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Item 18

TABLE OF CONTENTS

Page No.

ILLUSTRATIONS

TABLE OF CONTENTS (continued)

SUMMARY

Since May, 1978, thirteen shallow rotary and eighteen deeper percussion holes have been drilled on the Brown Devil property. The drilling, which totals 1,408 feet, was conducted to explore a massive sulfide body containing pyrite and pyrrhotite in order to determine if the iron and sulfur content was sufficient for the material to be used as a soil conditioner and fertilizer by Nevada agricultural interests.

Eleven of the percussion holes encountered sulfide-bearing material averaging in excess of the target grade of 20% iron and 20% sulfur. The drilling indicates a geologic reserve of 150,000 tons of material in excess of the target grade and the deposit is open along strike to the north and south and also, possibly, to depth.

Within the geologic reserve, a one-year mining plan involving approximately 40% of the reserve has been designed which will allow profitable mining at present prices without affecting the overall grade of the reserve. The one-year plan, herein termed the "1979 Pit", contains 65,000 tons of ore averaging 22.7% Fe and 19.7% S at a waste:ore ratio of 0.99:1

INTRODUCTION

The Brown Devil property was optioned during 1978 by Ruddock Resources, Inc. as a potential source of high grade iron and sulfur to be used as a soil conditioner and fertilizer by Nevada agricultural interests. Three drilling programs were conducted, one in May, 1978, the second in September-October, 1978, and the third in February, 1979.

The initial drilling in May consisted of thirteen rotary holes but most were shallow as the rotary bits were unable to penetrate unoxidized material. A second program of percussion drilling was decided upon and the writer first visited the property on September 13 to advise the optionees on the geology and the drilling program. Twelve holes were drilled using a down-the-hole hammer and eight were completed. Three days were spent on the property during the program and the holes were logged, representative coarse chips were screened from each sample, a transit survey of the holes was completed, a hand level survey of the drill hole collars was completed, and very preliminary mapping of surface features was conducted at that time.

The drilling results indicated the presence of a geologic reserve of approximately 150,000 tons averaging 22.6% Fe and 22.1% S. A one-year mining plan was devised and an open pit was designed to mine approximately 40% of the reserve. The results indicated that mining would be economic and not greatly affect the overall reserve grade. Fill-in drilling was recommended and six additional percussion holes were drilled in February, 1979. The fill-in holes indicated continuity of the mineralization and the presence of some additional ore.

INTRODUCTION (continued)

A new one-year plan was devised to encompass all 14 drill holes, a new pit was designed, and the one-year reserve was re-calculated. The purpose of this report is to describe the work completed to date and to describe the methods used in the reserve calculation.

LOCATION AND ACCESS

The Brown Devil property is located in the extreme southern end of the Humboldt Range, Section 34, T26N, R32E, Pershing County approximately 6 miles north of the Churchill County line.

Access is via paved county road 59 south from Lovelock 4.5 miles to the Tule Ranch then easterly 3.5 miles on gravel road, then southerly and southeasterly on dirt road 4.2 miles to the mineralized zone. The last 1.4 miles of road lie in the gully bottom and, although suitable for large equipment, are vulnerable to washout by cloudbursts.

WORK TO DATE

Work during 1978 and 1979 includes the following:

1. Cleanup and rebuilding the access road.
2. Construction of approximately 1,600 feet of drilling road and attendant drill sites.
3. Very limited geologic mapping at 1" = 50'.
4. Preliminary magnetometer survey.
5. Establishment of a surveyed base line.
6. Transit survey of all drill holes.
7. Hand level survey to establish relative difference in elevation between drill holes.
8. Drilling of thirteen shallow rotary holes (total 301 feet) and drilling of eighteen percussion holes totalling 1,107 feet.

GEOLOGY

Due to the very limited amount of time spent in examining the geology of the area, only a very brief description is possible. The source of high grade iron/sulfur is a massive sulfide body which appears to lie between limestone on its west flank and sandstone and siltstone on its east flank. The rocks are mapped as part of the Triassic Auld Lang Syne Group by Silberling and Wallace. [1] These are described as a thick sequence of fine grained argillite and interbedded sandstone and limestone which have been metamorphosed to slates, phyllite, hornfels, and quartzites .

In the southern portion of the Humboldt Range these Triassic rocks are at least 2,000 feet thick and are intensely deformed. Extensive thrust faulting is present along the range front, possibly related to the intrusion of a Jurassic gabbroic complex to the east in the central and eastern portions of the range. The iron sulfide body may be related to the intrusion of the gabbroic rocks but no direct relationship has been noted to date.

The true configuration of the sulfide body is unknown but it is at least 480 feet long, up to 145 feet wide at surface and locally appears to extend at least 120 feet below surface. Most of the drill holes were bottomed in low sulfide material (10% Fe/10% S) and the bottom of the lens on cross- and long-sections appears to be flat. The holes may, in fact, bottom in a cherty zone with a possible continuation of massive sulfide mineralization at greater depth.

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1 Johnson, M.G., Geology and Mineral Deposits of Pershing County, Nevada, Nev. Bureau Mines and Geol., Bull. 89, 1977, p. 21.

GEOLOGY (continued)

The body consists of pyrite, pyrrhotite, chert and carbonate. The pyrite-pyrrhotite content ranges from 30 to 95% and analyses suggest that the sulfides are 65.75% pyrite and 25-35% pyrrhotite.

DRILLING RESULTS

The percussion drilling programs were designed to probe the area indicated by preliminary mapping and the May, 1978 drilling (rotary) as being potentially underlain by massive sulfides. Drill holes BD-A, -C, -D, -E, -F, -G, -I, -J, -K, -L, -M, -N, -O, and -P all encountered mineralization considered to be within the desired grade range. Drill hole BD-J(B) encountered target grade mineralization at 95 feet suggesting that the sulfide body may dip to the east below low grade mineralization exposed on surface.

An attempt was made to drill the narrow northern extension of the massive sulfide zone but both holes (BD-H-A and BD-H-B) were lost prior to reaching the sulfide zone. One rotary hole, BD-11, was successful in penetrating low grade sulfides but the hole is located so close to the apparent edge of the massive sulfide zone that it is uncertain if the hole is representative of mineralization in that area.

Only BD-B and BD-J were drilled outside the apparent limits of the massive sulfide zone at surface, consequently,data on the dip of mineralization and its exact lateral extent are very limited. The zone may be considered to be open to the south and possibly to the north at least to the vicinity of BD-11.

Within the area of successful drill holes, the massive sulfide mineralization averages 34.4 feet thick with an average of 54 feet between drill holes. All but two holes bottomed in low grade material (Appendix) but the limited drilling depth does not preclude the presence of massive sulfides at greater depth.

DRILLING AND SAMPLING PROCEDURE

Rotary Drilling

The rotary drilling program was conducted during May using conventional rotary drilling techniques (tri-cone rock bit with air as the drilling fluid). Samples were collected in 5-foot intervals in pans set near the collar of the hole. Rotary methods were unable to penetrate unoxidized material, however, and most holes were terminated at the top of the sulfide zone. Thirteen holes were drilled totalling 301 feet with hole depths ranging from 5 to 60 feet.

All but one of the holes were drilled within the area of massive sulfide mineralization and each of the twelve holes encountered soft gossan. It is probable that substantial losses of iron-bearing material took place due to the lack of a cyclone and the soft friable nature of the mineralization.

Percussion Drilling

Percussion drilling techniques were used during the second and third programs. A down-the-hole hammer was used with air as the drilling fluid. Samples were recovered in a collector connected directly to the collar with cloth used to trap all but the finest material. A cyclone was not used. Samples were collected at 5-foot intervals and split in a Jones splitter. Depending on the size of the sample recovered, a split of 1/4 to 1/8 was bagged and sent for assay and a duplicate amount was also bagged and stored.

DRILLING AND SAMPLING PROCEDURE (continued)

Percussion Drilling (continued)

Results of the second and third programs are considered satisfactory although the indicated grade of the sulfide mineralization is probably less than the actual grade due to sample loss, classification of values in the air column, and the inability to vary sampling intervals with changes in the mineralization.

Sampling and Logging Procedure

As mentioned earlier, samples were taken every five feet and two 1/4 or 1/8 splits were bagged from each sample interval in all holes. A strainer full of sample from each interval was washed and the remaining coarser chips were placed in 4" x 6" bags for storage. The coarse chips were logged using a hand lens and the evident rock type, alteration, mineralization, etc. were recorded. Estimates of the proportions of pyrrhotite and pyrite were made using a magnet.

Assaying

One bagged split from each 5-foot (or less) interval in each hole was sent to Nevada Assay Office in Sparks. Each was analysed for iron and sulfur by Frank Jones. To the writer's knowledge, no check sampling by another assayer was conducted.

A listing of all assay values by drill hole and assay interval is given in the Appendix.

ORE RESERVES

Target Grade

Ore reserves were calculated with the intent of determining the tonnage of sulfide-bearing material averaging 20% Fe and 20% S, the grade desired by agricultural groups in the Winnemucca area for soil treatment.

A preliminary estimate indicated approximately 150,000 tons of sulfide mineraliztion is present within the area of drilling to date at a drill-indicated grade of 22.6% Fe and 22.1% S. Cut-off grade was approximately 10% Fe/10% S but exceptions were made depending on the average grade and thickness of mineralization in a particular drill hole. This calculation was made without regard for economic pit design and stripping ratio.

At the instruction of principals of Ruddock Resources, calculation of overall tonnage and grade within economic open pit limits was postponed in favor of first completing calculation of a one-year mining plan which would produce 60,000 tons at approximately the average indicated grade of the deposit known by drilling to date. This design and calculation is termed the 1979 Pit and is the subject of the remainder of this report.

Method of Calculation - Ore

The bottom of sulfide ore in all holes except BD-J is at relatively similar elevations and, based on present knowledge, the massive sulfide zone must be considered to have a flat bottom. Consequently, it was decided to use a polygon-shaped area of influence between drill holes and to assume that the edges of the massive sulfide zone extend vertically below their mapped or projected boundaries on surface. The polygons were extended a maximum of 25 feet along the indicated north-south strike of the zone at the north and south ends of the zone.

ORE RESERVES (continued)

Method of Calculation - Ore (continued)

Fourteen cross-sections and two long-sections were plotted through the mineralized zone and open pit walls sloping 60° were plotted on the edges of the mineralized block in areas of sulfide mineralization and bordering rocks. Pit slopes in gossan were plotted at 45°. The intersection of the pit slopes with the surface were then transferred to the plan map and a trial pit was constructed. Areas needing modification were transferred back to the sections and then re-transferred to the plan map after modification. The resulting pit is shown on the Surface Plan and Drill Hole Location Map.

As noted earlier, the collar of each drill hole was surveyed by transit and hand levels were run between holes to provide relative elevation control. No topographic maps are available at a scale appropriate to the present work so it was necessary to estimate the surface profile between and beyond the drill holes to the end of the sections. The pit outline is based on these projections and locally may be in error.

Following construction of the 1979 Pit, the top of the ore in each polygon in the north and south ends of the pit was transferred to the plan map and the area of each polygon at the top of the ore horizon and at the bottom of the pit was measured. The two areas obtained for each polygon were averaged and the average area was multiplied by the ore thickness in that polygon to obtain the volume of ore. The volume of each polygon was then multiplied by the average grade for iron and sulfur and the result added to identical calculations for the other polygons within the pit to obtain a total volume of ore and a weighted average grade. No measurement of possible ore was made even though some material of ore grade will probably be found within areas designated as waste.

ORE RESERVES (continued)

Method of Calculation - Ore (continued)

No measurements of the specific gravity of the ore are available so a specific gravity was calculated as follows:

1) The available iron and sulfur of the total amount of ore were considered to be entirely due to pyrite and pyrrhotite.

2) The iron and sulfur analyses were found to fit a sulfide composition which is 75% pyrite and 25% pyrrhotite (which in turn composes 44.7% of the ore by weight).

3) It was assumed that the remainder of the ore was 1/2 chert and 1/2 limestone.

The resulting combinations and specific gravities used are as follows:

Mineral/Rock	Weight	Specific Gravity
pyrite	30.70%	5.02
pyrrhotite	14.03%	4.60
chert	27.635%	2.76
limestone	27.635%	2.73

Weighted Specific Gravity = 3.70
Tonnage Factor = 8.65 cubic feet per ton

Results of the ore tonnage calculation are as follows:

65,000 tons averaging 22.7% Fe, 19.7% S

Method of Calculation - Waste

As elevation control was not sufficient to allow construction of level maps, the area of ore + waste on sections H-H', I-I', J-J', K-K', and M-M' was measured by planimeter and the area on each was divided by the mean length of the pit on each section to arrive at an average depth or thickness. The average depth of ore + waste on each section was then weighted by the area of ore + waste on that section and combined with identical calculations for the remaining sections to determine an average weighted depth for the pit as a whole. The weighted average depth thus derived was 42.67 feet.

ORE RESERVES (continued)

Method of Calculation - Waste (continued)

The area within the upper pit limit and the area within the bottom of the pit were then measured by planimeter. The total volume of the pit was calculated using the formula for the frustum of a cone[1]. This volume is 1,524,300 cubic feet; subtracting the volume of ore (571,100 cubic feet) leaves a total waste volume of 953,200 cubic feet.

The volume of gossan vs the volume of rock within each section was then estimated and, assuming a tonnage factor of 16 ft^3/ton for gossan and 12 ft^3/ton for rock, a weighted tonnage factor for waste of 14.7 ft^3/ton was derived.

Results of the waste calculation are as follows:

Waste tonnage	64,900 tons
Waste: Ore Ratio	0.99:1

$V = h/3\ (A_1 + A_2 + \sqrt{A_1 \times A_2})$, where

A_1 = upper surface

A_2 = lower surface

h = distance between surfaces

CONCLUSIONS

Based on the drilling completed to date, it is concluded that the massive sulfide mineralization encountered has enough consistency to calculate ore reserves on a drill-proven basis. Overall ore reserve calculations have not been completed but it appears that a one-year open pit mining plan comprising approximately 40% of the indicated reserve can be executed at a profit without affecting the overall grade of the deposit.

The reserves in the one-year pit, herein termed the "1979 Pit", are as follows:

Ore : 65,000 tons @ 22.7% Fe, 19.7% S
Waste: 64,900 tons
Waste: Ore Ratio 0.99:1

No measurement of possible ore was made even though some material of ore grade will probably be found within areas designated as waste.

M. J. Fitzgerald, P. Eng.

305

Item 18

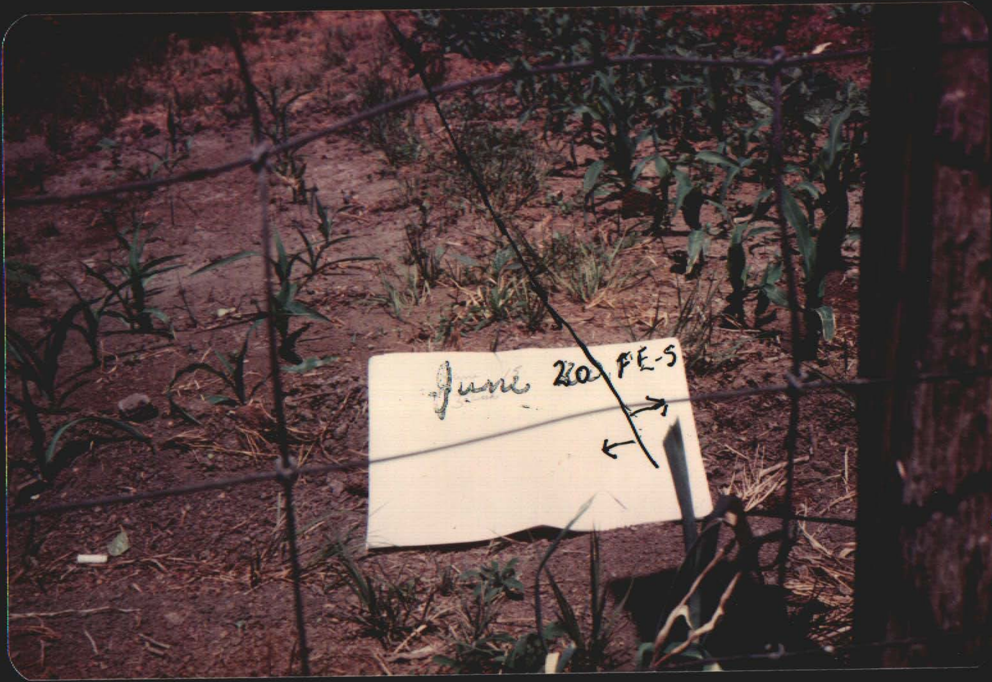
DRILLING RESULTS
AND A
ONE-YEAR MINING PLAN
FOR THE
BROWN DEVIL PROPERTY,
PERSHING CO., NEVADA

S 34, 26N, 32E

Metal-Ex Management, Inc.
North Vancouver, B.C.
Canada

M.J. Fitzgerald, P. Eng.

December 12, 1978


June 20 FE-5

Mc Farlin Gordon

F.E. - 5 applied

Swathing with 1/2 Cut because of heavy material.

garden at home
tomatoes by the bucket.


NEW HOLLAND

Grass 4½' tall, first cut in July 20th

117 Bales tall Crested-wheat
grass from (1) one acre.
Iron-sulfur applied 1987.
Lovelock

McFarlin garden

test garden in p.H. 10 soil
Right has applied material.

TABLE OF CONTENTS

ILLUSTRATIONS

TABLE OF CONTENTS (continued)

SUMMARY

Since May, 1978, thirteen shallow rotary and twelve deeper percussion holes have been drilled on the Brown Devil property. The drilling, which totals 1,013 feet, was conducted to explore a massive sulfide lens containing pyrite and pyrrhotite in order to determine if the iron and sulfur content was sufficient for the material to be used as a soil conditioner and fertilizer by Nevada agricultural interests.

Seven of the holes encountered sulfide-bearing material averaging in excess of the target grade of 20% iron and 20% sulfur. The drilling indicates a geologic reserve of 150,000 tons of material in excess of the target grade and the deposit is open along strike to the north and south and also, possibly, to depth.

Within the geologic reserve, a one-year mining plan involving approximately one-third of the reserve has been designed which will allow profitable mining at present prices without affecting the overall grade of the reserve. The one-year plan, herein termed the "1979 Pit", contains 52,000 tons of ore averaging 22.5% Fe and 22.3% S at an ore: waste ratio of 1.25:1. 12% FE

INTRODUCTION

The Brown Devil property was optioned during 1978 by Ruddock Resources, Inc. as a potential source of high grade iron and sulfur to be used as a soil conditioner and fertilizer by Nevada agricultural interests. Two drilling programs were conducted, one in May and the second in September-October.

The writer first visited the property on September 13th to advise the optionees on the second drilling program and later spent three days on the property (September 30, October 1, 3, 4,) during that program. The time allotted was sufficient only to complete logging of seven drill holes, a transit survey of the hole collars, a hand level survey between the holes, and very preliminary mapping of surface features.

The second drilling program was successful in outlining massive sulfide mineralization of the target grade (72% Fe, 20% S) and the assay results were consistent enough to allow calculation of drill-indicated ore reserves. The purpose of this report is to describe the work completed to date and to describe the methods used in the reserve calculations.

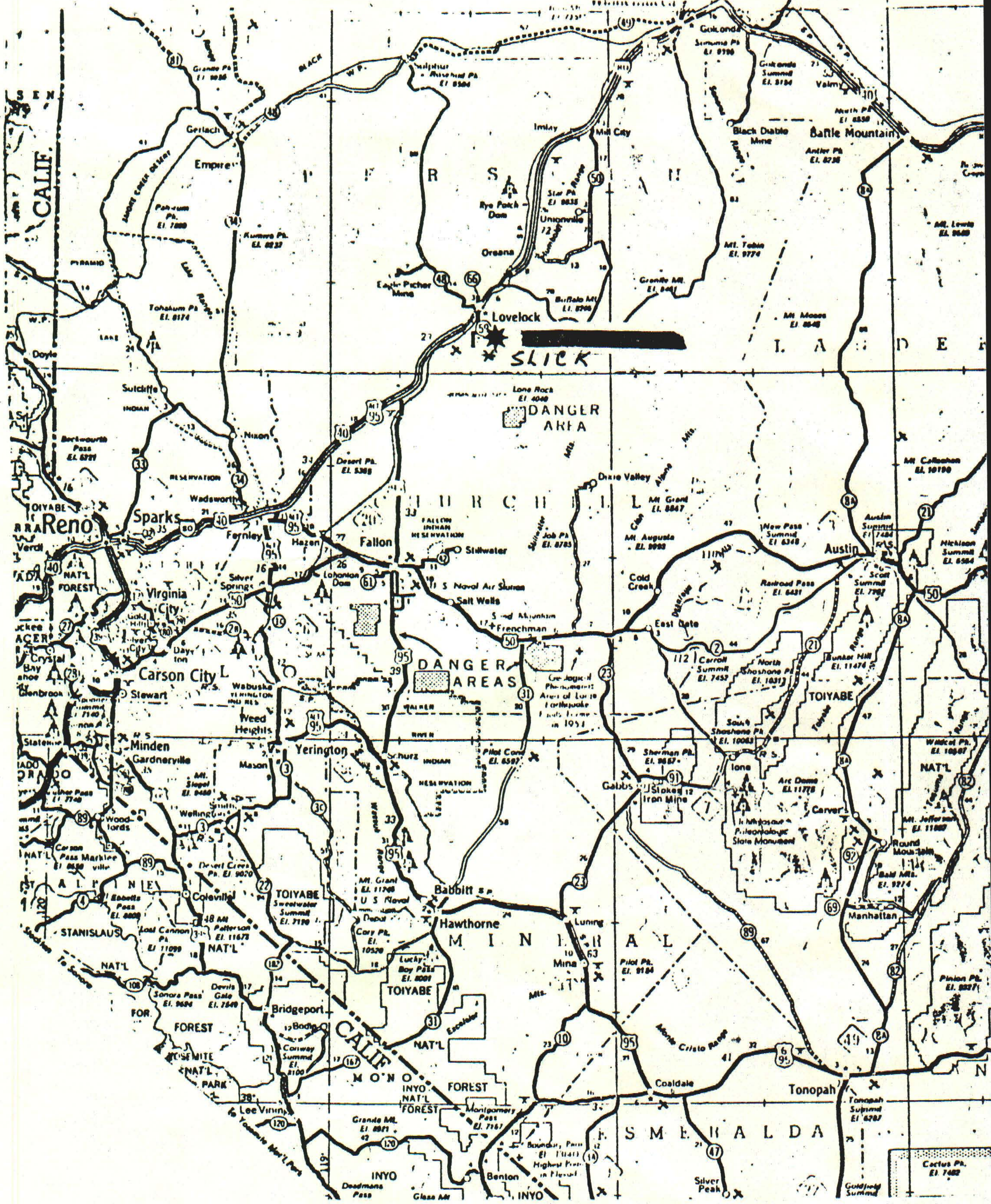


Figure 1 - Location Map - Brown Devil Property

WORK TO DATE

Work during 1978 includes the following:

1. Cleanup and rebuilding of the access road.
2. Construction of approximately 1,600 feet of drilling road and attendant drill sites.
3. Very limited geologic mapping at 1" = 50'.
4. Preliminary magnetometer survey.
5. Establishment of a surveyed base line.
6. Transit survey of all drill holes.
7. Hand level survey to establish relative difference in elevation between drill holes.
8. Drilling of thirteen shallow rotary holes (total 301 feet) and drilling of twelve percussion holes totalling 712 feet.

GEOLOGY

Due to the very limited amount of time spent in examining the geology of the area, only a very brief description is possible. The source of high grade iron/sulfur is a massive sulfide lens which appears to lie between limestone on its west flank and quartzofeldspathic rocks (possibly volcanic sediments or tuffs) on its east flank. The lens is apparently only one of several extending over an area of 2-3 miles.

The true configuration of the sulfide lens is unknown but it is at least 480 feet long and up to 145 feet wide at surface and locally appears to extend at least 120 feet below surface. Most of the drill holes were bottomed in low sulfide material ($<$ 10% Fe/10% S) and the bottom of the lens on cross- and long-sections appears to be flat. The holes may, in fact, bottom in a cherty zone with a possible continuation of massive sulfide mineralization at greater depth.

The lens consists of pyrite, pyrrhotite, chert and carbonate. The pyrite-pyrrhotite content ranges from 30 to 95% and analyses suggest that the sulfides are 75% pyrite and 25% pyrrhotite.

DRILLING RESULTS

The percussion drilling program was designed to probe the mineralized area indicated by preliminary mapping and the May, 1978 rotary drilling program. Access, in part, also dictated selection of drill sites (Plan Map). Drill holes BD-A, -C, -D, -E, -F, -G, and - I all successfully encountered mineralization considered to be of target grade. Drill hole BD-J encountered target grade mineralization at 95 feet suggesting that the mineralization may dip to the east below low grade mineralization exposed on the surface.

An attempt was made to drill the narrow northern extension of the massive sulfide zone but both holes (BD-H-A and BD-H-B) were lost prior to reaching the sulfide zone. One rotary hole, BD-11, was successful in penetrating low grade sulfides but the hole is located so close to the apparent edge of the massive sulfide zone that it is uncertain if the hole is representative of mineralization in that area.

Only BD-B and BD-J were drilled outside the apparent limits of the massive sulfide zone at surface, consequently, data on the dip of mineralization and its exact lateral extent are very limited. The zone may be considered to be open to the south and possibly to the north at least to the vicinity of BD-11.

Within the area of successful drill holes, the massive sulfide mineralization averages 32.7 feet thick with an average of 76 feet between drill holes. All but two holes bottomed in low grade material (Appendix) but the limited drilling depth does not preclude the presence of massive sulfides at greater depth.

DRILLING AND SAMPLING PROCEDURE

Rotary Drilling

The rotary drilling program was conducted during May using conventional rotary drilling techniques (tri-cone rock bit with air as the drilling fluid). Samples were collected in 5-foot intervals in pans set near the collar of the hole. Rotary methods were unable to penetrate unoxidized material, however, and most holes were terminated at the top of the sulfide zone. Thirteen holes were drilled totalling 301 feet with hole depths ranging from 5 to 60 feet.

All but one of the holes were drilled within the area of massive sulfide mineralization and each of the twelve holes encountered soft gossan. It is probable that substantial losses of iron-bearing material took place due to the lack of a cyclone and the soft friable nature of the mineralization.

Percussion Drilling

Percussion drilling techniques were used during the second program which was conducted during September and early October. A down-the-hole hammer was used with air as the drilling fluid. Samples were recovered in a collector connected directly to the collar with cloth used to trap all but the finest material. A cyclone was not used. Samples were collected at 5-foot intervals and split in a Jones splitter. Depending on the size of the sample recovered, a split of 1/4 to 1/8 was bagged and sent for assay and a duplicate amount was also bagged and stored.

DRILLING AND SAMPLING PROCEDURE (continued)

Percussion Drilling (continued)

Results of the September-October program are considered satisfactory although the indicated grade of the sulfide mineralization is probably less than the actual grade due to sample loss, classification of values in the air column, and the inability to vary sampling intervals with changes in the mineralization.

Sampling and Logging Procedure

As mentioned earlier, samples were taken every five feet and two 1/4 or 1/8 splits were bagged from each sample interval in all holes. A strainer full of sample from each interval was washed and the remaining coarser chips were placed in 4" x 6" bags for storage. The coarse chips were logged using a hand lens and the evident rock type, alteration, mineralization, etc. were recorded. Estimates of the proportions of pyrrhotite and pyrite were made using a magnet.

Assaying

One bagged split from each 5-foot (or less) interval in each hole was sent to Nevada Assay Office in Sparks. Each was analysed for iron and sulfur by Frank Jones. To the writer's knowledge, no check sampling by another assayer was conducted.

A listing of all assay values by drill hole and assay interval is given in the Appendix.

ORE RESERVES

Target Grade

Ore reserves were calculated with the intent of determining the tonnage of sulfide-bearing material averaging ~~20%~~ 12.6 Fe and 20% S, the grade desired by agricultural groups in the Winnemucca area for soil treatment.

A preliminary estimate indicated approximately 150,000 tons of sulfide mineraliztion is present within the area of drilling to date at a drill-indicated grade of ~~22~~ 12.6% Fe and 22.1% S. Cut-off grade was approximately 10% Fe/10% S but exceptions were made depending on the average grade and thickness of mineralization in a particular drill hole. This calculation was made without regard for economic pit design and stripping ratio.

At the instruction of principals of Ruddock Resources, calculation of overall tonnage and grade within economic open pit limits was postponed in favor of first completing calculation of a one-year mining plan which would produce 50,000 tons at approximately the average indicated grade of the deposit known by drilling to date. This design and calculation is termed the 1979 Pit and is the subject of the remainder of this report.

Method of Calculation - Ore

Considering the relatively great distance between drill holes (average 76') and the relatively thin nature of the mineralization (32.7'), it was decided to use two categories of ore in the calculations, drill-indicated ore and possible ore. The

ORE RESERVES (continued)

Method of Calculation - Ore (continued)

writer believes, however, that, due to the relative consistency of the mineralization, drilling of as few as five additional holes (which returned similar values) would allow movement of the calculated tonnages into the drill-proven and probable categories.

The bottom of sulfide ore in all holes except BD-J is at relatively similar elevations and, based on present knowledge, the massive sulfide zone must be considered to have a flat bottom. Consequently, it was decided to use a polygon-shaped area of influence between drill holes and to assume that the edges of the massive sulfide zone extend vertically below their mapped or projected boundaries on surface. The polygons were extended a maximum of 30 feet along the indicated north-south strike of the zone at the north and south ends of the zone.

Eight cross-sections and two long-sections were plotted through the mineralized zone and open pit walls sloping 60° were plotted on the edges of the mineralized block in areas of sulfide mineralization and bordering rocks. Pit slopes in gossan were plotted at 45°. The intersection of the pit slopes with the surface were then transferred to the plan map and a trial pit was constructed. Areas needing modification were transferred back to the sections and then re-transferred to the plan map after modification. The resulting pit is shown on the Surface Plan and Drill Hole Location Map.

As noted earlier, the collar of each drill hole was surveyed by transit and hand levels were run between holes to provide relative elevation control. No topographic maps are available at a scale appropriate to the present work so it was necessary to estimate the surface profile between and beyond the drill holes to the end of the sections. The pit outline is based on these projections and locally may be in error.

ORE RESERVES (continued)

Method of Calculation - Waste (continued)

The volume of gossan vs the volume of rock within each section was then estimated and, assuming a tonnage factor of 16 ft^3/ton for gossan and 12 ft^3/ton for rock, a weighted tonnage factor for waste of 14.7 ft^3/ton was derived.

Results of the waste calculation are as follows:

Waste tonnage	~~64,900~~ tons
Waste: Ore Ratio	~~1.25:1~~
REMOVED 1983	15,000 TONS

BROWN-DEVIL - 25,000 yds. STRIPPED 1983-84.
SLICK - 20,000 " " " "
EXPOSING REQUIRED GRADE ORE.

305

Item 18

GEOLOGY

Due to the very limited amount of time spent in examining the geology of the area, only a very brief description is possible. The source of high grade iron/sulfur is a massive sulfide body which appears to lie between limestone on its west flank and sandstone and siltstone on its east flank. The rocks are mapped as part of the Triassic Auld Lang Syne Group by Silberling and Wallace.[1] These are described as a thick sequence of fine grained argillite and interbedded sandstone and limestone which have been metamorphosed to slates, phyllite, hornfels, and quartzites .

In the southern portion of the Humboldt Range these Triassic rocks are at least 2,000 feet thick and are intensely deformed. Extensive thrust faulting is present along the range front, possibly related to the intrusion of a Jurassic gabbroic complex to the east in the central and eastern portions of the range. The iron sulfide body may be related to the intrusion of the gabbroic rocks but no direct relationship has been noted to date.

The true configuration of the sulfide body is unknown but it is at least 480 feet long, up to 145 feet wide at surface and locally appears to extend at least 120 feet below surface. Most of the drill holes were bottomed in low sulfide material (10% Fe/10% S) and the bottom of the lens on cross- and long-sections appears to be flat. The holes may, in fact, bottom in a cherty zone with a possible continuation of massive sulfide mineralization at greater depth.

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1 Johnson, M.G., Geology and Mineral Deposits of Pershing County, Nevada, Nev. Bureau Mines and Geol., Bull. 89, 1977, p. 21.

DN:

THIS INFORMATION CONCERNS THE PYRRHOTITE (Fe7,S8) deposit known as the Brown Devil and Slick claim group about 12 miles south of Lovelock, Nevada. The deposit was originally discovered in the 1950's and located by members of the Hunley family about 1960??. The Slick claim is owned by Mr. Hallie Pfiefer of Reno, Nevada individually and the Brown Devil claims are owned [redacted] by Pfeifer. Mr. Pfiefer has sole management of the property. There are 24 unpatented lode mining claims in the group. A limited amount of exploration work was done until a drilling program was conducted by Ruddock Resources in 1979 uunder a lease and option agreement with Mr. Hal Pfeifer. A total of 33 holes were drilled with an average depth of 67 feet. This program resulted in the outlining of about 400,000 tons of material with a significant iron (12%) and sulfur (20%) content. The deposit is very shallow and can be mined by open-pit mining methods. Addtional reserves may be present beyond the area of completed drilling. A magnetic survey indicated areas of high magnetism were present outside of the drilled zone.

The minerals present, Pyrrhotite, Pyrite and Marcasite are all iron sulfides. They are useful for reducing the pH alkaline soils (high Ph) for better plant growth. The value of the pH is an indicator of alkalinity-acidity with a value of 7.0 as neutral, like distilled water. The sulfur in these minerals is broken down by weathering processes to produce sulfuric acid. The acid combines with the alkaline bases to reduce the basic pH values (7 to 10) to neutral or slightly acidic (6.4 to 7).

HISTORY:

USES:

..02

alkal

IRON SULFUR PRODUCT

Following is a report on the data generated from the analysis of a sample of an iron sulfur material brought to the laboratory on January 15. It was indicated that this material is from a natural deposit found in central Nevada. The purpose of the examination was to see if the material might have any potential value as a soil amendment.

Analytical Results

From the data, it appears that this material is primarily an iron sulfide material which also contains some uncombined sulfur. The iron content was found to be 15.6% and the sulfur content was 42.5%. These data are in the same range as found by others in their analysis of the deposit. For the material to have a potential value as an iron supplement for plant growth, a substantial portion of the iron should be in the available form. This aspect is checked by what we call a DTPA extraction of the product. In this test only a small fraction of 1% was found to be in the available form. The level of available iron was in the same range as found in the analysis of an average field soil. Small quantities of copper, zinc, manganese and boron were also found to be in the available form, although once again the levels found were in a typical range for a normal agricultural soil.

The reaction of this product was fairly strongly acid which might be expected with the high sulfur content. Salinity is in a range that would restrict plant growth if the material were being used as 100% of a growing medium which would be highly unlikely. Fairly substantial quantities of soluble calcium, magnesium and sodium were found with magnesium being soluble in the highest proportion. The boron level would not restrict the use of this material as a soil amendment.

Discussion

Since it appears the iron found in this material is largely in the sulfide or unavailable form, the product would need to be marketed primarily for its sulfur content. The free sulfur is in the 20 to 25 percent range and since 100% sulfur is currently available in the 125.00 per ton range, the value of this product as a sulfur source would be in the 25.00 to 35.00 per ton range. Undoubtedly there would be sections of the deposit where the sulfur content might be somewhat higher. Sulfur will improve the growth of plants where the original soil is alkaline and/or where sulfur itself may be lacking. Generally, sites of this type are not in general agriculture, however, if there is pressure in the future for additional farm products, general agriculture may expand into areas characterized by soils of this type. Residential housing already exists in soils of this type and there might be a potential for use of this product in the landscape contractor and homeowner market. This would require substantial promotion to establish.

P.O. Box 11744, Santa Ana, California 92711 (714) 558-8333
P.O. Box 153, Santa Clara, California 95052 (408) 727-0330
P.O. Box 1648, Bellevue, Washington 98009 (206) 746-6665

Nevada Assay Office

675 LESTER AVENUE

Reno, Nevada

FRANK W. JONES
Assayer-Chemist

PH
329

October 23, 1978

ASSAY CERTIFICATE FOR: Ruddock Resources, Reno, Nev.

No.	SAMPLE	GOLD OZ./TON	SILVER OZ./TON	Fe %	S %	%	%
SA	0-5			12.42	5.95		
	5-10			18.04	10.37		
	15-20			1.27	8.56		
	25-30			1.86	6.00		
	30-35			4.93	4.38		
	35-40			6.90	10.29		
	40-45			2.93	19.04		
	50-55			4.03	25.73		
	55-60			11.83	45.89		
SC	60-65			0.99	44.14		
	65-70			0.69	5.74		
	70-75			0.40	3.38		
	75-80			0.30	2.06		
	80-85			1.47	4.12		
	85-90			1.18	2.93		
	90-95			0.79	2.90		
SD	0-5			12.03	8.93		
	5-10			9.86	10.86		
	10-15			11.43	15.26		
	15-20			6.50	10.58		
	20-25			5.03	12.63		
	25-30			6.70	9.38		
	30-35			4.73	7.29		
	35-40			5.12	8.67		
	40-45			1.20	5.71		
	45-50			1.00	6.84		
	50-55			1.78	5.41		
	55-60			1.08	3.26		
	60-65			1.48	6.93		
	65-70			2.67	9.21		
	70-75			2.57	6.43		

November 1, 1978

FRANK W. JONES
Assayer-Ch

ASSAY CERTIFICATE FOR: Ruddock Resources, Reno, Nev.

No.	SAMPLE	GOLD OZ./TON	SILVER OZ./TON	Fe %	S %	%	%
	SA 10-15			7.69	9.94		
	20-25			5.03	6.87		
	45-50			3.15	27.73		
	60-65			6.80	16.99		
	65-70			4.08	4.30		
	70-75			4.08	4.25		
	75-80			2.66	3.23		
	80-85			3.25	4.25		
	85-90			2.66	3.40		
	SB 5-10			2.58	2.99		
	10-15			6.21	3.74		
	15-20			7.40	4.30		
	20-25			8.68	5.55		
	25-30			14.69	9.14		
	30-35			7.22	10.30		
	35-40			3.58	26.13		
	40-45			1.08	22.69		
	SB 45-50			1.08	13.49		
	50-55			0.49	17.77		
	55-60			0.98	3.29		
	60-65			1.29	12.74		
	65-70			1.28	46.58		
	70-75			0.27	47.68		
	75-80			0.18	24.28		
	SB 80-85			0.30	6.69		
	85-90			1.00	32.68		
	90-95			1.00	47.90		
	95-100			0.50	43.50		
	100-105			0.80	32.96		
	105-110			1.50	7.49		
	SC 5-10			5.23	5.58		
	10-15			3.94	4.55		
	15-20			2.37	3.51		
	20-25			1.49	4.89		
	25-30			2.37	20.78		
	30-35			1.28	18.26		
	35-40			0.50	25.73		
	40-45			0.79	38.96		
	45-50			0.99	36.62		
	50-55			0.50	45.62		
	55-60			0.50	45.79		

APPENDICES

Nevada Assay Office

675 LESTER AVENUE

Reno, Nevada

June 2, 1978

FRANK W. JONES
Assayer-Chemist

Phone
329-4080

ASSAY CERTIFICATE FOR:

Reno, Nev.

No.	SAMPLE	GOLD OZ TON	SILVER OZ./TON	Fe %	S %	%	%	%
S-1	0-10			12.42	7.37			
	10-20			12.62	8.25			
	20-30			10.45	6.10			
S-2	0-10			4.63	5.01			
	10-20			12.15	7.18			
	20-30			4.63	10.30			
	30-35			6.90	9.35			
	35-40			5.82	7.51			
S-3	0-5			14.59	10.91			
	5-10			9.86	9.10			
	10-15			11.43	5.70			
	15-20			8.66	9.16			
	20-25			8.58	10.60			
	25-30			6.97	12.90			
	30-35			7.79	12.10			
	35-37			3.94	12.02			
S-4	0-5			7.99	10.96			
	5-10			17.16	11.20			

Nevada Assay Office

675 LESTER AVENUE

Reno, Nevada

June 2, 1978

FRANK W. JONES
Assayer-Chemist

Phone
329-4080

ASSAY CERTIFICATE FOR:

Reno, Nev.

No.	SAMPLE	GOLD OZ TON	SILVER OZ./TON	Fe %	S %	%	%	%
S-4	10-15			12.82	11.95			
	15-20			15.68	13.35			
	20-25			14.59	20.19			
	25-30			6.90	6.58			
	30-35			12.92	11.56			
	35-40			13.41	34.88			
S-5	0-5			6.41	10.26			
	5-10			6.31	13.28			
	10-15			5.32	27.37			
	15-20			3.94	12.30			
	20-25			2.37	3.08			
S-6	0-5			6.41	5.93			
	5-10			6.51	6.27			
	10-15			4.93	4.78			
	15-20			3.75	5.92			
	20-25			2.37	7.22			
S-3	20-30 Sulfide			8.58	15.81			
[illegible]	[illegible]			24.35	5.82			

Nevada Assay Office

675 LESTER AVENUE

Reno, Nevada

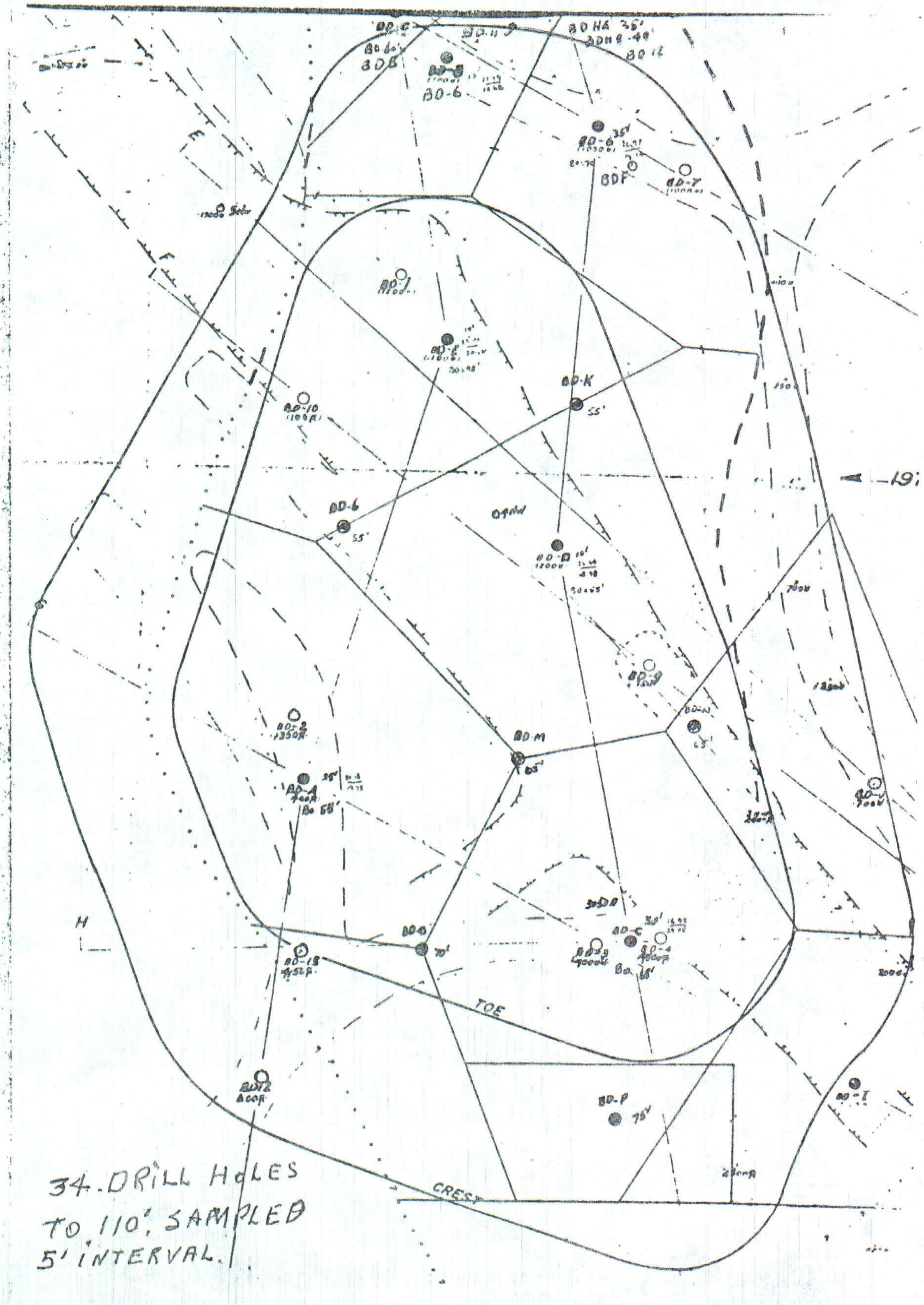
FRANK W. JONES
Assayer-Chemist

Ph
329

October 23, 1978

ASSAY CERTIFICATE FOR: Ruddock Resources, Reno, Nev.

No.	SAMPLE	GOLD OZ./TON	SILVER OZ./TON	Fe %	S %	%	%
	SA 0-5			12.42	5.95		
	5-10			18.04	10.37		
	15-20			1.27	8.56		
	25-30			1.86	6.00		
	30-35			4.93	4.38		
	35-40			6.90	10.29		
	40-45			2.93	19.04		
	50-55			4.03	25.73		
	55-60			11.83	45.89		
	SC 60-65			0.99	44.14		
	65-70			0.69	5.74		
	70-75			0.40	3.38		
	75-80			0.30	2.06		
	80-85			1.47	4.12		
	85-90			1.18	2.93		
	90-95			0.79	2.90		
	SD 0-5			12.03	8.93		
	5-10			9.86	10.86		
	10-15			11.43	15.26		
	15-20			6.50	10.58		
	20-25			5.03	12.63		
	25-30			6.70	9.38		
	30-35			4.73	7.29		
	35-40			5.12	8.67		
	40-45			1.20	5.71		
	45-50			1.00	6.84		
	50-55			1.78	5.41		
	55-60			1.08	3.26		
	60-65			1.48	6.93		
	65-70			2.67	9.21		
	70-75			2.57	6.43		



34. DRILL HOLES
TO 110', SAMPLED
5' INTERVAL.

Slick

Zn | Fe | Ni | Sn | MN | Sr | Mg | Ti | M | Al

S-1 N N 50 20 N N (15) N 70 20 N N N N 300 10 N N N N 100 1 N N N 200 N (50) (.2) (.1) (15) N 7 (.5) (N)

Copper, Lead, Zinc, Molybdenum, Iron, Tungsten, Nickel, Cobalt, Chrome, Arsenic, Antimony, Manganese, Vanadium, Bismuth, Zirconium, Boron, Barium, Beryllium, Strontium, Calcium, Magnesium, Titanium, Sodium, Potassium, (?), Aluminum, Phosphorus

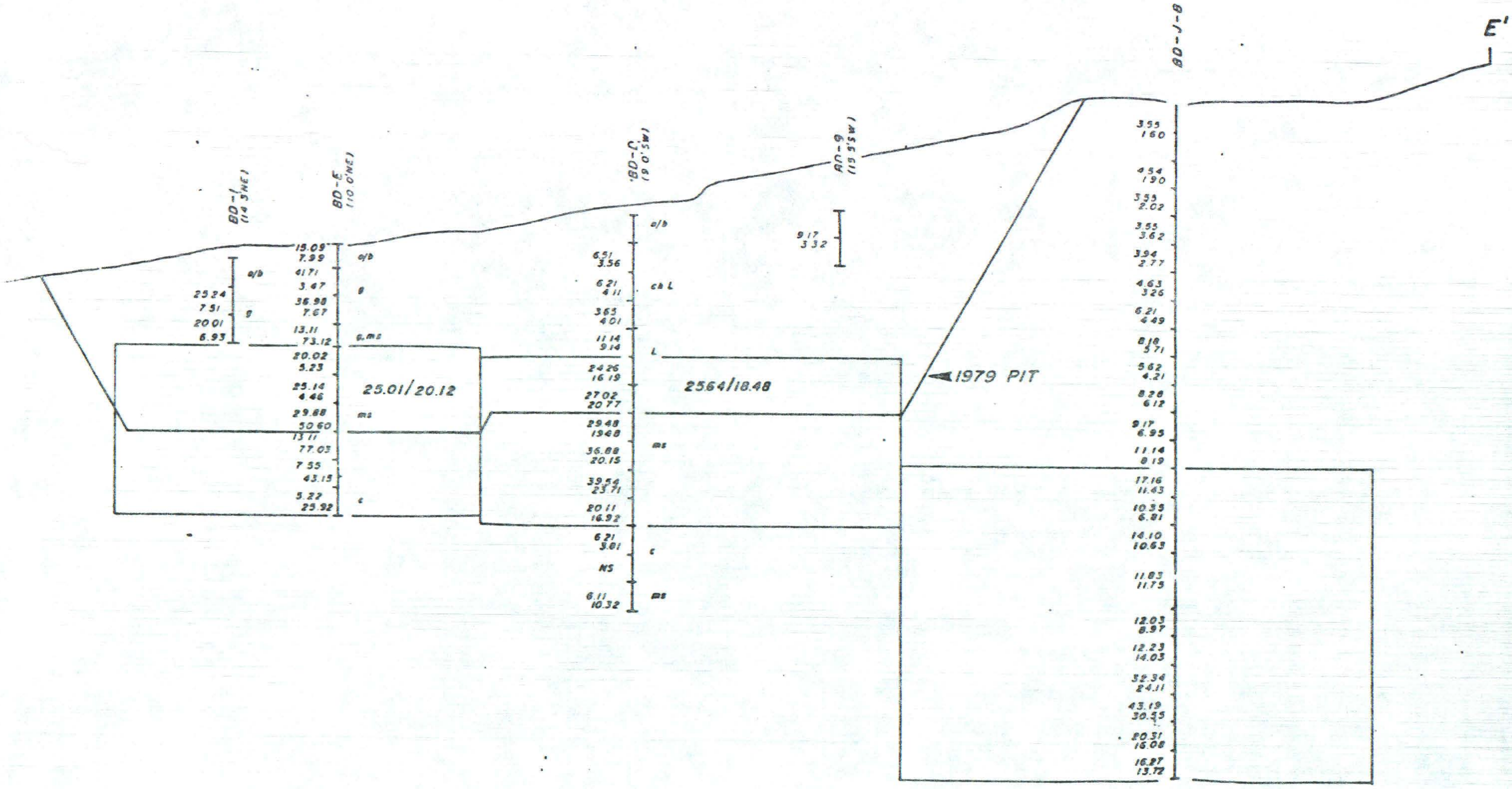
Hi GRADE SULPHIDE

Lower Detection Limit: 5 | 10 | 20 | 50 | 5 | 20 | 200 | 10 | 10 | 50 | 10 | 10 | 0.05 | 0.02% | 0.01% | 0.2% | 0.5% | 1% | 0.5%

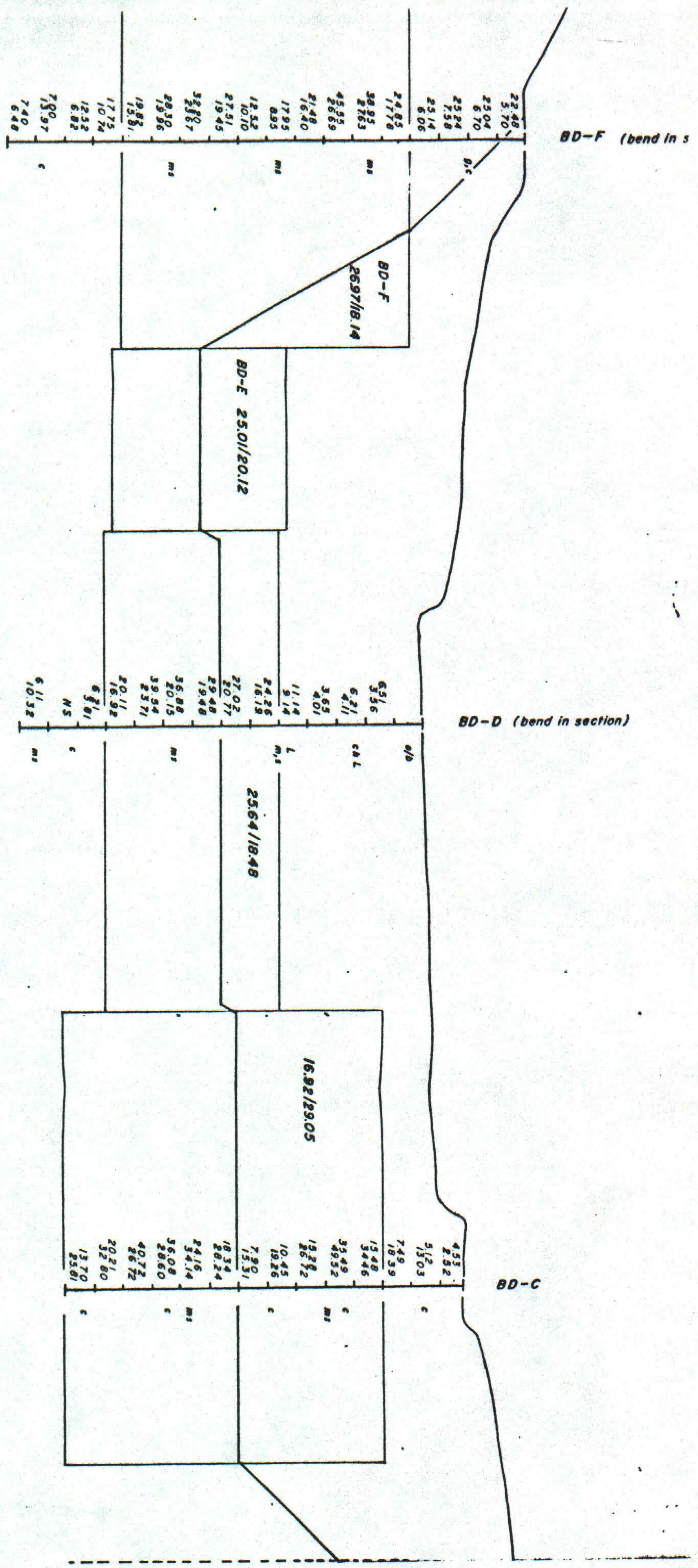
N — Not detected. L — Detected, but below limit of determination. G — Greater than

Keypunch code

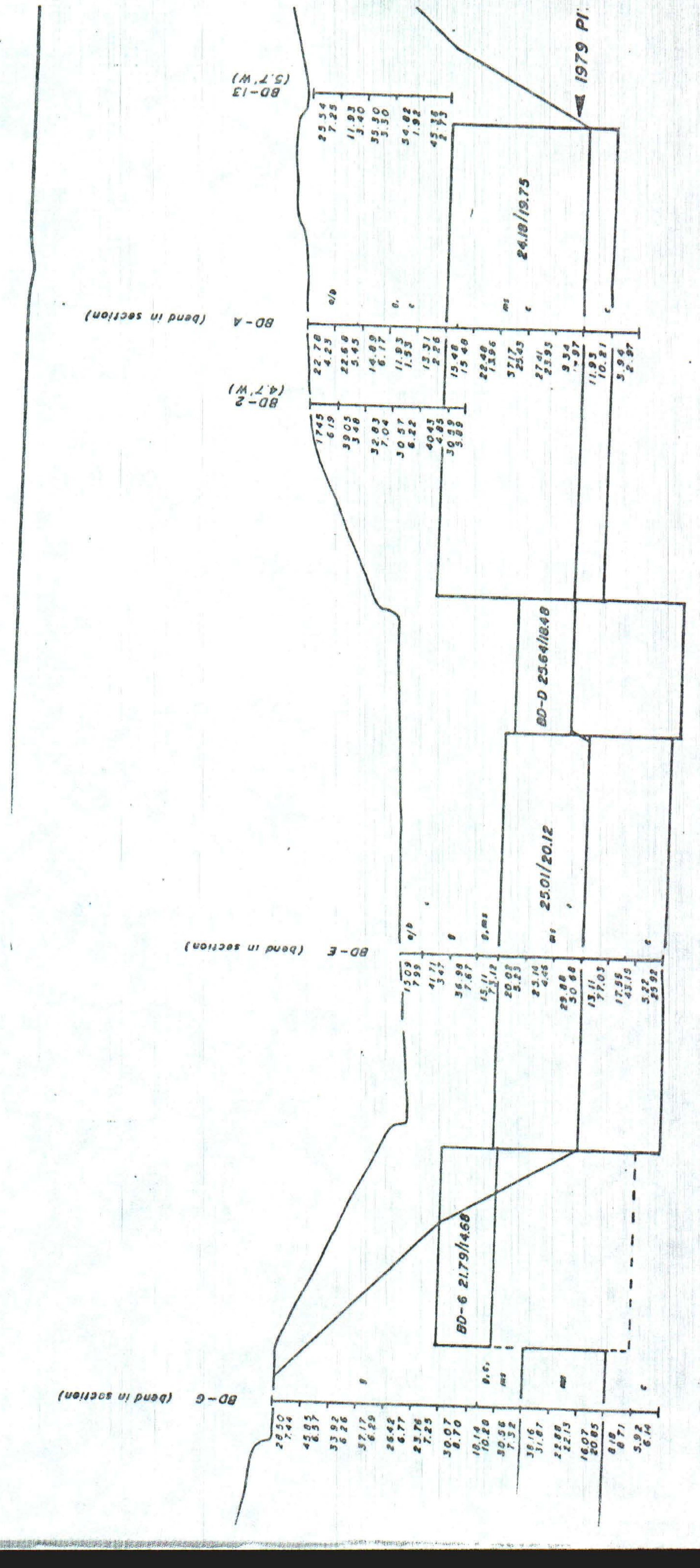
Analyst



BD-1
(14.3'NE)
BD-E
(10.0'NE)
BD-D
(9.0'SW)
AD-9
BD-J-8
E'
25.01/20.12
2564/18.48
1979 PIT



BD-F (bend in s
BD-F
26.97/18.14
BD-E 25.01/20.12
BD-D (bend in section)
25.64/18.48
16.98/29.05
BD-C



BD-13 (5.7' W)
BD-A (bend in section)
BD-2 (4.7' W)
1979 Pl
24.18/19.75
BD-D 23.64/18.48
25.01/20.12
BD-E (bend in section)
BD-6 21.79/14.68
BD-G (bend in section)

BROWN DEVIL PROPERTY

Assay Intervals and Assays

Drill Hole	Assay Interval	% Fe	% S
BD-F (cont.)	70-75	17.75	10.74
	75-80	12.52	6.82
	80-85	7.00	13.97
	85-90	7.40	6.48
BD-G	0- 5	28.50	7.44
	5-10	45.85	6.57
	10-15	33.92	6.26
	15-20	37.17	6.29
	20-25	26.42	6.77
	25-30	23.76	7.25
	30-35	30.07	8.70
	35-40	18.14	10.28
	40-45	30.56	7.32
	45-50	38.16	31.87
	50-55	22.88	22.13
	55-60	16.07	20.85
	60-65	8.18	8.71
	65-70	5.92	6.14
BD-H-A	0- 5	-	-
	5-10	20.41	3.81
	10-15	24.45	7.21
	15-20	17.32	8.62
	20-25	12.74	5.11
	25-30	10.87	4.33
BD-H-B	0- 5	-	-
	5-10	12.52	7.84
	10-15	15.58	2.66
	15-20	16.17	10.11
	20-25	13.11	4.96
	25-30	15.09	7.55
	30-35	11.44	3.71
BD-I	0- 5	-	-
	5-10	6.31	4.60
	10-15	22.28	16.21
	15-20	24.55	16.08
	20-25	2.47	2.69

BROWN DEVIL PROPERTY

Assay Intervals and Assays

Drill Hole	Assay Interval	% Fe	% S
BD-I (cont.)	25-30	20.41	19.92
	30-35	9.86	7.33
	35-40	9.66	9.47
	40-45	11.04	9.38
	45-50	15.78	10.81
	50-55	8.28	4.24
	55-60	8.38	5.84
BD-J	0- 5	3.55	1.60
	5-10	3.55	1.60
	10-15	4.54	1.90
	15-20	3.55	2.02
	20-25	3.55	3.62
	25-30	3.94	2.77
	30-35	4.63	3.26
	35-40	6.21	4.49
	40-45	8.18	5.71
	45-50	5.62	4.21
	50-55	8.28	6.12
	55-60	9.17	6.95
	60-65	11.14	8.19
	65-70	17.16	11.43
	70-75	10.35	6.81
	75-80	14.10	10.63
	80-85	11.83	11.75
	85-90	11.83	11.75
	90-95	12.03	8.97
	95-100	12.23	14.03
	100-105	32.34	24.11
	105-110	43.19	30.55
	110-115	20.31	16.08
	115-120	16.27	13.72

BROWN DEVIL PROPERTY

Assay Intervals and Assays

Drill Hole	Assay Interval	% Fe	% S
BD-D	0- 5	-	-
	5-10	6.51	3.56
	10-15	6.21	4.11
	15-20	3.65	4.01
	20-25	11.14	9.14
	25-30	24.26	16.19
	30-35	27.02	20.77
	35-40	29.48	19.48
	40-45	36.88	20.15
	45-50	39.54	23.71
	50-55	20.11	16.92
	55-60	2.21	3.81
	60-65	No Sample	No Sample
	65-70	6.11	10.32
BD-E	0- 4	15.09	7.99
	4- 9	41.17	3.47
	9-14	36.98	7.67
	14-18	13.11	73.12
	18-23	20.02	5.23
	23-28	25.14	4.46
	28-33	29.88	50.68
	33-38	13.11	77.03
	38-43	17.55	43.15
	43-48	5.22	25.92
BD-F	0- 5	22.48	5.70
	5-10	25.04	6.70
	10-15	25.24	7.58
	15-20	25.14	6.06
	20-25	24.85	17.78
	25-30	38.95	27.63
	30-35	45.55	26.69
	35-40	21.48	16.40
	40-45	17.95	8.95
	45-50	12.52	10.10
	50-55	27.51	19.45
	55-60	35.20	23.67
	60-65	28.30	19.96
	65-70	19.82	15.81

Appendix A.

BROWN DEVIL PROPERTY

Assay Intervals and Assays

Drill Hole	Assay Interval	% Fe	% S
BD-A	0- 5	22.78	4.23
	5-10	22.68	5.45
	10-15	14.89	6.17
	15-20	11.93	1.53
	20-25	13.31	2.26
	25-30	15.48	15.48
	30-35	22.48	13.96
	35-40	37.17	25.43
	40-45	27.41	23.93
	45-50	18.34	19.97
	50-55	11.93	10.21
	55-60	3.94	2.97
BD-B	0- 5	5.92	1.58
	5-10	6.90	2.57
	10-15	7.30	3.93
	15-20	7.30	1.92
	20-25	9.47	4.75
	25-30	7.89	7.38
	30-35	7.79	8.63
	35-40	8.87	9.07
	40-45	11.04	8.15
	45-50	7.59	8.04
BD-C	0- 4	4.53	2.52
	4- 9	5.12	13.03
	9-14	7.49	18.39
	14-19	15.48	34.46
	19-24	35.49	49.52
	24-29	15.28	26.72
	29-34	10.45	19.26
	34-39	7.90	15.31
	39-44	18.34	28.24
	44-49	24.16	34.14
	49-54	36.08	28.60
	54-59	40.72	26.72
	59-64	20.21	32.80
	64-69	13.70	25.81

The acidity produced by the decomposition of the Iron/Sulfur minerals can be used to control alkaline soil conditions. Some soils with very alkaline soils that are nearly or totally unproductive can be converted to productive soils with application of enough mineral material. The rate of production and release of the acids to the soil depend on the coarseness of the mineral material and can be expected to take place over 2 to 5 years. The iron and other trace elements contained in the minerals are thought to be beneficial plant food materials. The availability of the sulfur acid-producing minerals appears to be very high. A dramatic reduction of pH was observed in as little as thirty minutes in the laboratory. "Jack Omar, a horticulturist of the Burbank school, believes that Lovelock is missing a big bet by not using available rusty iron that has a high sulfur and phosphorus content.
He points with pride on his 15th street residence at a four year old bantam yellow delicious apple tree that is loaded with fruit.
It only grew an inch or two the first year, the he brought over a ton of the material and crushed in and wham! He put it on very liberally. Quantity, as in some chemicals, didnt't burn or harm but helped. The tree now is eight to ten feet tall. It compares favorably in size, health and productin with similar tree fifteen years old....With everything he treated with the iron material, the results have been astounding and Jack can't understand why there isn't a tremendous local market for this material, especially the way it benefits alkaline soils." (from the Lovelock, NV Review-Miner newspaper published in late summer of 1961.) A Mr. Bruce Boyer, technical representative of Sacramento, California states that there are two firms currently marketing iron-sulfur products that he is aware of and consults for:
Mel Williams of Colverdale Trailer Sales, Cloverdale, California is packaging and selling materials in 1 lb bags @ $1.95/ lb. The Iron Mountain Mines near Redding, California are selling a product called "SULFRON" for soil conditioning. This is thought to be a mixture of magnetite with a high sulfur content. This has rendered unsuitable for steel making uses. A third product, called "Iron Chelate" is marketed in 5 lb plackages for $18.00 to $24.00 per package or $3.50 to $4.80 per lb. MINING:

..03

Pyrrhotite - Iron - Sulphur - Gypsum
P.H. - 3.7 NEUTRALIZES ALKALINITY
Promotes Plant Growth
Hal Pfeifer
End Irish American Road
P.O. Box 281, LOVELOCK, NV 89419
Telephone (702) 273-2697

SUITABILITY
ANALYSIS
(A-02)

Date January 20, 1982

ample No.	Half Saturation %	pH	Saturation Extract Values — ECe	Calcium (milliequivalents per liter)	Magnesium	Sodium	Potassium				PPM Boron	SAR	Lime Content	
	16	3.7	9.1	30.0	79.2	37.4	0.5				2.7	5.1	med	

on sulfur product – sample received 1-15-82

There is also a possibility that when this material is combined with soil in a biological system that additional iron would become available. This could best be demonstrated in a growth trial using a fast growing plant such as ryegrass as the test crop. We would be happy to carry out this type of testing if you wish to generate additional information on the potential of this product for the horticultural trade. A trial of this type requires three to four months to complete and costs approximately $500 to $1000 depending upon the complexity of the trial and the amount of analytical work required upon completion to document the results. We do provide a written report with photographs which can be used as promotional literature.

Please contact us if you wish to discuss the product in any greater detail.

JOHN E. RODEBAUGH, Ph.D.

JER;cw

Half Saturation % — Approximate field moisture capacity. ECe - millimhos per centimeter. SAR — Sodium adsorption ratio on saturation extract.

Metallurgical Laboratories, Inc.

Chemists · Assayers · Spectrog

1142 HOWARD STREET • SAN FRANCISCO, CALIFORNIA 94103 • AREA CODE 415 8

Spectrographic Analysis
(Semi-quantitative)

Submitted by Mr. Hallie C. Pfeifer
P. O. Box 281
Lovelock, Nevada 89419

Date August 26, 1983

Sample of Mineral

P. O. No.

Lab. No. 6194

SAMPLE MARK →	#1			SAMPLE MARK →	#1		
IRON % **	58.53			SODIUM %	1.00		
COPPER	0.07			POTASSIUM	0.10		
NICKEL	0.001			STRONTIUM	0.001		
CHROMIUM	0.003			ZIRCONIUM	0.001		
ALUMINUM	1.75			BORON	0.001		
LEAD	0.003			BARIUM	0.001		
TIN	–			RARE EARTHS	–		
ZINC	0.001*			Sulfur**	30.92		
COBALT							
MANGANESE	0.004						
MOLYBDENUM	0.002						
SILICON	6.00						
SILVER *	0.0001						
VANADIUM	0.003						
MAGNESIUM	0.04						
CALCIUM	0.60						
TITANIUM	0.01						
BISMUTH							

*LESS THAN
**CHEMICAL DETERMINATION

METALLURGICAL LABORATORIES,

By [signature]
SPECTROCHEMIST

FA 7-8567

HORNKOHL LABORATORIES, INC.

CHEMICAL AND TESTING ENGINEERS
714 TRUXTUN AVENUE
BAKERSFIELD, CALIFORNIA

November 6, 1957

Laboratory No. 109533 *Marked* No Mark

Sample Ore

Received [illegible] 1957

Submitted by [illegible]

• • • • • • • • • •

CHEMICAL ANALYSIS

IRON CONTENT:

as Fe_2O_3	----	56.08%

SULFIDE CONTENT:

as S	----	0.74%

SULFATE CONTENT:

as SO_3	----	16.91%

SEMI-QUANTITATIVE SPECTROGRAPHIC ANALYSIS

MAJOR CONSTITUENTS:

Iron	----	Over 10%

INTERMEDIATE CONSTITUENTS:

Silicon	----	5-10%
Sodium	----	1-5%
Calcium	----	1-5%

MINOR CONSTITUENTS:

Aluminum	----	0.1-0.5%
Zinc	----	0.05-0.1%
Magnesium	----	0.05-0.1%
Manganese	----	0.01-0.05%
Gallium	----	0.01-0.05%
Molybdenum	----	0.01-0.05%
Vanadium	----	0.01-0.05%
Titanium	----	0.01-0.05%
Tin	----	0.005-0.01%
Copper	----	Trace
Silver	----	Trace
Nickel	----	Trace
Chromium	----	Trace

Respectfully submitted,
HORNKOHL LABORATORIES.

L. 6 4567

P. O. BOX

HORNKOHL LABORATORIES

CHEMICAL AND TESTING ENGINEERS
714 TRUXTUN AVENUE
BAKERSFIELD, CALIFORNIA

May 28, 1967

Laboratory No. 108141

Sample: Ore

Received: May 21, 1967

Submitted by:

CHEMICAL ANALYSIS

Iron Content:		
as Fe:	----	33.83%
as Fe_2O_3:	----	48.40%
Sulfide Content:		
as S:	----	5.17%
Sulfate Content:		
as SO_3:	----	1.39%

SEMI-QUANTITATIVE SPECTROGRAPHIC ANALYSIS

MAJOR CONSTITUENTS:		
Silicon	----	Over 10%
Calcium	----	Over 10%
Iron	----	Over 10%
INTERMEDIATE CONSTITUENT:		
Magnesium	----	1-5%
MINOR CONSTITUENTS:		
Aluminum	----	0.5-1.0%
Potassium	----	0.5-1.0%
Manganese	----	0.1-0.5%
Vanadium	----	0.01-0.05%
Copper	----	0.01-0.05%
Titanium	----	0.01-0.05%

(CONTINUED)

TEL. 8.8367

P. O. BOX 867

HORNKOHL LABORATORIES
CHEMICAL AND TESTING ENGINEERS
714 TRUXTUN AVENUE
BAKERSFIELD, CALIFORNIA

KERN PTG. CO. Laboratory No. 108141

MINOR CONSTITUENTS (CONTINUED):

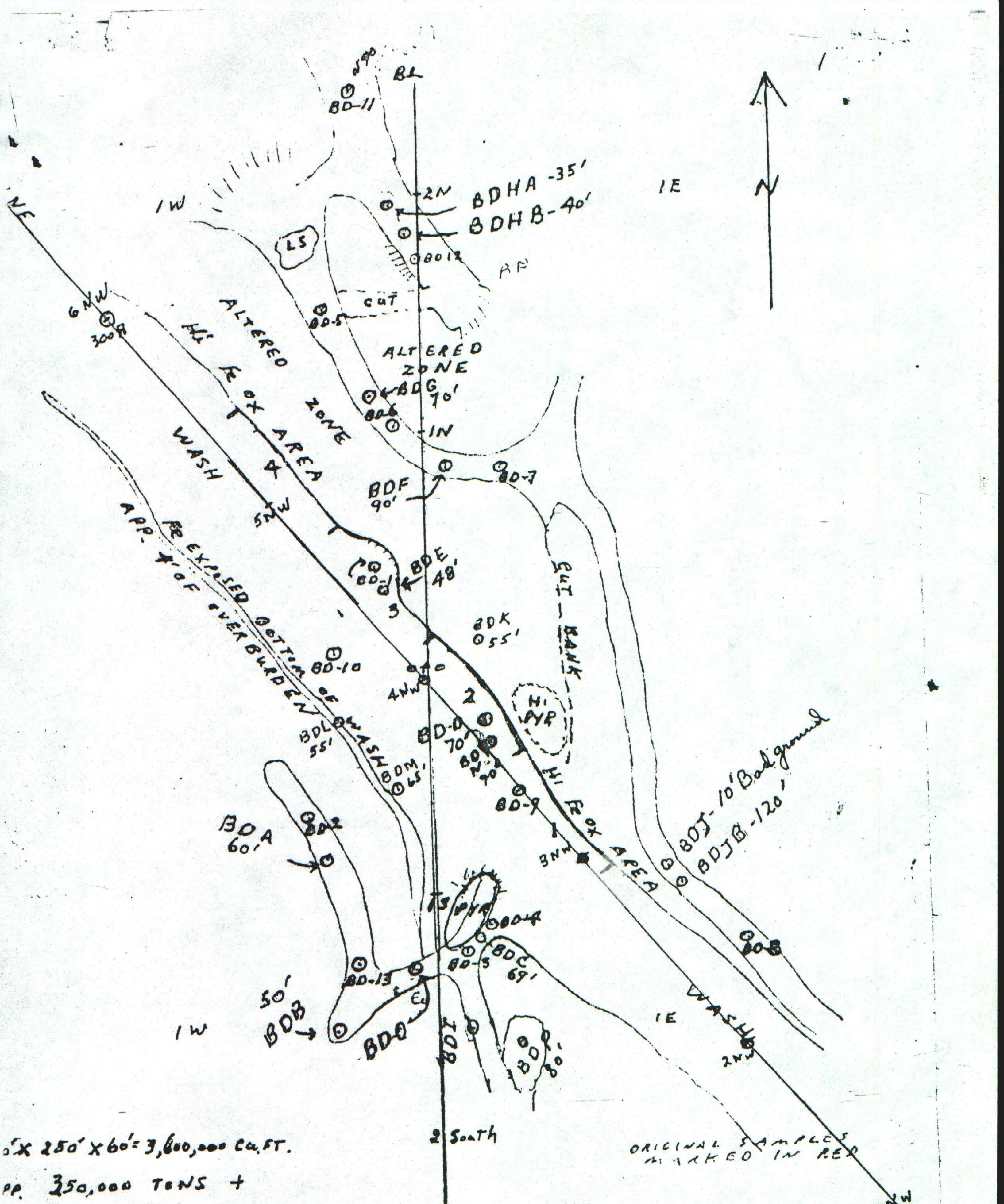
Molybdenum	----	0.001-0.005%
Silver	----	0.001-0.005%
Nickel	----	0.001-0.005%
Chromium	----	0.0001-0.0005%
Scandium	----	Trace
Ytterbium	----	Trace

Respectfully submitted,

HORNKOHL LABORATORIES

Chief Chemist

mk

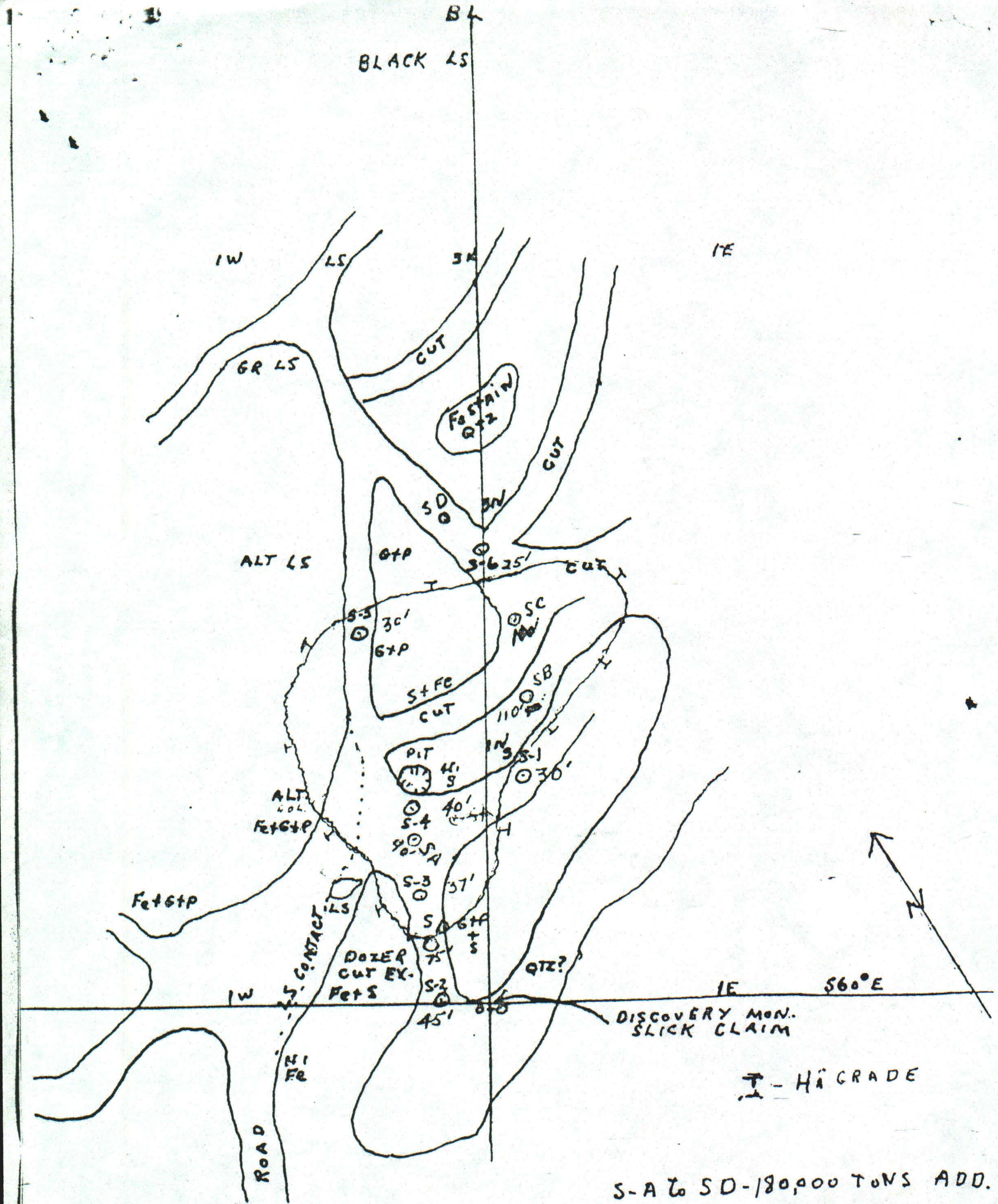


'X 250' X 60' = 3,600,000 Cu. FT.

PP. 350,000 TONS +

EC 34, T26N. R32E

DRILL LOCATION MAP
BROWN DEVIL CLAIMS
... COUNTY NEVADA



S-A to SD-180,000 TONS ADD.

DRILL LOCATION
SLICK CLAIM
PERSHING COUNTY NEVADA

00 X 75 X 30 = 450,000 Cu. FT.

40,000 TONS S-1 to S6

File: I

305

Item 18

DN:

THIS INFORMATION CONCERNS THE PYRRHOTITE (Fe7,S8) deposit known as the Brown Devil and Slick claim group about 12 miles south of Lovelock, Nevada. The deposit was originally discovered in the 1950's and located by members of the Hunley family about 1960??. The Slick claim is owned by Mr. Hallie Pfiefer of Reno, Nevada individually and the Brown Devil claims are owned equally by Hunley and Pfeifer. Mr. Pfiefer has sole management of the property. There are 3 unpatented lode mining claims in the group. A limited amount of exploration work was done until a drilling program was conducted by Ruddock Resources in 1979 uunder a lease and option agreement with Mr. Hal Pfeifer. A total of 33 holes were drilled with an average depth of 67 feet. This program resulted in the outlining of about 400,000 tons of material with a significant iron (12%) and sulfur (20%) content. The deposit is very shallow and can be mined by open-pit mining methods. Addtional reserves may be present beyond the area of completed drilling. A magnetic survey indicated areas of high magnetism were present outside of the drilled zone.

S 34, 26N, 32E

The minerals present, Pyrrhotite, Pyrite and Marcasite are all iron sulfides. They are useful for reducing the pH alkaline soils (high Ph) for better plant growth. The value of the pH is an indicator of alkalinity-acidity with a value of 7.0 as neutral, like distilled water. The sulfur in these minerals is broken down by weathering processes to produce sulfuric acid. The acid combines with the alkaline bases to reduce the basic pH values (7 to 10) to neutral or slightly acidic (6.4 to 7).

HISTORY:

USES:

..02

The acidity produced by the decomposition of the Iron/Sulfur minerals can be used to control alkaline soil conditions. Some soils with very alkaline soils that are nearly or totally unproductive can be converted to productive soils with application of enough mineral material. The rate of production and release of the acids to the soil depend on the coarseness of the mineral material and can be expected to take place over 2 to 5 years. The iron and other trace elements contained in the minerals are thought to be beneficial plant food materials. The availability of the sulfur acid-producing minerals appears to be very high. A dramatic reduction of pH was observed in as little as thirty minutes in the laboratory. "Jack Omar, a horticulturist of the Burbank school, believes that Lovelock is missing a big bet by not using available rusty iron that has a high sulfur and phosphorus content.
He points with pride on his 15th street residence at a four year old bantam yellow delicious apple tree that is loaded with fruit.
It only grew an inch or two the first year, the he brought over a ton of the material and crushed in and wham! He put it on very liberally. Quantity, as in some chemicals, didnt't burn or harm but helped. The tree now is eith to ten feet tall. It compares favorably in size, health and productin with similar tree fifteen years old....With everything he treated with the iron material, the results have been astounding and Jack can't understand why there isn't a tremendous local market for this material, especially the way it benefits alkaline soils." (from the Lovelock, NV Review-Miner newspaper published in late summer of 1961.)A Mr. Bruce Boyer, technical representative of Sacramento, California states that there are two firms currently marketing iron-sulfur products that he is aware of and consults for:
Mel Williams of Colverdale Trailer Sales, Cloverdale, California is packaging and selling materials in 1 lb bags @ $1.95/ lb.The Iron Mountain Mines near Redding, California are selling a product called "SULFRON" for soil conditioning. This is thought to be a mixture of magnetite with a high sulfur content. This has rendered unsuitable for steel making uses. A third product, called "Iron Chelate" is marketed in 5 lb plackages for $18.00 to $24.00 per package or $3.50 to $4.80 per lb.MINING:

The deposit is located near the ground surface in a barren area of the lower Humboldt range about 12 miles south of Lovelock, Nevada. Access is by good dirt roads from the lower valley road alongside of I-80 which can be accessed 4.5 miles south of Lovelock.About 15,000 cubic yards of material should be removed for a distance about 800 feet in order to develop the pit. This material is loose alluvium. Mining of the mineral materials can be done with a Catperpillar 977 loader equipped with a ripper assembly. About 10% of the high-grade material will probably require drilling and blasting. The material will then be loaded on trucks for a 12 mile haul to the stockpile and blending area near I-80. Suitable operating areas are available closer to the mine but do not currently offer power or water supplies.

PROCESSING:

It is necessary to selectively stockpile materials mined from the various grade zones within the deposit. This will make it possible to produce a blended product range from the lowest grade to the top grade of minerals present. There are deposits of gypsum and high-sulfur (sulphide) minerals on the Slick claim. MARKETING:

We will discuss marketing - prices and competition with the California sales manager for Wilbur Ellis Company who lives in Chula Vista, Ca when we have complete test information from Dr. John Rodebaugh, PhD. consultant with Soil and Plant Laboratory, Inc., p o box 11744, Santa Ana, Ca 92711, 714/558-8333

IRON SULFUR PRODUCT

Following is a report on the data generated from the analysis of a sample of an iron sulfur material brought to the laboratory on January 15. It was indicated that this material is from a natural deposit found in central Nevada. The purpose of the examination was to see if the material might have any potential value as a soil amendment.

Analytical Results

From the data, it appears that this material is primarily an iron sulfide material which also contains some uncombined sulfur. The iron content was found to be 15.6% and the sulfur content was 42.5%. These data are in the same range as found by others in their analysis of the deposit. For the material to have a potential value as an iron supplement for plant growth, a substantial portion of the iron should be in the available form. This aspect is checked by what we call a DTPA extraction of the product. In this test only a small fraction of 1% was found to be in the available form. The level of available iron was in the same range as found in the analysis of an average field soil. Small quantities of copper, zinc, manganese and boron were also found to be in the available form, although once again the levels found were in a typical range for a normal agricultural soil.

The reaction of this product was fairly strongly acid which might be expected with the high sulfur content. Salinity is in a range that would restrict plant growth if the material were being used as 100% of a growing medium which would be highly unlikely. Fairly substantial quantities of soluble calcium, magnesium and sodium were found with magnesium being soluble in the highest proportion. The boron level would not restrict the use of this material as a soil amendment.

Discussion

Since it appears the iron found in this material is largely in the sulfide or unavailable form, the product would need to be marketed primarily for its sulfur content. The free sulfur is in the 20 to 25 percent range and since 100% sulfur is currently available in the 125.00 per ton range, the value of this product as a sulfur source would be in the 25.00 to 35.00 per ton range. Undoubtedly there would be sections of the deposit where the sulfur content might be somewhat higher. Sulfur will improve the growth of plants where the original soil is alkaline and/or where sulfur itself may be lacking. Generally, sites of this type are not in general agriculture, however, if there is pressure in the future for additional farm products, general agriculture may expand into areas characterized by soils of this type. Residential housing already exists in soils of this type and there might be a potential for use of this product in the landscape contractor and homeowner market. This would require substantial promotion to establish.

P.O. Box 11744, Santa Ana, California 92711 (714) 558-8333
P.O. Box 153, Santa Clara, California 95052 (408) 727-0330
P.O. Box 1648, Bellevue, Washington 98009 (206) 746-6665

Lovelock, Nv.
3/22/90

Becky:

Enclosed some pictures of test plots on P.H. 10 soil and a tomato garden of eight plants over 6 ft. high and produced over several hundred Tomatoes. also have some farm plot pictures

Hallie.

Hope this will be of some help.