8913	"	60-65	"		"	0.60	3.12	21.84
8914	RE #42	5-25	"		Wasste	0.05	0.25	5.15
8915	RE #48	5-10	"		Sulfide	0.15	1.45	43.08
8916	"	10-15	"		"	0.20	1.91	47.78
9917	"	15-20	"		"	0.20	2.25	46.56
8918	"	20-25	"		"	0.15	1.64	45.45
8919	"	25-30	"		"	0.20	1.42	41.06

R. Kenneth McCallum

MINN. TAILING POND

Fb S/Fe



5-13-78
Samples

20,000 Ton
47/40

25,000 Ton
40/37

Sample holes spaced at 50' intervals.

1" – 300'

THE MOUNTAIN COPPER CO., LTD.

MATTIE LABORATORY SCRATCH SHEET

DATE 15 June

Minn Tailing Pond

E No.		DESCRIPTION	% Moisture	% CU	% ZN	% S	OTHER
59	1 Hole #2-1	0'-1'	18.9	0.20	0.81	58.46	34.
60	2	1'-2'	19.0	0.20	0.08	38.83	34.7
61	3	2'-3'	19.6	0.25	1.11	37.92	33.7
62	4	3'-8'	19.10	0.25	0.53	42.53	37.1
63	5	8'-10' Water level	24.8	0.30	0.69	43.20	39.1
	6	Wt. Average				41.45	36.0
	7						
64	8 Hole #2-2	0'-1'	16.2	0.20	1.07	39.50	35.4
65	9	1'-2'	18.7	0.10	0.11	38.07	33.8
66	10	2'-3'	19.5	0.40	Tr	40.43	35.0
67	11	3'-8'	23.60	0.35	1.07	39.27	35.4
	12	Wt. Average	20.36			39.29	35.1
	13						
68	14 Hole #2-3	0'-1'	18.20	0.20	0.21	39.39	35.9
69	15	1'-2'	20.80	0.30	0.69	39.59	35.0
0	16	2'-3'	21.70	0.30	0.56	37.07	33.7
71	17	3'-8a'	23.20	0.40	0.25	39.93	36.2
2	18	8'-10' Water level	25.1	0.35	0.78	42.20	38.1
	19	Wt. Average	22.5			40.04	36.
	20						
73	21 Hole #2-4	0'-1'	7.3	0.20	1.02	41.03	37.1
4	22	1'-2'	10.7	0.40	0.64	43.10	38.1
75	23	2'-3'	18.0	0.30	1.07	39.44	35.
6	24	3'-8'	23.8	0.30	0.98	40.42	38.9
7	25	8'-15'	16.1	0.35	0.85	43.03	39.1
	26	Wt. Average	17.8		.71	41.92	38.0

ASSAYER

THE MOUNTAIN COPPER CO., LTD.

MATTIE LABORATORY SCRATCH SHEET

DATE 15 June

LE No.	DESCRIPTION		% Moisture	% CU	% ZN	% S	OTHER
45	1 Hole #1-4	0'-1'	8.8	0.10	0.73	47.04	41.4
46	2	1'-2'	9.6	0.45	1.07	44.51	39.3
47	3	2'-3'	16.3	0.50	0.31	40.20	35.7
48	4	3'-8'	16.8	0.30	0.31	43.52	38.6
49	5	8'-14'	12.9	0.65	0.41	46.77	41.7
	6	Wt. Average	14.0			45.00	40.0
	7						
50	8 Hole #1-5	0'-1'	9.2	0.10	0.04	45.15	40.0
51	9	1'-2'	9.5	0.20	0.88	44.18	33.8
52	10	2'-3'	10.0	0.30	0.60	43.20	37.7
53	11	3'-8'	8.7	0.25	0.85	45.50	40.8
54	12	8'-15'	9.0	0.55	1.10	44.20	40.0
55	13	15'-20'	12.5	0.60	1.20	46.27	41.0
	14	Wt. Average	9.9			45.03	40.3
	15						
56	16 Hole #260	0'-1'	18.4	0.25	0.87	39.83	35.8
57	17	1'-2'	20.3	0.30	1.10	41.20	36.9
58	18	2'-5'	23.8	0.60	1.05	42.0	37.1
	19	Wt. Average	22.0		.74	41.40	36.8
	20						
	21						
	22						
	23						
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	25						
	26						

ASSAYER

THE MOUNTAIN COPPER CO., LTD.

MATTIE LABORATORY SCRATCH SHEET

DATE 15 June

Minn. Tailing Pond

E No.		DESCRIPTION			% Moisture	% CU	% ZN	% S	OTHER
1078	1	Hole #2-5	0'-1'		4.7	0.10	Tr	45.11	39.50
79	2		1'-2'		8.4	0.50	0.51	46.55	40.95
80	3		2'-3'		8.3	0.30	0.77	45.88	41.10
1	4		3'-8'		12.2	0.35	0.86	43.45	39.51
82	5		8'-14'		14.6	0.15	0.51	42.91	38.90
3	6		14'-20'		16.1	0.60	0.98	46.10	40.05
	7			Wt. Average	13.38			44.44	39.59
	8								
4	9	Hole#3-0	0'-1'		17.4	0.30	0.34	43.71	38.75
85	10		1'-3'	Water Level	23.5	0.35	0.64	41.28	37.85
	11			Wt. Average	21.4			42.09	38.15
	12								
6	13	Hole #3-1	0'-1'		16.0	0.45	0.74	41.61	3705
87	14		1'-2'		19.8	0.30	0.69	41.03	38.55
3	15		2'-3'		23.3	0.30	0.78	38.89	3539
89	16		3'-8'	Water Level	25.1	0.15	0.51	37.86	3403
	17			Wt. Average	23.0			38.85	3535
	18								
	19	Hole #3-2	0'-1'		17.9	0.30	0.20	40.97	36.50
	20		1'-2'		19.5	0.45	1.24	39.87	35.85
	21		2'-3'		16.1	0.30	0.77	36.08	32.75
	22		3'-8'		28.2	0.30	0.60	35.98	32.85
	23			Wt. Average	24.3		.68	36.98	33.64
	24								
	25								
	26								

ASSAYER ______________________

THE MOUNTAIN COPPER CO., LTD.

MATTIE LABORATORY SCRATCH SHEET

DATE 15 June

Minn. Tailing Pond

E No.	Description	% Moisture	% CU	% ZN	% S	OTHER Fe.
094	1 Hole #3-3 0'-1'	18.9	0.10	0.51	39.84	36.4
5	2 1'-2'	21.5	0.20	0.34	38.09	34.
96	3 2'-3'	25.8	0.30	0.90	36.30	33.
7	4 3'-8' Water Level	----	0.30	0.60	45.97	40.9
	5 Wt. Average	23.0			43.01	38.6
	6					
8	7 Hole #3-4 0'-1'	13.1	0.20	0.04	45.01	39.6
	8 1'-2'	14.4	0.50	0.47	42.80	37.9
0	9 2'-3'	15.7	0.40	0.73	39.67	35.2
101	10 3'-8'	12.9	0.30	0.98	41.83	37.25
2	11 8'-15'	13.7	0.40	0.85	45.46	40.05
	12 Wt. Average	13.6			43.66	38.6
	13					
103	14 Hole #3-5 0'-1'	6.7	0.10	0.04	47.34	41.4
4	15 1'-2'	7.7	0.25	0.37	46.08	40.8
105	16 2'-3'	10.0	0.45	0.63	45.31	40.25
06	17 3'-8'	10.2	0.35	0.94	44.52	39.10
107	18 8'-14'	8.9	0.30	1.03	46.95	41.10
08	19 14'-19'	14.8	0.40	1.08	44.83	39.79
	20 WT. Average	10.6			45.59	40.19
	21					
9	22 Hole # 4-0 0'-1'	12.6	0.40	0.60	45.47	39.65
110	23 1'-2'	19.10	0.40	0.73	41.40	38.40
1	24 2'-3' Water Level	26.10	0.40	0.69	42.77	38.35
	25 Wt. Average	19.3		.64	43.33	38.55
	26					

ASSAYER

THE MOUNTAIN COPPER CO., LTD.

MATTIE LABORATORY SCRATCH SHEET

DATE 15 June

Minn. Tailing Pond

E No.	Description		% Moisture	% CU	% ZN	% S	% Fe OTHER
112	1 Hole #4-1	0'-1'	13.8	0.35	0.86	42.11	37.3
13	2	1'-2'	14.4	0.45	0.35	42.46	37.7
114	3	2'-3'	13.6	0.20	0.35	42.00	37.5
15	4	3'-8'	12.8	0.30	0.36	39.03	35.3
116	5	8'-12' Water Level	13.6	0.25	0.38	44.05	39.3
	6	Wt. Average	15.5			41.50	37.45
	7						
17	8 Hole #4-2	0'-1'	13.1	0.20	0.21	43.53	38.4
18	9	1'-2'	10.6	0.45	0.54	40.13	35.8
119	10	2'-3'	15.5	0.30	0.38	41.55	37.0
20	11	3'-'	22.4	0.30	0.77	38.63	34.4
121	12	8'-15'	24.3	0.30	0.30	44.06	39.35
	13	Wt. Average	21.9			42.20	37.50
	14						
22	15 Hole #4-3	0'-1'	11.0	0.10	0.09	43.72	38.30
123	16	1'-2'	16.10	0.30	0.30	39.01	35.9
24	17	2'-3'	18.8	0.35	0.77	40.07	36.0
125	18	3'-8'	----	0.45	1.01	47.25	41.5
26	19	8'-15'	20.6	0.25	0.78	46.16	40.3
	20	Wt. Average	19.01		.63	45.49	40.3
	21						
	22						
	23						
	24						
	25						
	26						

ASSAYER

THE MOUNTAIN COPPER CO., LTD.

MATTIE LABORATORY SCRATCH SHEET

DATE ~~[illegible] 15~~

~~Minn. Tailing Pond~~

LE No.	DESCRIPTION		~~% Moisture~~	% CU	% ZN	% S	~~Fe~~ OTHER
127	Hole #4-4	0'-1'	8.5	0.10	0.08	44.71	40.
128		1'-2'	8.7	0.45	0.40	44.[illegible]	39.
129		2'-3'	8.9	0.45	0.58	44.92	39.
130		3'-8'	11.2	0.40	0.98	42.29	37.
131		8'-15'	9.9	0.45	1.15	46.87	42.
32		15'-20'	12.8	0.30	1.10	47.10	42.
		Wt. Average	10.8			45.47	40.
133	Hole #5-1	0'-1'	7.2	0.30	0.77	46.65	41.1
134		1'-2'	12.5	0.40	0.39	43.85	38.7
35		2'-3'	15.8	0.45	1.02	39.78	36.
136		3'-8'	9.2	0.30	0.77	43.10	39.1
57		8'-15'	8.7	0.67	1.17	47.42	42.0
		Wt. Average	9.5				
38	Hole #5-2	0'-1'	8.5	0.25	0.34	43.95	39.
159		1'-2'	14.6	0.20	0.40	44.74	39.
40		2'-3'	15.0	0.25	0.57	42.87	38.7
141		3'-8'	13.9	0.20	0.81	45.77	40.
42		8'-15'	15.0	0.40	1.10	46.25	41.1
143		15'-20'	14.5	0.35	1.18	47.05	42.1
		Wt. Average	14.3		.75	45.96	40.

ASSAYER

THE MOUNTAIN COPPER CO., LTD.

MATTIE LABORATORY SCRATCH SHEET

DATE 15 June 49

Menn. Tailing Pond

LE NO.		DESCRIPTION		% Moisture	% CU	% ZN	% S	%Fe OTHER
1144	1 Hole #5-5	0'-1'		7.4	0.25	0.08	45.04	40.5
145	2	1'-2'		6.9	0.30	0.04	45.19	39.5
1146	3	2'-3'		9.3	0.35	0.04	44.31	39.
147	4	3'-8'		12.0	0.30	0.04	43.04	38.6
1148	5	8'-14'		12.8	0.25	1.00	45.78	40.6
149	6	14'-20'		14.0	0.35	1.25	46.10	41.0
	7		Wt. Average	12.2			45.31	40.13
	8							
150	9 Hole #6-1	0'-1'		6.8	0.20	0.21	46.40	41.4
1151	10	1'-2'		6.4	0.35	0.68	45.77	41.40
152	11	2'-3'		5.5	0.45	1.15	46.39	41.
1153	12	3'-8'		8.9	0.35	0.78	46.25	41.0
154	13	8'-15'		12.1	0.55	0.98	47.00	41.60
	14		Wt. Average	9.9			46.60	41.42
	15							
1155	16 Hole #6-2	0'-1'		5.7	0.15	0.04	47.20	41.95
156	17	1'-2'		4.60	0.30	0.21	47.14	42.0
157	18	2'-3'		5.50	0.50	0.70	47.23	41.85
158	19	3'-8'		5.8	0.40	0.77	47.66	42.05
159	20	8'-15'		10.5	0.35	1.05	46.80	41.25
	21		Wt. Average	8.6		.62	47.16	41.66
	22							
	23							
	24							
	25							
	26							

ASSAYER

THE MOUNTAIN COPPER CO., LTD.

MATTIE LABORATORY SCRATCH SHEET

DATE 15 June

Minn. Tailing Pond

LE No.		DESCRIPTION		% Moisture	% CU	% ZN	% S	OTHER
30	1	Hole #1-1	0'-1'		0.15	0.34	43.10	38.75
1	2		1'-2'	17.8	0.30	0.34	40.77	39.0
32	3		2'-3'	13.8	0.25	0.60	40.21	35.5
3	4		3'-8'	17.1	0.35	0.98	43.63	39.7
34	5		8'-15'	17.0	0.30	1.16	45.30	40.2
	6		Wt. Average	15.7			43.96	39.5
	7							
5	8	Hole # 1-2	0'-1'	14.6	0.10	0.77	43.35	38.7
6	9		1'-2'	15.0	0.30	1.07	40.00	36.5
7	10		2'-3'	16.1	0.30	0.43	40.64	36.1
8	11		3'-8'	17.3	0.30	0.39	44.61	40.2
9	12		8'-14'	19.5	0.20	0.73	41.87	37.3
	13		Wt. Average	17.8			42.73	38.3
	14							
0	15	Hole #1-3	0'-1'	8.4	0.10	0.04	45.03	39.3
41	16		1'-2'	12.9	0.30	0.85	39.67	36.2
2	17		2'-3'	11.9	0.25	0.21	43.86	38.1
43	18		3'-8'	16.1	0.30	0.51	44.71	39.9
4	19		8'-15'	15.1	0.30	1.15	45.02	39.1
	20		Wt. Average	14.6		.63	44.48	39.1
	21							
	22							
	23							
	24							
	25							
	26							

ASSAYER

THE MOUNTAIN COPPER CO., LTD.

MATTIE LABORATORY SCRATCH SHEET

DATE ~~15 June~~

Minn. Tailing Pond

E No.		Description		%Moisture	% CU	% ZN	% S	OTHER
99	1	Hole #0-0	0'-1'	7.8	0.15	0.17	47.70	42.0
00	2		1'-2'	6.9	0.30	0.64	46.40	40.9
001	3		2'-3'	13.4	0.50	0.30	41.65	36.7
02	4		3'-5'	8.7	0.40	1.03	45.00	40.
003	5		5'-8'	13.8	0.35	1.28	43.91	39.0
04	6		8'-13'	15.0	0.40	1.08	46.57	40.4
	7		Wt. Average	12.5			45.34	39.9
	8							
5	9	Hole# 0'-1'	0'-1'	1.5	0.30	0.45	45.75	40.5
006	10		1'-2'	8.3	0.30	0.69	45.03	40.0
7	11		2'-3'	10.1	0.35	1.11	45.00	39.8
008	12		3'-8'	14.80	0.10	0.04	43.06	39.
9	13		8'-15'	13.9	0.25	0.55	45.95	40.3
	14		Wt. Average	12.8			44.85	39.9
	15							
010	16	Hole# #0-2	0'-1'	9.60	0.15	0.08	45.77	40.0
	17		1'#2'	6.10	0.35	0.11	47.43	41.3
2	18		2'-3'	6.2	0.35	0.45	47.24	40.1
3	19		3'-8'	10.7	0.35	0.94	45.06	39.
	20		8'-14'		0.40	1.54	46.53	40.5
	21		Wt. Average	9.4		.66	46.07	40.09
	22							
	23							
	24							
	25							
	26							

✓

cc: LTK, CWM, TPB, File

ASSAYER Stanley I. Watson

THE MOUNTAIN COPPER CO., LTD.

MATTIE LABORATORY SCRATCH SHEET

DATE 15 June

Minn. Tailing Pond

LE No.		DESCRIPTION		% Moisture	% CU	% ZN	% S	OTHER
15	1	Hole #0-3	0'-1'	14.6	0.25	0.04	41.42	37.04
16	2		1'-2'	14.70	0.40	0.30	43.89	38.4
17	3		2'-3'	10.9	0.35	1.03	43.30	38.95
18	4		3'-5'	9.5	0.25	0.56	45.72	40.83
19	5		5'-8'	11.1	0.35	1.22	47.09	41.3
20	6		8'-14'	12.3	0.40	1.00	46.85	40.70
	7		Wt. Average	12.6			45.89	40.42
	8							
21	9	Hole #0-4	0'-1'	8.30	0.15	0.04	45.61	41.23
22	10		1'-2'	9.70	0.25	0.60	44.40	37.73
23	11		2'-5'	9.2	0.40	0.82	44.80	39.07
24	12		5'-8'	11.1	0.40	1.37	45.55	40.23
25	13		8'-15'	11.05	0.32	1.00	46.21	40.4
	14		Wt. Average	9.2			45.64	40.00
	15							
26	16	Hole #1-0	0'-1'	12.8	0.30	0.39	41.78	38.12
27	17		1'-2'	16.4	0.30	0.08	42.35	37.63
28	18		2'-3'	13.7	0.10	0.25	43.18	38.05
29	19		3'-5' Bottom	29.5	0.30	0.94	44.11	38.15
	20		Wt. Average	16.4		.64	43.11	38.03
	21							
	22							
	23							
	24							
	25							
	26							

ASSAYER

THE MOUNTAIN COPPER CO., LTD.

MATTIE LABORATORY SCRATCH SHEET

DATE 15 June 49

Tailing Pond #1

LE No.	DESCRIPTION		% Moisture	% CU	% ZN	% S	OTHER %Fe.
1160	1 Hole #1A	0'-1'	8.0	0.20	0.51	44.58	39.6
1161	2	1'-2'	8.2	0.40	0.77	44.6	40.0
1162	3	2'-3'	9.9	0.85	1.11	43.81	39.5
1163	4	3'-8'	13.0	0.40	1.80	45.3	41.0
1164	5	8'-14'	14.6	0.40	1.84	45.1	40.3
1165	6	14'-19'	16.0	0.90	2.15	46.20	41.1
	7	Wt. Average	13.5			45.47	40.0
	8						
166	9 Hole #2A	0'-1'	3.3	0.20	0.24	45.84	40.9
1167	10	1'-3'	5.1	0.30	0.73	49.1	43.6
168	11	3'-8'	8.5	0.40	1.38	48.2	42.3
1169	12	8'-14'	10.1	0.50	1.93	47.51	42.4
170	13	14'-20'	9.8	0.65	2.50	48.10	42.6
	14	Wt. Average	8.1			47.95	42.51
	15						
171	16 Hole #3A	0'-1'	13.5	0.30	0.39	43.93	39.6
1172	17	1'-3'	15.0	0.40	1.54	46.04	41.0
173	18	3'-8'	19.0	0.35	1.90	45.83	40.1
1174	19	8'-15'	14.5	0.45	2.00	47.20	42.1
175	20	15'-20'	18.7	0.60	2.40	47.05	42.70
	21	Wt. Average	16.8		1.41	46.69	41.7
	22						
	23						
	24						
	25						
	26						

ASSAYER

THE MOUNTAIN COPPER CO., LTD.

MATTIE LABORATORY SCRATCH SHEET

DATE 15 June 49

Tailing Pond #1

LE No.	DESCRIPTION		% Moisture	% CU	% ZN	% S	OTHER % Fe
1176	Hole #4A	0'-1'	8.0	0.20	0.77	48.54	43.3
77		1'-3'	9.8	0.65	2.44	47.28	41.9
1178		3'-8'	11.7	0.45	2.14	46.72	41.1
79		8'-15'	12.8	0.20	1.53	45.00	39.4
80		15'-20'	15.0	0.60	2.82	48.19	42.
		Wt. Average	12.5			46.65	41.0
1181	Hole #1B	0'-1'	8.0	0.10	0.26	45.72	40.8
82		1'-3'	11.1	0.30	1.01	46.17	40.6
183		3'-8'	11.0	0.40	1.97	47.10	41.
84		8'-14'	12.9	0.60	2.53	46.73	41.
185		14'-20'	10.5	0.65	2.80	47.26	42.9
		Wt. Average	11.3			46.83	41.5
86	Hole #2B	0'-1'	6.7	0.25	0.60	44.52	39.9
87		1'-3	8.4	0.50	1.28	46.10	41.0
188		3'-8'	11.0	0.45	1.87	45.90	40.7
89		8'-14'	9.2	0.76	2.40	47.29	41.2
190		14'-18'	10.8	0.60	2.25	47.05	41.1
		Wt. Average	9.8			46.55	40.9
191	Hole #3B	0'-1'	6.7	0.10	0.47	45.47	41.2
92		1'-3	8.5	0.30	1.03	46.13	40.9
193		3'-8'	14.0	0.40	1.80	46.17	41.10
94		8'-15'	9.0	0.45	1.65	45.68	40.7
195		15'-19'	10.5	0.62	2.26	47.10	41.7
		Wt. Average	10.5		1.77	46.15	41.11

ASSAYER ______

B. 1.

List of Data Available at Iron Mountain Mines Office, Sacramento, California

IRON MOUNTAIN MINES. INC.

IRON MOUNTAIN MINES

INDEX

ID	NAME
Folder 1-40p	The West Shasta District, Shasta County, California, By Hillman, Schumacher and Gosling, U.S. Bureau of Mines
Folder 2-32p	Ore Reserves - Brick Flat Ore Body 1963 - Economics By Kaiser Engineers
Folder 3-58p	U.S.G.S. Institute Spectrcal IP Measurements: Open - File Report 81, 1981
Folder 4-123p	Iron Mountain Mines - Ore Reserves, Engineering, Drill Logs, and Assay Data, April 1963
Folder 5-32p	Iron Mountain Mines - Massive Sulphide and Gossan Ore Reserves Preliminary Feasibility Report - Financial and Operational Study - February 1980
Folder 6-28p	Verification of Iron Mountain Mines Ore Reserves and Stripping Data for Open Pit Operation
Folder 7-34p	Fifty years of Operation by the Mountain Copper Company, Ltd., in Shasta County, California. By William F. Kett
Folder 8-91p	Iron Mountain Mines Diamond Drill Logs and Assays - Brick Flat, Richmond, Matlie, Hornet, and Complex
Folder 9-9p	Iron Mountain Mines - Metallurgical Data and Flowsheet of the Mountain Copper Company , Flotation Plant at Iron Mountain, June 1944, By E.M. Bagley, Mill Superintendent, Bureau of Miners' Metallurgical Data and Pyrite Roasting Outline
Folder 10-182p	Iron Mountain Mines - History and Geology
Folder 11-43p	Iron Mountain Mines - Ore Reserves - Massive Sulphides, and Gossan
Folder 12-16p	Iron Mountain Mines - Maps Index: Brick Flat, Richmond, Hornet, U.S.G.S Maps
Folder 13-5p	General Data, Water Analysis, Ion Exchange, Copper Precipitation, Rail Siding and Aerial Tram
Folder 14-20p	Other Projects.

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2-3	Camden and Okosh Assays.
3-8	Brick Flat and Richmond Extension Logs and Assays.
4-6	Complete Diamond Drill and Weighted Assay of Richmond Extension Copper-Zinc Ore Zone and Attached Sketch of "I" Block.
5-5	Richmond Extension - RE 173-203 - Diamond Drill Logs and Assays.
6-7	Diamond Drilling at the Richmond Mine
7-25	Mattie Diamond Drill Samples and Assays, and Attached Drill and Assay Map.
8-19	Hornet Exploration Report and Diamond Drill Logs and Assays.
9-1	Assay Map of Mattie Workings – Richmond Level
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IRON MOUNTAIN MINES, INC.

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2-1	Flotation Test.
3-6	Metallurgical Data.
4-1	Flowsheet - Mountain Copper Company.

IRON MOUNTAIN MINES, INC.

FOLDER 10-182p

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1-10	"Iron Mountain Mine Plans Renewed Activity", California Builder and Engineer - September 22, 1978, and Location Maps.
2-16	Regional Geology - Iron Mountain Mine.
3-14	General Geology - Geomorphology and Physiography.
4-16	Geology and Base-Metal Deposits of West Shasta Copper-Zinc District Shasta County, California Geological Survey Professional Paper 285.
5-17	Division of Mines - Geology of the Massive Sulfide Deposits at Iron Mountain Shasta County, Special Report 14.
6-7	Open Pit Replaces Underground Mine at Mountain Copper Pyrite Operation.
7-6	Shasta County - Mines and Mineral Resources - County Report 6, Iron Mountain Mines - Brief History and Geology.
8-11	The Mountain Copper Story - By C. W. McClung.
9-23	California Geology - January, 1972, Volume 25, No. 1.
10-14	Copper Bulletin 176 - Mineral Commodities of California.
11-13	A. Bulletin No. 50 - Shasta County Mountain Copper. B. Report No. 13 P. 63 - Copper-Shasta and Sierra. C. Report No. 8 PP. 566-567 - Report of the State Mineralogist. D. Report No. 29 PP. 38-39 - Report of the State Mineralogist. E. Report No. 14 PP. 769-770 - Shasta County. F. Report No. 10 PP. 633-634 - Report of the State Mineralogist. G. Report No. 12 P. 377 - Silver-San Bernardino and Shasta County.
12-4	The Copper Handbook (1911).
13-15	Symposium on Strata-Bound Sulphides.

Also - See Folder 7.

FOLDER 11-43p

ID	NAME
1-2	Massive Sulphide and Gossan Ore Reserves.
2-1	Mountain Copper Mine - Pyrite Ore Inventory.
3-14	Southwestern Engineering Report.
4-1	Iron Mountain Pyrite Grade - By L. E. Manion, Stauffer Chemical Company.
5-13	Massive Gossan Deposit - By L. E. Manion.
6-7	Gossan Sands and Gossan Ore - By L. E. Manion.
7-5	Gossan Mill Tailing - Tonage and Assays.

IRON MOUNTAIN MINES, INC.

FOLDER 12-16p

ID	NAME
1-8	Iron Mountain Mines - Mine Maps.
2-1	Underground Workings of the Iron Mountain Mine, Shasta County, California.
3-1	Geologic Sections - Ore Bodies of the Iron Mountain Mine, Shasta County, California.
4-1	Map and Section Showing Ore Bodies.
5-1	Map Showing Location of Mines West Shasta Copper-Zinc District.
6-1	Map Showing Trend of Planar Structures in the West Shasta Copper-Zinc District.
7-1	Geologic Map and Sections of the Iron Mountain Area, Shasta County, California.
8-1	Geologic Maps and Section of the Lone Star Prospect, Shasta County, California.
9-1	Geologic Sections of the West Shasta Copper-Zinc District, Shasta County, California.

IRON MOUNTAIN MINES, INC.

FOLDER 13-5p

ID	NAME
1-1	Morse Laboratory Report on Mine Water Samples.
2-1	Iron Mountain Run-Off Treatment Flowsheet.
3-1	Iron Mountain Mines Boulder Creek Copper Precipitate Plant.
4-1	Aerial Tramway Data.
5-1	Iron Mountain Mines - Rail Siding.

IRON MOUNTAIN MINES, INC.

FOLDER 14-20p

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1-12	Iron Mountain Mines - Gossan Mill Tailings - Gold and Silver project operational and Financial Data.
2-8	Iron Mountain Mines - Hydroelectric Power Project.

MINERAL EXPLORATION • DEVELOPMENT • MINING • PROCESSING
PRODUCERS OF INDUSTRIAL AND AGRICULTURAL MINERALS

IRON MOUNTAIN MINES, INC.

Index to Iron Mountain Mine Data At Iron Mountain Mine, Inc.
Sacramento office.

Explanation

1. Surface
2. Underground
3. Cross-Sections
4. Assays
5. Stripping

R - Richmond and general area including Hornet, Brick Flat, Camden, Mattie.

H - Hornet (including Mattie).

BF - Brick Flat.

RMO- Richmond Mine Maps.

HLM- Hornet - Lawson Mine Maps.

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1-R	Surface
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1-R-3a.	Plan showing location of Diamond Drill Holes.
1-R-4	Hornet-Richmond ore bodies (also Mattie, Complex and Camden) 1951.
1-R-5	Area topo map showing ore bodies.
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1-R-7	Profiles to accompany 1-R-6.
1-R-8	Plan showing exploration work of the Mountain Copper Company (see 2-D-2) 1909.
1-R-9	Plan showing relation of Hornet, Richmond, and Mattie to Scott Level.
1-R-10	Brick Flat open pit.

2 - Underground

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2-S	**Stope development** (also in RMO 12-18 and Hornet extension 2-H-2 and 3, exploration subhead).
2-S-1	Pillar recovery plan for Richmond extension Cu-Zn stopes - 1949.
2-S-2	H-2, D-2, STope Development - 1/13/53.
2-D	**Drilling**
2-D-1	Chart of Diamond Drill holes 1898-1914 (blue print Reproduction-not labeled. .
2-D-2	Cross section near New Camden Tunnel on Plane N42°W showing DD holes projected upon it. 1909 revision.
2-D-3	Diamond Drilling J Blcok and Richmond Extension - (1945).
2-D-4	Diamond Drill Map - Richmond Ore body (1952).
2-D-5	Diamond Drill Map - Richmond Ore Body composite (incomplete) 1971.
2-D-6	Brick Flat Diamond Drill Map (see 2-A-5, 2-A-6 for assays)

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3-R-A	Cross Section A-A through ore bodies.
3-R-2	2-2'
3-R-1	1-1'
3-R-10	10-10'

Longitudinal sections through ore bodies.

3-R-1-1	L/Sections L-0 and L-I
3-R-1-2	L/Sections L-II and L-III

Sections Transverse to ore bodies.

3-R-2-1	Index (sheet 1)
-2	Sections 1-10 (sheet 2)
-3	Sections 11-19 (sheet 3)
-4	Sections 20-23 (sheet 4)
-5	Sections 24-32 (sheet 5)

3-R-4-1	Vertical section of Richmond ore body.
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4-A Assays

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4-A-3	Assay Map - Richmond workings, Hornet Mine, 1924.
4-A-4	Exploration Map - Upper Richmond ore body, 1947 (xerox red) showing DDH location.
4-A-5	Assay sheet - Upper Richmond ore body (use w/ 2-A-4).
4-A-6	Assay sheet - Upper Richmond ore body (use w/ 2-A-4).

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5-R0-4	Sections for stripping - 1958.
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5-R1-1	Sections for stripping estimates 1961-1963 Section 1200E.
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RMO-3	Surface Drill Holes
RMO-4	Surface Drill Holes
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RMO-7	Richmond Underground Drill Holes
RMO-8	Richmond Haulage levels - stages of Development
RMO-8a	Richmond Haulage levels - stages of Development
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RMO-10	2600 Haulage
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RMO-11a	Lawson Extension and Richmond Winze Further Development
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RMO-12a	Stope sheet showing A & B stopes
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RMO-14	Plan of stopes - 2600 level
RMO-15	Plan of stopes ?
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RMO-18	L-stage development - plan
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RMO-20	Grizzly floor - Richmond
RMO-21	Mill floor - 3040 El. - 1"=20'
RMO-22	Haulage level 3005 El 1"=20'

H Hornet Extension Exploration

1-H-1	Surface Hornet Extension Exploration (showing ore body w/ workings longitudinal section and index cross sections 22,26,30,34).
1-H-2	Hornet Quarry

Level Map

2-H-1	Hornet Extension Exploration - Drill location, level, cross section locations 23-27, longituding section L-IV
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3	Cu-Zn Ore Reserves - stoping.

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3-H-1-2	Pictorial block diagram showing possible faulting of Mattie ore body.

Stripping

5-H-1	Preliminary estimate for stipping Hornet Workings 1935/1942.
5-H-2	Hornet Quarry - Section axis 1944.
5-H-3	Detailed estimate of surface stripping old Hornet body.
5-H-4	Detailed estimate of waste stripped from Hornet Quarry.
5-H-5	Detailed estimate of waste stripped from Hornet Quarry.

Hornet-Lawson Mine Maps - Reproduction from blueprints - not labeled.

H-LM-1	Plan first level Hornet mine.
H-LM-2	Hornet-Lawson cover sheet w/workings - no explanation. No. 1 sheet and No. 2 sheet 2200' level.
H-LM-3 through 2H-LM-4	2250' through 2500' levels, copies of blueprints may not reproduce.

B. 2.

Other Publications and Articles on Iron Mountain Mines and the West Shasta Mining District.

B. 2. OTHER PUBLICATIONS

Prospecting for Deep Volcanogenic Ore. Julian Boldy, CIM Bulletin, October 1981.

Mercury Dispersion Halos as Ore Guides for Massive Sulfide Deposits, West Shasta District, California. Friedich, G.H., and Hawkes, H.E., Mineral Deposits, V. 2, 1966.

Geology of the Shasta King Mine, Shasta County, California. Kinkel, A.R., and Hall, W.E., California Division of Mines Special Report 16, December 1951.

Economics geology of the French Gulch (15') Quadrangle, Shasta and Trinity Counties, California. Albers, J.P., and Sandburg, C.H., California Division of Mines Special Report 85, 1965.

A Lithologic - Tectonic Framework for the Metallogenic Provinces of California. Albers, J.P., Economic Geology, V.76, June - July 1981.

Geology and Base-Metal Deposits of West Shasta Copper-Zinc District, Shasta County, California. Kinkel, A.R. et. al., U.S.G.S. Professional Paper 285, 1956.

C.

Definitions of Kaiser Engineers Estimate Types.

comparison of estimates

ITEM	TYPE I	TYPE II	TYPE III	TYPE IV
Site				
Plant capacity	Assumed	Preliminary	Optimized	Finalized
Geographical location	Assumed	General	Approximate	Specific
Maps and surveys	None	If available	Available	Detailed
Soil and foundations tests	None	None	Preliminary	Final
Site visits by project team	Possibly	Recommended	Essential	Essential
Process				
Process flowsheets	Assumed	Preliminary	Optimized	Finalized
Bench-scale tests	If available	Recommended	Essential	Essential
Pilot plant tests	Not needed	Recommended	Recommended	Essential
Energy and material balances	Not essential	Preliminary	Optimized	Finalized
Facilities Design				
Nature of facilities	Conceptual	Possible	Probable	Actual
Equipment selection	Hypothetical	Preliminary	Optimized	Finalized
General arrangements, mechanical	None	Minimum	Preliminary	Complete
General arrangements, structural	None	Outline	Outline	Preliminary
General arrangements, other	None	Minimum	Outline	Preliminary
Piping drawings	None	None	One-line	Some detail
Electrical drawings	None	None	One-line	Some detail
Specifications	None	Performance	General	Detailed
Basis for Capital Cost Estimating				
Estimates prepared by	Project Engr	Sr Estimators	Sr Estimators	Est Dept
Vendor quotations	Previous	Single source	Multiple	Competitive
Civil work	Rough sketch	Drawing estimate	Drawing estimate	Take-offs
Mechanical work	% of machinery	% of machinery	Man-hours/ton	Man-hours/ton[1]
Structural work	Rough sketch	Prelim drawings	Take-off/ton	Take-off/ton[1]
Piping and instrumentation	% of machinery	% of machinery	Take-off	Take-off[1]
Electrical work	$ per hp	$ per hp	Take-off	Take-off[1]
Indirect costs	% of total	% of total	Calculated	Calculated
Contingency[2]	20-25%[2]	15-20%[2]	15%[2]	10%[2]
Operating Cost Determination				
Labor rates	Assumed	Investigate	Get contracts	Get contracts[3]
Labor burden	Assumed	Calculated	Calculated	Calculated[3]
Power costs	Assumed	Actual	Actual	Contract[3]
Fuel costs	Assumed	Verbal quote	Letter quote	Contract[3]
Expendable supplies	Assumed	Verbal quote	Letter quote	Contract[3]
Reagents	Assumed	Verbal quote	Letter quote	Contract[3]
Parts	Assumed	Verbal quote	Letter quote	Letter quote
Economic Analysis D.C.F.	Not meaningful	If requested	If requested	If requested
Use of Estimates	Comparison rejection	Feasibility	Budget	Funding

Notes: 1 Often subject to subcontract bids.

2 In this definition the percentage assigned to contingencies is a judgment factor and is not to be interpreted as meaning that estimates are necessarily accurate within this percentage range, nor is there an implied reference to any order of accuracy.

3 Contracts can be solicited if project is near-term.

type I estimate

DEFINITION OF TYPE I ESTIMATE

For Economic Feasibility Studies

Basis

A Type I estimate can be based on assumed flowsheets and process requirements. Test work is desirable but not an absolute requirement if the process is generally well known. A visit to the actual plant site would be helpful. Design drawings are not prepared beyond sketches made by the project engineer. Equipment lists are prepared from the assumed flowsheets and priced on updated former quotations, telephone quotations from vendors' representatives, and occasionally letter quotes. Equipment specifications are not required, nor are formal vendors' proposals solicited. Total facility costs can be determined by roughly estimating the shelter volume and foundation concrete and applying unit costs. Percentage factors are used for installation of machinery. Electrical costs other than motors and substations are estimated as unit costs per installed horsepower. Percentage factors can be used for contractor's field overhead, construction plant, construction camp, design costs, procurement, and contractor's profit.

Information Required

It is necessary to know the geographical area of the project, the capacity required by the client, and some idea of the gross value of the raw material to be processed. For calculating operating costs, it is helpful to know the range of local labor rates, statutory and union required labor burden, and the approximate cost of basic supplies such as fuel, power, explosives, grinding media, reagents, etc.

Skills Employed

A Type I estimate can usually be made by a project engineer with experience in the industry covered by the feasibility study. Generally, design drawings and specifications are not prepared; however, recent Kaiser Engineers' experience in the construction of industrial facilities is used for updating percentage factors and other unit costs. Often the project engineer depends heavily on his personal acquaintances among vendors and operating companies and on his own experience in the industry.

Use of Estimates

A Type I estimate contains heavy contingencies.* These may range from 20% to 25% on structures and 10% to 15% on machinery. Kaiser Engineers believes that a Type I estimate may frequently be suitable to reject a project, but it is seldom adequate for positive acceptance of a project. A Type I estimate is often used for preliminary comparison of alternates and generally describes a hypothetical installation; it seldom becomes the basis for even conceptual design. It may, however, indicate the desirability of expanding the estimate to a Type II or Type III.

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* In this definition the percentage assigned to contingencies is a judgment factor and is not to be interpreted as meaning that estimates are necessarily accurate within this percentage range, nor is there an implied reference to any order of accuracy.

type II estimate

DEFINITION OF TYPE II ESTIMATE

For Economic Feasibility Studies

Basis

For a Type II estimate there should be sufficient bench-scale test work to determine the process flowsheet and approximate material balance, and to size various items of process machinery. One or more visits to the actual plant site are mandatory. Minimum general arrangement drawings are prepared, and major equipment lists are based on recent letter quotations from vendors. Specifications are not prepared, and inquiries are usually limited to a single vendor. Facility costs are estimated by making approximate quantity takeoffs from the general arrangement drawings and applying unit cost factors elsewhere. While foundation concrete and structural steel are not defined in detail, it is possible to make approximate estimates from the drawings. Machinery installation and electrical costs can be estimated more accurately than in a Type I estimate. However, percentage factors are still employed for many installation costs. Percentage factors are used to determine indirect costs.

Information Required

It is necessary to know the geographical area of the project, the capacity required by the client, and some idea of gross value of the raw material being processed. Written reports from competent metallurgical laboratories should be available concerning process requirements for calculating operating cost, actual labor contracts from the area should be obtained, and letter quotations should be received from suppliers of basic materials such as fuel, explosives, grinding media, reagents, etc. Written schedules should be obtained from utility companies serving the area.

Skills Employed

A Type II estimate is made under the supervision of a project engineer knowledgeable in the industry covered by the feasibility study. However, because of the existence of minimum general arrangement drawings, it is possible to seek the assistance of professional estimators familiar with the industry covered by the study.

Use of Estimates

Type II estimates still contain heavy contingencies,* amounting to 15% to 20% for structures and at least 10% for machinery and installation. A Type II estimate may be suitable to indicate feasibility, but it may not be adequate for budgeting the project, depending on individual client policy. A Type II estimate usually describes a conceptual installation that might be built rather than the installation which will be built.

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* In this definition the percentage assigned to contingencies is a judgment factor and is not to be interpreted as meaning that estimates are necessarily accurate within this percentage range, nor is there an implied reference to any order of accuracy.

type III estimate

DEFINITION OF TYPE III ESTIMATE
For Economic Feasibility Studies

Basis

A Type III estimate may be undertaken upon completion of bench-scale test work but, preferably, should be supported with pilot plant investigations. Several visits to the plant site may be required. Equipment lists and general arrangement drawings supported by one-line piping and electrical drawings are prepared. No equipment specifications are prepared, and formal vendors' bids are not solicited; however, letter quotations should be obtained from more than one vendor for each item. Machinery installation costs are determined by weight factors, from past experience, or percentage factors. Electrical and piping costs can be based on approximate electrical and piping runs. An estimate is prepared for the construction plant and camp, and estimates for design costs can be more highly refined.

Information Required

It is necessary to know the geographical area of the project and to have accurate topographic maps available. Written reports should be available concerning bench-scale and pilot plant work, and information should be available concerning gross value of the raw material. Actual labor contracts from the area should be obtained, and letter quotations should be received from suppliers of basic materials such as fuel, explosives, grinding media, reagents, etc. Written schedules should be obtained from utility companies serving the area. Use permits from government agencies should be investigated where required. Air and water pollution regulations should be investigated.

Skills Employed

A Type III estimate is made under the supervision of a project engineer knowledgeable in the industry covered by the feasibility study. Because of the existence of general arrangement, piping, electrical, and instrument drawings, it is possible to use professional estimators skilled in electrical, piping, and instrumentation estimating, as well as estimators who are familiar with the industry covered by the study.

Use of Estimates

A Type III estimate has reduced contingencies;* however, the overall contingency is still of the order of 15%. A Type III estimate is generally suitable to determine feasibility and assist management in establishing a budget for the project. A Type III estimate generally describes the installation that probably will be built rather than an installation which is conceptual only. The drawings prepared may become the basis for detailed engineering.

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* In this definition the percentage assigned to contingencies is a judgment factor and is not to be interpreted as meaning that estimates are necessarily accurate within this percentage range, nor is there an implied reference to any order of accuracy.

type IV estimate

DEFINITION OF TYPE IV ESTIMATE
For Economic Feasibility Studies

Basis

A Type IV estimate contains all of the input of a Type III estimate with regard to process information. It is based on general arrangement drawings, supported by piping and instrument drawings, and general arrangement drawings of structural steel and concrete. Drawings prepared may constitute approximately 25% or more of the drawings that will ultimately be required for the project. The total facility costs are estimated by making quantity takeoffs and obtaining subcontract quotations for steel and concrete. Specifications are prepared and submitted to several machinery vendors, who are requested to submit formal proposals. Machinery installation and electrical costs are determined by a professional estimating department. A detailed estimate can be prepared covering the construction plant and camp and the contractor's field overhead. Sufficient drawings are provided so that a detailed estimate can be made of the remaining costs.

Information Required

In addition to all of the information input contained in Type II and Type III estimates, it is necessary to have accurate topographic maps and actual surveys of the plant site, together with foundation data. A professional construction estimator should make several trips to the field with the project engineer to obtain information on all local codes and regulations pertaining to land use and air and water pollution. The availability and cost of labor should be thoroughly investigated. All of the factors mentioned in Type II and Type III estimates which affect operating costs should be obtained in detail, preferably in written quotations from vendors and utility companies.

Skills Employed

A Type IV capital cost estimate is made entirely by a professional estimating department. However, operating costs, where involved, are estimated by the project engineer.

Use of Estimates

A Type IV estimate contains minimum contingencies,* but never less than 10%. A Type IV estimate may be suitable for funding of the project; however, clients may differ as to the amount of detail which they require for funding. A Type IV estimate should enable the client to authorize Kaiser Engineers to proceed with a turnkey job of detail design and construction. Additional detail design will be required, but the designs and estimates provided in the Type IV estimate are for the plant that will be built, and at this point further modifications would be minimal. A Type IV estimate is seldom undertaken unless there is reasonable assurance as to the feasibility of the project. It may be follow-on work after a Type I, Type II, or Type III estimate.

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* In this definition the percentage assigned to contingencies is a judgment factor and is not to be interpreted as meaning that estimates are necessarily accurate within this percentage range, nor is there an implied reference to any order of accuracy.

D.

Detailed Geological Map of the Immediate Iron Mountain Mine Surface Area.