Mr. H. I. Young

Chas. A. Dobbel

Mr. R. A. Young

February 1, 1954

Mt. Wheeler Mine,
White Pine County,
Nevada

Dear Mr. Young:

Since my letter of January 16, I have studied the information we have on the Mt. Wheeler Mine and reviewed the various reports written to date and can thus supplement my letter of January 16 to a considerable degree.

Present Status of the Mine

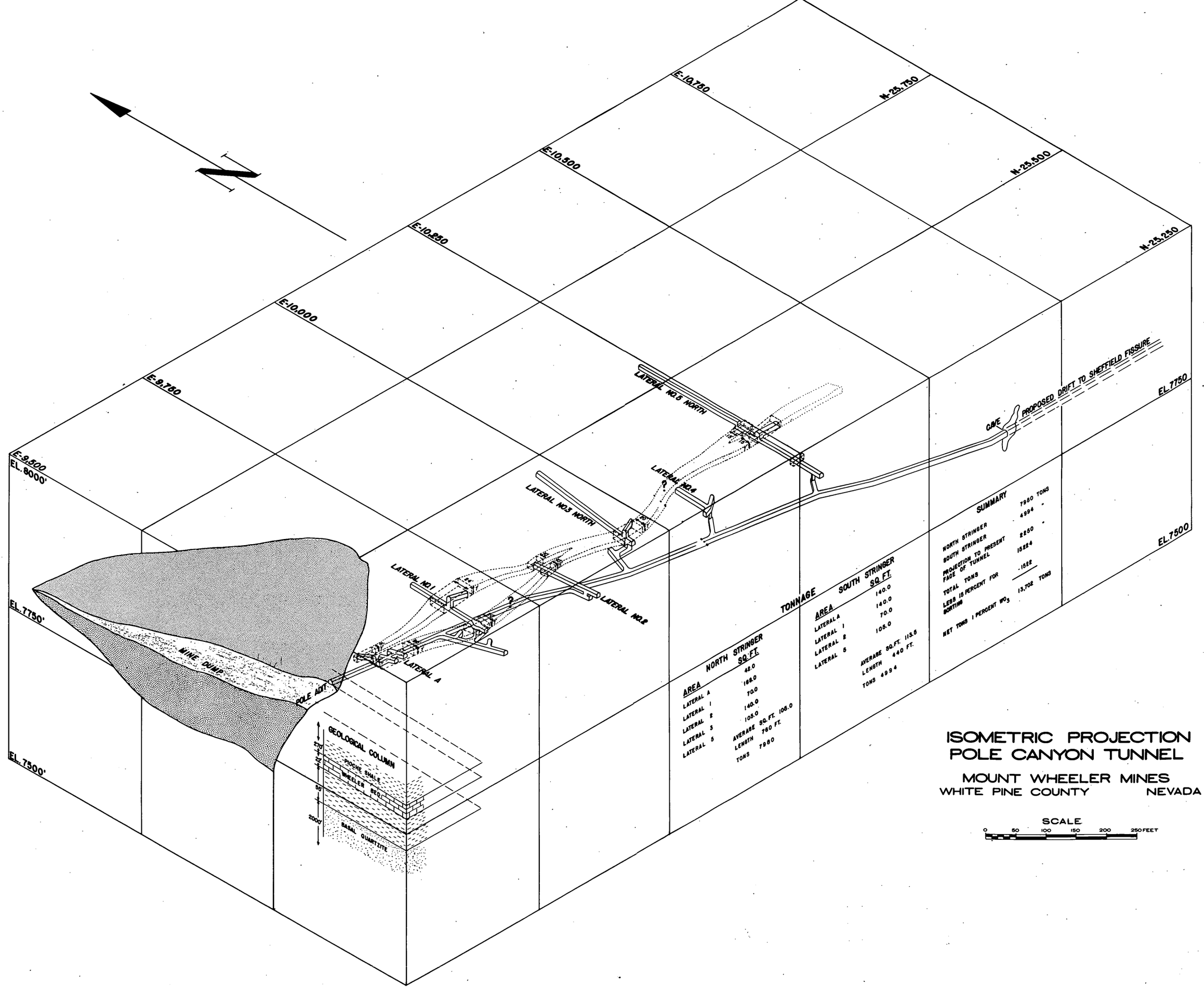
Figure 1 immediately following gives a three dimensional concept of the condition of the mine at this particular writing. The Pole Adit or main entry to the Mt. Wheeler deposit stands at 1108 feet from the portal. The occurrence of tungsten mineralization has been sought by laterals and raises from this main entry and a line of tungsten mineralization has been shown to exist in the Wheeler bed just under the so-called Pioche shale. The mineralization follows a fracture zone that runs nearly parallel or adjacent to the Pole Adit.

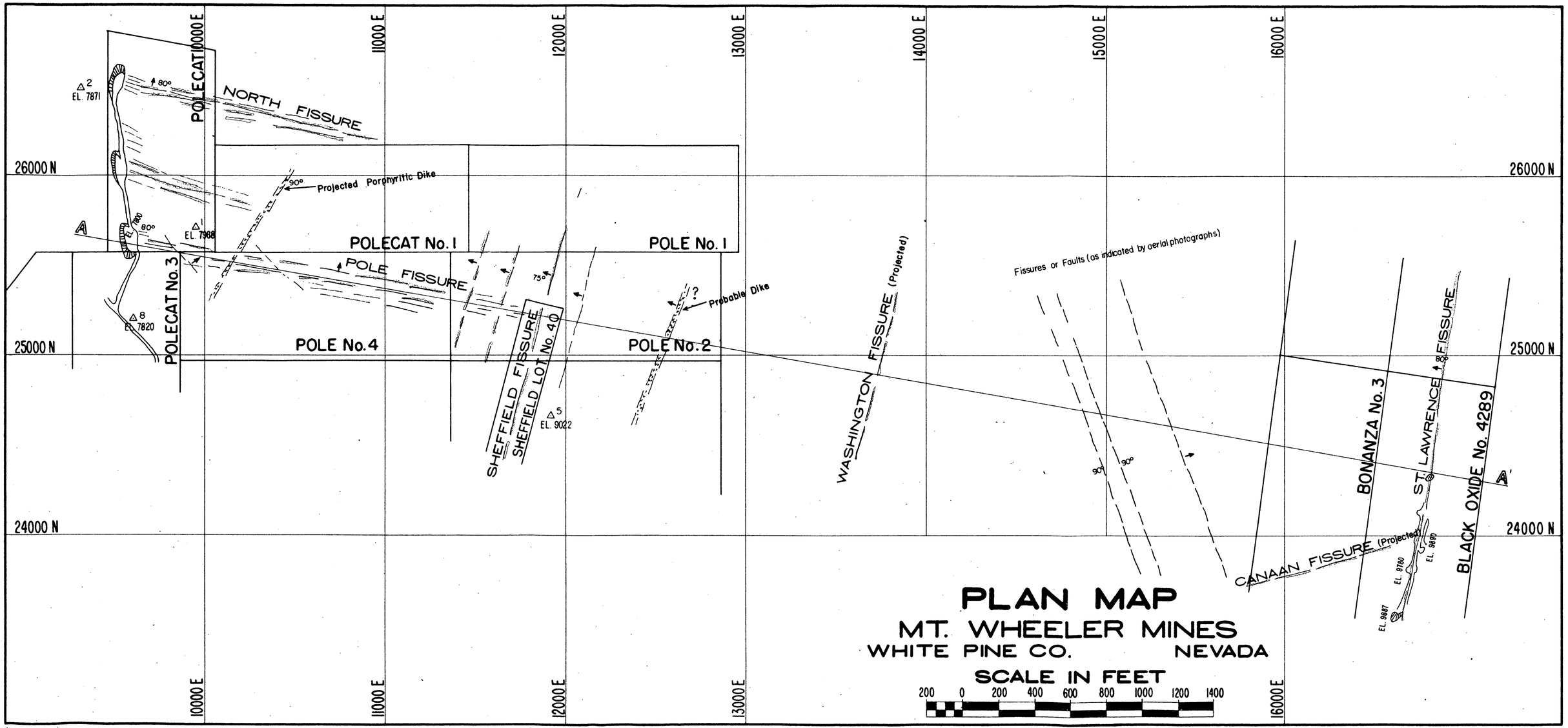
Observation in the laterals and raises driven from the Pole Adit show the existence of tungsten ore as shown in this diagram where this fracture zone and the Wheeler bed have been cut by these laterals and raises.

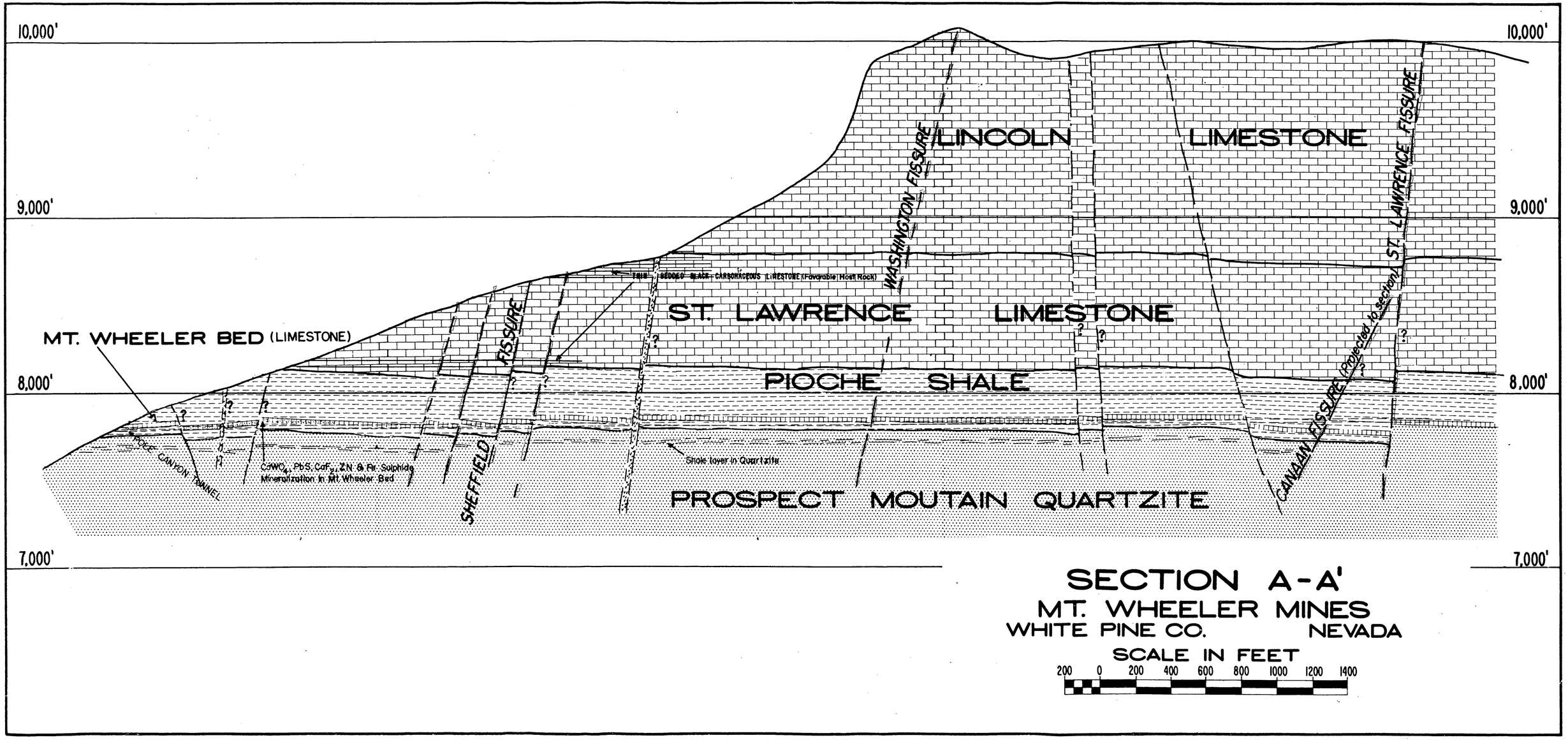
A review of the showings observed and recorded in this lateral work indicates that about 15,000 tons of milling ore can exist in this mineralized zone. Grab samples from the work in these raises and laterals along with the actual production of 361 tons of crude ore, indicate that an average assay of material will support the conclusion that production from this zone can average from 0.75 to 1.0% WO_3

With sorting, it is apparent that material mined from this zone can be raised to 1.0% WO_3 or more and it may be possible, sorting waste from the ore, to remove up to 15%. This figure, however, will depend upon the sorting facilities that can be provided and can only be determined after trial. It is assumed, therefore, that this zone can produce about 13,000 net tons of 1.0% WO_3.

A summary of how this calculation was arrived at is shown on the isometric diagram immediately following.


N
E-9,500
EL. 8000'
EL. 7750'
EL. 7500'
E-9,750
E-10,000
E-10,250
E-10,500
E-10,750
N-25,750
N-25,500
N-25,250
EL. 7750
EL. 7500
LATERAL NO. 5 NORTH
LATERAL NO. 4
LATERAL NO. 3 NORTH
LATERAL NO. 1
LATERAL NO. 2
LATERAL A
POLE ADIT
MINE DUMP
CAVE
PROPOSED DRIFT TO SHEFFIELD FISSURE
GEOLOGICAL COLUMN
PIOCHE SHALE
WHEELER BED
BASAL QUARTZITE
20'
40'
60'
2000'
TONNAGE
NORTH STRINGER
AREA SQ. FT.
LATERAL A 42.0
LATERAL 1 168.0
LATERAL 2 70.0
LATERAL 3 140.0
LATERAL 5 105.0
AVERAGE SQ. FT. 105.0
LENGTH 760 FT.
TONS 7980
SOUTH STRINGER
AREA SQ. FT.
LATERAL A 140.0
LATERAL 1 140.0
LATERAL 2 70.0
LATERAL 5 105.0
AVERAGE SQ. FT. 113.5
LENGTH 440 FT.
TONS 4994
SUMMARY
NORTH STRINGER 7980 TONS
SOUTH STRINGER 4994 "
PROJECTION TO PRESENT FACE OF TUNNEL 2250 "
TOTAL TONS 15224
LESS 15 PERCENT FOR SORTING -1522
NET TONS 1 PERCENT WO3 13,702 TONS
ISOMETRIC PROJECTION
POLE CANYON TUNNEL
MOUNT WHEELER MINES
WHITE PINE COUNTY NEVADA
SCALE
0 50 100 150 200 250 FEET


10000 E
11000 E
12000 E
13000 E
14000 E
15000 E
16000 E
26000 N
25000 N
24000 N
POLECAT
NORTH FISSURE
80°
△2
EL. 7871
90°
Projected Porphyritic Dike
A
△1
EL. 7968
80°
POLECAT No. 1
POLE No. 1
POLE FISSURE
POLECAT No. 3
△8
EL. 7820
POLE No. 4
75°
SHEFFIELD FISSURE
SHEFFIELD LOT No. 40
△5
EL. 9022
?
Probable Dike
POLE No. 2
WASHINGTON FISSURE (Projected)
Fissures or Faults (as indicated by aerial photographs)
90°
90°
BONANZA No. 3
ST. LAWRENCE FISSURE
80°
BLACK OXIDE No. 4289
A'
CANAAN FISSURE (Projected)
EL. 9880
EL. 9780
EL. 9687
PLAN MAP
MT. WHEELER MINES
WHITE PINE CO. NEVADA
SCALE IN FEET
200 0 200 400 600 800 1000 1200 1400



SECTION A-A'

MT. WHEELER MINES

WHITE PINE CO. NEVADA

SCALE IN FEET

200 0 200 400 600 800 1000 1200 1400

Proposed Development

As called to your attention in previous work done at the Wheeler, the best possibilities of the Wheeler Mine lie beyond the present developed area. It is conceded that the Wheeler bed is a very acceptable "host" rock to mineralization and from what we have seen to date, the so-called Pole fracture system appears to prepare the Wheeler bed for mineralization. This has been the cause of localization of tungsten mineralization in the Wheeler Mine to date. The Sheffield fissure crosses in a north-south direction and is a very pronounced fault-zone some 1200 feet ahead of the present face of the Pole Adit. Evidence of mineralization on this Sheffield fissure is well known from previous work so the conclusion drawn in such reports as that written by Requa and E. B. Young is correct - that the intersection of the Pole fissure with the Sheffield zone will be an unusually favorable locus for ore deposition.

There are also other fissures parallel to the Pole ore channel and the so-called North Fissure exists some 900' north of the Adit. With limited work on the surface at this time, evidence of mineralization exists here which suggests the likelihood of similar mineralization in the Wheeler bed along this North zone.

The plan, therefore, which has been drawn up as an amendment to Contract Idm-E 248 contemplates extending the Pole Adit another 1200 feet to cut through the Sheffield zone. It also includes the opening of the North fissure zone and the necessary lateral and raise work contingent to the opening of these fissures. A complete outline of this amendment is attached hereto as Appendix "A" and specifically requests a total outlay of $113,014. It is work that can be accomplished within a six month period and there appears to be ample geological reason to believe that the completion of this development might multiply the available tungsten ore from the Mt. Wheeler Mine by two or three times the available tonnage as presently indicated.

The Claim Map which accompanies this letter shows the area covered by location and patented claims in the Mt. Wheeler area and calls attention to the three major fissures known as the Sheffield, Washington and St. Lawrence, which cut across the line of the proposed Pole Canyon Tunnel. The pending application for amendment, however, will extend the Pole Canyon Adit to traverse through the Sheffield fissure zone only, but it is well to consider that future possibilities in the Mt. Wheeler Mine still exist with these major fissures showing evidence of mineralization on the surface and near the surface which lie ahead of the present and the proposed workings.

The sketch immediately following shows these prospecting possibilities in plan where the Pole Fissure will cut these major cross-fissures. It also shows the relationship of the so-called North Fissure to the Pole fissure. Also immediately following is shown a section along the line of the Pole Canyon tunnel to give a general idea of the location of the Mt. Wheeler bed and its relationship to these cross fractures and the geologic column.

Ore Values

The results from gravity milling of the Mt. Wheeler ores has been encouraging. The ore concentrated was taken from the raises and laterals in the Mt. Wheeler Mine with no attempt at sorting. Actual results of this milling under very crude conditions showed that the ore averaged 0.78% WO_3 from which an average recovery showed 0.58% WO_3 per ton. The details of this mill test is given in the report by Requa and E. B. Young, a copy of which is attached hereto as Appendix "B".

Requa and Young further spoke of upgrading this ore by sorting in the stopes and they estimate that it could so be upgraded into about 3,000 tons of 3% WO_3. This is not a definite figure, however, and actual results of such sorting would have to be proven by experience. It is definitely believed, however, that with a minimum amount of sorting, this ore can be graded to 1% which would show a profit with the present Government price.

The ore reserves of 10,000 tons (Requa and Young) or 13,000 tons (as arrived at by re-study) should not be taken as a total possibility of 1% ore to be produced by development to date. Wheeler is a replacement ore deposit in limestone and the actual mining of this ore may reveal irregularities in the actual replacement so that more than this present calculated tonnage can be realized even from present workings.

Concentration of Wheeler Ores

Combined Metals has conducted a number of flotation tests on Mt. Wheeler ore. Results have indicated a lower grade concentrate than that realized by gravity concentration would be realized, but this concentrate can be subjected to acid treatment to bring it up to a marketable grade. As compared to gravity treatment, however, the tailings loss in these flotation tests was consistently below 0.10% WO_3 as compared to a tailings loss of 0.18% WO_3 or more as found in the gravity concentration of the ore.

No flotation plant exists within the immediate area of the W heeler Mine and results of the gravity milling and the flotation tests strongly suggest the possibility of treating this ore by a combined method of gravity followed by flotation.

The immediate milling of Mt. Wheeler ores at the Bauer Concentrator near Salt Lake City has been considered. This stands as a possibility to subject these ores to flotation concentration and still net a profit from the production of 1% WO_3 ore.

The concentrator is now available for this but the production from Wheeler alone will not keep a unit of this mill running on tungsten concentration. For this reason, it would appear that the judicial action would be to put the Wheeler into a further development period at this time until ores from the Minerva Mine are available and this combined tonnage would then keep the Bauer Concentrator unit busy on the treatment of tungsten ores. At such a time when the presently contemplated development is completed, justification of a joint mill for the treatment of both Minerva and Wheeler ores may be fully justified.

It seems logical to assume the Wheeler ore can be produced on a 1% WO_3 basis, sorting enough waste from the ore to hold the grade at 1% or better.

The Bauer Mill calculates the net amount paid per unit as follows:

Government Price		$63.00
Refining Charge (15.00 X 90%)	$13.50	
Refining Loss 10%	6.30	
		19.80
Net Unit Pay		$43.20
Multiply the Net Unit Pay times the Mill Recovery (80%)		$34.60
Mill Treatment Charge		6.00
Net Value F.O.B. Mill		$28.60
Freight and Haulage to Bauer		7.00
Net Value F.O.B. Mine (1% WO_3 ore)		$21.60

It, therefore, appears that if Wheeler ore could be mined for a maximum of $10 per ton, the net value to be realized per ton of ore produced when shipping to the Bauer Mill would be $11.60.

This is based on the possibility of haulage and freight at $7.00 per ton. Former quoted figures were calculated on the basis of $8.00 per ton but it appears now that this haulage can be reduced in the range of from $6.50 to $7.00 and it may be as low as $6.00 per ton when final schedules are arranged.

Results of milling in the Stopper Mill are included herewith as Appendix "C".

Conclusion

Mt. Wheeler is a combination of favorable stratigraphy, favorable structure, and favorable evidence of mineralization, which urges one to recommend that the current development program be endorsed. The work accomplished to date is strong evidence that tungsten ore can be produced here with an economic return. Additional development is fully justified and it gives every indication of promise to an improvement of current showings.

Very truly yours,

Chas. A. Dobbel

CAD:mm

A

CURRENT REQUEST FOR AMENDMENT - CONTRACT Idm - E 248

Mt. Wheeler Mines

This amendment was applied for on October 27, 1953 and consists of the following request:

A. Pole Adit Entry:

1. Extend the pole adit 1200 feet east in a direction of about S. 80° E. to E. within the Wheeler bed. Adit to be turned slightly to follow under the lime-shale contact and to proceed in length to cut the Sheffield fissure.

2. Drive six short laterals northerly about 200 feet apart with the strongest north-south trending shear zones cut by adit advance. Drive short raises where necessary to enter the ore zone. Total lateral and raise footage not to exceed 600 feet.

B. Easterly drive at north zone:

1. Drive east 500 feet within the Wheeler bed ore zone to explore this fracture zone parallel to and approximately 900 feet north of the pole adit.

2. Short laterals north and south at appropriate intervals to determine width of ore zone and three raises to determine thickness of ore zone. Lateral and raise footage not to exceed over 200 feet.

The cost of this project has been estimated as follows:

<u>Agreed Unit Cost</u>:

1200 feet of pole adit at $40 per foot	$48,000
600 feet of laterals and raises at $40 per foot	24,000
500 feet - north zone drift at $40 per foot	20,000
200 feet - north zone laterals and raises at $40 per foot	8,000

240 feet - timbering as required at $15 per foot		$ 3,600
		$103,600
Operating Equipment:		
315 cu. ft. compressor Joy - WK80 Skid Mounted	$8,514	
4 X 8 ft. Welded Air Receiver	600	
		9,114
Assaying:		300
GRAND TOTAL		$113,014

On November 5, 1953, it was advised that Mr. Mittendorf had written for the field team report and the final report was written. On November 19, 1953, phone conversations with Mr. Mittendorf had advised that he would hasten the field team report.

This project was originally designed to cover a twelve month period but the work could be accomplished in six months by two shift operation.

Current status of this request is that the report has not been received in Washington and is expected around February 10th.

B

COMBINED METALS REDUCTION COMPANY

P. O. Box 150

SALT LAKE CITY 10, UTAH

Subject: Mt. Wheeler Mines, Inc. - Geology and Ore Reserves
Date: December 17, 1953

To: Mr. E. H. Snyder
From: L. K. Requa and E. B. Young

In accordance with your instructions we went to the Mt. Wheeler mine, White Pine County, Nevada, and during the period of November 30, to December 2, made an examination for the purpose of revising the ore reserve estimate, and we submit our opinion in this regard herewith. We also have made some comments on the geology of the tungsten ore occurrence, which we hope will be helpful to all concerned.

Mode of Occurrence of
<u>the Mt. Wheeler Orebodies</u>

We consider that a clear understanding of the geological structure of this deposit is of first importance. If exploration can be kept within the zones of the greatest promise, the profitable operation of the mine will be more definitely assured.

The development of replacement tungsten orebodies at the Mt. Wheeler mine in the Combined Metals bed, or Wheeler bed as this Cambrian limestone horizon is locally called, represents in our opinion a significant development in tungsten mining because this deposit is a type of tungsten deposit not generally heretofore recognized and it promises to be a more dependable ore structure than the other better known types of tungsten deposits.

The greater number of tungsten deposits that have been mined in the western part of the United States have been either the fissure veins or the contact metamorphic type. Innumerable small, erratic and unpredictable orebodies dot the western states. Now and then a bonanza has been found such as Atolia and Yellow Pine, but these have been more a matter of luck than planned exploration. If the Mt. Wheeler type of orebodies will permit more orderly planning of exploration it will be a great advance in domestic tungsten mining. We believe this can be done.

The fundamental conception of this geology is that a mineralizing fissure, or zone of fissuring, has intersected a favorable limestone bed (the Wheeler bed), and that by following this intersection the miner will stay in the most favorable position for following ore. If the fissure, or zone, is of substantial width then the probability of having continuous ore is good.

At Mt. Wheeler there are several good zones of multiple fissuring, but to date the exploration has been confined to one, which has been called the Pole Ore Channel and it has been crosscut in seven different places over an east-west distance of about 800 feet.

While this type of ore deposit is new to the tungsten industry it does have some precedent in other types of mining. At Pioche the Combined Metals Reduction Company has mined lead, zinc and more lately manganese ores in important quantities from a similar horizon. The ore zone in the Combined Metals bed at Pioche has been mined continuously for several miles.

This gave a general background for different kinds of ores and it seemed reasonable to suppose that in a good tungsten area, this same horizon under favorable structural conditions, would also be a good localizer of tungsten ores. This was suggested in 1950 by Mr. E. H. Snyder and it is now being proven.

Experience Factor

Any ore estimate must be made with the aid of an experience factor. At Pioche estimates of ore made on the experience factor basis have been remarkably accurate. We are just now building up this experience factor at Mt. Wheeler and while we have more knowledge than a year ago we must still use it with caution in projecting known orebodies.

Details of the Exploration Work

The Pole Tunnel has been driven eastward, mostly under the Wheeler bed, for a distance of 1108 feet. Laterals have been driven from this tunnel, in the Wheeler bed and up dip, for from 100 to 400 feet in length. These laterals are from 100 to 200 feet apart, and while several ore occurrencies have been noted, there is only one strong and probably continuous ore channel found in these laterals. This we have called the Pole Ore Channel and we believe that it will be found to contain continuous ore when mined through its presently developed length.

A typical log of the Wheeler bed, as seen in Lateral No. 5, is as follows -

Top - Pioche Shale

5 - 7 Feet Limestone	-	Unexplored; may contain important ore
3 " "	-	Upper ore bed; only partially explored

4	Feet	Limestone	- Barren interbed
4 - 5	"	"	- Lower ore bed; exploration concentrated here
4 - 5	"	"	- Barren lower bed

Bottom - Pioche Shale

The individual laterals can be described as follows:

A & B

The work in the bed here has mined out an area about 75 feet long by 6 to 7 feet wide, with an ore thickness of 2 to 5 feet. Grade of ore is in excess of 2% WO_3. This work was done prior to the first DMEA contract. Some additional ore will be obtained here and exploration to the south and into the upper part of the bed is indicated.

No. 1 Lateral

Approximately 220 feet from portal. Driven 180 feet north. Three mineralizers were crosscut.

1. At the back of the raise a zone 25 feet wide was cut by four east-west fractures. Low grade rock was mined. There may be better ore above and raising is indicated.
2. At 35 feet north a 5 foot zone was cut showing mineralization. Raising is indicated.
3. At 55 feet north a 10 foot ore zone was cut and a drift extended east 25 feet, which is probably under better ore as a raise assayed 1.74% WO_3. A 6" quartz fissure strikes east-west and widens in the upper part of the bed. Mud and loose ground were found in the upper part of the bed.

No. 2 Lateral

Approximately 170 feet from No. 1 Lateral. Driven 135 feet north.

1. First ore zone found 80 feet north of chute is 12 feet wide by 5 feet thick. Thirty cars mined for stockpile were estimated to run 1% WO_3.
2. At 100 feet north of chute there is an ore zone 10 feet wide by 6 feet thick, estimated to run over 1%.

No. 3 Lateral

Approximately 120 feet east of No. 2 Lateral. Driven 210 feet north.

1. Between 14 and 24 feet north of chute there is a 10 foot ore zone 12 feet thick beginning 6 feet above the bottom of the Wheeler bed. A 30 foot drift has been extended east and ore from this working is estimated at 0.8% WO_3. This ore seems to be the continuation of the best ore cut in A, B, Nos. 1 and 2 Laterals.

No. 4 Lateral

Approximately 125 feet east of No. 3 Lateral. Driven 65 feet north.

This was driven north along a strong fault filled with mud and was abandoned due to the bad nature of the ground. However, pieces of high grade ore were found in this mud and in some small east-west fissures. Definite measurements are impossible due to caving ground.

No. 5 Lateral

Approximately 170 feet east of No. 4 Lateral. Driven 401 feet north.

Three ore zones were cut.

1. At 30 feet north from chute a 5 foot zone was cut associated with a small east-west fissure containing some high grade. Muck pile estimated to run 0.75% WO_3.

2. At 100 to 120 feet north of the chute the most important ore zone in the mine was cut. A 35 foot drift was run east and two raises were put up. An upper bed of ore is readily seen here. Ore is estimated to run over 1%.

3. A third zone was cut between 125 to 140 feet north from the chute. It is low grade. Thirty-six cars ran 0.32% WO_3. It is important to note that this exploration largely proves an upper bed about 4 feet above the better known lower bed. There is also a possibility of a third bed directly under the upper shale contact that may be the highest grade of all. This indicates that the full thickness of the Wheeler bed should be explored in all ore areas.

Other Ore
Possibilities

It has been our opinion that the presently developed ore is only a minor part of a much larger ore structure and that the best part of this structure is yet to be seen.

Where the Wheeler bed has been explored there is a lack of any pronounced throw in the faulting. While large faults, in themselves, are seldom good mineralizers, the fractured zones adjacent to such large faults are frequently very favorable areas for ore deposition.

There is a zone of very pronounced faulting and fissuring 1200 feet ahead of the present face of the Pole Tunnel. This is known as the Sheffield zone and can be easily seen on the surface and in aerial color photograph. This zone is composed of several prominent fissures striking about N 15° E and dips westerly. The zone itself is about 300 feet wide and extends for many hundreds of feet. It is marked by numerous diggings of early day miners. The intersection of the Pole fissure zone with the Sheffield zone would form an unusually favorable locus for ore deposition. The heretofore nonproductive, northerly striking fissures and fractures seen in the presently developed area at Mt. Wheeler, could become important ore producers under the conditions that might exist along the Sheffield zone.

This is a very worthy objective and every effort should be made to reach it.

Other attractive zones of fissuring parallel the Pole Ore Channel. The north ore zone has been recognized for some time. Indeed a small tunnel was driven years ago on a quartz fissure, which is a part of this zone. This lies about 1100 feet north of the Pole Ore Channel. It is a zone of good fracturing about 50 feet wide and contains strong quartz veins and some notable showings of scheelite.

Between the Pole Ore Channel and the North Ore Zone there is a minor fissure zone, which has not been explored and could contain tungsten ore.

South of the Pole Ore Channel there are several possible objectives. These have not been given much consideration because most of them are too far down dip to be economically developed from the Pole Tunnel. However, a short drive was made in Lateral No. 2 South and at a point 120 feet south of the Pole Ore Channel, a 4 inch quartz vein was cut in the shale below the Wheeler bed. A raise on this vein into the bed showed only minor amounts of scheelite, but we still believe that this zone should be investigated in other localities.

The biggest east-west zone of all lies about 2300 feet south of the Pole Tunnel. This is the Canaan Vein which has a strong surface outcrop accompanied by a good showing of porphyry and scheelite. It is unlikely that any immediate development of this vein will be attempted, but it is definitely something to consider for the future.

Mill Test on Ore

During September of this year a milling test was made at the Stopper mill at the Minerva mine, near by. This is a small gravity mill equipped with two concentrating tables, but no flotation units. Four lots of ore were mined from four different laterals and the milling results were as follows -

Lateral	Tons	Calculated Grade of Ore	Units in Concentrates	Units in Tailings	Units Recovered Per Ton		
B South	54.0	1.36% WO_3	58.57/Ton	0.20/Ton	1.12		
No. 1 South	82.0	0.41	22.60	0.26	82 x	0.15	12.3
No. 3 North	120.0	0.50	23.70	0.18	120 x	0.32	38.4
No. 5 North	105.0	1.10	43.55	0.18	105 x	0.93	97.5
					307	0.48	148.2

This ore was mined without selection and in case of the ore from No. 3 Lateral North we believe that it was mined too low in the bed. The ore from Lateral No. 1 South was mined outside of what we consider the Pole Ore Channel.

Composite Results

361 Tons of crude ore averaged	0.78% WO_3	Per Ton
Average recovery per ton	0.58	"
Percent of total scheelite recovered	74.4	

Omitting the ore mined from the No. 1 Lateral South, which cannot be considered Pole Ore Channel ore, we get an average weighted grade of 0.96% WO_3 per ton.

The concentrates made in this milling test were taken to Bishop, California, where they were roasted and put through a magnetic separator. The resulting concentrates assayed as follows -

Lot 1	69.45%	B Lateral Ore
Lot 2	50.01	Composite No. 1 South & No. 3 North
Lot 3	65.99	No. 5 North

Sorting and Upgrading Crude Ore

Over the past month tests have been made on sorting crude ore in the stopes. This was done in Laterals A & B and more lately

in Lateral No. 5. The results have been gratifying and at the time we left the mine approximately 75 tons of this sorted product had been produced. It had an estimated grade of 3% WO_3.

It is possible that the entire production can be so upgraded and if so it may permit putting the mine on a profitable basis as soon as milling facilities can be provided. Two milling outlets are available. The first is the Stopper mill, already mentioned. This is a small gravity mill, with a capacity of one ton, or less, per hour. Its only advantage is its proximity to the Mt. Wheeler mine. The other milling outlet is the new tungsten circuit at the Bauer mill of Combined Metals Reduction Company. Here a flotation section has been converted to tungsten. Milling Mt. Wheeler ores here would involve about a 275 mile haul.

Irrespective of which milling outlet is selected the mine now could be put on a productive basis.

Ore Reserves

The work accomplished at the mine during the past year has given us more information on the behavior that may be expected from this type of ore structure.

Last year an estimate of 15,000 tons of possible ore was made. The estimate was made on inferences which seemed justifiable at the time. It was then believed that both the north-south and east-west series of fractures would be mineralizers. Later development has shown that the principal mineralization in this section of the deposit follows the east-west fissuring. The north-south fracture zones appear to be only of importance where they intersect the east-west mineralizers.

In making the present estimate we have confined it to the Pole Ore Channel. No ore reserves for any of the other structures, even though some of them are quite important, have been figured.

We believe that the Pole Ore Channel will be fairly continuous and that it may be considered as one ore channel.

A figure for proven ore is not set up as we do not have enough experience to project proven ore faces. There is certainly proven ore in the mine, but any arbitrary projection of this ore would not be based on sound experience as the total drifting on ore so far amounts to only about 200 feet. We therefore believe that all the ore estimated should be put in the classes of probable and possible ore.

The average exposed cross section of the ore channel is 60 square feet and 800 linear feet of ore channel is indicated. We believe that a projection of this channel for an additional 200 feet is warranted, but such ore would be classed as "possible".

Our estimate of ore at the present time is as follows -

Probable Ore	Tons	Grade WO_3
For 800 feet of Pole Ore Channel in the lower ore stratum	4,000	1.0%
Possible Ore		
For 200 additional feet eastward in Pole Ore Channel, lower ore stratum	1,000	1.0
For 1000 feet in Pole Ore Channel, upper ore stratum	5,000	1.0
Total Ore Reserve	10,000	1.0%

We believe that there is a possibility of up-grading this ore into 3000 tons of about 3% WO_3, or 9000 units of tungsten. Further sorting of ore will have to be conducted before this can be said to be definite, but at the time of our visit up-grading of ore by sorting was in successful progress.

Cost of the Venture

The total expense of the Mt. Wheeler venture to date is close to $271,685. In round figures this sum can be distributed as follows -

Source of Income	
Sale of Treasury Stock	$156,250
DMEA Participation	104,175
Sale of Concentrates	11,260
	$271,685

Distribution of Expense	Amount	% of Total
Payment on optioned claims	$12,500	4.60
Camp construction	35,000	12.89
Camp equipment	9,500	3.49
Mine surface buildings	13,000	4.78
Mine ore bins	3,750	1.38
Road construction	5,500	2.02
Automotive equipment - 3 units	10,500	3.86
Mining equipment	42,500	15.64
Location of 72 mining claims	7,500	2.76
Water system	1,250	0.46
Initial organization expense	2,500	0.92
Initial geology and engineering	2,000	0.74
Initial surface exploration	7,500	2.76
Pole adit - 1108 feet	58,750	21.63
Bedding exploration - 1592 feet	53,000	19.52
Office, travel, assaying, etc.	6,935	2.55
	$271,685	100.00

Against this there is a possible 9000 units of WO_3 to show with an overall gross value of $567,000. In addition there is an estimated 800 tons of ore on the dump at the mine with an approximate content of 0.5% WO_3 per ton.

Mr. James D. Williams has estimated that by sorting the ore in the stopes, to up grade crude ore, there is a net profit of $40 per unit of WO_3 after mining, sorting in stopes, trucking, milling, transportation of concentrates, roasting up-grading/and marketing.
concentrates

Conclusions

1. It is our opinion that Mt. Wheeler will eventually be a large mine.

2. The area so far explored is probably the fringe of a bigger and more important ore structure.

3. In the 22 foot Wheeler bed exploration has largely been confined to the bottom part. The recently demonstrated upper bed is known in only a few places. The upper shale contact is entirely unexplored. These new areas should be considered in all future exploration. Also drifting in ore in this bed is better practice than crosscutting it.

4. The structural controls in the Mt. Wheeler deposit appear to be more definite than in the usual tungsten deposit. This should permit better results from exploration. The concept of a continuous east-west ore channel is logical.

5. As we build up our experience factor on structural control we should be able to make better estimates of the probable productive length of the ore channels.

6. With the $271,685 spent to date at Mt. Wheeler, with 9000 units of tungsten in the probable and possible ore reserve, with large ore structures still to be explored and the price of tungsten guaranteed by the government for almost five years more, it can be said that this venture was well warranted.

7. The nearest important large structural unit is the Sheffield fissure zone, about 1200 feet ahead of the present face of the Pole Tunnel. This drive should be made in the immediate future.

8. The North Ore Zone, which parallels the Pole Ore Channel about 1100 feet north and which is almost entirely unexplored, is also worthy of immediate attention.

9. Production could start at this mine in the very near future if weather conditions would permit. It could certainly start in the spring of next year. By sorting ore in stopes there is the possibility of making a 3% WO_3 product. Using either the Stopper mill at Minerva or the tungsten circuit at Bauer, 100 tons a month of such a product should carry expenses.

We wish to take this opportunity of expressing our thanks to Mr. James D. Williams, the president and general manager of Mt. Wheeler Mines, Inc., for the courtesy and cooperation extended to us during our visit. Mr. Williams has done a fine job in bringing this mine to its present state of development.

/s/ L. K. Requa
L. K. Requa
Director of Exploration

/s/ Earl B. Young
E. B. Young
Chief Geologist

C

RESULTS OF MILLING IN THE STOPPER MILL

July to September, 1953

---

1. "B" Lateral South

54 tons of ore produced 2061# of concentrate

Content of concentrate - 58.57% WO_3 = 1207# WO_3 net

WO_3 recovery = $\frac{1207}{54}$ = 22.35# per ton or 1.12% WO_3

Tailings = 0.20% WO_3

Calculated assay of ore = 1.36% WO_3

Mill recovery = 85.4%

2. No. 1 Lateral South

82 tons of ore produced 1082# of concentrate

Content of concentrate - 22.60% WO_3 = 245# WO_3 net

WO_3 recovery = $\frac{245}{82}$ = 2.99# per ton or 0.15% WO_3

Tailings = 0.26% WO_3

Calculated assay of ore = 0.41% WO_3

Mill recovery = 36.5%

3. No. 3 Lateral North

120 tons of ore produced 3198# of concentrate

Content of concentrate - 23.70% WO_3 = 758# WO_3 net

WO_3 recovery = $\frac{758}{120}$ = 6.32# per ton or 0.32% WO_3

Tailings = 0.18% WO_3

Calculated assay of ore = 0.50% WO_3

Mill recovery = 63.2%

4. No. 5 Lateral North

105 tons of ore produced 4500# of concentrate

Content of concentrate - 43.55% WO_3 = 1960# WO_3 net

WO_3 recovery = $\frac{1960}{105}$ = 18.67# per ton or 0.93% WO_3

Tailings = 0.18% WO_3

Calculated assay of ore = 1.10% WO_3

Mill recovery = 84.8%

Composite Results

361 tons of ore averaged 0.78 units WO_3 per ton

Recovery averaged 0.58 units per ton

Indicated over-all recovery - 74.4%

Conclusions drawn by Mr. Williams on these results are as follows:

> The ore as mined ran 0.7% WO_3 and indicated to his satisfaction that 1% WO_3 could be mined with selection. This added value, he felt, could be raised by sorting and thus he could realize substantial reserves from the indicated ore.
>
> Due to the success of this milling effort, he felt that this ore could be subject to gravity concentration, impurities could be removed by roasting, and magnetic separation. From his mill results he drew the conclusion that the bulk of the mill loss was due to overgrinding.
>
> After roasting, sample lots were analyzed as follows:

Sample Lot	
1	69.45% WO_3
2	50.01% WO_3
3	65.99% WO_3

In all 6262# of concentrate were realized showing 62.15% WO_3 or actually 3892# WO_3. The loss in magnetic rejects of 100# of WO_3 indicated a loss of 2.5% in magnetic separation.

These lots averaged 0.146% in phosphorous, which is penalized for at the rate of 25¢ per .01% in excess of .05% and therefore, the phosphorous penalty on these concentrates amounted to $2.40 per unit of WO_3. Payment for these concentrates was based on a value of $61 per unit for 194.6 units which gave a total of

		$ 11,870.60
Deductions were as follows:		
Roasting and magnetic separation	223.83	
Sampling	31.24	
Assaying	54.00	
½ Phosphorous Penalty	318.83	
		627.90
		$ 11,242.70

This indicates that $58 per unit was realized from this shipment.

MT. WHEELER MINES, INC.

P. O. BOX 150

SALT LAKE CITY 10, UTAH

October 25, 1954

Defense Minerals
OCT 29 1954

Mr. C. O. Mittendorf, Administrator
Defense Minerals Exploration Administration
United States Department of the Interior
Washington 25, D.C.

Re: Docket DMEA-2082-Tungsten
Contract Idm-E-248 (Amend. 5-20-54)
Mt. Wheeler Mines, Inc.
White Pine County, Nevada
Request for Amendment

Dear Mr. Mittendorf:

To date we have completed 451.0 feet of exploration work in the North zone under the above captioned contract, as shown on the attached Progress Map C-100, and , as you will note, the tungsten showings encountered have not been very encouraging. The bedding has been broken by numerous faults which have been filled with mud and a good portion of the bed itself has been replaced by mud. The face of the main drift at +323.0 feet, has also broken into a mud area. In view of these conditions we see little reason for continuing with the project in that area.

We should like to request, however, that the balance of the contract footage, amounting to 249.0 feet, be diverted to driving up bedding from No. 7 Lateral North in the Pole Adit as per attached Map C-101. We have attempted to outline briefly the geological justification for this change in location for the balance of the footage in the attached Geological Summary and Report.

Mr. A. C. Johnson, Chief, Mining Division III, and Mr. Glen Gentry, Examining Engineer, U.S. Bureau of Mines, Reno, Nevada, examined the project during the week of October 9, and concur fully in the wisdom of this change. I have also discussed this with Mr. Roscoe Smith, U.S.G.S. member of the DMEA Field Team in San Francisco, and he sees no objection to the proposal. Insofar as this request entails only 249 feet of work and may give us very valuable information as well as additional ore discovery under new and different geological conditions, might not your approval of the amendment be immediate? Incidentally, the Field Team has suggested that such an amendment should properly be granted by Washington; hence, this request is directed to you.

We shall, as always, appreciate your favorable consideration in this matter.

Very truly yours,

MT. WHEELER MINES, INC.
By

James D. Williams
President

JDW-K

Enc.

GEOLOGICAL SUMMARY AND REPORT
TO ACCOMPANY REQUEST FOR AMENDMENT

OF THE INTERIOR
als Administration
OCT 29 1954

Docket DMEA-2082-Tungsten
Contract Idm-E-248 (Amend. No. 4-5-20-54)
North Zone Exploration
Mt. Wheeler Mines, Inc.
White Pine County, Nevada

This brief report has been prepared for the purpose of presenting pertinent geological and engineering data to support our request, as per the attached letter, to divert 249 feet of authorized contract footage from the North zone to a bedding drive Northerly from No. 7 Lateral North in the pole adit, as per attached Maps C-100 and C-101.

1. Resume of North Zone Exploration
(See Map C-100)

A. Main Drift

The main drift has been advanced a total of 323.0 feet; 46.0 feet on an E-W course; 36.0 feet on S 80° E course and 241.0 feet on a S 68° E course. In general, the drift followed the contact of the lower shale member with the bottom of the Wheeler limestone bedding. Five small quartz fissures, striking around N 85° E with steep North dips, showing scattered scheelite mineralization were cut. Three N 30° W faults, mud filled, were cut which necessitated 30 feet of timbering. The face of the drift at +323.0 feet has broken into another mud area and would undoubtedly require considerable timbering in order to drive through. The tungsten showings in the drift were not considered important. There seems little or no reason at all to advance the drift farther Easterly. The drift progress was impeded by the mud and open ground; the average advance being somewhat under 3.5 feet per shift.

B. North Lateral

A turnout from the main drift was cut at +284.0 feet and driven on the level 31.0 feet on a N 45° E course. At the face a short raise was driven into the Wheeler bed, a slusher installed, and the bedding drift advanced 97.0 feet on a N 25° E course, just on top of the lower shale. This drive turned out to be a most difficult one. Three large mud filled faults were cut which ran upwards about 30 feet. Approximately 400 mine cars of mud sloughed into the drift from these faults and a large quantity of temporary timbering was required. The progress here was extremely difficult, averaging less than 2.0 feet per shift.

Two small N 80° E quartz fissures showing scattered scheelite were cut at the slusher raise; two more near the large quartz zone; 18" of good looking ore was cut on the South side, and 6" of fair ore was cut on the North side, of the wide quartz zone. The zone itself was barren. None of the ore exposures

are of sufficient size or value to justify mining operations. In all, this work has been most disappointing and further exploration in the area is not indicated.

2. Requested Exploration from No. 7 Lateral North in Pole Adit (See Map C-101)

A Mining Operations conducted.
Since the completion of Stage I (January 29, 1953), we have advanced the pole adit 191.0 feet Easterly to +1263.0 feet. At +1156.0 feet Lateral No. 7 North was cut and driven 37.0 feet off the pole adit. This 228 feet of work was done on company account.

Since the completion of Stage II (December 12, 1953), we have conducted mining operations Easterly on the main ore channel in No. 5 Lateral North and have produced an additional 156.5 tons of ore which mill settled at 2.39% WO_3. We have also produced 278.0 tons of ore from Laterals Nos. 1, 2 and 3 which mill settled at 0.59% WO_3. This was also done on company account.

B Geological Information.
From the above new work we have gained additional information which may be briefly summarized as follows -

1. In Laterals Nos. 1, 2, 3 and 4, driven Northward up bedding, the E-W trending ore zone has been almost entirely obliterated by ankerite mud. What ore has been mined along the channel has been fairly low grade; averaging in the aggregate approximately 0.5% WO_3. The Easterly work in No. 5 Lateral has been entirely free of any mud replacement of the bed. A study of the surface indicates the probable reason for this. The shale formation is exposed on the surface to an Easterly point which corresponds to just about vertically above the mid point between No. 4 and 5 Laterals. At this point the shale plunges under the St. Lawrence limestone and from there Easterly we have limestone cover. The shale, which ordinarily is thought to be impervious to water, certainly has permitted considerable water percolation into the Wheeler bed via numerous small cracks and a few larger fissures. This undoubtedly has resulted in the heavy mud replacement encountered. Further, at No. 4 Lateral the Wheeler bed is approximately 190 feet below the surface. From this point on Easterly the surface rises quite abruptly so that at No. 7 Lateral the Wheeler bed is about 500 feet below the surface. We believe these two factors have contributed materially in eliminating the mud in No. 5 Lateral and Easterly. This is demonstrated fully by two facts; i.e., first, absolutely no mud has been found anywhere in the No. 5 Lateral area; and, second, the grade of bedded ore mined from the No. 5 Lateral area, 434 tons, has averaged 1.56% WO_3, which is approximately three times that mined from the other laterals where mud conditions prevailed. We expect this favorable bedding condition to continue Easterly.

2. The only major fault which has thus far been cut by the pole adit was at +1040.0 feet, just past No. 6 Lateral North. The lateral was driven before the fault was known. Up to this fault the lime-shale

contact was striking quite uniformly S 73° E with a 9° Southerly dip. The fault strike is N 10° W with a fairly flat Easterly dip (45°), with the East block down approximately 27 feet. Beyond this fault the strike of the lime-shale contact changed to S 67° E and gradually swung to S 62° E at +1263.0 feet. The Southerly dip steepened to 12°. This indicates some Southerly rotation of the block and possibly a flat anticlinal fold with a N-S axis. This being the case, we should reasonably expect additional physical preparation of the Wheeler bedding in the area of the E-W ore zone which may result in a much larger replacement area. The requested drive North from No. 7 Lateral is intended to test this possibility.

3. Description of the Proposed Work

No. 7 Lateral has been cut, the switch installed and advance Northerly on the adit level has been 37.0 feet. It is proposed to extend the lateral approximately 30.0 feet, turning it to a N-S course. At the face, +67.0 feet from the adit, a short raise is to be driven into the Wheeler bed, a chute built, slusher installed and a drift driven up bedding to cut the E-W ore zone. Two hundred feet has been allowed for this bedding drift although it is believed that the ore zone will probably be cut at about 160 feet. This is based upon our observation that little or no horizontal movement took place on the N 10° W fault. The diverted footage of 249 feet will be allocated essentially as follows -

Extend drift lateral	30.0	Feet
Raise into Wheeler bed	12.0	
Drift up bedding	200.0	
Misc. drift in ore zone	7.0	
	249.0	Feet

Any footage saved by virtue of cutting the ore zone at a distance of less than 200 feet may be used in drifting in the ore zone and raising thru the ore zone as indicated. If no footage remains the company will do this on its own account.

4. Conclusions

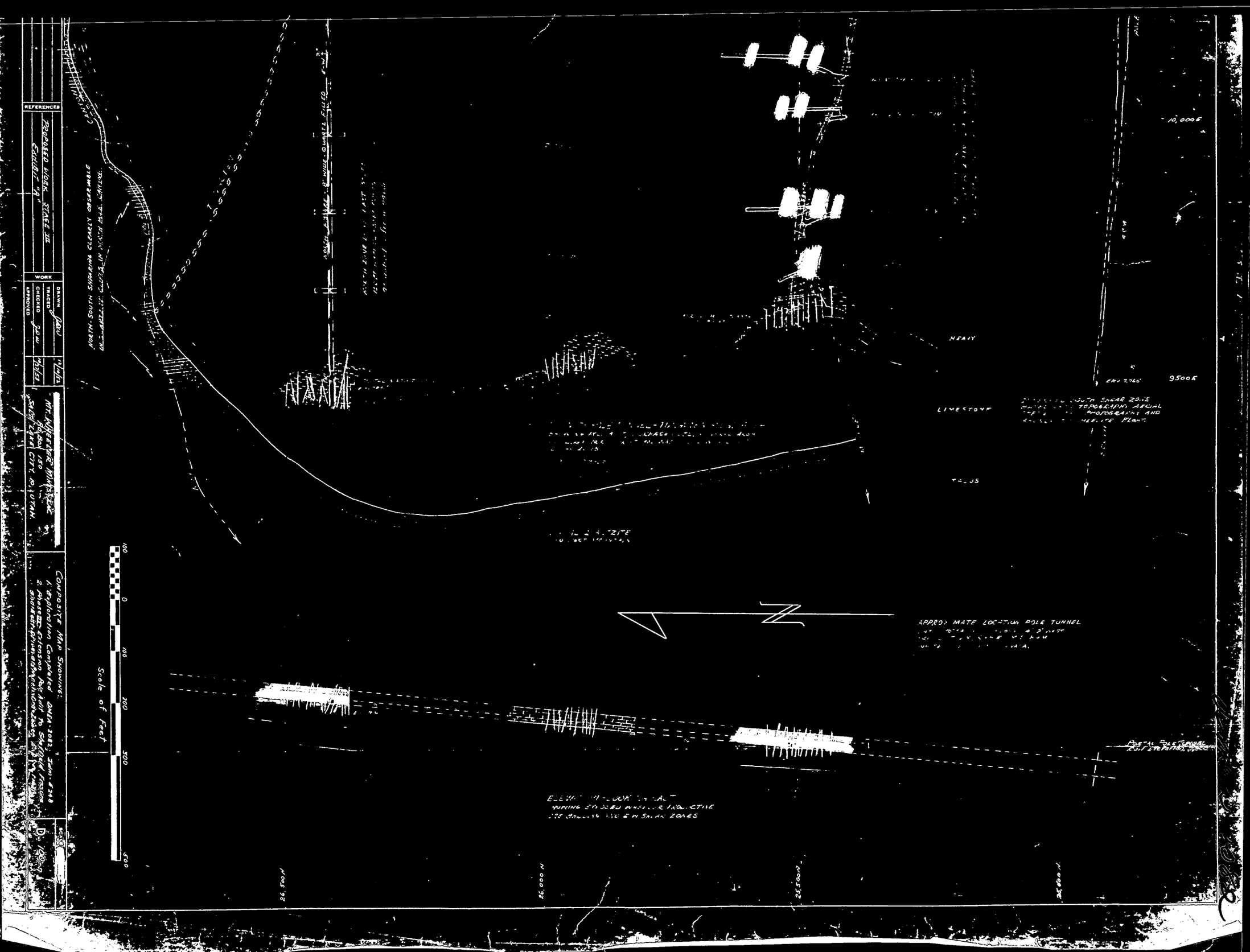
Based upon careful observation and study we have firmly concluded that bedding conditions from No. 5 Lateral Easterly are much more favorable for ore for the following reasons -

1. The bedding is more regular and there is a total absence of mud.
2. Structural preparation of the ore bed has undoubtedly been better East of the major fault.
3. Grade of ore mined has been materially higher from No. 5 Lateral Easterly (3 times average of Nos. 1, 2, 3 Laterals).

This short drive will be an important link in the chain of geological evidence which is so necessary for the proper understanding of what we are dealing with in the exploration of the mine. It will explore what we believe to be a strong ore zone but under new and different conditions which appear to be much more favorable. The crew, equipment and facilities are available and ample time remains before winter to complete the proposed work.

October 25, 1954

2082


NORTH-SOUTH SHEARING CLEARLY OBSERVABLE
HEAVY
LIMESTONE
TALUS
10,000E
9500E
APPROXIMATE LOCATION POLE TUNNEL
Scale of Feet
100
0
100
200
300
500
26,500 N
26,000 N
25,500 N
25,000 N
REFERENCES
PROPOSED WORKS STAGE III
EXHIBIT "A"
WORK
DRAWN
TRACED
CHECKED
APPROVED
MTN. MINERALS DEVELOPMENT
SALT LAKE CITY, UTAH
COMPOSITE MAP SHOWING:
1. Exploration Completed OMIA-2082; Jan-Feb
2. Phosphate Extension Per Agt. to Smoot Fission
3. Underground Workings

DOCKET

Mr. H. C. Miller, Executive Officer
DMEA Field Team, Region III
1012 Flood Building
870 Market Street
San Francisco 2, California

Re: Docket No. DMEA 2082 - Tungsten
Mt. Wheeler Mines, Inc.
Mt. Wheeler Mine
White Pine County, Nevada
Contract No. Idm-E248

Dear Mr. Miller:

Attached are two positives taken from a negative made here of the aerial photograph that accompanied Exhibit "C" of the application submitted by Mt. Wheeler Mines, Inc.--Docket DMA 89X (Lead-Zinc)--for work on the St. Lawrence Fissure. The scale as stated thereon was approximately one inch equals 1,000 feet. In making the copy we increased the scale to approximately one inch equals 800 feet in order to compare the copy with the claim map submitted by the Operator on that scale, his No. D-4-102-0. For convenience of reference, please note that the same claim map on the scale of one inch equals 500 feet is attached to Contract Idm-E248 of January 29, 1952.

Apparently the Bonanza group and other claims shown are plotted only roughly with respect to scale and azimuth. It was our intention to plot the Sheffield claim and to determine to what extent the Sheffield Fissure was reflected in the topography. This we were unable to accomplish because of the various inaccuracies referred to above, and our plotting of the claim and fissure must be taken as an indication rather than as an approximation or even as a rough approximation.

Please hold this letter and attachments in your file so that if the Operator should again raise any question with regard to the Sheffield Fissure, you will be

able to request him to correct the position of Sheffield Lot No. 40 and Sheffield Fissure on one print for your use and one print for our use.

Sincerely yours,

Chairman, Operating Committee

Enclosures

APPROVED:

_____
Member, Bureau of Mines

_____
Member, Geological Survey

cc: DOCKET
FIELD TEAM, REG. III
CODE 400
ADM. READ. FILE
OPER. COMM.
R. W. GEEHAN, USBM
T. P. THAYER, USGS

WSMartin/ls
5/13/54

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

Mr. H. C. Miller, Executive Officer
DMEA Field Team, Region III
1012 Flood Building
870 Market Street
San Francisco 2, California

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Mt. Wheeler Mines, Inc.
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Apparently the Bonanza group and other claims shown are plotted only roughly with respect to scale and azimuth. It was our intention to plot the Sheffield claim and to determine to what extent the Sheffield Fissure was reflected in the topography. This we were unable to accomplish because of the various inaccuracies referred to above, and our plotting of the claim and fissure must be taken as an indication rather than as an approximation or even as a rough approximation.

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Sincerely yours,

Chairman, Operating Committee

Enclosures

APPROVED:

_____
Member, Bureau of Mines

_____
Member, Geological Survey

MT. WHEELER MINES, INC.

P. O. BOX 150

SALT LAKE CITY 10, UTAH

Defense Minerals Administration
RECEIVED
FEB 18 1954

January 28, 1954

Mr. A. C. Johnson, Chief
Mining Division, Region III
United States Bureau of Mines
P. O. Box 1551
Reno, Nevada

Re: Mt. Wheeler Mines, Inc.
DMEA-2082-Tungsten; Idm-E
248 MF-104 Statement -
December, 1953

Dear Mr. Johnson:

Enclosed are the original and four copies of our MF-104 voucher for the month of December, 1953. This constitutes our final report for work authorized under Contract Idm-E248 as amended May 11, 1953. Included also are the following -

1. ~~Narrative Report of Progress~~
2. Monthly Progress Maps
3. Report on Geology and Ore Reserves by Messrs. Earl B. Young and Lawrence K. Requa, Geological Staff, Combined Metals Reduction Company
4. Resume of Exploration Completed.

No 1. Pulled and attached to MF-104 and MF-104 as

Very truly yours,

MT. WHEELER MINES, INC.

By James D. Williams
President

COMBINED METALS REDUCTION COMPANY

P. O. BOX 150

SALT LAKE CITY 10, UTAH

Subject: Mt. Wheeler Mines, Inc. - Geology and Ore Reserves
Date : December 17, 1953

To : Mr. E. H. Snyder
From : L. K. Requa and E. B. Young

In accordance with your instructions we went to the Mt. Wheeler mine, White Pine County, Nevada, and during the period of November 30, to December 2, made an examination for the purpose of revising the ore reserve estimate, and we submit our opinion in this regard herewith. We also have made some comments on the geology of the tungsten ore occurrence, which we hope will be helpful to all concerned.

Mode of Occurrence of the Mt. Wheeler Orebodies

We consider that a clear understanding of the geological structure of this deposit is of first importance. If exploration can be kept within the zones of the greatest promise, the profitable operation of the mine will be more definitely assured.

The development of replacement tungsten orebodies at the Mt. Wheeler mine in the Combined Metals bed, or Wheeler bed as this Cambrian limestone horizon is locally called, represents in our opinion a significant development in tungsten mining because this deposit is a type of tungsten deposit not generally heretofore recognized and it promises to be a more dependable ore structure than the other better known types of tungsten deposits.

The greater number of tungsten deposits that have been mined in the western part of the United States have been either the fissure veins or the contact metamorphic type. Innumerable small, erratic and unpredictable orebodies dot the western states. Now and then a bonanza has been found such as Atolia and Yellow Pine, but these have been more a matter of luck than planned exploration. If the Mt. Wheeler type of orebodies will permit more orderly planning of exploration it will be a great advance in domestic tungsten mining. We believe this can be done.

The fundamental conception of this geology is that a mineralizing fissure, or zone of fissuring, has intersected a favorable limestone bed (the Wheeler bed), and that by following this intersection the miner will stay in the most favorable position for following ore. If the fissure, or zone, is of substantial width then the probability of having continuous ore is good.

At Mt. Wheeler there are several good zones of multiple fissuring, but to date the exploration has been confined to one, which has been called the Pole Ore Channel and it has been crosscut in seven different places over an east-west distance of about 800 feet.

While this type of ore deposit is new to the tungsten industry it does have some precedent in other types of mining. At Pioche the Combined Metals Reduction Company has mined lead, zinc and more lately manganese ores in important quantities from a similar horizon. The ore zone in the Combined Metals bed at Pioche has been mined continuously for several miles.

This gave a general background for different kinds of ores and it seemed reasonable to suppose that in a good tungsten area, this same horizon under favorable structural conditions, would also be a good localizer of tungsten ores. This was suggested in 1950 by Mr. E. H. Snyder and it is now being proven.

Experience Factor

Any ore estimate must be made with the aid of an experience factor. At Pioche estimates of ore made on the experience factor basis have been remarkably accurate. We are just now building up this experience factor at Mt. Wheeler and while we have more knowledge than a year ago we must still use it with caution in projecting known orebodies.

Details of the Exploration Work

The Pole Tunnel has been driven eastward, mostly under the Wheeler bed, for a distance of 1108 feet. Laterals have been driven from this tunnel, in the Wheeler bed and up dip, for from 100 to 400 feet in length. These laterals are from 100 to 200 feet apart, and while several ore occurrencies have been noted, there is only one strong and probably continuous ore channel found in these laterals. This we have called the Pole Ore Channel and we believe that it will be found to contain continuous ore when mined through its presently developed length.

A typical log of the Wheeler bed, as seen in Lateral No. 5, is as follows -

Top - Pioche Shale

5 - 7	Feet	Limestone	- Unexplored; may contain important ore
3	"	"	- Upper ore bed; only partially explored
4	"	"	- Barren interbed
4 - 5	"	"	- Lower ore bed; exploration concentrated here
4 - 5	"	"	- Barren lower bed

Bottom - Pioche Shale

The individual laterals can be described as follows:

A & B

The work in the bed here has mined out an area about 75 feet long by 6 to 7 feet wide, with an ore thickness of 2 to 5 feet. Grade of ore is in excess of 2% WO_3. This work was done prior to the first DMEA contract. Some additional ore will be obtained here and exploration to the south and into the upper part of the bed is indicated.

No. 1 Lateral

Approximately 220 feet from portal. Driven 180 feet north. Three mineralizers were crosscut.

1. At the back of the raise a zone 25 feet wide was cut by four east-west fractures. Low grade rock was mined. There may be better ore above and raising is indicated.

2. At 35 feet north a 5 foot zone was cut showing mineralization. Raising is indicated.

3. At 55 feet north a 10 foot ore zone was cut and a drift extended east 25 feet, which is probably under better ore as a raise assayed 1.74% WO_3. A 6" quartz fissure strikes east-west and widens in the upper part of the bed. Mud and loose ground were found in the upper part of the bed.

No. 2 Lateral

Approximately 170 feet from No. 1 Lateral. Driven 135 feet north.

1. First ore zone found 80 feet north of chute is 12 feet wide by 5 feet thick. Thirty cars mined for stockpile were estimated to run 1% WO_3.

2. At 100 feet north of chute there is an ore zone 10 feet wide by 6 feet thick, estimated to run over 1%.

No. 3 Lateral

Approximately 120 feet east of No. 2 Lateral. Driven 210 feet north.

1. Between 14 and 24 feet north of chute there is a 10 foot ore zone 12 feet thick beginning 6 feet above the bottom of the Wheeler bed. A 30 foot drift has been extended east and ore from this working is estimated at 0.8% WO_3. This ore seems to be the continuation of the best ore cut in A, B, Nos. 1 and 2 Laterals.

No. 4 Lateral

Approximately 125 feet east of No. 3 Lateral. Driven 65 feet north.

This was driven north along a strong fault filled with mud and was abandoned due to the bad nature of the ground. However pieces of high grade ore were found in this mud and in some small east-west fissures. Definite measurements are impossible due to caving ground.

No. 5 Lateral

Approximately 170 feet east of No. 4 Lateral. Driven 401 feet north.

Three ore zones were cut.

1. At 30 feet north from chute a 5 foot zone was cut associated with a small east-west fissure containing some high grade. Muck pile estimated to run 0.75% WO_3.

2. At 100 to 120 feet north of the chute the most important ore zone in the mine was cut. A 35 foot drift was run east and two raises were put up. An upper bed of ore is readily seen here. Ore is estimated to run over 1%.

3. A third zone was cut between 125 to 140 feet north from the chute. It is low grade. Thirty-six cars ran 0.32% WO_3. It is important to note that this exploration largely proves an upper bed about 4 feet above the better known lower bed. There is also a possibility of a third bed directly under the upper shale contact that may be the highest grade of all. This indicates that the full thickness of the Wheeler bed should be explored in all ore areas.

Other Ore
Possibilities

It has been our opinion that the presently developed ore is only a minor part of a much larger ore structure and that the best part of this structure is yet to be seen.

Where the Wheeler bed has been explored there is a lack of any pronounced throw in the faulting. While large faults, in themselves, are seldom good mineralizers, the fractured zones adjacent to such large faults are frequently very favorable areas for ore deposition.

"There is a zone of very pronounced faulting and fissuring 1200 feet ahead of the present face of the Pole Tunnel. This is known as the Sheffield zone and can be easily seen on the surface and in aerial color photograph. This zone is composed of several prominent fissures striking about N 15° E and dips westerly. The zone itself is about 300 feet wide and extends for many hundreds of feet. It is marked by numerous diggings of early day miners. The intersection of the Pole fissure zone with the Sheffield zone would form an unusually favorable locus for ore deposition. The heretofore nonproductive, northerly striking fissures and fractures seen in the presently developed area at Mt. Wheeler, could become important ore producers under the conditions that might exist along the Sheffield zone."

This is a very worthy objective and every effort should be made to reach it.

Other attractive zones of fissuring parallel the Pole Ore Channel. The north ore zone has been recognized for some time. Indeed a small tunnel was driven years ago on a quartz fissure, which is a part of this zone. This lies about 1100 feet north of the Pole Ore Channel. It is a zone of good fracturing about 50 feet wide and contains strong quartz veins and some notable showings of scheelite.

Between the Pole Ore Channel and the North Ore Zone there is a minor fissure zone, which has not been explored and could contain tungsten ore.

South of the Pole Ore Channel there are several possible objectives. These have not been given much consideration because most of them are too far down dip to be economically developed from the Pole Tunnel. However a short drive was made in Lateral No. 2 South and at a point 120 feet south of the Pole Ore Channel a 4 inch quartz vein was cut in the shale below the Wheeler bed. A raise on this vein into the bed showed only minor amounts of scheelite, but we still believe that this zone should be investigated in other localities.

The biggest east-west zone of all lies about 2300 feet south of the Pole Tunnel. This is the Canaan Vein which has a strong surface outcrop accompanied by a good showing of porphyry and scheelite. It is unlikely that any immediate development of this vein will be attempted, but it is definitely something to consider for the future.

Mill Test on Ore

During September of this year a milling test was made at the Stopper mill at the Minerva mine, near by. This is a small gravity mill equipped with two concentrating tables, but no flotation units. Four lots of ore were mined from four different laterals and the milling results were as follows -

Lateral	Tons	Calculated Grade of Ore	Units in Concentrates	Units in Tailings	Units Recovered Per Ton
B South	54.0	1.36% WO_3	58.57/Ton	0.20/Ton	1.12
No. 1 South	82.0	0.41	22.60	0.26	0.15
No. 3 North	120.0	0.50	23.70	0.18	0.32
No. 5 North	105.0	1.10	43.55	0.18	0.93

This ore was mined without selection and in the case of the ore from No. 3 Lateral North we believe that it was mined too low in the bed. The ore from Lateral No. 1 South was mined outside of what we consider the Pole Ore Channel.

Composite Results

361 Tons of crude ore averaged	0.78% WO_3	Per Ton
Average recovery per ton	0.58	"
Percent of total scheelite recovered	74.4	

Omitting the ore mined from the No. 1 Lateral South, which cannot be considered Pole Ore Channel ore, we get an average weighted grade of 0.96% WO_3 per ton.

The concentrates made in this milling test were taken to Bishop, California, where they were roasted and put through a magnetic separator. The resulting concentrates assayed as follows -

Lot 1	69.45%	B Lateral Ore
Lot 2	50.01	Composite No. 1 South & No. 3 North
Lot 3	65.99	No. 5 North

Sorting and Upgrading Crude Ore

Over the past month tests have been made on sorting crude ore in the stopes. This was done in Laterals A & B and more lately in Lateral No. 5. The results have been gratifying and at the time we left the mine approximately 75 tons of this sorted product had been produced. It had an estimated grade of 3% WO_3.

It is possible that the entire production can be so upgraded and if so it may permit putting the mine on a profitable basis as soon as milling facilities can be provided. Two milling outlets are available. The first is the Stopper mill, already mentioned. This is a small gravity mill, with a capacity of one ton, or less, per hour. Its only advantage is its proximity to the Mt. Wheeler mine. The other milling outlet is the new tungsten circuit at the Bauer mill of Combined Metals Reduction Company. Here a flotation section has been converted to tungsten. Milling Mt. Wheeler ores here would involve about a 275 mile haul.

Irrespective of which milling outlet is selected the mine now could be put on a productive basis.

Ore Reserves

The work accomplished at the mine during the past year has given us much more information on the behavior that may be expected from this type of ore structure.

Last year an estimate of 15,000 tons of possible ore was made. The estimate was made on inferences which seemed justifiable at the time. It was then believed that both the north-south and east-west series of fractures would be mineralizers. Later development has shown that the principal mineralization in this section of the deposit follows the east-west fissuring. The north-south fracture zones appear to be only of importance where they intersect the east-west mineralizers.

In making the present estimate we have confined it to the Pole Ore Channel. No ore reserves for any of the other structures, even though some of them are quite important, have been figured.

We believe that the Pole Ore Channel will be fairly continuous and that it may be considered as one ore channel.

A figure for proven ore is not set up as we do not have enough experience to project proven ore faces. There is certainly proven ore in the mine, but any arbitrary projection of this ore would not be based on sound experience as the total drifting on ore so far amounts to only about 200 feet. We therefore believe that all the ore estimated should be put in the classes of probable and possible ore.

The average exposed cross section of the ore channel is 60 square feet and 800 linear feet of ore channel is indicated. We believe that a projection of this channel for an additional 200 feet is warranted, but such ore would be classed as "possible".

Our estimate of ore at the present time is as follows -

Probable Ore	Tons	Grade WO_3
For 800 feet of Pole Ore Channel in the lower ore stratum	4,000	1.0%
Possible Ore		
For 200 additional feet eastward in Pole Ore Channel, lower ore stratum	1,000	1.0
For 1000 feet in Pole Ore Channel, upper ore stratum	5,000	1.0
Total Ore Reserve	10,000	1.0%

We believe that there is a possibility of up-grading this ore into 3000 tons of about 3% WO_3, or 9000 units of tungsten. Further sorting of ore will have to be conducted before this can be said to be definite, but at the time of our visit up-grading of ore by sorting was in successful progress.

Cost of the Venture

The total expense of the Mt. Wheeler venture to date is close to $271,685. In round figures this sum can be distributed as follows -

Source of Income	
Sale of Treasury Stock	$156,250
DMEA Participation	104,175
Sale of Concentrates	11,260
	$271,685

Distribution of Expense	Amount	% of Total
Payment on optioned claims	$ 12,500	4.60
Camp construction	35,000	12.89
Camp equipment	9,500	3.49
Mine surface buildings	13,000	4.78
Mine ore bins	3,750	1.38
Road construction	5,500	2.02
Automotive equipment - 3 units	10,500	3.86
Mining equipment	42,500	15.64
Location of 72 mining claims	7,500	2.76
Water system	1,250	0.46
Initial organization expense	2,500	0.92

Initial geology and engineering	2,000	0.74
Initial surface exploration	7,500	2.76
Pole adit - 1108 feet	58,750	21.63
* Bedding exploration - 1592 feet	53,000	19.52
Office, travel, assaying, etc.	6,935	2.55
	$271,685	100.00

* after credit of $11,260 concentrate sales.

Against this there is a possible 9000 units of WO_3 to show with an overall gross value of $567,000. In addition there is an estimated 800 tons of ore on the dump at the mine with an approximate content of 0.5% WO_3 per ton.

Mr. James D. Williams has estimated that by sorting the ore in the stopes, to up grade crude ore, there is a net profit of $40 per unit of WO_3 after mining, sorting in stopes, trucking, milling, transportation of concentrates, roasting up-grading concentrates and marketing.

Conclusions

1. It is our opinion that Mt. Wheeler will eventually be a large mine.

2. The area so far explored is probably the fringe of a bigger and more important ore structure.

3. In the 22 foot Wheeler bed exploration has largely been confined to the bottom part. The recently demonstrated upper bed is known in only a few places. The upper shale contact is entirely unexplored. These news areas should be considered in all future exploration. Also drifting in ore in this bed is better practice than crosscutting it.

4. The structural controls in the Mt. Wheeler deposit appear to be more definite than in the usual tungsten deposit. This should permit better results from exploration. The concept of a continuous east-west ore channel is logical.

5. As we build up our experience factor on structural control we should be able to make better estimates of the probable productive length of the ore channels.

6. With the $271,685 spent to date at Mt. Wheeler, with 9000 units of tungsten in the probable and possible ore reserve, with large ore structures still to be explored and the price of tungsten guaranteed by the government for almost five years more, it can be said that this venture was well warranted.

7. The nearest important large structural unit is the Sheffield fissure zone, about 1200 feet ahead of the present face of the Pole Tunnel. This drive should be made in the immediate future.

8. The North Ore Zone, which parallels the Pole Ore Channel about 1100 feet north and which is almost entirely unexplored, is also worthy of immediate attention.

9. Production could start at this mine in the very near future if weather conditions would permit. It could certainly start in the spring of next year. By sorting ore in stopes there is the possibility of making a 3% WO_3 product. Using either the Stopper mill at Minerva or the tungsten circuit at Bauer, 100 tons a month of such a product should carry expenses.

We wish to take this opportunity of expressing our thanks to Mr. James D. Williams, the president and general manager of Mt. Wheeler Mines, Inc., for the courtesy and cooperation extended to us during our visit. Mr. Williams has done a fine job in bringing this mine to its present state of development.

L. K. Requa

L. K. Requa
Director of Exploration

Earl B. Young

E. B. Young
Chief Geologist

K

RESUME OF EXPLORATION COMPLETED

I. THE WORK

Work was started under Contract Idm-E248 (amended May 11, 1953) on May 11, 1953. Concurrent with the underground preparations and mining the company undertook the construction of a 225 ton - 3 compartment ore bin in order to provide ore storage and truck loading facilities for the bulk mill sampling of ore produced from the bedding exploration within the ore zone pursuant to an informal agreement with the Tungsten Division of DMEA. In addition to this, the company constructed a modern change house and a blacksmith shop and repair building. The road from the County highway to the Pole adit, 4.6 miles in length, was widened and fully graveled in order to accommodate heavy trucking units. A concrete and cement block powder magazine, conforming to U. S. Bureau of Mines specifications, was completed with DMEA funds. The Exploration Project was completed on December 12, 1953, with the following results - (See attached Map D100-6)

A. No. 1 Lateral Area.

Total footage driven in this area was 225.0 ft.; 172.0 ft. on a Northerly course, 20.0 ft. on a N75°E course, 24.0 ft. Easterly within the third ore zone North, and 9.0 ft. of raise within this same ore zone. In driving the lateral North, three distinct ore zones were cut, i.e., No. 1, 27.0 ft. wide from 0-27.0 ft.; No. 2, 7.0 ft. wide from 43.0-50.0 ft.; and No. 3, 25.0 ft. wide from 57.0-82.0 ft. These ore zones have all been reported in the monthly narrative reports with supporting assays on samples taken from mine cars dumped into the stockpile. However, a summary of these will be given.

1. No. 1 Ore Zone; 0.0 to 27.0 ft.

90 cars, (65 tons), placed into the stockpile sampled 0.26% WO_3. This muck was heavily diluted by driving through the underlying shale plus about 3-4 ft. of the lower portion of the Wheeler bed which is usually barren. Our best judgement is that this ore will break about 0.60% WO_3 when mining is confined to the vertical limits within the bedding. It is well to point out at this time that this ore undoubtedly continues Southerly to the #3 raise in No. 1 Lateral South as is indicated on the map.

2. No. 2 Ore Zone; 43.0 to 50.0 ft.

15 cars, (12 tons), placed in the stockpile sampled 0.23% WO_3. Again, this muck was heavily diluted by the lower portion of the bed which is barren. There is no doubt but that in mining the actual ore zone the muck could be held to about 0.60% WO_3.

3. No. 3 Ore Zone; 57.0 - 82.0 ft.

42 cars produced in driving through the zone assayed 0.36% WO_3; 30 cars from the 9.0 ft. raise within the zone assayed 1.74% WO_3. These two average 0.94% WO_3. Again, on the first sample we had considerable dilution which prudent mining, on a production basis, would avoid.

B. No. 2 Lateral Area.

Total footage in this area was 242.0 ft.; 130.0 ft. on a Northerly course, 60 ft. on a Southerly course, 25.0 ft. Easterly and 19.0 ft. of raise within the first ore zone, and 8.0 ft. Easterly within the second ore zone.

In driving the lateral North two ore zones were cut, viz., No. 1, 12.0 ft. wide from 82.0 - 94.0 ft., and No. 2, 10.0 ft. wide from 107.0 - 117.0 ft.

1. No. 1 Ore Zone; 82.0 to 94.0 ft.

35 cars dumped into the stockpile were estimated at 0.75% WO_3; the trammer forgot to take grab samples from the cars. However, this was good ore. In this area the scheelite appeared to make in the lower portion of the bedding.

2. No. 2 Ore Zone; 107.0 to 117.0 ft.

25 cars of stockpile ore were estimated at 0.75% WO_3. This zone had numerous small E-W quartz fissures containing high grade scheelite with considerable dissemination within the limestone.

A total of 33.0 ft. of drifting was done Easterly within these two ore zones which produced approximately 90 cars, (65 tons), of ore which easily averaged +0.75% WO_3. We first considered these separate zones but after driving Easterly and carefully washing down the East and West walls of the North Lateral between the two zones, we are now of the opinion that mining for production may demonstrate this area to be one ore zone some 35 feet wide.

C. No. 3 Lateral Area.

Total footage in this area was 261.5 ft.; 203.0 ft. on a Northerly course, 13.0 ft. on a N50°E course, and 32.0 ft. of E-W drifting and 19.0 ft. of raising within the second ore zone.

This Lateral produced two ore zones, viz., No. 1, 15.0 ft. wide from 0.0 - 15.0 ft., and No. 2, 20.0 ft. wide from 30.0 - 50.0 ft.

1. No. 1 Ore Zone; 0.0 to 15.0 ft.

   30 cars grab sampled 0.73% WO_3 when dumped into the stockpile. The N50°E drift in this zone has a full face of ore which appears to be of somewhat higher grade, possibly 1.0%.

2. No. 2 Ore Zone; 30.0 to 50.0 ft.

   64 cars to stockpile grab sampled 0.82% WO_3. A 13.5 ft. raise was run vertically through this ore zone and 40 cars to the stockpile grab sampled 1.56% WO_3. This is very good ore and has a demonstrated thickness at this point of plus 16.0 ft.

D. No. 4 Lateral Area.

Total footage in this area was 66.5 ft.; 57.5 ft. Northerly and 9.0 feet Westerly.

The exploration in this area was abandoned because the entire bedding traversed by the North drift was replaced by a heavy ankerite mud which entirely obliterated the scheelite mineralization. However, a 2.0 ft. E-W quartz fissure was cut at interval 22.0 - 24.0 ft., which contained high grade ore. No effort was made to save this ore.

E. No. 5 Lateral Area.

Total footage amounted to 454.0 ft.; 401.0 ft. Northerly, 10.0 ft. Westerly within No. 1 ore body, 35.0 ft. Easterly plus 4.5 ft. of raise within No. 2 ore body, and 3.5 ft. of raise for the second slusher station.

This Lateral produced two ore zones, viz., No. 1, 5 ft. wide from 44.0 - 49.0 ft. and No. 2, 35.0 ft. wide from 114.0 to 149.0 ft.

1. No. 1 Ore Zone; 44.0 to 49.0 ft.

   Muck piles from this zone were estimated at 0.75% WO_3 and were placed in the stockpile. The 10.0 ft. drift Westerly in this zone showed three E-W quartz fissures 2" to 4" wide containing high grade scheelite. Some disseminated scheelite mineralization was also observed.

2. No. 2 Ore Zone; 114.0 to 154.0 ft.

This is the widest and highest grade ore zone thus far exposed by exploration from the Pole adit. In driving through this zone at intervals 114.0 to 134.0 ft., with the North drift, 55 cars of ore placed in the stockpile grab sampled 0.50% WO_3. This was heavily diluted by the bottom portion of the Wheeler bed which was barren. At interval 134 - 139 ft. an E-W fault was cut which dropped the North side about 2.0 ft. Between interval 139.0 and 154.0 ft. a 15.0 ft. ore zone was cut. 36 cars broken grab sampled 0.32% WO_3. A 5.0 ft. raise was run vertically at 119.0 to 126.0 ft. and the grab sample of the muck pile assayed 1.76% WO_3.

A 35.0 ft. drift was run Easterly at 123.0 ft. and produced 105.0 tons of ore having mill heads of 1.10% WO_3. Later, a 13.0 ft. raise was run vertically at the end of this 35 ft. East drift and the cut sample in the face of the raise assayed essentially 7% WO_3. This opened up the very best ore we have thus far observed in the mine. More will be said about this under Section II - Geology.

II. PROBABLE ORE RESERVES

This estimate is based upon the limited information made available by the exploration work completed within the Wheeler bedding; essentially all of which was done immediately North of the Pole adit. The factors used are average width of ore zones but by North Laterals, average thickness of these zones as shown by drifts and raises, average assays compiled from ore car grab samples, weight factor of 12 cu. ft. per ton in place and the assumption that such ore zones will be continuous Easterly and Westerly between the laterals.

No. 1 Lateral Area.

(a) Ore zone dimensions -

Total widths 27.0 + 7.0 + 25.0 =		59.0 ft.
Indicated thickness from drifts		7.0 ft.
Assumed Length:		
To "B" Lateral - Westerly	120.0 ft.	
To No. 2 Lateral - Easterly (1/2)	75.0 ft.	
	195.0 ft.	195.0 ft.

(b) Average assay from grab samples -

90	cars	@	0.26%	
15	"	@	0.23%	
42	"	@	0.36%	
147	"	"	0.29%	0.29% WO_3

(c) Calculated tonnage -

$$\frac{(59.0)(7.0)(195.0)}{12} = 6{,}710 \text{ tons} \qquad 6{,}710 \text{ tons}$$

No. 2 Lateral Area.

(a) Ore zone dimensions -

Total widths 12.0 + 10.0 =		22.0 ft.
Indicated thickness from drifts		7.0 ft.
Assumed length:		
1/2 dist. Westerly to No. 1 Lateral	75.0 ft.	
1/2 dist. Easterly to No. 3 Lateral	55.0 ft.	
	130.0 ft.	130.0 ft.

(b) Average assays from grab samples -

35	cars	@	0.75%) Estimated	
25	cars	@	0.75%)	
60	"	"	0.75%	0.75% WO_3

(c) Calculated tonnage -

$$\frac{(22.0)(7.0)(130.0)}{12} + 1{,}670 \text{ tons} \qquad 1{,}670 \text{ tons}$$

No. 3 Lateral Area.

(a) Ore zone dimensions -

Total widths 15.0 + 20.0 =		35.0 ft.
Indicated thickness from drifts		7.0 ft.
Assumed length:		
1/2 dist. Westerly to No. 2 Lateral	55.0	
1/2 dist. Easterly to No. 4 "	60.0	
	115.0 ft.	115.0 ft.

(b) Average assays from grab samples -

30	cars	@	0.73% WO_3	
64	"	@	0.82% "	
94	"	"	0.79% "	0.79% WO_3

(c) Calculated tonnage -

$$\frac{(35.0)(7.0)(115.0)}{12} = 1{,}000 \text{ tons}$$ 1,000 tons

No. 5 Lateral Area.

(a) Ore zone dimensions -

Total widths 5.0 + 35.0 =		40.0 ft.
Indicated thickness from drifts		7.0 ft.
Assumed length:		
1/2 dist. Westerly to No. 4 Lateral	70.0 ft.	
Total dist. to fault at No. 6 Lateral	180.0 ft.	
	250.0 ft.	250.0 ft.

(b) Average assays from grab samples -

15	cars	@	0.75% WO_3	
55	"	@	0.50% "	
36	"	@	0.36% "	
12	"	@	1.76% "	
118	"	"	0.62% "	0.62% WO_3

(c) Calculated tonnage -

$$\frac{(40)(7)(250)}{12} = 5{,}830 \text{ tons}$$ 5,830 tons

From this set of calculations we arrive at the following preliminary tonnages:

Location	Tonnage	Grade-%WO_3
No. 1 Lateral	6,710	0.29
No. 2 Lateral	1,670	0.75
No. 3 Lateral	1,000	0.79
No. 5 Lateral	5,830	0.62
	15,210	0.50

However, this estimate is based upon the lower 7.0 ft. section of the Wheeler ore bedding, immediately above the shale, which was opened by the exploration drifts. It is a demonstrated fact that the first 3-4 ft. above the shale was generally barren or very low grade, but this material was all included in the stockpiled ore from which the grab samples were taken. Obviously, this 3-4 ft. section would not be mined under a production schedule. Therefore, in order to obtain a true estimate of tonnage and grade, we must reduce the above preliminary tonnage by 4/7 and correspondingly increase the grade by 7/4. This gives us the following estimate of probable ore reserves:

$$(15{,}210)(4/7) = \underline{\underline{8{,}690 \text{ tons}}}$$

$$(0.50)(7/4) = \underline{\underline{0.88\% \ WO_3}}$$

By reforming the preliminary estimate on this basis, we arrive at the following summary of probable ore:

Location	Tonnage	Grade
No. 1 Lateral	3,834	0.51
No. 2 Lateral	954	1.31
No. 3 Lateral	571	1.38
No. 5 Lateral	3,331	1.09
Total	8,690	0.88% WO_3

It will now be noted that in milling ore from Laterals 1, 3 and 5, (as reported in MF-104 narrative for the month of September, 1953) wherein the lower 3.0 ft. barren portion of the Wheeler bedding was avoided as much as possible during mining, the following calculated grades were reported:

*Location	Tonnage Milled	Calculated Heads
No. 1 Lateral	82.0	0.41% WO_3
No. 3 Lateral	120.0	0.50% "
No. 5 Lateral	105.0	1.10% "
	307.0	0.68% "

*Lateral "B" omitted.

This checks remarkably close with the estimate of probable ore grade in Lateral No. 1, (0.51% against 0.41%) and Lateral No. 5, (1.09% against 1.10%). However, we are at a loss to explain Lateral No. 3, (1.38% against 0.50%), but it has been suggested, and it is a physical fact, that this ore drift Easterly within the ore zone was driven practically on the shale contact and included the lower barren portion of the ore bedding.

If we add Lateral "B" ore to the above, we come out with an actual milling head of essentially 0.80% WO_3 which is in close agreement with the final estimate of probable grade of 0.88% WO_3.

III. POSSIBLE ORE RESERVES

This estimate is based upon evidence of ore in the upper portion of the Wheeler bedding as demonstrated by the raise in No. 1 Lateral, which was driven 9.0 ft. above the back of the drift, indicating an ore zone thickness of at least 13.0 ft. (total above shale of 16.0 ft. less 3' barren lower portion of bedding); the raise in No. 3 Lateral, which was driven 13.5 ft. above the back of the drift, indicating an ore zone thickness of at least 17.5 ft. (total above shale of 20.5 ft. less 3.0 ft. of barren lower bedding); and the raise in No. 5 Lateral, which was driven 13.0 ft. above the back of the drift, indicating an ore zone thickness of at least 16.0 ft. (total above shale of 20.0 ft. less 4.0 ft. of barren lower bedding).

The grab samples from the muck piles broken in driving these raises through the ore bedding were as follows -

Location	Total Ore Thickness	Cars to Stockpile	Assay - % WO_3
No. 1 Lateral	13.0 ft.	30	1.74%
No. 3 Lateral	17.5 ft.	40	1.56%
No. 5 Lateral	16.0 ft.	20	1.76%
Average	15.5 ft.	90	1.66%

By using the **ratio** of this suggested additional ore thickness to the 4.0 ft. thickness used in arriving at the final estimate of probable ore $\left(\frac{15.5-4.0}{4.0}\right)$ and multiplying by the net tonnage (8,690 tons) we arrive at a fairly reasonable guess of estimated possible ore as follows -

$$\frac{(8,690)(11.5)}{4.0} = 24,980 \text{ tons}$$

And, while it is admitted that the estimated grade of 1.66% WO_3 is based upon inadequate sample data and may be somewhat high, we know from careful observation that such upper bedding ore is certainly of an appreciably higher grade than heretofore mined in the lower portion of the bedding. This is especially noticeable in No. 5 Lateral where samples up to 7.0% WO_3 have been cut in the face of the raise.

Based upon the foregoing analysis, the total estimated ore reserves are suggested as follows -

1.	Probable ore	8,690 tons		0.88% WO_3
2.	Possible ore	24,980 tons		1.66% "
	Total	33,670 tons	@	1.46% "

The reasonableness of this grade estimate is demonstrated by our selectively mining 65 tons of ore from the upper bedding of Laterals "B" and No. 5 during the month of November, 1953, and milling in the Stopper mill. This 65 tons of ore produced 3,668 lbs. of concentrate assaying 52.44% WO_3 showing a mill recovery of 1.48% WO_3 per ton. The calculated heads of this ore was 1.88% WO_3. (This milling is reported in the attached MF-104 narrative for the month of December, 1953).

III. GEOLOGY

The initial concept of the Wheeler limestone replacement by scheelite was borrowed by analogy from the lead-zinc replacement pattern in an equivalent lower cambrian section at Pioche, Nevada. In this Pioche pattern the high grade ore is generally found in the lower portion of the bedding just above the shale. It was, therefore, quite natural for us to use this system in our thinking. However, within the last few months other facts have been uncovered which tend to indicate that our best ore will be found in an upper bedding, just under the shale, where, in effect, the shale has acted as an impervious lid to the ascending mineral. This was indicated fairly clearly in the raises in Nos. 1 and 3 Laterals, but was well demonstrated in the raise at the end of the East drift in No. 5 Lateral, where face assays up to 7% WO_3 have been reported. Limited ore production, based upon this new concept, has demonstrated the existence of this upper productive bed and indicates its grade will be considerably higher grade than estimated for the lower portion of the bed.

Another significant factual development is that the size and grade of the ore zones increase materially as we go East. No. 5 Lateral has opened a zone at least 35 ft. wide having a lower ore bed of about 5-6 ft. which will assay 1.1% WO_3 as broken, and an upper ore bed of about 4-5 ft. which will probably break at least 1.5 - 1.7% WO_3. Of course, as we drive Easterly we approach the large igneous stock which outcrops about a mile and a quarter to the Northeast and it seems reasonable to connect the scheelite mineralization in the Wheeler bed genetically with this igneous stock. Such being the case, we should expect a decided increase in mineralization as we approach the source.

A third observation to which we attach considerable importance is the fact that thus far, all exploration in the Wheeler bed has been done in an area open to intense alteration by surface waters (the face of the Pole adit being less than 300 ft. below the surface). All major fissuring, both N-S and E-W, shows a complete filling with an ankerite mud, and large areas of the Wheeler bed, particularly in Laterals Nos. 2, 3 and 4, are completely replaced with this same mud. The only Lateral in which no mud was encountered was No. 5 and we explain this exception by pointing out that we have limestone cover over the shale vertically above No. 5. This limestone cover tends to seal off surface waters which normally accumulate in the shale talus and run down the more or less open fissures. It is our firm conviction, based upon these studies, that Easterly exploration to the Sheffield area, will open significantly larger ore zones of considerably higher scheelite content.

January 28, 1954

Jaw.

REQUEST FOR AN AMENDMENT
TO EXPLORATION PROJECT D.M.E.A. 2082- TUNGSTEN
CONTRACT Idm-E 248

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
MAR 16 1953

For the Purpose of

1. Exploring the Productive East-West Shear Zone Opened by the Pole Tunnel.

2. Exploring Other Productive East-West Shear Zones Northward from the Pole Tunnel, and

3. Extending the Pole Tunnel Eastward to the Sheffield Fissure Shear Zone.

Submitted To

MR. H. C. MILLER, EXECUTIVE OFFICER
D.M.E.A. FIELD TEAM
DEFENSE MINERALS EXPLORATION ADMINISTRATION
DEPARTMENT OF THE INTERIOR
1012 FLOOD BUILDING, 870 MARKET STREET
SAN FRANCISCO 2, CALIFORNIA

By

MT. WHEELER MINES, INC.
P.O. Box 150
SALT LAKE CITY 10, UTAH

February 28, 1953

MT. WHEELER MINES, INC.

P. O. BOX 150

SALT LAKE CITY 10, UTAH

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Mr. H. C. Miller, Executive Officer
DMEA Field Team, Region III
1012 Flood Building
870 Market Street
San Francisco 2, California

Re: Contract Idm-E 248
Docket DMEA-2082-Tungsten
Mt. Wheeler Mines, Inc.
Amendment to Contract

Dear Mr. Miller:

In accordance with our several conferences and discussions, we are submitting four copies of a requested amendment to Contract Idm-E 248 to provide for additional exploration under the above captioned docket.

This amendment has been under consideration for the past three months, during which time numerous conferences were held between the Operator and Messrs. Johnson and Gentry of the Reno office, Mr. Roscoe Smith of the U.S.G.S., Salt Lake office, yourself and Mr. Bailey, and has evolved into its present scope as a cooperative effort. We are authorized to state that Messrs. Johnson, Gentry and Smith are in complete accord with the exploration program as outlined herein. At the same time we wish to thank all these gentlemen for the extraordinary efforts expended in their examination, analysis and reporting of this project.

The Abstract of Amendment, which follows this letter, will serve to give you a concise summary of the scope of the proposed work. We should also like to call your attention to the brief "Explanations of Items" which follows at the end of Stage I and Stage II "Statement of the Proposed Work". This explanatory narrative has been designed to clarify the items in the body of the amendment. Your attention is also called to Exhibit "E" which gives a complete analysis of unit costs of the program just completed, and to Exhibits "B" and "D", the work sheets showing the conversion of project costs to the various MF-104 classifications under which they will be reported monthly.

Thank you for your very kind consideration.

Very truly yours,

MT. WHEELER MINES, INC.
By

James D. Williams
President

ABSTRACT OF AMENDMENT

1. Property

Situated in Section 15, Township 12 North, Range 68 East, Mt. Diablo Base and Meridian, White Pine County, Nevada.

2. Geology and Ore

Mine is in sedimentary rocks of lower Cambrian age consisting of quartzites, shales and limestones. Productive ore zone open by present exploration in 22 foot Wheeler limestone bedding within Pioche shale series 45 feet above Basal Prospect Mountain Quartzite. The scheelite ore occurs in the lower 10 foot section of this Wheeler bed where cut by East-West trending quartz fissure shear zones having widths of 100 feet plus. Three such E-W shear zones are known to exist over a distance of 900 feet north from the Pole adit. Concentrations of scheelite usually occur where these intersections are cut by N-S fissuring.

3. Preliminary Production

(a) The initial work done by the Company in "A" and "B" Laterals South produced approximately 90 tons of ore. Grab samples taken from the cars as dumped into the stockpile averaged 2.25% WO_3.

(b) Exploration drifting, within the bedding, just completed, produced approximately 150 tons of ore. Grab samples taken from the cars as dumped into the stockpile averaged 0.85% WO_3. Since this came from exploration as broken, it contained considerable waste which would ordinarily not be mined.

4. Proposed Exploration

(a) Stage I

1305 feet of exploration within the Wheeler productive bedding where cut by the E-W shear zone. This work to be done from faces opened in the bedding by exploration just completed.

(b) Stage II

1. Main Bedding Drive North

2050 feet of exploration within the Wheeler productive bedding, north up bedding dip, from No. 5 Lateral North, 800 feet east of portal in Pole adit.

2. Pole Adit Drive Easterly

4210 feet of exploration to the east of the present face of the Pole adit; 1200 feet of which will advance the adit to the important Sheffield fissure area and the balance of 3010 feet will be exploration within the Wheeler bedding north from the adit at appropriate intervals.

5. Cost and Time Estimates (As per MF-104 Items)

(a) Estimated Cost

1. Stage I

Labor and Supervision	$ 39,458.70	
Operating Materials and Supplies	13,764.65	
Operating Equipment	31,761.95	
Initial Reh. and Repairs	None	
New Buildings and Improvements	18,710.40	
Miscellaneous	8,252.44	
Contingencies	4,860.68	
Total - Stage I	116,698.82	$116,698.82

2. Stage II

Labor and Supervision	$137,777.60	
Operating Materials and Supplies	70,092.51	
Operating Equipment	36,591.34	
Initial Reh. and Repairs	None	
New Buildings and Improvements	34,532.70	
Miscellaneous	23,079.60	
Contingencies	4,841.47	
Total - Stage II	306,915.22	306,915.22
Total - Amendment		$423,614.04

(b) Estimated Time to Complete

1. Stage I

Surface Facilities	2 Months	
Underground Facilities	1	
Underground Exploration	5	
Total - Stage I	8 Months	8 Months

2. Stage II

Surface Facilities	1 Month	
Underground Facilities	1	
Underground Exploration	14	
Total - Stage II	16 Months	16
Total - Amendment		24 Months

No. 4780SI
Colored Tabs

No. 4781SI
Clear Tabs

MADE IN U. S. A.

NATIONAL INSERTABLE-TAB INDEXES ENABLE YOU TO MAKE YOUR OWN SUBJECT ARRANGEMENT, USING PLAIN INSERTS ON WHICH TO WRITE YOUR OWN CAPTIONS.

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1. Statement of the Proposed Work (See Maps - Exhibit "A")

A Underground Exploration

1. Miscellaneous Bedding Exploration

(a) From the end of "A" Lateral South, drive a 5' x 7' drift within the ore bed 40.0 feet in a southerly direction (approximately S 15° E), to cut the south quartz fissure as indicated.

(b) From the end of the above drift drive a 5' x 7' side drift easterly and westerly on the south quartz fissure, 20.0 feet in each direction to explore the south quartz fissure ore zone.

(c) Extend "A" Lateral northerly 20.0 feet to cut the north quartz fissure as indicated on the map. Drive four side drifts easterly and westerly on ore showings opened for a total of 60.0 feet.

(d) From the end of the bedding drift in Raise No. 2, No. 1 Lateral South, drive a 5' x 7' drift within the ore bed 100.0 feet northerly (approximately N 15° W), to cut the north quartz fissure, and 20 feet easterly. From the North drift drive six short side drifts easterly and westerly in favorable ore showings opened, for a total of 90 feet.

(e) From the end of the bedding drift in Raise No. 1, No. 1 Lateral South, drive a 5' x 7' drift within the ore bed 70.0 feet northeasterly (approximately N 70° E), to determine the effect of this N 70° E fissuring upon ore deposition within the productive bed.

(f) From the end of the bedding drift in the raise in No. 3 Lateral North, drive a 5' x 7' drift within the ore bed 85.0 feet north to cut the north quartz fissure. Explore the favorable ore zones thus opened by driving six side drifts easterly and westerly for a total of 90.0 feet.

(g) From the same starting point in (f), above, drive a 5' x 7' drift within the ore bed 110.0 feet northeasterly (approximately N 70° E), to determine the nature of the mineralization within the productive bed in the area of these N 70° E quartz fissures.

(h) From the top of the raise in No. 5 Lateral North, drive a 5' x 7' drift within the ore bed 160.0 feet north to cut the north quartz fissure. Drive eight side drifts easterly and westerly to explore the ore zones opened up for a total of 120.0 feet.

(i) Other miscellaneous drifting within the productive zone, as may be reasonably indicated from the foregoing exploration, in the amount of 300 feet. This work to be approved by the Field Team before it is actually started.

B Additional Underground Facilities Required

1. Miscellaneous Bedding Exploration

(a) Build chutes and manways as follows -

1. Slide chute at "A" Lateral South.
2. Slide chute at "A" Lateral North.
3. Chute and manway at Raise No. 1, No. 1 Lateral South.
4. Chute and manway at Raise in No. 3 Lateral North.
5. Chute and manway at Raise in No. 5 Lateral North.

(b) Timber for, and install slushers as follows -

1. Install present slusher equipment at No. 1 Lateral South area for bedding exploration.
2. When exploration in (1) above is completed move slusher equipment to No. 3 Lateral North area for bedding exploration.
3. Install new slusher equipment at No. 5 Lateral North for bedding exploration.

(c) Other Preparation

1. Run air, water and ventilation lines from main tunnel to working faces.

2. Install underground air receiver.

3. Place 12 drift sets in main adit from No. 1 Lateral South, 60 ft. easterly, where bedding drifts will cross overhead.

C Additional Surface Facilities Required

1. Bins for Bulk Mill Sampling

(a) Construct a 50 ton bin at the Pole tunnel, install necessary switches and trackage and grade truck road to bin. This facility is necessary to accomplish bulk sampling of the exploration within the productive zone.

(b) Construct a wing bin at the bottom of Pole canyon for storage of the bulk sampling product in lots of 250-500 tons and for transfer into larger trucking units for haul to the mill.

2. Other Facilities

(a) Under Amendment No. 2, to Contract Idm-E-248, authorization was given to add a change room to the blacksmith shop at a

cost of $650.00. It is now requested that this change room be made into a small warehouse and a separate 16' x 20' change house, complete with all necessary facilities, be constructed at the Pole tunnel.

(b) Construct a 12' x 12' powder magazine in accordance with standard specifications of the U.S. Bureau of Mines. This facility has been ordered by the State Industrial Commission of Nevada.

(c) Prepare waste dump facilities for side dump operation.

(d) Make permanent installation of ventilating blower.

D Additional Equipment Required

1. Drilling Equipment as Follows

(a) 3 Jackhammers (2 3/4" machines)
(b) 3 Jackleg units (6 foot leg)
(c) 2 Stopers (2 5/8" machines)
(d) 3 Sets 50' x 3/4" Air hoses
(e) 3 Sets 50' x 1/2" Water hoses
(f) 1 Hitchcutter

2. Ten - 27 cubic foot capacity side dump mine cars. Amendment No. 1 to Contract Idm-E-248, provided for the rental of mine cars in the amount of $1050.00. This sum was not expended because 10 - 15 cubic foot cars were borrowed from another operation. These cars must now be returned.

3. A four-wheel drive truck of 5 ton capacity will be required for year around hauling in the canyon. This unit will be equipped with an oversize bed for also hauling supplies and a snowplow.

4. Eight underwriters approved fire extinguishers for the mine buildings; two to each.

5. One double drum slusher with necessary accessory equipment.

6. Purchase of present rental units.

2. Estimated Cost of Proposed Work (See Exhibit "E" - Past Costs)

A Underground Exploration

1. Miscellaneous Bedding Exploration - 1305 Feet

(a) "A" Lateral North and South Area - 160 Feet

1.	Contract labor	@	$13.50/Ft.	$2160.00	
2.	Pipe & ventilation		1.63	260.80	
3.	Powder, fuse & caps		2.70	432.00	
4.	Steel & bits		1.53	244.80	
5.	Timber		0.46	73.60	
6.	Fuel & Lube Air generation		1.37	219.20	
7.	Misc. small tools		0.55	88.00	
8.	Comp. Insurance		0.95	152.00	
9.	Payroll taxes		0.61	97.60	
	Total 160 Feet	@	23.30/Ft.	$3728.00	$3728.00

(b) No. 1 Lateral South Area - 280 Feet

1.	Contract labor	@	$13.50/Ft.	$3780.00	
2.	Pipe & ventilation		2.11	590.80	
3.	Powder, fuse & caps		2.70	756.00	
4.	Steel & bits		1.53	428.40	
5.	Timber		0.46	128.80	
6.	Fuel & Lube Air generation		1.37	383.60	
7.	Misc. small tools		0.55	154.00	
8.	Slusher cable		0.25	70.00	
9.	Comp. Insurance		0.95	266.00	
10.	Payroll taxes		0.61	170.80	
	Total 280 Feet	@	24.03/Ft.	$6728.40	6728.40

(c) No. 3 Lateral North Area - 285 Feet

1.	Contract labor	@	$13.50/Ft.	$3847.50	
2.	Pipe & ventilation		2.11	601.35	
3.	Powder, fuse & caps		2.70	769.50	
4.	Steel & bits		1.53	436.05	
5.	Timber		0.46	131.10	
6.	Fuel & Lube Air generation		1.37	390.45	
7.	Misc. small tools		0.55	156.75	
8.	Slusher cable		0.25	71.25	
9.	Comp. Insurance		0.95	270.75	
10.	Payroll taxes		0.61	173.85	
	Total 285 Feet	@	24.03/Ft.	$6848.55	6848.55

(d) No. 5 Lateral North Area - 280 Feet

1.	Contract Labor	@ $13.50/Ft.	$3780.00	
2.	Pipe-Ventilation	2.11	590.80	
3.	Powder-fuse-caps	2.70	756.00	
4.	Steel and bits	1.53	428.40	
5.	Timber	0.46	128.80	
6.	Fuel & Lube Air Generator	1.37	383.60	
7.	Misc. small tools	0.55	154.00	
8.	Slusher cable	0.25	70.00	
9.	Comp. Insurance	0.95	266.00	
10.	Payroll taxes	0.61	170.80	
	Total 280 Feet @	24.03/Ft.	$6728.40	6,728.40

(e) Other Miscellaneous Bedding Exploration 300 Feet

1.	Contract Labor	@ $13.50/Ft.	$4050.00	
2.	Pipe-Ventilation	2.11	633.00	
3.	Powder-fuse-caps	2.70	810.00	
4.	Steel and bits	1.53	459.00	
5.	Timber	0.46	138.00	
6.	Fuel & Lube	1.37	411.00	
7.	Misc. small tools	0.55	165.00	
8.	Comp. Insurance	0.95	285.00	
9.	Payroll taxes	0.61	183.00	
	Total 300 Feet @	23.78/Ft.	$7134.00	7,134.00
	Total Underground Exploration-Direct Costs			$31,167.35 $31,167.35

B Underground Facilities

1. Miscellaneous Bedding Exploration

a Chutes and Manways as follows-

1. Slide chute at "A" Lateral South

(a)	Timber and supplies		$ 127.00	
(b)	Labor 4 Man-shifts	@ $15.70	62.80	
(c)	Comp. Insurance	7.01%	4.40	
(d)	Payroll taxes	4.5 %	2.82	
			$ 197.02	$ 197.02

2. Slide chute at "A" Lateral North

(a)	Timber and supplies		$ 127.00	
(b)	Labor 4 shifts	@ $15.70	62.80	
(c)	Comp. Insurance	7.01%	4.40	
(d)	Payroll taxes	4.5 %	2.82	
			$ 197.02	$ 197.02

3. Chute and Manway at No. 1 Lateral South

(a)	Mining supplies		$117.20	
(b)	Timber and supplies		246.00	
(c)	Fuel and Lube			
	Air Generation		33.40	
(d)	Labor- 20 shifts	@ $15.70	314.00	
(e)	Comp. Insurance	7.01%	22.01	
(f)	Payroll taxes	4.5 %	14.13	
			$746.74	$ 746.74

4. Chute and Manway at No. 3 Later North

(a)	Mining supplies		$117.20	
(b)	Timber and supplies		246.00	
(c)	Fuel and Lube			
	Air Generation		33.40	
(d)	Labor- 20 shifts	@ $15.70	314.00	
(e)	Comp. Insurance	7.01%	22.01	
(f)	Payroll taxes	4.5 %	14.13	
			$746.74	746.74

5. Chute and Manway at No. 5 Lateral North

(a)	Mining supplies		$117.20	
(b)	Timber and supplies		246.00	
(c)	Fuel and Lube			
	Air Generation		33.40	
(d)	Labor- 20 shifts	@ $15.70	314.00	
(e)	Comp. Insurance	7.01%	22.01	
(f)	Payroll taxes	4.5 %	14.13	
			$746.74	746.74

b Install 3 slushers as follows-
(Cost of each setup will be about the same - below is an example)

1. In No. 1 Lateral South

(a)	Mining supplies		$ 87.10	
(b)	Timber and misc.		79.00	
(c)	Fuel and Lube			
	Air Generation		24.71	
(d)	Switches, bolts, etc.		90.00	
(e)	Labor- 12 shifts	@ $15.70	188.40	
(f)	Comp. Insurance	7.01%	13.21	
(g)	Payroll taxes	4.5 %	8.48	
	Total 3	@	$490.90	1472.70

c Other Preparation

1. Air, Water & Vent Lines to Working Faces

(a)	250 Ft. 2" air line		$ 87.50	
(b)	250 Ft. 1" water line		50.00	
(c)	250 Ft. 8" vent tube		190.00	
(d)	Misc fittings & valves		75.00	
(e)	Labor- 10 shifts @ $15.70		157.00	
(f)	Comp. Insurance	7.01%	11.01	
(g)	Payroll taxes	4.5 %	7.07	
			$577.58	$ 577.58

2. Install Underground Air Receiver

(a)	4' x 8' Welded tank		$564.00	
(b)	Fittings, valves, etc.		46.50	
(c)	Labor- 6 shifts @ $15.70		94.20	
(d)	Comp. Insurance	7.01%	6.60	
(e)	Payroll taxes	4.5 %	4.24	
			$715.54	715.54

3. Drift Sets in Adit No. 1 Lateral South Area

(a)	Timber and supplies		$738.00	
(b)	Labor-18 shifts @ $15.70		282.60	
(c)	Comp. Insurance	7.01%	19.81	
(d)	Payroll taxes	4.5 %	12.72	
			$1053.13	1053.13

4. Electric Light line in Pole Tunnel and Laterals

(a)	2000' #10/2 Conc B-x		$ 235.00	
(b)	Switches and fuses		42.00	
(c)	Insulators-junction boxes		38.00	
(d)	Lights and sockets		23.00	
(e)	Labor- 6 shifts @ $15.70		94.20	
(f)	Comp. Insurance	7.01%	6.60	
(g)	Payroll taxes	4.5 %	4.24	
			$ 443.04	443.04

Total Underground Facilities	$6896.25	$6896.25

C Additional Surface Facilities Required

1. Bins for Bulk Mill Sampling

a Mine Bin

1.	Timber and materials		$1355.00	
2.	Grading for site & road		240.00	
3.	Foundations		250.00	
4.	Trackage and switches		510.00	
5.	Labor- 74 shifts @ $15.70		1161.80	
6.	Comp. Insurance	7.01%	81.44	
7.	Payroll taxes	4.5 %	52.28	
			$3650.52	3650.52

b Wing Bin for Transfer

1.	Timber and materials		$984.00	
2.	Grading		260.00	
3.	Foundations		275.00	
4.	Labor- 52 shifts @ $15.70		816.40	
5.	Comp. Insurance	7.01%	57.23	
6.	Payroll taxes	4.5 %	36.74	
			$2429.27	$2429.27

2. Other Facilities

a Change House at Mine - 16'x20'

1.	Materials and supplies		$1383.00	
2.	Showers and toilets		570.00	
3.	Hot water & heating eqt.		425.00	
4.	Labor- 60 shifts @ $15.70		942.00	
5.	Comp. Insurance	7.01%	66.03	
6.	Payroll taxes	4.5 %	42.39	
			$3428.42	3428.42

b Powder Magazine - 12'x12'

1.	Timber and supplies		$ 529.00	
2.	Grading and excavation		160.00	
3.	Labor- 24 shifts @ $15.70		376.80	
4.	Comp. Insurance	7.01%	26.41	
5.	Payroll taxes	4.5 %	16.96	
			$1109.17	1109.17

c Waste Dump Preparation

1.	Timber and supplies		$ 316.00	
2.	Trackage and switches		315.60	
3.	Labor- 20 shifts @ $15.70		314.00	
4.	Comp. Insurance	7.01%	22.01	
5.	Payroll taxes	4.5 %	14.13	
			$ 981.74	981.74

d Permanent Blower Installation

1.	Timber and supplies		$ 55.00	
2.	Electrical supplies		90.00	
3.	Labor- 4 shifts @ $15.70		62.80	
4.	Comp. Insurance	7.01%	4.40	
5.	Payroll taxes	4.5 %	2.83	
			$ 215.03	215.03

Total Surface Facilities	$11814.15	$11,814.15

D Additional Equipment Required

1. Drilling Equipment

(a)	3 Jackhammer & jackleg units complete @ $535.00	$2675.00	
(b)	2 Stopers 550.00	1100.00	
(c)	3 Sets air & water hose	180.00	
(d)	1 Hitchcutter	125.00	
		$4080.00	$4080.00

2. Mine Cars

(a)	10-27 Cu. Ft. side dump ore cars @ $506.50	$5065.00	5065.00

3. General Purpose Truck

(a)	1 1/2 Ton Ford chasis	$2700.00	
(b)	4-Wheel drive conversion	1390.00	
(c)	Hydraulic dump bed	1200.00	
(d)	Snowplow	750.00	
		$6040.00	6040.00

4. Fire Extinguishers

(a)	8 Model 60 CO_2 Units	$ 480.00	480.00

5. Double Drum Slusher

(a)	1 Joy Model AAF-212	$2125.00	
(b)	1 30" Scraper	282.00	
(c)	3 8" Sheave blocks	129.00	
(d)	2 Eyes and wedges	28.40	
(e)	Cable for slusher	212.50	
		$2776.90	2776.90

6. Purchase of Present Rental Units

Note: Under the original Contract Idm-E-248 and Amendment No. 2, monthly rental was authorized on five pieces of equipment. A "Gentlemen's" agreement has been worked out with our suppliers granting an option to apply these rentals 100% on the purchase of these units if the transactions are completed by the payment of the cash balances plus interest by February 28, 1953. It is requested this be done.

Purchase price, rental credit and cash balances as of February 28, 1953, will be as follows -

Rental Item	Purchase Price Plus Interest	DMEA Rent Payment	Cash Balance		
Compressor	$ 9,724.22	$ 4,230.00	$ 5,494.22		
Generator	2,009.60	1,550.46	459.14		
Trammer	7,726.73	3,800.00	3,926.73		
Mucker	3,104.85	2,360.00	744.85		
Jumbo	2,338.86	770.00	1,568.86		
	$24,904.26	$12,710.46	$12,193.80	12,193.80	
		Total Additional Equipment Required		$30,635.70	$30,635.79

E Supervisory and Supporting Labor

1. Supervisory and Technical

(a) Supt., Engineer and Geologist	8 Mo @ $650/Mo		$ 5,200.00	
(b) Working Foreman	8 Mo.	500	4,000.00	
			$ 9,200.00	9,200.00

2. Supporting Labor (Mine Operations Only)

(a) Timekeeper, warehouseman & compressorman	8 Mo @ $450/Mo		$ 3,600.00	
(b) Cook	8 Mo	300	2,400.00	
(c) Combination underground and surface maintenance man -2 shifts $14.50/day & O.T.	8 Mo	408.20	6,531.20	
			$12,531.20	12,531.20

3. Comp. Insurance & Payroll Taxes

(a) Comp. Insurance	@	7.01%	$ 1,523.38	
(b) Payroll taxes		4.5 %	977.90	
			$ 2,501.28	2,501.28
		Total Supervisory and Supporting		$24,232.48	24,232.48

F Other Costs

1. Freight on Supplies (Salt Lake to Mine)

(a) Pipe & vent lines 5200# @ $0.75/Cwt.	$ 390.00	
(b) Timber and lumber 105300# 0.75/Cwt.	789.75	
(c) Miscellaneous supplies 17500# 0.75/Cwt.	131.25	
	$ 1,311.00	1,311.00

2.	Freight on Equipment			
	(a) Factory to Salt Lake	$ 712.50		
	(b) Salt Lake to mine - 116,200#	413.75		
		$ 1126.25	1,126.25	
3.	Truck Operation			
	(a) 2392 miles per month @ 10¢/ mile operation and maintenance 7 months	$ 1674.40		
	(b) Operator's wages @ $14.50/ shift & O.T.-7 Mo 408.20	2857.40		
	(c) Comp. Insurance @ 7.01	200.30		
	(d) Payroll taxes 4.5 %	128.58		
		$ 4860.68	4,860.68	
4.	Accounting and Blueprinting			
	(a) Project accounting 8 Mo @ $100/Mo	$ 800.00		
	(b) Report printing and copy 8 Mo @ 55/Mo	440.00		
		$ 1240.00	1,240.00	
5.	Jeep Mileage (Rental)			
	(a) Allowance for actual mileage required for reasonable and necessary project travel-Est. 1200 M/Mo @ $.08/Mile - 8 Mo.	$ 768.00	768.00	
6.	Assaying			
	(a) Est. 78 samples per month @ $2.00/Sample - 8 Mo.	$ 1248.00	1,248.00	
7.	Equipment Repairs (Incl. Freight)			
	(a) On basis of past experience 1305 Ft. @ $0.352/Ft.	$ 459.36	459.36	
8.	Misc. Operating Supplies (Purchased Locally)			
	(a) On basis of past experience 1305 Ft. @ $0.72/Ft.	$ 939.60	939.60	
	Total Other Costs		$11,952.89	11,952.89
	Total Estimated Cost of Project			$116,698.82

RECAP OF COSTS - STAGE I

A	Underground Exploration - Direct		$ 31,167.35
B	Underground Facilities		6,896.25
C	Surface Facilities		11,814.15
D	Additional Equipment		
	1. New Equipment	$18,441.90	
	2. Purchase Present Rental Units	12,193.80	
		$30,635.70	30,635.70
E	Supervisory & Supporting Labor		24,232.48
F	Other Costs		11,952.89
		Total Estimated Cost of Project	$116,698.82

RECAP OF ESTIMATED COSTS - STAGE I

Amendment to Contract Idm- E-248
Conforming to MF-104 Classification of Items
(See Worksheet - Exhibit "B" For Conversion)

		Unit Detail	Unit Total
1.	Independent Contracts	$ None	$ None
2.	Labor and Supervision		
	(a) Labor	30,148.70	
	(b) Supervision	9,200.00	
	(c) Technical	None	
		$39,348.70	39,348.70
3.	Operating Materials and Supplies		
	(a) Misc. Operating Supplies	$ 939.60	
	(b) Timber	600.30	
	(c) Explosives	3,523.50	
	(d) Pipe and Ventilation	2,676.75	
	(e) Track	None	
	(f) Fuel and Lube	1,787.85	
	(g) Steel and Bits	1,996.65	
	(h) Misc. Small Tools	929.00	
	(i) Freight	1,311.00	
		$13,764.65	13,764.65
4.	Operating Equipment		
	(a) Purchase and Freight	$31,761.95	31,761.95
5.	Initial Rehabilitation and Repairs	None	None
6.	New Buildings and Improvements		
	(a) Materials and Labor	$18,710.40	18,710.40
7.	Miscellaneous		
	(a) Accounting and Blueprinting	$ 1,240.00	
	(b) Repairs to Equipment	459.36	
	(c) Assaying	1,248.00	
	(d) Payroll Taxes	1,773.95	
	(e) Compensation Insurance	2,763.13	
	(f) Administrative (Jeep Mileage)	768.00	
		$ 8,252.44	8,252.44
8.	Contingencies		
	(a) Truck Operation	$ 4,860.68	4,860.68
	Total Estimated Project Cost		$116,698.82

EXPLANATION OF STAGE I ITEMS

A Basis of the Exploration (Please refer to Exhibit "A")

The work, as set forth in items (a) to (h) on page 1, has been designed for the specific purpose of securing the necessary information regarding the nature and extent of scheelite mineralization in the area where the Wheeler bed and the East-West trending quartz fissure shear zone intersect. We do not know the North-South extent of this shear zone, but for the purpose of Stage I we have set an arbitrary width of 100 feet as indicated on Exhibit "A". The lateral drives in the bed, as indicated, will serve to explore this ore zone sufficiently to establish known limits, nature and extent of the ore and probable mining grade. This geological information is necessary in order to plan properly the Exploration requested in Stage II.

Item (h) on page 1, provides for 300 feet of miscellaneous work in the bed as may reasonably be indicated from the other exploration. This footage has been requested on the theory that some additional work may become a necessity. For example, in the drives northerly within the bed it may be that the arbitrary north limit of the East-West trending shear zone can be moved north by adding footage to the drive. This would certainly be true if, at the end of the authorized footage, ore were still in the face. Or, as another example, if the short East-West drives in the bed should show some unusual or different condition it may be that some additional footage might be required. Or, as yet another example, we may wish to drive in the bed from the top of the raise in No. 6 Lateral North to determine the effect of the fault just ahead. There may be many such reasons for this contingent footage.

B Additional Underground Facilities

These are self-explanatory. The chutes and manways are required for muck storage and subsequent loading into cars for tramming either to the waste dump or the ore bin. The slushers, of course, keep the labor cost down and provide a rapid means of removing the muck from the face so that the drilling cycle may have maximum time. The air receiver serves to maintain more constant air pressure and to remove moisture from the lines. The drift sets in the Pole adit in the vicinity of No. 1 Lateral South are necessary because the ground in this area is quite broken and the bottom of the bedding drifts will pass overhead at not more than five feet. This timber will keep the bedding drifts from breaking thru into the Pole adit.

C Additional Surface Facilities

The bins are required as a part of the bulk sampling of the bedded ore produced by this exploration. This program was originally suggested by Mr. Glen Gentry of the U.S.B.M., Reno office, and Mr. Roscoe Smith of the U.S.G.S., Salt Lake office, and concurred in fully by the operator. It is clearly recognized that this method of collecting large tonnages (250-500 tons) of the ore as mined, and milling this ore in one batch will provide the only practical means by which acceptable assay values may be obtained.

The 1305 feet of 5' x 7' exploration in the bed will produce approximately 4500

tons of muck. We have no definite basis upon which to estimate the proportion which will be ore but experience indicates that it may be considerable. In the main, the waste and ore fractions will be selected by estimation under the ultra violet light on each muck pile broken each day.

Under other facilities we have requested a change house by itself. During the past operation the need for a small warehouse was clearly demonstrated. We have no storage space for supplies; as a result they get scattered, lost, damaged by weather, etc. Shortages develop which holds up work because there is no control over inventory. By constructing a change house we can then use the space previously given to it for a small warehouse. This is really a must.

The powder magazine is also a must. We purchase our explosives in half carload lots to gain the advantage of price and free delivery to the mine. State law requires that we provide a U.S. Bureau of Mines approved storage magazine. Heretofore we have stored this powder underground.

The waste dump preparation and permanent blower installation are items that will facilitate the operation materially. They were deferred from the original project in the interests of time.

D. Additional Equipment Required

The drilling equipment is necessary to the performance of the exploration. Under the original contract no provision was made for the purchase of stopers or jackhammers for the raise and bedding drift work. Five such units were borrowed from another operation, at no cost to this project, but must now be returned. The item of ten mine cars is on this same basis.

A 4-wheel drive truck unit is a necessity because of the steep grades, switchbacks, and snow and ice conditions during the winter months. A snowplow attachment will solve the road maintenance problem during the snow season.

The balance of the items is self-explanatory.

E. Project Costs

These are based upon past experience and are considered very representative of what we may actually expect. The contract labor rate of $13.50 per foot allows a little leeway over past costs of $10.81 per foot but the drives in the bed with manual setup, double handling of the muck and numerous side drifts will probably add at least $2.00 per foot over past costs. This $13.50 represents maximum cost to be allowed; if it can be done for less it will be so done.

On other item which may require analysis is that of Supervisory and Supporting Labor. In this amendment an effort has been made to be more realistic than in the prior contract, as regards supervision, technical and clerical services. This is a very isolated operation at 8000 foot altitude. It is difficult to get good men to stay, especially those with families. In the past we failed to provide adequate supervision for the night shift with the result that in two sections of the adit grades became too steep and the tunnel section became

undersize. Considerable time and expense was involved in correcting these conditions. Salaries have been set to conform to those offered for similar work at Pioche and Ely where city living prevails.

A clerical office must be provided for; this for time card use in properly distributing costs of the project, purchasing and warehouse withdrawals, and for payroll at the mine. This latter item is of greatest importance as our mail delivery is but twice per week and we must drive 18 miles to get it. This results in late arrival of the payroll at the Salt Lake office and no matter how quickly the checks are mailed back, pay day is usually 3-5 days late and the men raise hell about it.

The other supporting labor is self-explanatory. A cook is as much a necessity as the compressor or powder. One man on each shift for maintenance, repair and equipment operation is an absolute minimum requirement.

F Time Estimate

The time required to complete Stage I of this amendment is estimated as follows -

1.	Construction of bins, Change House, Powder Magazine and other surface facilities	2 Months
2.	Installing chutes, manways, slushers and other underground facilities	1
3.	Underground exploration, 1305 feet @ 260 feet per month	5
	Total Estimated Time	8 Months

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Colored Tabs

No. 4781SI
Clear Tabs

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EXHIBIT "A"
MAP SHOWING PROPOSED
EXPLORATION

STAGE I

KAROLTON KLASP—8½ x 11¼
MADE BY
THE AMERICAN ENVELOPE CO.
WEST CARROLLTON, OHIO

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EXHIBIT "B"

WORK SHEETS SHOWING CONVERSION OF ESTIMATED COSTS TO MF-104 ITEMS

STAGE I

KAROLTON KLASP—8¾ x 11¼
MADE BY
THE AMERICAN ENVELOPE CO.
WEST CARROLLTON, OHIO

NATIONAL

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No. 4781SI
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II

FOREWORD TO STAGE II

In discussing this program with Mr. Roscoe Smith of the U.S.G.S., Salt Lake Office, and Messrs. A. C. Johnson and Glen Gentry, U.S.B.M., Reno Office, agreement was reached that the commencement of Stage II should be contingent upon certain results of Stage I. Briefly, these conditions are as follows -

1. The Pole adit drive easterly shall not be started until the bedding exploration from No. 5 Lateral North, as outlined in paragraph (h) on page 1 of the Statement of the Work for Stage I, shall have demonstrated commercial tungsten ore within the East-West shear zone as indicated in Exhibit "A". In the event this bedding exploration is negative, then part of the 300 feet of miscellaneous drifting in the bed, as provided for in paragraph (i) on page 1 of the Statement of the Work for Stage I, shall be used to drive a bedding drift northerly in the region of No. 6 Lateral North, and if this exploration shall find commercial tungsten ore in the East-West shear zone, then the Pole adit drive easterly may be started.

2. The Main Bedding Drive North, cannot, of course, be started until the exploration of Stage I is completed northerly from No. 5 Lateral North. While this drive is not to be contingent upon positive results from Stage I work, nevertheless the Main North Bedding Drive is to proceed only in 525 foot sections with the second, or last, 525 foot section contingent upon the results of the first section.

The operator is in full accord with these limitations. It is suggested that authority to proceed, under the conditions above outlined be secured by request to the Executive Officer, DMEA Field Team, San Francisco, California.

1. Statement of the Proposed Work (See Map - Exhibit "C")

A Underground Exploration

1. Main Bedding Drive North

a Starting at the end of the bedding drift driven 160 ft. northerly from the raise in No. 5 Lateral North, as outlined in Stage I of this request, drive a 5'x 7' slusher drift, within the productive bed, up bedding dip, approximately 1050 feet to explore the intersections of additional E-W shear zones with the Wheeler bed and to cut the strong north quartz fissure shear zone as indicated

b At appropriate intervals, as indicated from the advance, drive twelve short side drifts easterly and westerly, within the bed, on favorable E-W shear zones. While the exact location and extent of these side drifts will be dictated by conditions found at the time, their total footage shall not exceed 600 feet.

c At approximately the center of the drive, run two side drifts within the E-W shear zone, easterly and westerly, a distance of 100 feet each.

d Drive a side drift easterly and westerly within the north quartz fissure zone a distance of 100 feet each.

2. Pole Tunnel Drive Easterly

a Extend the Pole tunnel 1200 feet easterly (approximately S-80° E to E-W), following just under the lime-shale contact as heretofore, to cut the Sheffield fissure and accompanying north trending shear zone.

b Drive six short laterals northerly approximately 40 feet within the strongest N-S trending shear zones cut by the tunnel advance. If practical, these laterals should be driven near the center of each 200 foot section of advance.

c From the end of each lateral drive a short raise into the productive ore bed (approximately 25 ft.).

d From the top of each raise drive a 5' x 7' drift northerly within the ore bed to cut the productive E-W zone. These drifts will probably vary in length but their total is not to exceed 900 ft.

e From each of these drifts up bedding, at appropriate points of ore occurrence as indicated from the advance, drive six side drifts easterly and westerly to explore the E-W ore zone. The total of these six side drifts not to exceed 120 ft. in each area.

f Drive a 5'x 7' slusher drift 500 ft. northerly up bedding dip at the Sheffield fissure-Wheeler bed intersection, with 8 side drifts to explore favorable ore zones. These 8 side drifts not to exceed an aggregate of 200 ft.

How far?

(g) Drive a 5'x 7' drift southerly on the Sheffield fissure, with 4 side drifts to explore favorable ore zones. These 4 side drifts not to exceed an aggregate of 100 ft.

B Additional Underground Facilities Required

1. Main Bedding Drive North

(a) Install power line in Pole tunnel with necessary branch circuits.

(b) Replace air slusher with electric slusher at No. 5 Lateral North.

(c) Install permanent blower line in Pole tunnel with necessary take-offs for laterals.

2. Pole Tunnel Drive Easterly

(a) Cut passing track at interval 1100-1150 ft. from portal (to be cut concurrently with advance by widening).

(b) "Cherry-Picker" for drive easterly.

(c) Install second underground air receiver.

(d) Install 6 chutes and manways in raises at end of short laterals.

C Additional Surface Facilities Required

1. Mine Water System

(a) Excavate a 4'x 4' cribbed well at North Pole Canyon Springs, approximately 25 ft. in depth, in order to collect sub-surface water flowing in wash.

(b) Install a 1 H.P., 25 g.p.m. pump to elevate water approximately 150 ft. vertically into mine storage tank. Length of this line will be approximately 250 feet; 1 1/2" pipe will be used. Construct a small shelter over well and pump.

(c) Install a 10,000 gal. capacity redwood water storage tank at north bulldozer cut. This will give an effective pressure head of 90 ft. at the portal of the Pole tunnel.

(d) Run a 2" supply line from this storage tank to the Pole tunnel. This line will be approximately 900 ft. in length and be buried 3 ft. to prevent freezing.

(e) Run a single phase 240 volt power line from the generator building to the pump for remote control operation.

2. Generator Building and Facilities

(a) Construct a 16'x 20' wood frame generator building with sheet metal

outside covering, sheetrock inside finish and concrete floor. To contain the necessary windows, doors and heating equipment.

(b) Pour a 4'x 7'x 3' concrete foundation for the generator unit.

(c) Install switchboard containing the necessary meters and control equipment.

(d) Install a 2250 gal. fuel storage tank with necessary foundations, valves, fittings and piping. Run feed and return lines into generator building.

(e) Install 2- 5 KW., 480/240/110 volt single phase transformers; one for surface lights and water pump and one for the underground light circuit.

3. Other Facilities

(a) Construct a 28'x 36' bunkhouse to accommodate 6 additional men. This unit will be of frame construction, sheet metal covered outside, sheetrock inside finish and will contain the necessary wash, shower, toilet and heating facilities. With the completion of this unit a crew of 16 can be adequately housed and fed. The balance of camp has been constructed with company funds.

(b) Cooling Tower for Compressed Air.
Construct a 5'x 5'x 8' evaporation cooling tower with simple header heat exchanger to cool compressed air and remove excess moisture before entering underground lines. Water in the air lines has been a very serious problem during the past operations.

D Additional Equipment Required

1. One electric generator, 50 K.W., at 0.8 P.F., 480 volt, 60 cycle, 3 phase direct connected to a Cummins diesel engine, Model HGA-601 rated at 77 H.P. continuous at 1200 r.p.m. up to 10,000 ft. altitude. This unit to be equipped with Woodward Hydraulic Governor, Sylphone safety shut down, 24 volt starting system and a switchboard complete with automatic voltage regulator, circuit breaker, voltmeter ammeter and continuous KW demand meter.

2. One 315 cu. ft. diesel driven air compressor.

3. Ten - 27 cu. ft. capacity side dump ore cars. These additional cars will be used exclusively in the Pole heading.

4. Electric Slushers as Follows -

(a) 1 - 15 H.P. and 2 - 7 1/2 H.P. slushers for main bedding drive north for tandem slusher setup. Complete with necessary accessory equipment.

(b) 1- 15 H.P. slusher for drive up Sheffield-Wheeler bed intersection, complete with all necessary accessory equipment.

2. Estimated Cost of the Proposed Work

A Underground Exploration

1. Main Bedding Drive North - 2050 Feet

a Main Drift - 1050 Feet 5'x 7' Section

(1)	Contract labor	@ $13.50/Ft.	$14,175.00	
(2)	Pipe-Ventilation	2.11	2,215.50	
(3)	Powder-fuse-caps	2.70	2,835.00	
(4)	Steel and bits	1.53	1,606.50	
(5)	Timber	0.46	483.00	
(6)	Fuel and Lube Air Generation	1.37	1,438.50	
(7)	Misc. small tools	0.55	577.50	
(8)	Slusher cable	0.25	262.50	
(9)	Power cable	1.00	1,050.00	
(10)	Comp. Insurance	0.95	997.50	
(11)	Payroll taxes	.61	640.50	
	Total - 1050 Ft.	@ $25.03/Ft.	$26,281.50	$26,281.50

b Side Drifts- 1000 Ft. 5'x 7' Section

(1)	Contract labor	@ $13.50/Ft.	$13,500.00	
(2)	Pipe-Ventilation	1.03	1,030.00	
(3)	Powder-fuse-caps	2.70	2,700.00	
(4)	Steel and bits	1.53	1,530.00	
(5)	Fuel and Lube Air Generation	1.37	1,370.00	
(6)	Misc. small tools	0.55	550.00	
(7)	Comp. Insurance	0.95	950.00	
(8)	Payroll taxes	0.61	610.00	
	Total - 1000 Ft.	@ $22.24/Ft.	$22,240.00	22,240.00

2. Pole Tunnel Drive Easterly - 4210 Feet

a Main Adit - 1200 Feet

(1)	Contract labor	@ $13.50/Ft.	$16,200.00
(2)	Trackage	2.60	3,120.00
(3)	Pipe-Ventilation	2.11	2,532.00
(4)	Powder-fuse-caps	2.70	3,240.00
(5)	Steel and bits	1.53	1,836.00
(6)	Timber	0.46	552.00

(7)	Fuel and Lube Air Generation	@ $ 1.37/Ft.	$ 1,644.00	
(8)	Mis. small tools	0.55	660.00	
(9)	Comp. Insurance	0.95	1,140.00	
(10)	Payroll taxes	0.61	732.00	
	Total - 1200 Ft.	@ $26.38/Ft.	$31,656.00	$31,656.00

b Laterals and South Sheffield Drift - 540 Feet

(1)	Contract labor	@ $13.50/Ft.	$ 7,290.00	
(2)	Installing switch. 7 @ $29 - $203	0.38	205.20	
(3)	Trackage	2.60	1,404.00	
(4)	Powder-fuse-caps	2.70	1,458.00	
(5)	Steel and bits	1.53	826.20	
(6)	Timber	0.46	248.40	
(7)	Fuel and Lube Air Generation	1.37	739.80	
(8)	Misc. small tools	0.55	297.00	
(9)	Comp. Insurance	0.98	529.20	
(10)	Payroll taxes	0.63	340.20	
	Total - 540 Ft.	@ $24.70/Ft.	$13,338.00	13,338.00

c Raises and Bedding Drifts - 1770 Feet

(1)	Contract labor	@ $13.50/Ft.	$23,895.00	
(2)	Pipe-Ventilation	1.63	2,885.10	
(3)	Powder-fuse-caps	2.70	4,779.00	
(4)	Steel and bits	1.53	2,708.10	
(5)	Timber	0.46	814.20	
(6)	Fuel and Lube Air Generation	1.37	2,424.90	
(7)	Mis. small tools	0.55	973.50	
(8)	Comp. Insurance	0.95	1,681.50	
(9)	Payroll taxes	0.61	1,079.70	
	Total - 1770 Ft.	@ $23.30/Ft.	$41,241.00	41,241.00

d Drift up Intersection of Sheffield Fissure-Wheeler Bed - 700 Feet

(1)	Contract labor	@ $13.50/Ft.	$ 9,450.00	
(2)	Pipe-Ventilation	1.63	1,141.00	
(3)	Powder-fuse-caps	2.70	1,890.00	
(4)	Steel and bits	1.53	1,071.00	
(5)	Timber	0.46	322.00	
(6)	Fuel and Lube Air Generation	1.37	959.00	
(7)	Misc. small tools	0.55	385.00	
(8)	Slusher cable	0.25	175.00	
(9)	Comp. Insurance	0.95	665.00	
(10)	Payroll taxes	0.61	427.00	
	Total - 700 Ft.	@ $23.55/Ft.	$16,485.00	16,485.00
	Total Underground Exploration - Stage II		151,241.50	$151,241.50

B Additional Underground Facilities Required

1. Main Bedding Drive North

a Power Line in Pole Tunnel

(1)	1200 Ft. #4/3 cond. cable (used if possible)		$ 1,980.00	
(2)	Switches, fuses, etc.		125.00	
(3)	Hangers, wire, etc.		75.00	
(4)	Labor- 8 shifts @	$15.70	125.60	
(5)	Comp. Insurance	7.01%	8.80	
(6)	Payroll taxes	4.5 %	5.65	
			$2,320.05	$2,320.05

b Replace Air Slusher at No. 5 North with Electric Slusher

(1)	Switches, fuses, etc.		$ 75.00	
(2)	Materials and supplies		25.00	
(3)	Labor-10 shifts @	$15.70	157.00	
(4)	Comp. Insurance	7.01%	11.00	
(5)	Payroll taxes	4.5 %	7.07	
			$ 275.07	275.07

c Install Permanent Ventilation Line in Pole Tunnel

(1)	1200 Ft. 18"x 24 gauge galv. line @ $1.75/Ft.		$2,100.00	
(2)	Fittings-gates-hangers		275.00	
(3)	Tape-tar-tie wire, etc.		75.00	
(4)	Labor-16 shifts @	$15.70	251.20	
(5)	Comp. Insurance	7.01%	17.61	
(6)	Payroll taxes	4.5 %	11.30	
			$2,730.11	2,730.11

2. Pole Tunnel Drive Easterly

a Passing Track

(1)	Extra footage allowance for enlarged section 75 Ft. @	$ 5.00	$ 375.00	
(2)	Installing switches		58.00	
(3)	Extra powder, steel bits, etc.		150.00	
(4)	Switches, rail, ties		412.00	
(5)	Comp. Insurance @	7.01%	30.35	
(6)	Payroll taxes	4.5 %	19.49	
			$1,044.84	1,044.84

b "Cherry Picker"

(1)	Lifting mechanism		$ 250.00		
(2)	Beam-rollers & chain		175.00		
(3)	Valves-piping-hose		75.00		
(4)	Labor- 2 shifts @	$15.70	31.40		
(5)	Comp. Insurance	7.01%	2.20		
(6)	Payroll taxes	4.5 %	1.41		
			$ 535.01	$ 535.01	

c Air Receiver

(1)	4'x 8' Welded tank		$ 564.00		
(2)	Fittings-valves, etc.		46.50		
(3)	Labor- 6 shifts @	$15.70	94.20		
(4)	Comp. Insurance	7.01%	6.60		
(5)	Payroll taxes	4.5 %	4.24		
			$ 715.54	715.54	

d Chutes and Manways in Laterals

(1)	Mining supplies		$ 117.20		
(2)	Timber and supplies		246.00		
(3)	Fuel and Lube Air Generation		33.40		
(4)	Labor-20 shifts @	$15.70	314.00		
(5)	Comp. Insurance	7.01%	22.01		
(6)	Payroll taxes	4.5 %	14.13		
	6 Units @		$ 746.74	4,480.44	
		Total			
	Underground Facilities - Stage II			12,101.06	$12,101.06

C Additional Surface Facilities Required

1. Mine Water System

a Cribbed Well

(1)	Timber		$ 190.50		
(2)	Small building		250.00		
(3)	Labor-20 shifts @	$15.70	314.00		
(4)	Comp. Insurance	7.01%	22.01		
(5)	Payroll taxes	4.5 %	14.13		
			$ 790.64	$ 790.64	

b Pump and Pump Line

(1)	1 H.P. Pump		$ 225.00		
(2)	Electric eqt.-supplies		90.00		
(3)	Pipe-fittings-valves		137.50		
(4)	Labor-12 shifts @	$15.70	188.40		
(5)	Comp. Insurance	7.01%	13.21		
(6)	Payroll taxes	4.5 %	8.48		
			$ 662.59	662.59	

c Water Storage Tank

(1)	10,000 Gal. tank		$ 900.00	
(2)	Foundations		150.00	
(3)	Labor-20 shifts @	$15.70	314.00	
(4)	Comp. Insurance	7.01%	22.01	
(5)	Payroll taxes	4.5 %	14.13	
			$1,400.14	$ 1,400.14

d Water Supply Line to Pole Tunnel

(1)	950 Ft. 2" Pipe		$ 332.50	
(2)	Labor - laying pipe		94.20	
(3)	Labor - trenching		471.00	
(4)	Comp. Insurance @	7.01%	39.62	
(5)	Payroll taxes	4.5 %	25.43	
			$ 962.75	962.75

e Power Line to Pump

(1)	Poles and hardware		$ 350.00	
(2)	Wire & insulators		475.00	
(3)	Control equipment		75.00	
(4)	Labor-20 shifts @	$15.70	314.00	
(5)	Comp. Insurance	7.01%	22.01	
(6)	Payroll taxes	4.5 %	14.13	
			$1,250.14	1,250.14

2. Generator Building and Facilities

a & b Building - 16'x 20' and Foundations

(1)	Materials-supplies		$1,383.00	
(2)	Foundations-materials		265.00	
(3)	Labor-56 shifts @	$15.70	879.20	
(4)	Comp. Insurance	7.01%	61.63	
(5)	Payroll taxes	4.5 %	39.56	
			$2,628.39	2,628.39

c Switchboard

(1)	All switchboard equipment is included in the price of the generator unit quoted in Section D below.			
(2)	Materials and supplies		$ 106.40	
(3)	Labor- 6 shifts @	$15.70	94.20	
(4)	Comp. Insurance	7.01%	6.60	
(5)	Payroll taxes	4.5%	4.24	
			$ 211.44	211.44

d Fuel Storage Tank

(1)	2250 Gal. steel tank		$ 318.50	
(2)	Foundations		75.00	
(3)	Pipes-valves-fittings		35.00	
(4)	Labor- 6 shifts @	$15.70	94.20	
(5)	Comp. Insurance	7.01%	6.60	
(6)	Payroll taxes	4.5 %	4.24	
			$ 533.54	$ 533.54

e Transformers

(1)	2- 5 K.W. 480/240/110 V.		$ 240.00	
(2)	Switches and wiring		62.50	
(3)	Labor- 4 shifts @	$15.70	62.80	
(4)	Comp. Insurance	7.01%	4.40	
(5)	Payroll taxes	4.5 %	2.83	
			$ 372.53	372.53

3. Other Facilities

a Bunkhouse for Added Crew

(1)	Materials-supplies		$ 6,915.00	
(2)	Shower-toilet facilities		790.00	
(3)	Room furnishings		652.75	
(4)	Hot water & heating		565.00	
(5)	Labor-234 shifts @	$15.70	3,673.80	
(6)	Comp. Insurance	7.01%	257.53	
(7)	Payroll taxes	4.5 %	165.32	
(8)	Site preparation		160.00	
			$13,179.40	13,179.40

b Cooling Tower

(1)	Lumber-supplies		$ 90.00	
(2)	Heat exch. and trap		175.00	
(3)	Labor-10 shifts @	$15.70	157.00	
(4)	Comp. Insurance	7.01%	11.01	
(5)	Payroll taxes	4.5 %	7.07	
			$ 440.08	440.08
	Total Surface Facilities - Stage II			22,431.64 $22,431.64

D Additional Equipment Required

1. Diesel - Electric Generator

(a)	1- Model HGA-601, 50 K.W. @ 0.8 P.F., 480 V., 60 cycle, 3 phase generator unit complete with switchboard and control	$ 7,880.25
(b)	Installation- 8 shifts @ $15.70	125.60

D Additional Equipment Required - (Cont.)

(c)	Comp. Insurance	@	7.01%	$ 8.80	
(d)	Payroll taxes		4.5 %	5.65	
				$ 8,020.30	$ 8,020.00

2. Air Compressor

(a)	1- 315 Cu. Ft. Joy Model WK-80 skid mounted diesel unit			$ 8,514.00	
(b)	Foundation			225.00	
(c)	Piping-valves-etc.			75.00	
(d)	Installation 12- shifts	@	$15.70	188.40	
(e)	Comp. Insurance		7.01%	13.21	
(f)	Payroll taxes		4.5%	8.48	
				$ 9,024.09	9,024.09

3. Mine Cars

(a)	10- 27 Cu. Ft. side dump ore cars	@	$506.50	$ 5,065.00	5,065.00

4. Electric Slushers

(a)	1- 15 H.P. Mod. B-2F-211			$ 2,900.00	
	2- 7 1/2 H.P. Mod. AAF-212			4,250.00	
(b)	1- 15 H.P. Mod. B-2F-211			2,900.00	
(c)	2- Welded scrapers - 36"			630.00	
(d)	6- 8" Sheave blocks			258.00	
(e)	6- Eyes and wedges			85.20	
(f)	Cable for above units			1,350.00	
				$12,373.20	12,373.20

Total New Equipment - Phase II	34,482.59	$34,482.59

E Supervisory and Supporting Labor

1. Supervisory and Technical

(a)	Gen. Supt. 16 Mo.	@	$650/Mo	$10,400.00	
(b)	Engineer-Geologist 16 Mo.		550	8,800.00	
(c)	Working Foreman 16 Mo.		500	8,000.00	
				$27,200.00	27,200.00

2. Supporting Labor (Mine Operations Only)

(a)	Timekeeper, warehouseman and compressorman - 16 Mo.	@	$450/Mo	$ 7,200.00	
(b)	Cook - 16 Mo.		350	5,600.00	
(c)	2 Combination underground & surface maintenance men - @ $14.70 Day- 2 @ $408.20/Mo. 16 Mo.			13,062.40	
				$25,862.40	$25,862.40

3. Comp. Insurance & P.R. Taxes

(a)	Comp. Insurance	@	7.01%	$ 3,719.67	
(b)	Payroll taxes		4.5%	2,387.81	
				$ 6,107.48	6,107.48
	Total Supervisory and Supporting - Stage II				59,169.88 $59,169.88

F Other Costs

1. Freight on Supplies (Salt Lake to Mine)

(a)	Trackage-45,160#	@	$ 0.75/Cwt	$ 338.70	
(b)	Pipe lines-42,450#		0.75	318.38	
(c)	Timber & lumber-195,300#		0.75	1,464.75	
(d)	Mine supplies-27,500#		0.75	385.00	
				$2,506.83	2,506.83

2. Freight on Equipment

(a)	Factory to Salt Lake 47,500#			$1,662.50	
(b)	Salt Lake to Mine 59,500#			446.25	
				$2,108.75	2,108.75

3. Truck Operation

(a)	750 Miles per mo. @ 10¢ per mile operation & maintenance 16 mo.			$1,200.00	
(b)	Wages of operator-1/2 shift @ $14.50 + O.T. $204.10 - 16 mo.			3,265.60	
(c)	Comp. Insurance	@	7.01%	228.92	
(d)	Payroll taxes		4.5%	146.95	
				$ 4,841.47	4,841.47

4. Electric Power Generation (Basis 3/4 Load)

(a)	Fuel- 3.26 gal/hr. (3.26)(24)(26)(16)(.178)		$ 5,793.52	
(b)	Lubrication-390 gal @	$ 0.80	312.00	
(c)	Filters & misc. repairs		239.26	
			$ 6,344.78	$6,344.78

5. Accounting and Blueprinting

(a)	Project accounting @ 16 Mo.	$100	$ 1,600.00	
(b)	Reporting printing & copy- 16 Mo.	55	880.00	
			$ 2,480.00	2,480.00

6. Jeep Mileage (Rental)

(a)	Allowance for actual mileage required for all reasonable & necessary project trans. Est. 1200 miles/mo. @	0.08	$ 1,536.00	1,536.00

7. Assaying

(a)	Estimated 30 samples per mo. @ $2.00/sample - 16 Mo.		$ 960.00	960.00

8. Equipment Repairs (Inc. Freight)

(a)	On basis of past experience 6260 Ft. @ $0.352/Ft.		$ 2,203.52	2,203.52

9. Misc. Operating Supplies (Purchased Locally)

(a)	On basis of past experience 6260 Ft. @ $0.72/Ft.		$ 4,507.20	4,507.20
	Total Other Costs - Stage II			27,488.55	27,488.55
	Total Estimated Cost - Stage II				$306,915.22

RECAP OF COSTS - STAGE II

A	Underground Exploration - Direct		
	1. Main Bedding Drive North	$ 48,521.50	
	2. Pole Tunnel Drive Easterly	102,720.00	
		$151,241.50	$151,241.50
B	Underground Facilities		
	1. Main Bedding Drive North	$ 5,325.23	
	2. Pole Tunnel Drive Easterly	6,775.83	
		$ 12,101.06	12,101.06
C	Surface Facilities	$ 22,431.64	22,431.64
D	New Equipment	$ 34,482.59	34,482.59
E	Supervisory & Supporting Labor	$ 59,169.88	59,169.88
F	Other Costs	$ 27,488.55	27,488.55
	Total Estimatec Cost - Stage II		$306,915.22

RECAP ESTIMATED COSTS - STAGE II

Amendment to Contract Idm- E-248
Conversion to Classification of MF-104 Items
(See Worksheet - Exhibit "D" for Conversion)

		Unit Detail	Unit Total
1.	Independent Contracts	$ None	$ None
2.	Labor and Supervision		
	(a) Labor	110,577.60	
	(b) Supervision	18,400.00	
	(c) Technical	8,800.00	
		137,777.60	137,777.60
3.	Operating Materials & Supplies		
	(a) Misc. Operating Supplies	4,507.20	
	(b) Timber	2,419.60	
	(c) Explosives	16,902.00	
	(d) Pipe and Ventilation	9,803.60	
	(e) Track	4,524.00	
	(f) Fuel and Lube	14,920.98	
	(g) Steel and Bits	9,577.80	
	(h) Misc. Small Tools	4,930.50	
	(i) Freight	2,506.83	
		70,092.51	70,092.51
4.	Operating Equipment		
	(a) Equipment & Freight	36,591.34	36,591.34
5.	Initial Rehabilitation & Repairs	None	None
6.	New Buildings & Improvements		
	(a) Materials and Labor	34,532.70	34,532.70
7.	Miscellaneous		
	(a) Accounting and Blueprinting	2,480.00	
	(b) Repair to Equipment	2,203.52	
	(c) Assaying	960.00	
	(d) Payroll Taxes	6,217.21	
	(e) Comp. Insurance	9,682.87	
	(f) Administrative (Jeep Mileage)	1,536.00	
		23,079.60	23,079.60
8.	Contingencies		
	(a) Truck Operation	4,841.47	4,841.47
	Total Estimated Project Cost - Stage II		$306,915.22

EXPLANATION OF STAGE II ITEMS

A Basis of Exploration (Please refer to Exhibit "C")

1. Main Bedding Drive North

The work, as outlined in items (a) to (d) on page 1, has been designed to crosscut the Wheeler bed in a North-South direction by driving a 5' x 7' drift, within the bed, up bedding dip 1050 feet (approximately +6°-9°). It is based upon studies made on the surface which show the definite existence of two other major East-West trending quartz fissure shear zones, both of which have a significant scheelite showings where opened by surface cuts. Other E-W shear zones may exist and this drive should expose them also. The northernmost exposure, designated as the North Quartz fissure shear zone, actually has greater surface expression and scheelite mineralization than the zone of Stage I.

The many side drifts from the main drift north, as provided for, will allow ample footage to explore the favorable ore showings exposed within the bed, and provides extra footage for east-west exploration of the two major shear zones already exposed.

2. Pole Adit Drive Easterly

The objective of this work is to reach the Sheffield fissure shear zone. This is, by far, the most important north-south trending shear zone area in the Pole Canyon amphitheater. It is comprised of a series of N 15° E fissures, dipping 75° westerly, covering an east-west distance of 500 feet on the surface, and the limestone within this shear zone shows heavy alteration and dolomitization. The fissures are highly mineralized and can be traced for more than 5000 feet on the surface. The colored aerial photography of this area gives a splendid exposition of the importance of this exploration.

The adit will be advanced on much the same basis as heretofore, viz., driving on, or just under the line-shale contact insofar as it is practical. Calculations indicate that the first 600 feet can be driven on an east course since the start will be in the extreme top portion of the down faulted Wheeler bed. This is particularly advantageous because the first two, and possibly three, laterals can be driven north from the adit into the productive portion of the bed without the necessity of raising and subsequent sub-level drifting.

The bedding exploration from the laterals has been designed to avoid the deficiencies which were inherent in the first contract, insofar as it will provide what is believed to be sufficient exploration in the east-west shear zone and within the productive portion of the Wheeler bed.

The work provided in exploration up bedding on the main Sheffield fissure (500 feet) is believed adequate to define the limits of the east-west trending shear zone and possibly reach the second zone north. Also, the 200 foot drift southerly on the Sheffield fissure would explore the suggested E-W shear zone to the south. Ample side drifts from both drives will permit a sufficient exploration east and west of ore exposures opened.

B Additional Underground Facilities

In Stage II all slushing will be done electrically because of the greater speed and efficiency. This, of course, calls for a 3-phase underground power cable. It is believed that sufficient No. 4, 3-conductor used cable can be obtained for this installation. This would reduce the cost by about $1000.00.

A permanent metal ventilating line will be required for the drives in Stage II in order that sufficient volume will be available for both drives. The fabric line now being used will be utilized from the end of the metal line as the drives advance.

A passing track at 1100 feet in the adit will provide for switching and storage of loaded cars and facilitate the movement of muck from the adit face. By providing this convenience we eliminate the need of a separate motorman as each crew will haul and dump its own muck on a staggered schedule after the face is clear and the drilling cycle starts. For example, the bedding drive north crew will tram in the afternoon and the Pole adit crew in the morning. This rotation will follow on both shifts.

The remainder of the items is self-explanatory.

C Additional Surface Facilities

The drilling water must now be hauled from the end of the pipeline approximately three-fourths mile to the Pole adit. The elevation of the North Pole Canyon springs does not permit a direct flow to the mine. This haul is not much trouble when only one or two machines are operating underground; however, under Stage II there may be as many as five machines per shift. In addition to this factor there is the need of additional water for shower and toilet facilities in the change house. These make the hauling of water prohibitive in money as well as time and tie-up of truck equipment.

The water system, as outlined on page 2, is designed to provide an adequate water supply for all mine requirements during the exploration program.

The generator building, foundations and auxiliary fixtures are necessary to the installation of a diesel-electric generator for slushing operations underground.

The additional bunkhouse will be necessary to accommodate the increased crew needed during Stage II of this exploration. The Company has provided, at its own expense, a fully equipped messhall, bunkhouse and staff house, which now accommodates 10 men, at a cost of $26,000.00 plus.

The cooling tower is definitely needed to remove moisture from the compressed air before entering the mine lines. Very serious trouble resulted from this condition all through the current winter. The air lines froze, the machines froze and considerable time was lost.

D Additional Equipment

It is believed that one 50 KW diesel-electric unit will be sufficient to provide the necessary electric power for the slushers. The cost of providing this same slusher capacity and the air compressor capacity to operate it would be prohibitive because of the extremely low efficiency of air power conversion and transmission.

The increased air requirements of Stage II makes an additional compressor necessary. This new unit will be the same as the present unit and will be mounted in the same building. This will give us a total of 630 cubic feet of air per minute which should take care of all demands during this stage of exploration.

The additional 10 mine cars will be required for the adit advance so that adequate car capacity is available during the mucking cycle.

The three electric slushers to be used in the main Bedding Drive North will be set approximately 450-350-350 feet apart. This is about the maximum efficient slushing distance. They will be operated in tandem. The other slusher will be needed for the 500 foot drive up bedding at the Sheffield fissure.

E Project Costs

Labor, supervision and supporting labor has been fully discussed under "Explanation" of Stage I. No change is anticipated in Stage II operations. However, a Geologist-Engineer has been added for Stage II because the volume of underground sampling, mapping and surveying will be greatly increased. In addition to this, much greater time and effort will be required for the monthly detailed MF-104 reports. Most of this work will be done on the job by the staff.

The other costs are based upon experience in past operations and should be fairly close to actual costs. The past footage contract labor cost of $10.81 per foot will probably have to be increased by about $2.50 per foot for the main Bedding Drive North because of the number of times the muck must be handled. Also, it is estimated that we will have to increase the footage payment in the Pole adit by $1.50 per foot because of the longer tram. However, the $13.50 figure should be ample to cover these drives. The balance of the cost items are self-explanatory.

F Estimated Time

The time required to complete Stage II of the exploration is estimated as follows -

1.	Surface Preparation	1	Month
2.	Underground Preparation	1	
3.	Underground Exploration	14	
	Total	16	Months

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Colored Tabs

No. 4781SI
Clear Tabs

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NATIONAL INSERTABLE-TAB INDEXES ENABLE YOU TO MAKE YOUR OWN SUBJECT ARRANGEMENT, USING PLAIN INSERTS ON WHICH TO WRITE YOUR OWN CAPTIONS.

EXHIBIT "C"

EXHIBIT "C"

MAP SHOWING PROPOSED EXPLORATION

STAGE II

KAROLTON KLASP—8¾ x 11¼
MADE BY
THE AMERICAN ENVELOPE CO.
WEST CARROLLTON, OHIO

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EXHIBIT "D"

WORK SHEETS SHOWING
CONVERSION OF ESTIMATED
COSTS TO MF-104 ITEMS

STAGE II

KAROLTON KLASP—8¾ x 11¼
MADE BY
THE AMERICAN ENVELOPE CO.
WEST CARROLLTON, OHIO

No. 4780SI
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RESUME OF EXPLORATION COMPLETED TO DATE

The following is a brief resume of exploration work completed under Contract Idm-E-248 for the 12 month period February 1, 1952, to January 29, 1953, inclusive. Approximately two months were lost because of heavy snowfall in February and March, 1952, leaving a net operating period of 10 months.

1. Surface Facilities and Preparation

A 16' x 24' compressor building with concrete floor and concrete foundations for the compressor, generator and battery charging set was constructed. Necessary fuel and water tanks and air receiver were installed. A 3" air and 1" water line were run to the portal of the Pole adit.

A 18' x 30' combination blacksmith shop and change room was started. The concrete foundation and outside frame have been completed. The balance of the structure is now being finished on Company account.

The portal of the Pole adit was enlarged, straightened and timbered. Trackage and switches were installed from the portal to the compressor house, waste dump and ore stockpile.

A water supply line, approximately 4000 feet in length, was layed from the North Pole Canyon springs and a 2500 gallon storage tank installed.

Floodlights were installed on the mine dump for night operations.

Approximately 78 tons of equipment, materials and supplies were transferred by hand and hauled from the bottom of Pole Canyon to the mine dump in a smaller truck unit rented locally.

Trackage, air and water lines and ventilating line were installed in the Pole adit. A 5 HP blower was installed just south of the portal.

2. Underground Exploration

Mining started on July 6, 1952, on a one shift basis. A second shift was added on August 6, 1952, and thereafter operations were maintained on a two shift per day basis. Exploration advance was as follows -

(a) Pole Adit		965.0 Ft.
(b) No. 1 Lateral South Area		
No. 1 Lateral	99.0 Ft.	
Nos. 1-2-3 Raises	25.5	
Nos. 1-2-3 Bedding Drifts	37.5	
	162.0	162.0

(c) No. 2 Lateral South Area

No. 2 Lateral	36.0 Ft.	
Raise	17.5	
Bedding Drift	9.0	
	62.5	62.5 Ft.

(d) No. 3 Lateral North Area

No. 3 Lateral	61.0	
Raise	19.0	
Bedding Drifts	22.0	
	102.0	102.0

(e) No. 4 Lateral North Area

No. 4 Lateral	36.0	
Raise	4.0	
Bedding Drifts	42.0	
	82.0	82.0

(f) No. 5 Lateral North Area

No. 5 Lateral	35.5	
Raise	9.0	
	44.5	44.5

(g) No. 6 Lateral North Area

No. 6 Lateral	32.0	
Raise	15.0	
	47.0	47.0
Total Advance		1465.0 Ft.

3. Project Costs

Total project expenditures amounted to $82,809.41 as follows (basis MF-104 reports) -

A Labor and Supervision

1. Labor	$23,790.62	
2. Supervision	3,500.00	
	$27,290.62	$27,290.62

B Operating Materials and Supplies		
1. Misc. Operating Supplies	$ 744.08	
2. Timber	407.73	
3. Explosives	4,047.15	
4. Pipe	1,962.75	
5. Track	3,271.20	
6. Fuel and Lube	2,621.99	
7. Steel and Bits	2,367.18	
8. Vent Tube	1,151.60	
9. Freight	937.70	
	17,511.38	$17,511.38
C Operating Equipment		
1. Rental	$14,335.46	
2. Purchase and Freight	4,207.14	
	18,542.60	18,542.60
D Initial Rehabilitation and Repairs		2,472.30
E New Buildings and Improvements		8,866.06
F Miscellaneous		
1. Repairs to Equipment	$ 720.77	
2. Sample and Analysis	39.00	
3. Payroll Taxes	1,439.77	
4. Liability Insurance	2,586.66	
5. Administrative (Project Only)	2,537.16	
6. Truck Rental	500.00	
7. Aerial Maps	250.00	
	8,073.36	8,073.36
G Contingencies		
1. Bulldozer-Snow Removal	$ 646.00	646.00
		83,402.32
Less Suspension by Audit of 12-31-52		592.91
Total Project Cost		$82,809.41

The total project expenditure of $82,809.41 was $7,333.41 in excess of the contract authorization of $75,476.00. This excess was expended on Company account in order that the full program of underground exploration might be completed in accordance with the original program. Various analysis of unit costs are given in Exhibit "E" attached hereto.

4. Geology and Ore

A Summary

The results of this initial 1465 feet of exploration were most encouraging. It is our opinion that tungsten (scheelite) mineralization has been reasonably demonstrated within the entire block opened by this exploration, viz., some 1100 feet East-West and 125-150 feet North-South. However, it is recognized that insufficient exploration, within the productive Wheeler bed, was provided for in the original contract, and, therefore, no basis has been developed upon which an accurate estimate of tonnage and mining grade can be made. However, an attempt was made to arrive at some reasonably indicated ore basis and this resulted in the suggestion of some 15,000 tons of 1% WO_3. This analysis is presented in Exhibits "F" and "G", reports by the Geological Staff of Combined Metals Reduction Company and Earl B. Young, Chief Geologist, attached hereto. The need for additional work within the productive bedding, to be executed from present workings in the bed, forms the basis of Stage I of this requested amendment. This added exploration within the Wheeler bed, as shown in Exhibit "A", has been designed to accomplish this objective.

B Detail of Exploration

1. Pole Adit

Total advance was 965.0 feet. Start was at portal plus 108.0 feet; finish at portal plus 1073.0 feet. At start, the lime-shale contact was breast high (rail plus 5.0 ft.). This rose slowly as the adit advanced on a S 82° E course and passed over the back at 75 feet. (All distances will be given from start of DMEA project.) The adit was continued on this course to 214 feet at which point it was turned to S 66° E in order to bring the contact down. This turn, coupled with a N 10° W reverse fault at 322 feet, dropped the contact to the breast high position at that point. Between 75 and 322 feet the adit was entirely in shale, which proved to be very stable ground. The N-S fracturing showed up quite well in the shale but required close observation because of tightness.

At 322 feet the course of the adit was turned to S 73° E and at 365 feet further changed to S 80° E. At 598 feet a N 20° W normal fault raised the contact to the breast high position and at 628 feet a N 30° W normal fault raised the contact above the back of the adit. The adit was continued to 692 feet where the course was changed to S 73° E. The adit then continued in shale to 935 feet where a strong N 10° W normal fault dropped the contact 27 feet. Beyond this fault the adit was in the blue mottled lime in the extreme top portion of the Wheeler bed. The course was changed to S 83° E for the balance of the advance. On the last round the "burn cut" broke a small hole, in the center of the face, into an open cave of considerable size.

Map D-100$_5$, Exhibit "A" of Stage I, clearly shows the progress of the Pole adit and the geological shifting resulting from faulting. Most faults encountered were reverse ones having very small throws (many less than 1 foot; a few 3 to 5 feet); the only normal fault of significance was the one at 935 feet which had a vertical movement of 27 feet.

2. No. 1 Lateral South

This lateral was started at 72 feet and driven 99.0 feet on a S 20° E course. Numerous E-W trending quartz filled fissures carrying scheelite were cut over the entire 99 feet. Three raises were driven into the productive bedding at 25 foot intervals. From these raises drifts were driven easterly within the ore bed. The entire product from these raises and bedding drifts (an estimated 125 tons), grab sampled 0.62% WO_3. These samples were taken from the mine cars as they were dumped into the stockpile. It is estimated that all three bedding faces, as they would be mined, will run plus 1% WO_3.

The important result of the exploration in this area is that the bedded ore has been demonstrated in No. 3 Raise which is 70 feet south of the Pole adit. It also suggests a continuity of bedded ore between the three raises thus opened into the ore bed.

3. No. 2 Lateral South

This lateral was started at 279 feet and driven 36.0 feet on a S 8° E course. This was entirely in the shale and only one important E-W quartz filled fissure was cut. A raise was driven on this to cut the ore bed, but cut a strong N 10° W fault which dropped the bed. Only scattered scheelite mineralization was observed and 40 cars from this work grab sampled 0.12% WO_3. No further exploration was done in this area because of the difficulty and expense involved in reaching the bed in this fault area. It was also thought that the position of this raise was somewhat south of the East-West shear zone upon which this exploration program was suggested.

4. No. 3 Lateral North

This lateral was started at 366 feet and driven 61.0 feet on a N 20° E course. Important scheelite mineralization was cut in the bed just off the adit. Several strong E-W trending quartz filled fissures showing scheelite were cut in the advance. At 50 feet a raise was driven easterly into the ore bed and 22 feet of drift was driven easterly within the bed. The first 14 feet produced 35 cars of ore which grab sampled 1.08% WO_3. The last 8 feet, driven on a series of N 70° E quartz fissures, produced 20 cars of ore which grab sampled 2.96% WO_3. These were all placed in the stockpile.

The exploration in this area has produced the best showing of bedded ore (other than the original work done by the Company in "A" and "B" laterals south) so far observed in the project. This occurs at the south boundary of the East-West shear zone previously mentioned.

5. No. 4 Lateral North

This lateral was started at 509 feet and driven 36.0 feet on a N 40° E course. At the end an inclined raise was driven into the bedding and 42.0 feet of drifting was done in a general NE direction. Two very strong E-W quartz filled fissures were cut just off the raise. Two mine cars of ore, selected from these fissures, grab sampled 24.3% WO_3 and were stockpiled.

Two strong faults cut this area and complicated the exploration considerably. To the east the bed had dropped while to the north the drift followed a fault. The bed in this zone was entirely replaced by an ankerite mud. However, on the west side good scheelite mineralization was observed in the unaltered bedding.

6. No. 5 Lateral North

This lateral was started at 681 feet and driven 35.5 feet on a N 40° E course. At the end a vertical raise was driven 9.0 feet into the Wheeler bed on a series of E-W quartz fissures. The scheelite mineralization in this area was somewhat scattered, but none the less, considerable. There is definite replacement in the limestone. However, this face is about 60 feet south of the E-W shear zone and this may account for the lesser showing of ore.

7. No. 6 Lateral North

This lateral was started at 894 feet and driven 32.0 feet on a N 50° E course. At the end a vertical raise was driven 15.0 feet into the bottom of the Wheeler bed. At this point only scattered scheelite mineralization was observed. This face is approximately 125 feet south of the E-W shear zone and this may again account for the limited ore showings in the bedding.

5. Conclusions

From this completed exploration, the following conclusions are suggested -

1. The 22 foot Wheeler productive limestone bedding is a continuous structure, well prepared structurally by numerous N-S and E-W trending fractures.

2. Numerous faults, striking from N 10° W to N 30° W and in the main dipping rather steeply to the west, have been cut by the Pole adit. In most instances the vertical displacement has been very small (less than one foot); in a few it has been up to 3 feet; and in one approximately 27 feet.

3. It would be difficult to drive an adit within this ore zone since small vertical displacements produce a rather large horizontal shift because of the low angle of dip of the beds (6°-9° southerly), combined with the almost easterly strike of the bed (S 73° E to S 85° E).

4. The scheelite mineralization occurs as a definite replacement of the limestone in the lower 8 to 10 feet of the Wheeler bed immediately above the shale. It is also true, however, that high grade "hot spots" of scheelite occur within E-W trending quartz fissures where they intersect the lower portion of the Wheeler bed. In several instances this same concentration was observed in N-S trending fissures, but it is not a general situation.

5. An East-West trending shear zone, at least 100-125 feet wide, is rather definitely suggested. It has been observed that apparently the best ore occurrence is within this zone. This zone may be considerably wider than 100 feet but we have no underground exploration extending beyond this width.

6. Additional exploration within the Wheeler bed and the E-W trending shear zone, as requested in Stage I, and shown in detail in Exhibit "A", is firmly indicated at this time.

7. At least 2 other such E-W trending shear zones containing scheelite are indicated to the north of the Pole adit by surface cuts. A 1000 foot drive to the north, up bedding dip from the Pole tunnel, as requested in Stage II, and shown in detail in Exhibit "C", would explore these and others which may exist.

8. There is every reason to assume this pattern of scheelite mineralization within the Wheeler bed will continue easterly to the important Sheffield fissure N-S trending shear zone. This exploration is also requested in Stage II and shown in detail in Exhibit "C".

9. The initial project has shown that commercial scheelite occurs within the Wheeler productive bedding over a large area. The program requested in Stages I and II of this amendment represents the logical next step necessary to demonstrate the existence of a new domestic tungsten producing area of significant national importance.

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Recap. of Project Cost

Sheet 1

DMEA-2082; Idm-E248

Total Advance 1465.0 Ft.

Item No.	Item of Expense			Total.	Cost per Foot.
1-a	Compressor Building			$1996.03	1.362
1-b-1	20# rail			2009.98	1.372
1-b-2	Rail splices			155.80	0.106
1-b-3	4"x6" ties			351.19	0.240
1-b-4	Track spikes			141.76	0.096
1-b-5	Track bolts			33.30	0.023
1-b-6	Switches			862.86	0.589
1-b-7	Freight			342.00	0.233
1-c-1	3" air line			829.81	0.566
1-c-2	2" air line			172.87	0.118
1-c-3&4	1" water line			810.21	0.553
1-c-5	Vent tube			1151.60	0.786
1-c-6	Air receiver			40.00	0.027
1-c-7	Valves and fittings			251.02	0.171
1-c-8	Freight			220.00	0.150
1-d-1	Bulldozer - Bldg. sites			192.00	0.131
1-d-2	" Pipe line			352.00	0.240
1-d-3	" Snow removal			646.00	0.441
2-a	Rental - Compressor			4700.00	3.208
2-b	" Muckers			2655.00	1.812
2-c	" Generator			1550.46	1.058
2-d	" Drammer			4275.00	2.918
2-f	" Jumbo			1155.00	0.788
3-a	Fuel tanks			89.17	0.061
3-b	Blower			518.63	0.354
3-c	Drifters (2)			1750.00	1.195
3-d	Misc. small tools			820.94	0.560
3-e	Slusher equipment			591.80	0.404
4-a	Supporting labor			11509.63	7.856
4-b	Cook			2300.00	1.570
4-c	Supt. - Engr.			5000.00	3.413
4-e	Labor - Pole Adit	1465.0'	$10,299.53		
4-f	" - Laterals		4116.81	15838.69	10.811
4-g	" Raises		1422.35		
4-h	Comp. Ins. & P.R. taxes			4026.43	2.749
5-a	Blacksmith shop & charge room			1382.42	0.944
6-a	Powder, fuse & caps			4056.23	2.769
6-b	Steel and bits			2367.18	1.616
6-c	Fuel and lube			2621.99	1.790
6-d	Timber			57.16	0.039
6-e	Misc. expense			4801.58	3.278
6-f	Aerial Photo			250.00	0.171
6-g	Jackleg, etc.			526.58	0.359
				83402.32	56.920
	Less suspension by 12/31/52 Audit			592.91	0.405
				82809.41	56.525

Breakdown of Project Costs — Sheet 2

DMEA-2082; IDM-E248

Total advance 1465.0 ft.

		Total	Cost Per Foot
1. Direct Underground costs.			
A. Trackage			
1-b-1	20# rail	2,009.98	1.372
1-b-2	Rail splices	155.80	0.106
1-b-3	4"x6" ties	351.19	0.240
1-b-4	Track spikes	141.76	0.096
1-b-5	Track bolts	33.30	0.023
1-b-6	Switches	862.86	0.589
1-b-7	Freight on above	342.00	0.233
		3896.89	2.659
B. Pipe and Vent lines			
1-c-1	3" air line	829.81	0.566
1-c-2	2" air line	172.87	0.118
1-c-3&4	1" water line	810.21	0.553
1-c-5	Vent tube	1151.60	0.787
1-c-7	Valves and fittings	251.02	0.171
1-c-8	Freight on above	220.00	0.150
		3435.51	2.345
C. Equipment Rental			
2-a	Compressor	4700.00	3.207
2-b	Mucker	2655.00	1.812
2-c	Generator	1550.46	1.058
2-d	Trammer	4275.00	2.918
2-f	Jumbo	1155.00	0.788
		14335.46	9.785
D. Labor and Supervision			
4-a	Supporting labor	11509.63	7.856
4-b	Cook	2300.00	1.570
4-c	Supt-Engr.	5000.00	3.413
4-e	Adit		
4-f	Laterals	15828.69	10.811
4-g	Raises		
4-h	Comp. Ins. & P.R. taxes	4026.43	2.749
		38674.75	26.399
E. Supplies			
6-a	Powder, fuse & caps	4056.23	2.768
6-b	Steel and bits	2367.18	1.616
6-c	Fuel and lube	2621.99	1.790
6-d	Timber	57.16	0.039
3-d	Misc. small tools	820.94	0.560
		9923.50	6.773

		Total	Cost Per Foot
2. Other Costs			
1-d-3	Bull dozer - snow removal	646.00	0.441
6-f	Aerial photography	250.00	0.171
6-e	Miscellaneous expense		
	1. Accounting	1000.00	0.683
	2. Truck rental	500.00	0.342
	3. Jeep Mileage	1061.16	0.724
	4. Report printing - DMEA	182.80	0.125
	5. Freight-in - supplies	314.29	0.215
	6. Freight in - Equipment	270.44	0.185
	7. Misc. operating supplies	930.80	0.635
	8. Assaying	39.00	0.026
	9. Equipment repairs	503.09	0.343
		5,697.58	3.888
3. New Facilities and Equipment			
A. New Facilities			
1-a	Compressor building	1996.03	1.362
5-a	Blacksmith shop & change room	1382.42	0.944
1-d-1	Bulldozer - bldg sites	192.00	0.131
1-d-2	" Pipe line	352.00	0.240
		3,922.45	2.677
B New Equipment			
1-c-6	Air receiver	40.00	0.027
3-a	Fuel tanks	89.17	0.061
3-b	Blowers	518.63	0.354
3-c	Shovels	591.80	0.404
6-g	Jackleg	526.58	0.359
3-c	Drifters (2)	1750.00	1.195
		3,516.18	2.400
		83,402.32	56.930
	Less suspension by 12/31/52 Audit	592.91	0.405
		$82,809.41	56.525

Analysis of Project Costs — Sheet 4

DMEA-2082; Idm-E 248

Total Advance 1465.0 ft.

	Total	Cost per foot
1. Direct Underground Costs		
Trackage	3896.89	2.659
Pipe and Vent lines	3435.51	2.345
Labor and Supervision (Inc. CI & P.R. taxes)	23259.81	15.877
Supplies	9923.50	6.775
Miscellaneous expense	4801.58	3.278
	45317.29	30.934
2. Supporting Costs		
Equipment rental	14335.46	9.785
Outside labor (inc. CI. & P.R. taxes)	15414.94	10.522
Bulldozer - snow removal	646.00	0.441
	30396.40	20.748
3. Facilities and Equipment		
New Facilities	3922.45	2.677
New Equipment	3516.18	2.400
Aerial photos	250.00	0.171
	7688.63	5.248
	83402.32	56.930
Less: Suspension by audit of 12/31/52	592.91	0.405
	$82809.41	$56.525

Distribution of Misc. Exp items TMEA-2082; Tdm-E248

	Month	Amount	Accounting	Truck rental	Jeep Mileage	TMEA report Printing	Freight Supplies	Freight Eqt.	Misc. opr. Supplies	Packaging	Eqt. Repairs
1952	February	$ 134.82	100.00		34.82						
	April-May	578.83	100.00	100.00	4.350 62.00			165.88 105.06	2.89		
	June	515.71	100.00	50.00	108.68 18.50	23.60			10.71 153.90		55.32
	July	336.34	100.00	50.00	62.30	25.20	3.96		94.88		62.28
	August	597.38	100.00	50.00	67.80 64.00	38.25			41.19 47.66 57.25		3.57 58.70 5.47
	September	364.01	100.00	50.00		23.90	14.39		148.58	6.00	16.14
	October	497.42	100.00	50.00	155.52		19.82		19.78 32.05 54.30	3.00	32.95
	November	566.23	100.00	50.00	132.64	18.00	6.79		46.40 56.50		30.66 6.64 22.00 61.71 39.94
	December	496.27	100.00	50.00	101.60	30.55	41.42 9.90		11.23 66.83 3.34 11.91	30.00	13.85 1.35 5.40 6.84
		$ 4087.01	900.00	450.00	846.36	159.50	96.28	270.44	889.36	39.00	456.07
1953	January	714.57	100.00	50.00	214.80	23.30	21.01		41.44		67.02
		4801.58	1000.00	500.00	1061.16	182.80	314.29		930.80		503.09
Feet adv. 1956'		$ 2.398	0.683	0.342	0.724	0.125	0.215	0.185	0.635	0.026	0.343

EXHIBIT "E"

COST ANALYSIS OF
INITIAL 1465 FT. OF
EXPLORATION COMPLETED

KAROLTON KLASP—8¾ x 11¼
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THE AMERICAN ENVELOPE CO.
WEST CARROLLTON, OHIO

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EXHIBITS "F" and "G"

GEOLOGICAL REPORTS

COMBINED METALS REDUCTION COMPANY

P. O. BOX 150

SALT LAKE CITY 10, UTAH

October 24, 1952

REPORT ON THE GEOLOGICAL DEVELOPMENTS AT MT. WHEELER MINES, INC.

Prospecting work at the Mt. Wheeler Mines, Inc., having reached the stage where tungsten ore is known to occur in the Wheeler bed in significant quantities, the management requested an independent appraisal of the ore possibilities. Consequently Requa, Thomas and Hagen visited the property for the desired examination. Mr. Young, being unable to accompany them, has reviewed the report in the light of his previous observations.

This examination was for the particular purpose of investigating the scheelite ore occurrence and of evaluating the adequacy of the present program of exploration. A transit survey of the workings was made by Mr. Hagen, with adjustment to the true meridian.

The country rock at the mine consists of a series of sediments in the Lower Cambrian formation, which occur in a broad, flat-lying dome that pitches at a low angle to the south. Erosion has developed a striking amphitheatre, which drains into Pole Canyon. This type of erosion naturally suggests the presence of numerous cross fractures which have made the formation of the amphitheatre possible.

A large exposure of granitic material, a mile or more to the northeast, suggests that the doming may be associated with this intrusion and that the multiple fracturing in Pole Canyon may be the result of gradual settling due to the cooling of the magma below this area. Thus many channels have been provided for the entry of hydrothermal solutions and gases into the favorable beds.

The total thickness of the Wheeler limestone bed is about 22 feet. This bed lies only a few feet above the contact with the underlying Prospect Mountain quartzite. The Wheeler bed is part of the Pioche shale formation. The middle portion of the Wheeler bed has been found favorable for replacement by scheelite and has been highly altered by hydrothermal solutions. The favorable portion is usually four to five feet thick. In the exposed faces the ore has been found to be a combination of scheelite bearing quartz and replaced limestone.

This bed has been highly fractured, but not greatly displaced, over quite a wide area, which is at least 1000 feet in a north-south direction by about 600 feet in an east-west direction as evidenced by surface exposures and recent development work.

Quartz has been deposited on most of these fractures, as well as ankerite and scheelite. This is best developed at fracture intersections where limestone replacement ore occurs.

The development program, under the present DMEA project, has been confined to driving a tunnel under the productive bed, which has a flat dip to the south and by raising into this bed at selected places. This program has demonstrated ore, but fails to give sufficient information on the extent of such ore.

As exposed to date the ore shoots have been assumed to constitute a tabular body of ore four to five feet thick, twenty or more feet wide and of unknown length. The long dimension of the ore evidently follows east-west fracturing.

This zone does not contain all of the ore possibilities of the Mt. Wheeler property. Fracturing of the Wheeler bed is sufficiently widespread in the Pole Canyon area to provide other loci of ore deposition and these should eventually be investigated.

The known ore zone has been referred to as a shear zone, which is probably a misnomer. It is our belief that this structure should be called a fracture pattern, which would provide a much wider area for ore deposition than the zone now under consideration.

Knowledge of the continuity of the ore shoots is now vital and the present program fails to provide this information. The raises, now in ore, fail to give sufficient information for the calculation of an ore reserve.

To get some adequate idea of the tonnage we suggest that a certain portion of the prospecting footage be allocated to driving in the ore bed. What portion of the total footage should be devoted to this purpose will be a matter that experience will dictate, but for an initial effort in this direction and for footage that can be allocated from the remaining footage in the present DMEA contract, we suggest the following -

Slusher drifts should be run from the following raises:

1. From the #1 South Lateral, Raise #2, in a N 20° W direction, up dip in the bed for a distance of 70 feet.

2. From the #2 South Lateral, Raise #1, in a N 10° W direction, up dip in the bed for a distance of 105 feet.

3. From the #3 North Lateral, Raise #1, in a northerly direction for 60 feet up dip in the bed and, from this same raise, a drive in an easterly direction for 40 feet in the bed.

This is a total footage of 275 feet and in order that this work may be permissible under the DMEA contract it is suggested that it be deducted from the 1000 feet which has been allowed for the main adit.

Any future extension of the DMEA project should allow amply for such prospecting work in the Wheeler bed.

In all drives on ore we suggest that continuous samples be taken. We consider cut samples unreliable in the irregular mineralization pattern usually found in most tungsten mines. We, therefore, suggest systematic muck samples be taken from the cars of ore, or waste, removed from each heading in the ore bed.

For the above reason we cut no samples on this examination but did carefully examine each ore face with the tungsten light. The management advised us that the stock pile muck samples taken from the ore removed from all DMEA exploration faces averaged 0.62% WO_3 and that these faces by selective mining, or with sorting, should produce plus 1% ore.

It should be noted that no faults having any significant displacement have been encountered so far. As the main tunnel advances some faults will be found, also some quartz veins. Our examination did not include the consideration of these possibilities, but we believe such structures should be studied in more detail. A real dislocation of the Wheeler bed, along a strong mineralizer, could result in a very significant deposition of tungsten ore.

The Sheffield fissure is the first strong quartz vein known to exist immediately ahead of the main tunnel. This vein runs about north and south and should be cut in another 1000 feet, more or less, of advance by the main tunnel. Where the Sheffield fissure has been explored it consists of a five foot quartz filled fissure containing high temperature lead ore.

In general we can say that the Mt. Wheeler development is very encouraging. It is a type of replacement deposit that is not well known to the tungsten industry. If successfully developed, and we believe that it has such possibilities, it should open up a new field for tungsten exploration.

While our inspection was not a general mine examination we would like to comment on the neat and orderly condition of the camp and the mine. It was a pleasure to see such efficiency and organization at such an early stage of this operation. We also wish to thank Mr. Williams, president and general manager of this company, for his complete cooperation and kind hospitality during the course of this examination.

L. K. Requa

L. K. Requa

Earl B. Young

Earl B. Young

L. G. Thomas

L. G. Thomas

C. R. Hagen

C. R. Hagen

K

COMBINED METALS REDUCTION COMPANY

P. O. BOX 150

SALT LAKE CITY 10, UTAH

Subject: Tungsten Ore Reserve at Mt. Wheeler Mine
To : Mr. E. H. Snyder

From : Earl B. Young
Date : December 16, 1952

Sufficient development has been completed at the Mt. Wheeler Mine in its Pole Canyon tunnel to justify a restatement of the geological conditions that exist and to make a "guesstomate" of probable ore reserves as of this date. "Probable" as used in this letter includes "positive" and "probable" as ordinarily used.

The tunnel has advanced past the 900 foot mark and with its side crosscuts, raises and subdrifts, it has revealed a very interesting pattern of ore occurrence. We have dubbed this the waffle-iron, and an explanation may be necessary. The first work in the tunnel was based on the belief that there were several shear zones trending easterly across the area which would serve as guides for mineralizing solutions and gases. This conception must now be expanded to include another series of fracture zones which extend in a north-south direction across the amphitheatre. To date five of these N-S zones have been identified and designated A, B, C, D and E.

Zone "A" is cut in the tunnel from 24 feet to 95 feet from the portal. About 80 feet of sub-level work in the orebed produced 105 cars which assayed 3.68 WO_3 and a considerable amount of low grade. We feel justified in assigning a width to the zone at this point of 72 feet, extend it for 100 feet in a north-south direction and consider the ore thickness as 5 feet, although in some places it is up to 7 feet. Allowing 12 cubic feet to the ton, we obtain an estimated probable reserve of 3000 tons.

Zone "B" is cut from 142 to 216 feet from the portal and is also considered as 72 feet wide. The bed has been exposed by three raises from the No. 1 Lateral-South and by short drifts in the bed. Replacement by scheelite again occurs over a thickness which in places is six to seven feet. Again allowing 100 feet north and south with an average thickness of five feet, we have an additional probable reserve indicated of 3000 tons. The average assay from 125 cars from this zone was 0.62% WO_3.

Zone "C" is cut from 355 feet to 434 feet from the portal and is considered as 60 feet wide. The bed was entered by one raise from which 40 cars averaged 0.12% WO_3. While this raise was driven on an east-west fracture, it seems to be in a lean part of the zone and is outside of our estimated block. Here, we assume a block 60 feet wide by 100 feet north and south and 5 feet thick. This gives 2500 tons. Grade is unknown, but as the zone is strong further work into the block is indicated.

Zone "D" is cut from 471 feet to 520 feet from the portal and is considered as 60 feet wide. The zone has been developed by No. 3 Lateral-North with a raise and 20 feet of sub-level. Strong mineralization shows along both the north-south and the east-west fractures and as replacement in the bed. The first 35 cars from the sub-level assayed 1.08% WO_3. Specimen ore occurs in the east-west fractures.

The very conservative estimate of 60 feet by 100 feet north-south by a thickness of five feet adds another 2500 tons to the probable reserve.

Zone "E" is cut from 582 to 682 feet from the portal and is considered as 90 feet wide. It is developed by No. 4 Lateral-North and a short incline up the beds parallel to the north-south fracturing. No assays are yet available but specimen ore was seen in the muck pile. We wish to estimate a block here 90 feet wide by 100 feet north-south by five feet thick, to contain 3750 tons of ore over 1% WO_3.

The total probable reserve from the five blocks outlined above totals 14,750 tons. This is enough to supply a 25-ton mill for nearly two years.

The possible reserve runs into such fantastic figures that they would probably only provoke doubt. Hence we content ourselves with a brief statement concerning the north-south zones which were not given due significance in our first studies, even though we did emphasize the long-range objectives offered by the Shefield, the Washington and the St. Lawrence fissures, all of which trend north-south. Now we find that these north-south fracture zones, separated by relatively tight areas are an important part of the fracture pattern. They are plainly seen in the quartzite walls of Pole Canyon about 1200 feet north of the portal of the tunnel. Also of special significance is the new series of colored air-photos taken by Phillip A. Laylander which show definite north-south alteration zones on the surface of the area being crossed by Pole tunnel.

In view of the recent developments we are now forced to expand our conception of the ore possibilities of Pole Canyon to include both east-west and north-south zones. The areas of intersection will be of better grade while the areas between the zones will be low grade or possibly waste. In general, the east-west fractures are frequently filled with quartz, sometimes carrying scheelite, while the north-south fractures tend to be open or filled with aragonite, mud and pebbles. The displacement on the fractures is usually a matter of inches, but is obviously sufficient to have prepared the zones for the entry of tungsten bearing solutions and gases. With such impressive mineralization in the north-south zones already encountered, we eagerly look forward to the intersection with the Shefield, now only about 1200 feet to go.

Respectfully submitted,

Earl B. Young

Earl B. Young

N-S fractures may have [illegible] available [illegible] from [illegible] grade

K

Table 1. Work Sheet showing Conversion of Amendment Cost Sheets to Classification of MS-104 Form - Stage II

Costs as shown in Legislative Amendment - Stage II		1. Labor and Supervision: Labor	Supervision	Technical	2. Operating Materials and Supplies: Mine Open. Supplies	Timber	Explosives	Pipe and Ventilation	Track	Pipe and Cable	Steel and Bits	Mine Small Tools	Freight	4. Operating Equipment: Equip.	Freight	5. Drilled Rds. & Bridges: Materials	Labor	6. Mine Bldg. & Dwgs.: Materials	Labor	7. Miscellaneous: Accounting Blueprint	Expense to Equipment	Assaying	Payroll Taxes	Comp. Ins.	Admin.	8. Underwriting: Bookkeeping	Trucking
a. Underground Exploration																											
1. Main Adding Drive North																											
a. Main drift	1000'																										
1. Contract labor		19,170.00																									
2. Pipe and ventilation								221.50																			
3. Powder, fuse & caps							2835.00																				
4. Steel and bits											1666.50																
5. Timber						593.00																					
6. Track and bolts										1439.50																	
7. Misc. small tools												577.50															
8. Shovels costs												262.50															
9. Power costs												1050.00															
10. Comp. Insurance																							997.50				
11. Payroll taxes																						640.50					
b. Side drifts	1000'																										
1. Contract labor		15500.00																									
2. Pipe and ventilation								1030.00																			
3. Powder, fuse & caps							2700.00																				
4. Steel and bits											1530.00																
5. Track and bolts										1370.00																	
6. Misc. small tools												550.00															
7. Comp. Insurance																							950.00				
8. Payroll taxes																						610.00					
2. Pb Tunnel Drive Easterly																											
a. Main adit	1200'																										
1. Contract labor		16,200.00																									
2. Roadbase									3120.00																		
3. Pipe and ventilation								2622.00																			
4. Powder, fuse & caps							3240.00																				
5. Steel and bits											1836.00																
6. Timber						532.00																					
7. Track and bolts										1644.00																	
8. Misc. small tools												660.00															
9. Comp. Insurance																							1140.00				
10. Payroll taxes																						732.00					
b. Latitude & S. Mayfield Drift	540'																										
1. Contract labor		7290.00																									
2. Portable compressor		208.20																									

Sheet No 2 - Page II

		2. Labor and Supervision			3. Operating Materials and Supplies									4. Operating Equipment		5. Initial Rib & Repairs		6. New Bldgs & Surfaces		7. Miscellaneous						8. Contingencies	
		Labor	Supervision	Technical	Misc. Oper. Supplies	Timber	Explosives	Pipe and Ventilation	Track	Fuel and Lube	Steel and Bits	Misc. Small Tools	Freight	Equipment	Freight	Materials	Labor	Materials	Labor	Accounting Blueprint	Repairs to Equipment	Assaying	Payroll Taxes	Comp. Ins.	Repairs	Bushelling	Trucking
3. Trackage									1401.00																		
4. Powder, fuse & caps							1158.00																				
5. Steel and bits											826.20																
6. Timber						348.40																					
7. Fuel and lube										739.80																	
8. Misc. small tools												297.00															
9. Comp. Insurance																								529.20			
10. Payroll taxes																							340.20				
c. Raise and Bed Drifts	1770'																										
1. Contract labor		23,895.00																									
2. Pipe and ventilation								2895.10																			
3. Powder, fuse & caps							2779.00																				
4. Steel and bits											2708.10																
5. Timber						814.20																					
6. Fuel and lube										2422.90																	
7. Misc. small tools												973.50															
8. Comp. Insurance																								1691.50			
9. Payroll taxes																							1079.70				
d. Sheffield Bed Drift	700'																										
1. Contract labor		9450.00																									
2. Pipe and ventilation								1141.00																			
3. Powder, fuse & caps							1390.00																				
4. Steel and bits											1071.00																
5. Timber						322.00																					
6. Fuel and lube										959.00																	
7. Misc. small tools												385.00															
8. Slusher cable												175.00															
9. Comp. Insurance																								665.00			
10. Payroll taxes																							427.00				
B. Underground Facilities																											
1. Main Bedding Drive North																											
a. Power line in tunnel																		2180.00	140.05								
b. Replace air slusher																		100.00	175.07								
c. Permanent vent. line																		2450.00	280.11								
2. Pole Tunnel Drive Easterly																											
a. Passing tracks																		562.00	192.84								

Sheet No. 3 - Page II

	2. Labor and Supervision			3. Operating Materials and Supplies									4. Operating Equipment		5. Initial Rb. & Repairs		6. Mine Bldg. & Improv.		7. Miscellaneous						8. Contingencies	
	Labor	Supervision	Technical	Misc. Oper. Supplies	Timber	Explosives	Pipe and Ventilation	Tools	Fuel and Lube	Shoe and Bits	Misc. Small Tools	Freight	Equip.	Freight	Materials	Labor	Materials	Labor	Cementing Shipping	Repairs to Equipment	Assaying	Payroll Taxes	Comp. Insu.	Adm.	Prospecting	Trucking
b. Chimney - Pitchers																	500.00	35.01								
c. Air receiver																	410.50	105.04								
d. Chutes and manways																	2377.60	2100.24								
C. Surface Facilities																										
1. Mine Water system																										
a. Drilled Well																	400.50	350.14								
b. Pump & Pump line																	153.50	315.09								
c. Storage tanks																	1050.00	350.14								
d. Supply line																	426.70	536.05								
e. Power line to pump																	900.00	350.14								
2. Generator Building																										
a. b. Building																	1648.00	980.39								
c. Switchboard																	105.40	105.04								
d. Fuel tank																	428.50	105.04								
e. Transformer																	302.50	70.03								
3. Other Facilities																										
a. Bunkhouse																	902.75	407.65								
b. Cooling tower																	265.00	175.08								
D. Additional Equipment																										
1. Mont-Alpha Generator													8020.30													
2. Air compressor													9021.09													
3. Mine Cars													5065.00													
4. Electric Shovel													12373.20													
E. Supervisory & Supporting Labor																										
1. Supervisory & Technical		18000.00	8800.00																							
2. Supporting Labor	25952.00																									
3. Comp. Insurance																							319.61			
4. Payroll Taxes																						2397.11				
F. Other Costs																										
Freight on Supplies												1506.03														
Freight on Equipment														2108.75												
Trucks, Operation																										1291.93
Power Generation									6314.70																	
Dismantling & Shipping																			2150.00							
Pick Mileage																										
Assaying																				2103.52	760.00					
Equipment repairs				450.70																				1030.00		
Misc. Operating supplies	1047.60	18000.00	8800.00	450.70	2417.60	6000.00	9863.60	1470.00	10720.00	8477.80	1930.60	2506.03	34492.84	2108.75			2888.95	1064.75	2150.00	2103.52	760.00	2397.11	319.61	1030.00	1291.93	1291.93

Work Sheet showing conversion of Amendment Cost Items to classification of MR-104 Forms - Stage I.

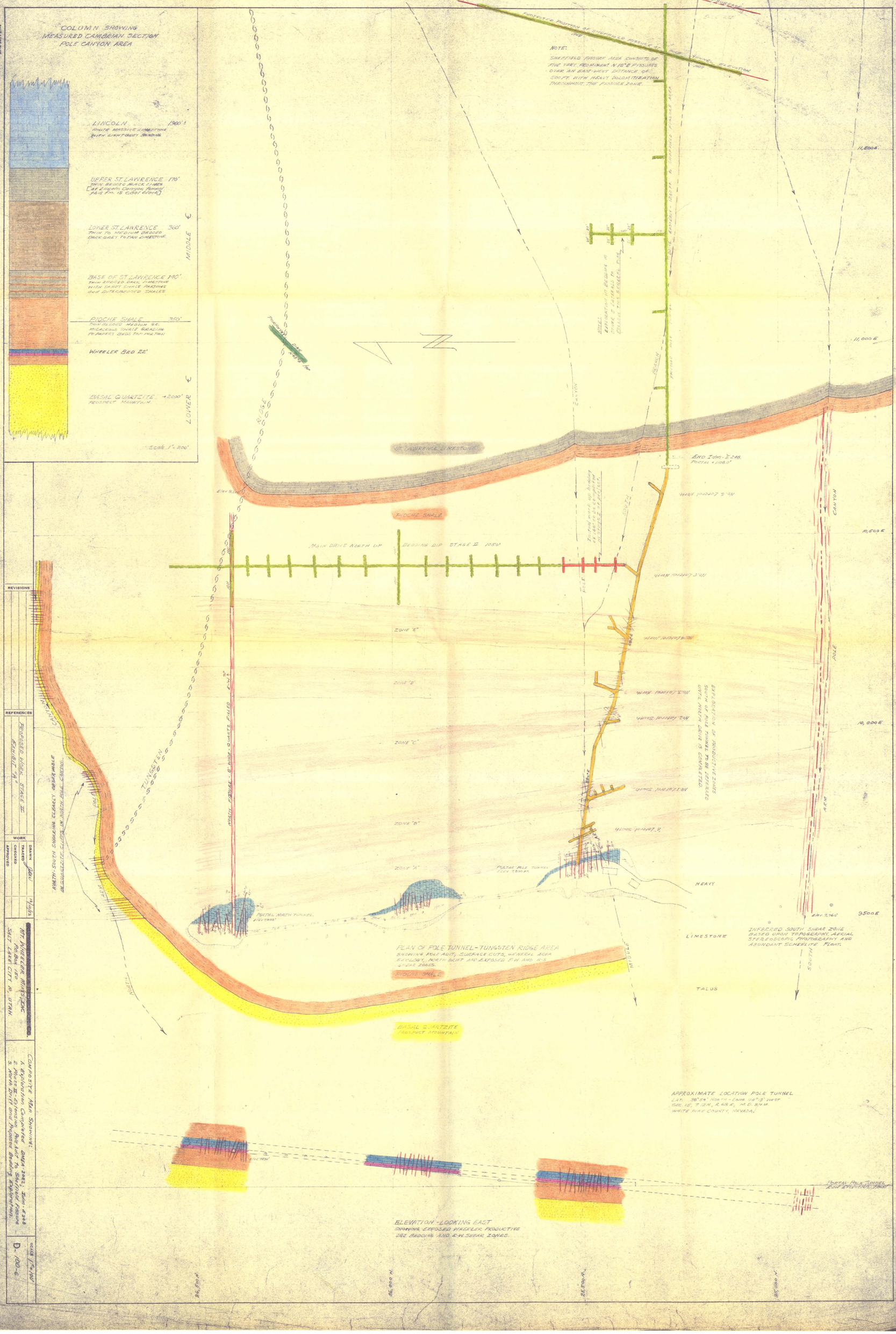
Work Sheet Item No.	Work Items as Shown in Engraved Amendment Stage I		1. Labor and Supervision: Labor	Supervision	Technical	2. Operating Materials and Supplies: Misc. Spec. Supplies	Timber	Explosives	Pipe and Ventilation	Track	Pump and Cable	Steel and Bits	Misc. Small Tools	Freight	4. Sanitary Equipment: Eqpt.	Freight	5. Outside Pch. & Repairs: Materials	Labor	6. Non-Oblig. Expend.: Materials	Labor	7. Miscellaneous: Accounting Blueprint	Repairs to Equipment	Assaying	Payroll Taxes	Comp. Insur.	Admin.	8. Fixed Improvements: Building	Railroad
A.	Underground Exploration																											
	1. Misc. Drifting & Exploration																											
	(a) No. 1 Lateral North & South	160'																										
	1. Labor		2160.00																									
	2. Pipe and Ventilation								260.80																			
	3. Powder fuse & caps							932.00																				
	4. Steel and bits											344.80																
	5. Timber						73.60																					
	6. Pump and hose										117.20																	
	7. Misc. Small tools												98.00															
	8. Comp. Insurance																								152.00			
	9. Payroll taxes																							97.60				
	(b) No. 1 Lateral South	280'																										
	1. Contract labor		3780.00																									
	2. Pipe and Ventilation								690.80																			
	3. Powder, fuse & caps							1560.00																				
	4. Steel and bits											428.40																
	5. Timber						128.80																					
	6. Pump and hose										183.60																	
	7. Misc. Small tools												154.00															
	8. Shaker cable												70.00															
	9. Comp. Insurance																								266.00			
	10. Payroll taxes																							170.80				
	(c) No. 2 Lateral North	285'																										
	1. Contract labor		3197.50																									
	2. Pipe and Ventilation								601.35																			
	3. Powder, fuse & caps							769.50																				
	4. Steel and bits											416.05																
	5. Timber						181.10																					
	6. Pump and hose										310.75																	
	7. Misc. Small tools												158.75															
	8. Shaker cable												71.25												270.75			
	9. Comp. Insurance																							173.85				
	10. Payroll taxes																											

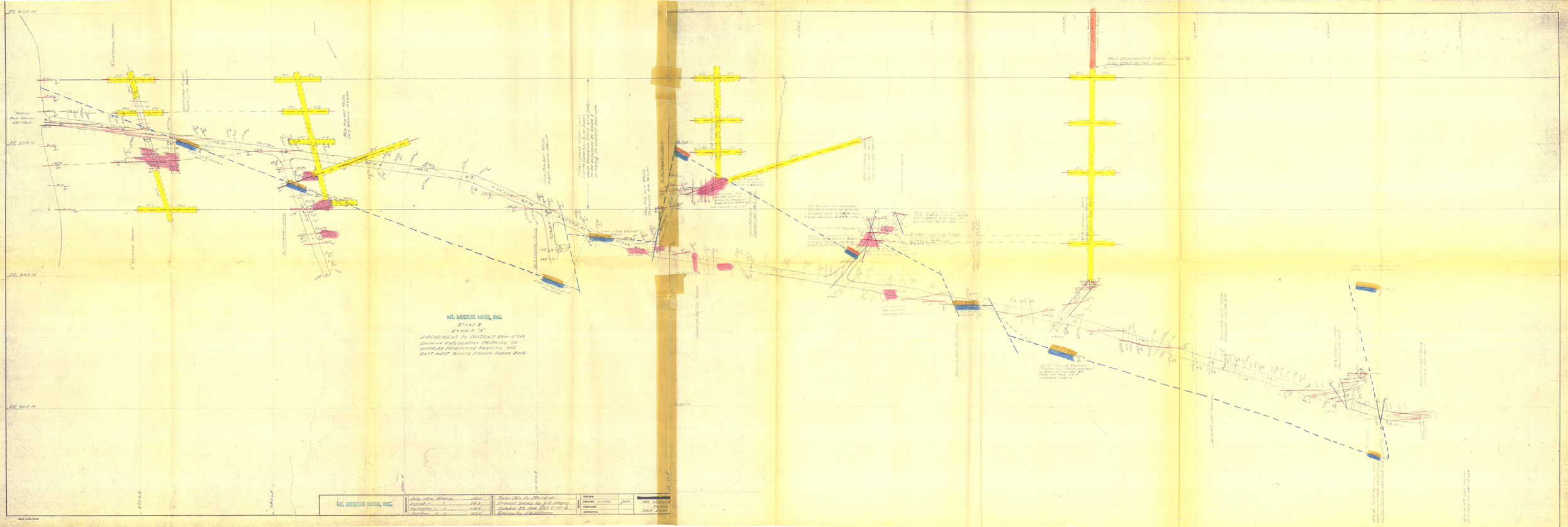
Sheet No. 2.

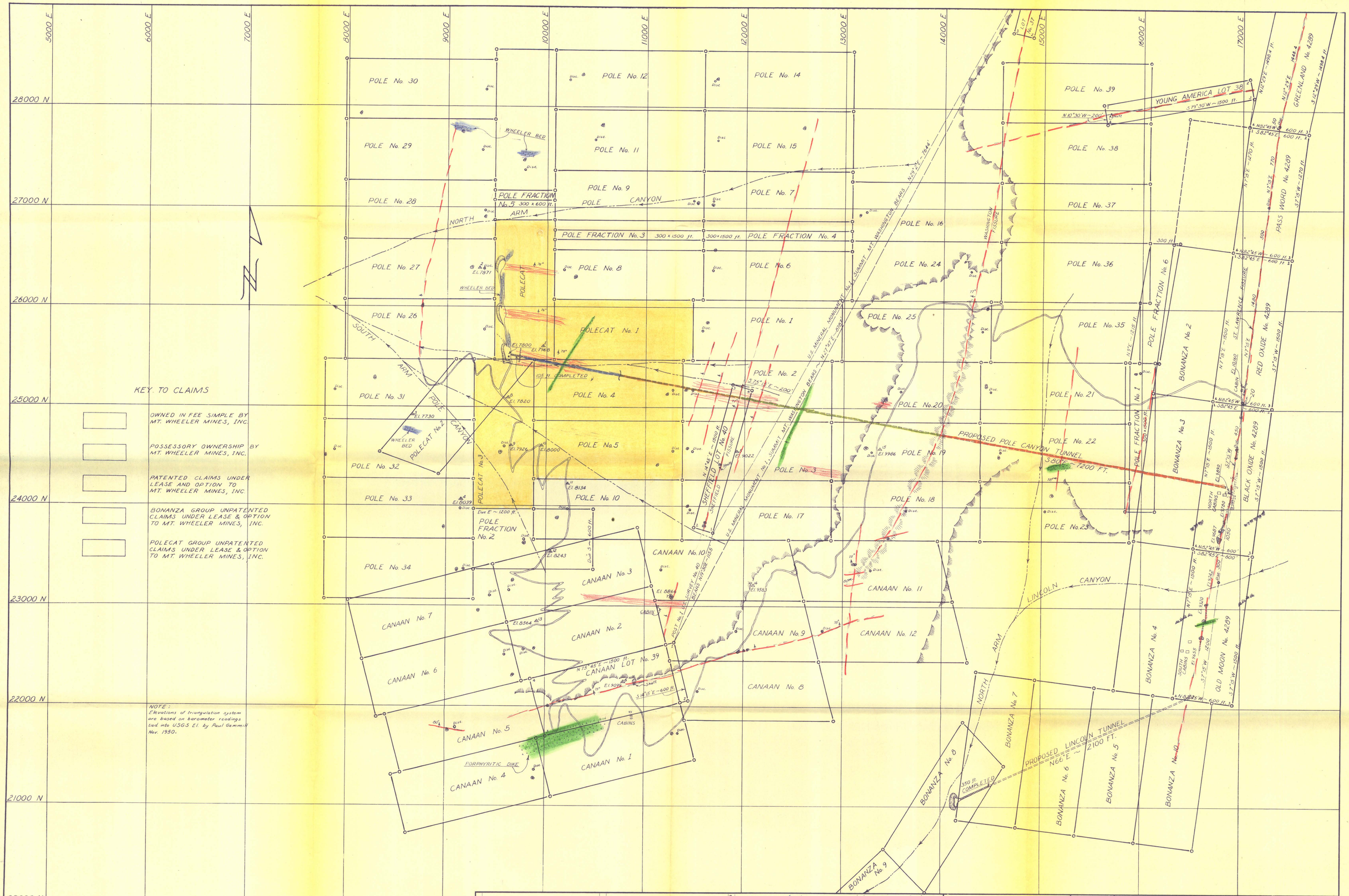
		2. Labor and Supervision			3. Operating Materials and Supplies									4. Operating Equipment		5. Indirect Mat. & Repairs		6. New Bldgs. & Improvements		7. Miscellaneous						8. Overhead	
		Labor	Supervision	Technical	Misc. Opr. Supplies	Timber	Explosives	Pipe and Ventilation	Tracks	Fuel and Lube	Tools and Bits	Misc. small Tools	Freight	Opt	Freight	Materials	Labor	Materials	Labor	Accounting Blueprints	Repairs to Equipment	Charging	Payroll Taxes	Legal Fees	Admin.	Building Maintenance	
(b) No. 5 Lateral North	250'																										
1. Contract labor		3780.00																									
2. Pipe and Ventilation								540.00																			
3. Powder, fuse & caps							756.00																				
4. Steel and bits											428.40																
5. Timber						129.30																					
6. Fuel and lube										393.60																	
7. Misc. small tools												154.00															
8. Blasher cable												70.00															
9. Comp. Insurance																								266.00			
10. Payroll Taxes																							171.80				
(c) Other Building drives	300'																										
1. Contract labor		1050.00																									
2. Pipe and ventilation								633.00																			
3. Powder, fuse & caps							910.00																				
4. Steel and bits											459.00																
5. Timber						139.00																					
6. Fuel and lube										411.00																	
7. Misc. small tools												165.00															
8. Comp. Insurance																								285.00			
9. Payroll Taxes																							183.00				
8. Underground Facilities																											
1. Misc. Building Exploration																											
(a) Shafts and Manways																											
1. N. Lateral South																		127.00	70.02								
2. N. Lateral North																		127.00	70.02								
3. No. 1 Lateral South																		396.60	350.14								
4. No. 5 Lateral North																		396.60	350.14								
5. No. 5 Lateral North																		396.60	350.14								
(b) Contact Thru Workings																		142.43	430.32								
(c) Other Preparation																											
1. Air and water lines																		202.50	178.08								
2. Air motors																		60.00	108.04								
3. 1/2 Drift cuts																		288.00	315.13								
4. Electric lights																		338.00	105.04								

Sheet No. 2

	2. Labor and Supervision			3. Operating Materials and Supplies									4. Mine Equipment		5. Initial Rch. & Repairs		6. New Bldg. & Improvs.		7. Miscellaneous						8. Contingencies	
	Labor	Supervision	Technical	Mine Min. Supplies	Timber	Explosives	Pipe and Installation	Track	Fuel and Lube	Steel and Bits	Misc. small Tools	Freight	Eqt.	Freight	Materials	Labor	Materials	Labor	Accounting Blueprint	Assay to Eqt.	Assaying	Payroll Taxes	Corp. Inc.	Adm.	Bunkering	Stocking
C. Surface Facilities																										
1. Bins - Buck Sampling																										
a. Mine Bin																	3355.00	1295.52								
b. Transfer Bin																	1518.90	919.37								
2. Other Facilities																										
a. Change House																	237.00	1050.42								
b. Powder Magazine																	669.00	420.17								
c. Waste Dump																	631.60	350.14								
d. Blower installation																	145.00	70.03								
D. Mine Equipment																										
1. Drilling equipment													410.80.00													
2. Mine cars													3065.00													
3. Hoists													6040.00													
4. Fire extinguishers													880.00													
5. Slusher													2776.90													
6. Punch. rental units													12,193.80													
E. Supervisory & Supporting																										
1. Supervisory & technical		9200.00																								
2. Supporting Labor	12531.20																									
3. Comp. Insurance																							1523.38			
4. Payroll taxes																						977.90				
F. Other Costs																										
1. Freight - supplies												1311.00														
2. Freight - equipment														1126.35												
3. Truck operation																										4860.88
4. Accounting & Blueprint																			1240.00							
5. Jeep mileage																								768.00		
6. Assaying																					1248.00					
7. Equipment repairs																				259.36						
8. Misc. Operating supplies				939.60																						
	30,148.70	9200.00		939.60	600.30	2323.50	2676.25		1787.95	1996.65	927.00	1311.00	30,638.70	1126.35			12,092.79	6617.67	1240.00	259.36	1248.00	1977.85	2063.18	768.00		4860.88

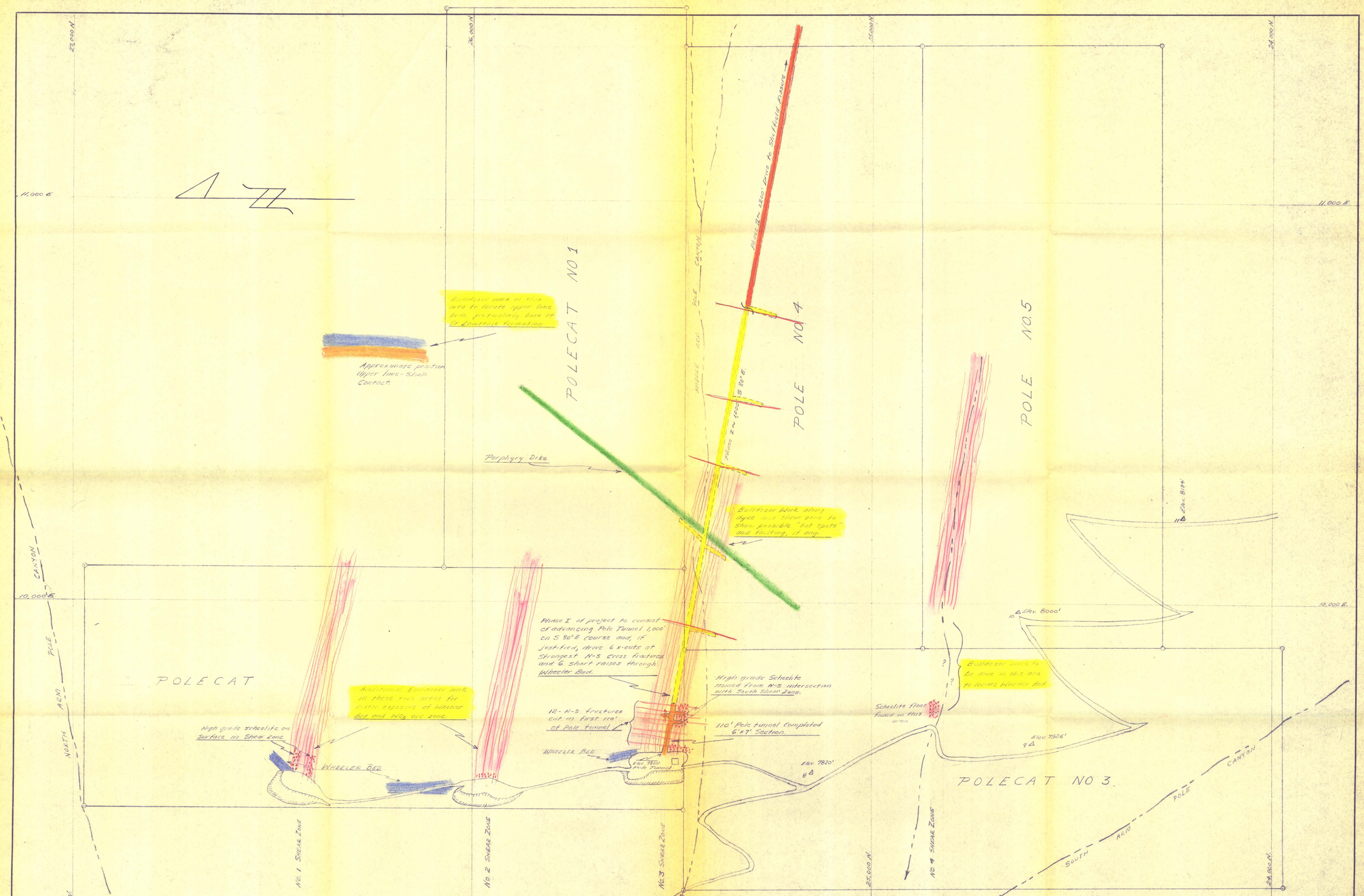

COLUMN SHOWING
MEASURED CAMBRIAN SECTION
POLE CANYON AREA
LINCOLN 1900'±
WHITE MASSIVE LIMESTONE WITH LIGHT GRAY BANDING
UPPER ST. LAWRENCE 170'
THIN BEDDED BLACK LIMES [AN EXCELLENT CARVING MATERIAL HAS FOR. IS COST CLOCK]
LOWER ST. LAWRENCE 360'
THIN TO MEDIUM BEDDED DARK GREY TO TAN LIMESTONE.
BASE OF ST. LAWRENCE 190'
THIN BEDDED GRAY LIMESTONE WITH SANDY SHALE PARTING AND SUBORDINATE SHALES
PIOCHE SHALE 350'
THIN BEDDED MEDIUM GR. MICACEOUS SHALE GRADING TO MARKED LEDGE TOP FORMATION
WHEELER BED 22'
BASAL QUARTZITE +2000'
PROSPECT MOUNTAIN
MIDDLE Є
LOWER Є
Scale 1"=200'
NOTE:
SHEFFIELD FISSURE AREA CONSISTS OF FIVE VERY PROMINENT N 10° E FISSURES OVER AN EAST-WEST DISTANCE OF 300 FT. WITH HEAVY DOLOMITIZATION THROUGHOUT THE FISSURE ZONE.
ST. LAWRENCE LIMESTONE
PIOCHE SHALE
MAIN DRIVE NORTH UP
BEDDING DIP STAGE II 1050'
ZONE "E"
ZONE "D"
ZONE "C"
ZONE "B"
ZONE "A"
TUNGSTEN
HEAVY
LIMESTONE
TALUS
PLAN OF POLE TUNNEL-TUNGSTEN RIDGE AREA
SHOWING POLE ADIT, SURFACE CUTS, GENERAL AREA GEOLOGY, NORTH DRIFT AND EXPOSED E-W AND N-S SHEAR ZONES.
BASAL QUARTZITE
PROSPECT MOUNTAIN
APPROXIMATE LOCATION POLE TUNNEL
LAT. 38°54' 10" LONG 114°3' WEST
SEC. 15, T. 2 N, R. 65 E, M.D. B&M
WHITE PINE COUNTY, NEVADA.
ELEVATION-LOOKING EAST
SHOWING EXPOSED WHEELER PRODUCTIVE BED BEDDING AND E-W SHEAR ZONES.
REVISIONS
REFERENCES
PROPOSED WORK STAGE III
SCALE 1"=1'
WORK
DRAWN
TRACED
CHECKED
APPROVED
MT. WHEELER MINES, INC.
P.O. BOX 180
SALT LAKE CITY 10, UTAH
COMPOSITE MAP SHOWING:
A. EXPLORATION COMPLETED GMEX 2085; ZAW-4348
B. PHASE III-SINKING POLE ADIT TO SHEFFIELD FISSURE
C. NORTH DRIFT ONLY PROPOSED DEVELOPING EXPLORATION.
D-100-6
SCALE 1"=100'


MT. WHEELER MINES, INC.
STAGE I
EXHIBIT "A"
AMENDMENT TO CONTRACT 2EM-E-245
SHOWING EXPLORATION PROPOSED IN
WHEELER PROSPECTIVE BEDDING AND
EAST-WEST QUARTZ FISSURE SHEAR ZONE.
MAIN BEDDING DRIVE NORTH - STAGE II
FULL STAGE AT TOP FLOOR
EAST-WEST CONTACT
PROSPECTIVE FROM SURFACE
IS MADE AT TOP OF AT
PRESENT PRO. DRIVE
EASTERN PORTS
MT. WHEELER MINES, INC.
DRAWN
TRACED
CHECKED
APPROVED
MT. WHEELER
PROJ.
SALT LAKE



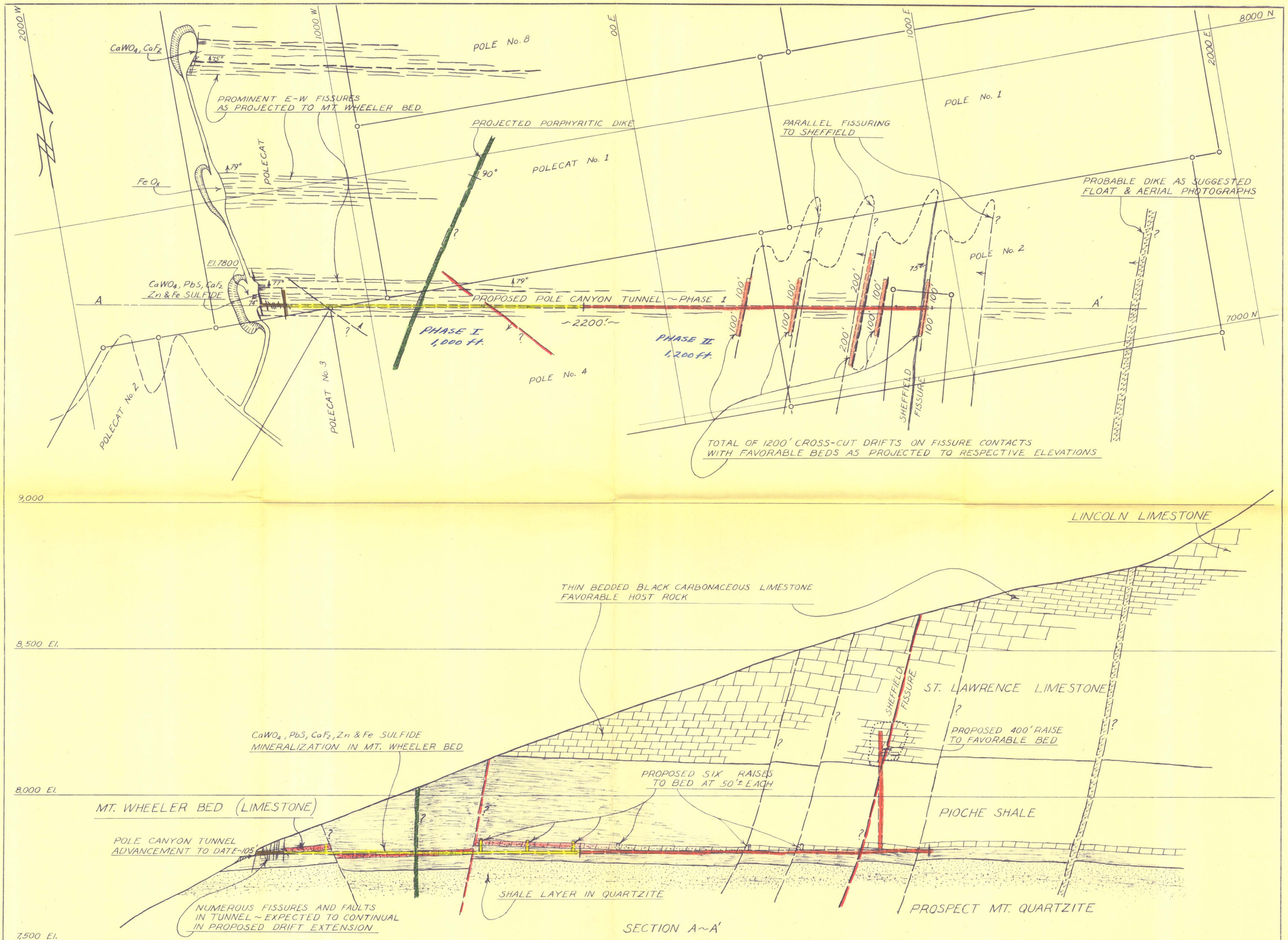
REVISIONS	REVISIONS: Claims Devoted to Project DMA - 2082 - TUNGSTEN	REFERENCES: Revised 9/24/51 JDW	WORK: DRAWN Nancy S. Miller 7-10-51; TRACED; CHECKED JDW 7/10/51; APPROVED	MT. WHEELER MINES INC. 218 FELT BUILDING SALT LAKE, UTAH	POLE CANYON DEVELOPMENT TUNGSTEN PROJECT — SCALE 1" = 400' — D-100-2

PEMBROKE CO. - #166 PHOENIX



REVISIONS	REVISIONS	EXHIBIT "A" PROPOSED EXPLORATION	REFERENCES	WORK			POLE CANYON PROJECT D.M.A. - 2082 TUNGSTEN	MT. WHEELER MINES, INC. 218 Felt Building Salt Lake City 1, Utah	SCALE 1" = 100' D-100-3
				DRAWN	9/24/51	J.D.W.			
				TRACED		✓			
				CHECKED		✓			
				APPROVED					

SALT LAKE BLUE 1000H



REVISIONS	REFERENCES	WORK			
	D.M.A.-2082-TUNGSTEN	DRAWN Harry S. Mills	5/9/51	MT. WHEELER MINES INC. 218 FELT BUILDING SALT LAKE, UTAH	PLAN AND ELEVATION OF PROPOSED POLE CANYON TUNNEL DEVELOPMENT ~ PHASE 1 TUNGSTEN PROJECT ~
		TRACED			
		CHECKED J.K.W.	5/11/51		
		APPROVED E.T.Zay	5/12/51		

SCALE 1" = 200'

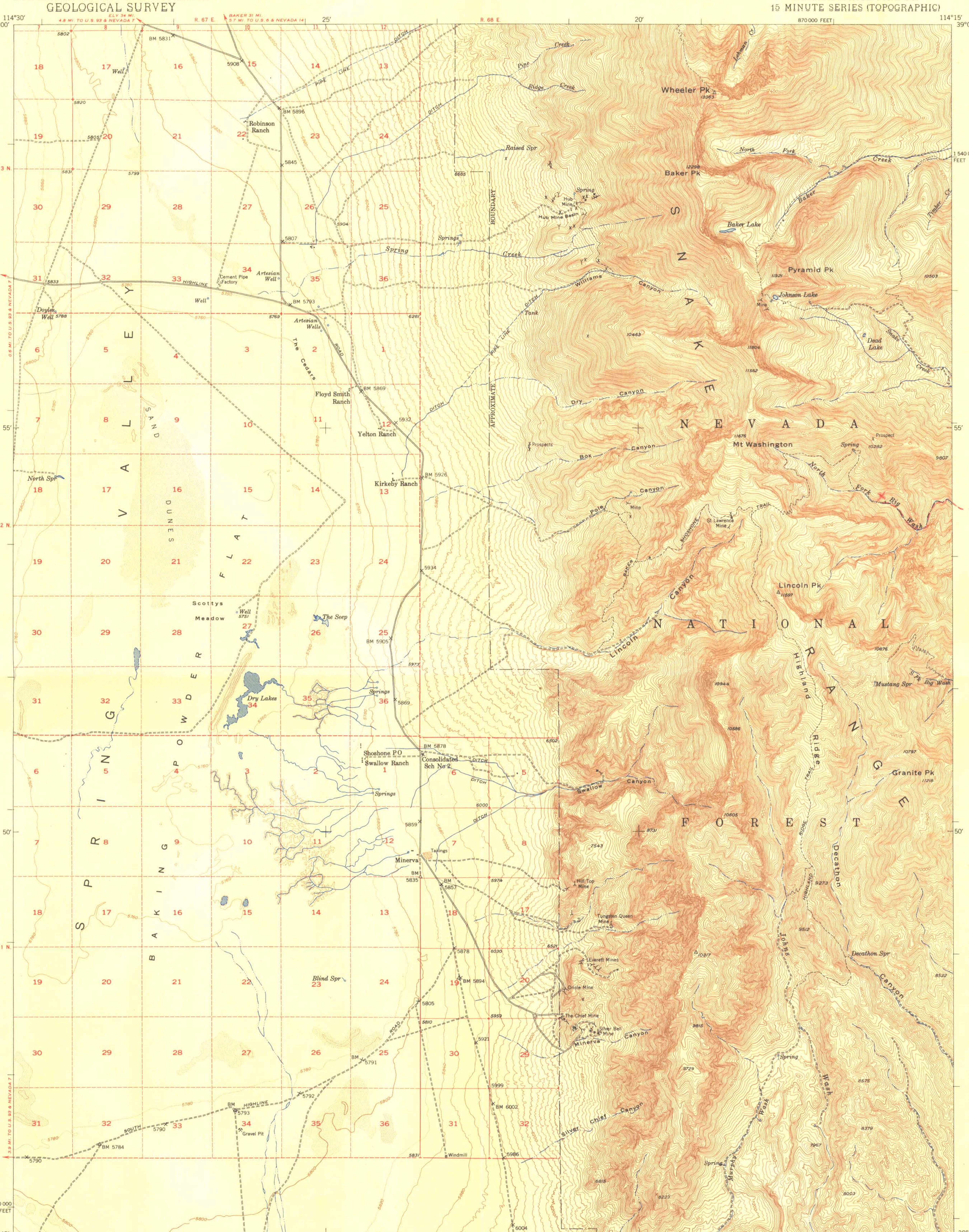
C-101-0

SALT LAKE BLUE

Code 400

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

WHEELER PEAK QUADRANGLE
NEVADA-WHITE PINE CO.
15 MINUTE SERIES (TOPOGRAPHIC)



x Big Wash Mine

– Access Road down Big Wash to highway at Pruess Lake Highway 21

DMEA 3368
Bacon Associates

Mapped, edited, and published by the Geological Survey

Control by USGS, and USC&GS

Topography from aerial photographs by multiplex methods, and by plane-table surveys 1948
Aerial photographs taken 1945.

Polyconic projection. 1927 North American datum
10,000-foot grid based on Nevada coordinate system, east zone

Dashed land lines indicate approximate location

TRUE NORTH
MAGNETIC NORTH
17°
APPROXIMATE MEAN DECLINATION, 1948

SCALE 1:62500

1 ½ 0 1 2 3 4 MILES

3000 0 3000 6000 9000 12000 15000 18000 21000 FEET

1 .5 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT HALF-INTERVAL CONTOURS
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION

HARD-SURFACE ALL WEATHER ROADS — DRY WEATHER ROADS
Heavy-duty — 4 LANE | 6 LANE — Improved dirt
Medium-duty — 4 LANE | 6 LANE — Unimproved dirt
Loose-surface, graded, or narrow hard-surface
U. S. Route — State Route

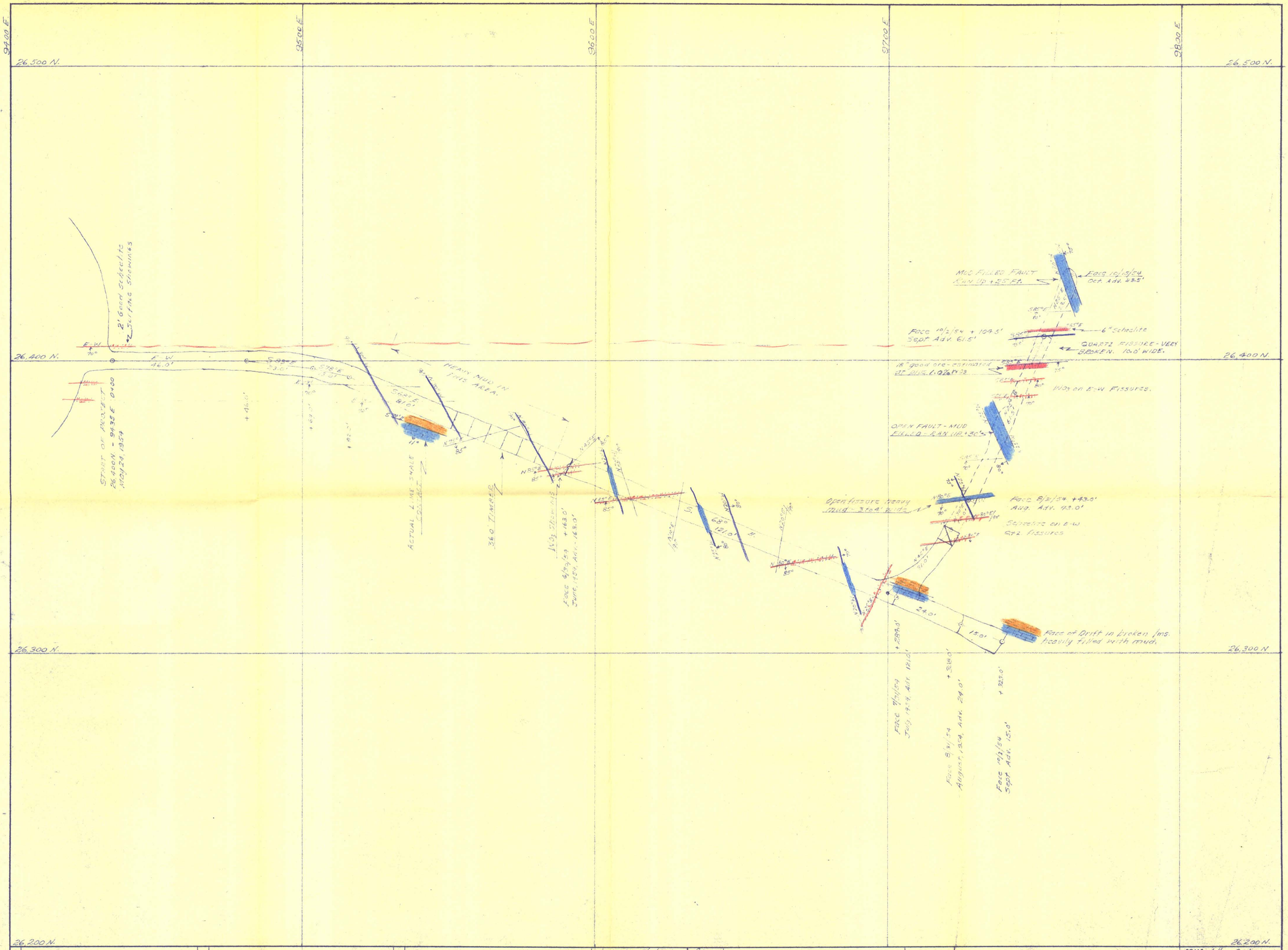
WHEELER PEAK, NEV.
N3845—W11415/15

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS

FOR SALE BY U. S. GEOLOGICAL SURVEY, FEDERAL CENTER, DENVER, COLORADO OR WASHINGTON 25, D. C.
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

EDITION OF 1950

POLE CANYON
LINCOLN CANYON
N
Approximate Scale
1" = 1000'



REVISIONS	REVISIONS			REFERENCES		WORK		
	June, 1954 Advance	163.0'		October 1954 Advance	23.5'	DRAWN 7/7/54	Dow	Mt. Wheeler Mines, Inc.
	July, 1954 Advance	121.0'				TRACED 8/4/54	✓	218 Felt Building
	Aug. 1954 Advance	67.0'				CHECKED 9/3/54	✓	SALT LAKE CITY, UTAH.
	Sept. 1954 Advance	16.5'				APPROVED 10/8/54	✓	

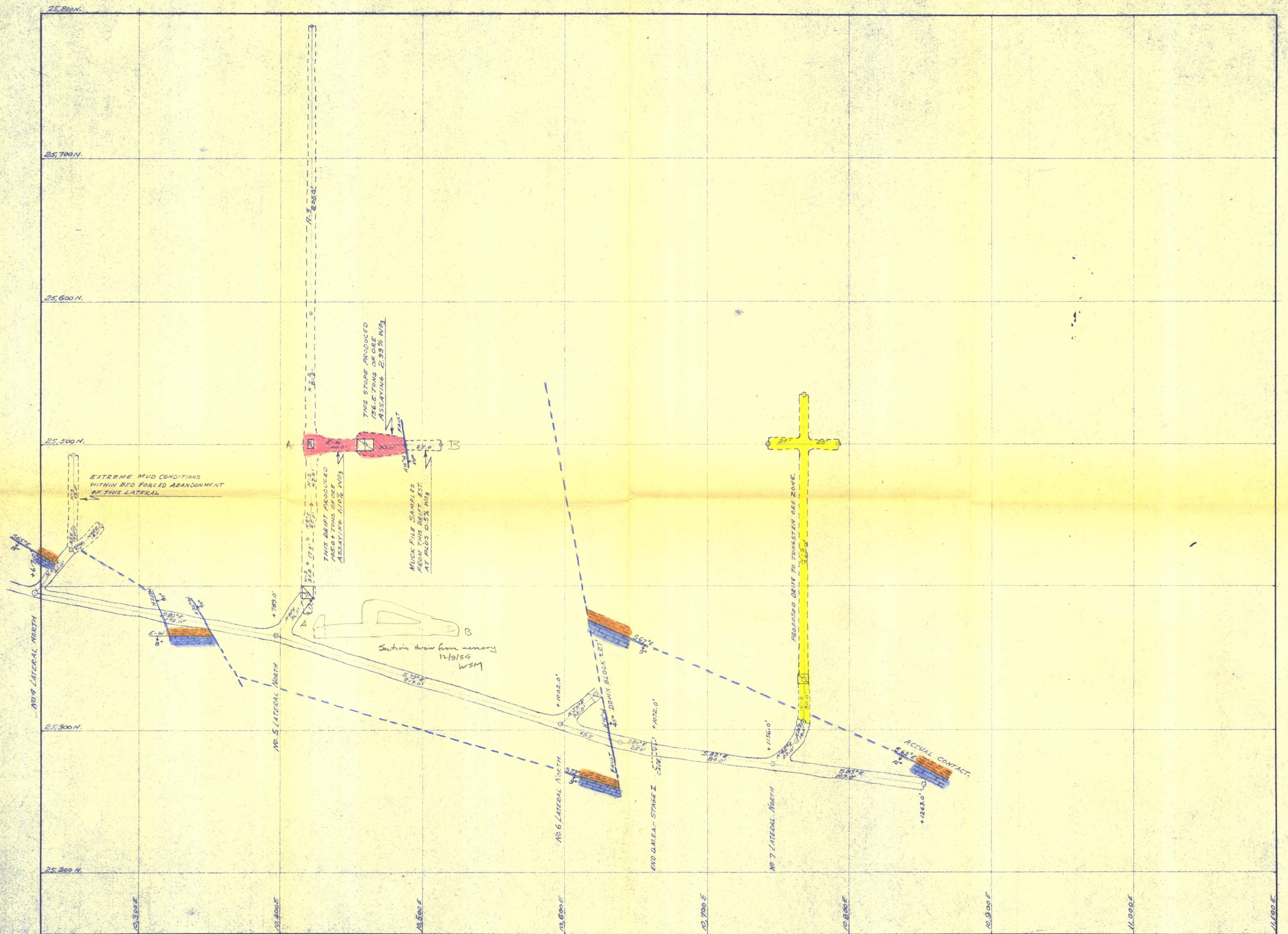
PLANT

D.M.E.A.-2082-TUNGSTEN
Contract I-Am-E248 Amend. No. 4
PROGRESS MAP ~ NORTH ZONE.

SCALE 1" = 20'

C-100

CESCO-1000M



REVISIONS	REVISIONS	REFERENCES	WORK		
			DRAWN	JACW	10/11/54
			TRACED		
			CHECKED		
			APPROVED		

MT. WHEELER MINES, INC.
218 Felt Building
SALT LAKE CITY, UTAH

PLANT

REQUESTED AMENDMENT TO
CONTRACT Idm-E248 (Amend. 5/29/54)
DMEA-2082-TUNGSTEN

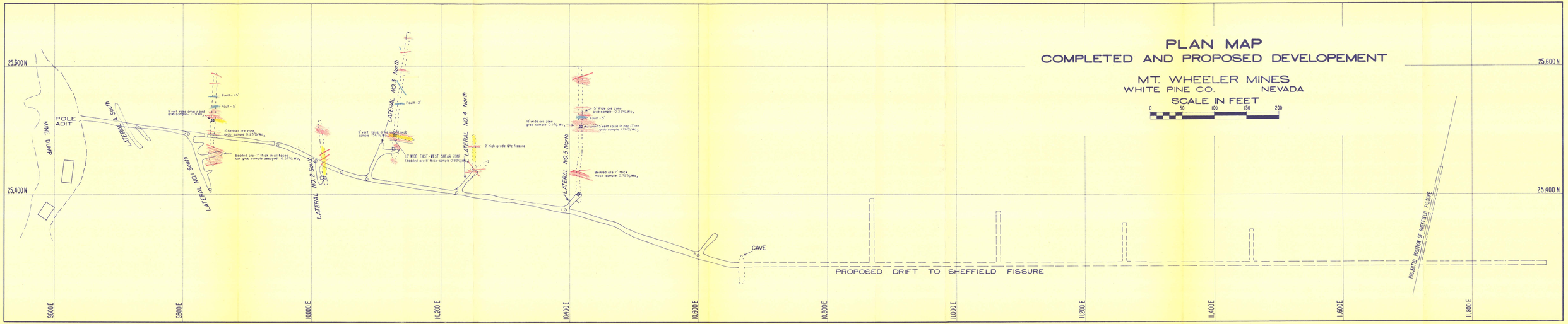
SCALE 1" = 40'

C-101

CESCO-10000H

POLE CANYON
LINE OF PERPENDICULAR LOG
CABIN
N
Approximate Scale
1" = 1,000'
LINCOLN CANYON
Elev. 7,910'

PLAN MAP
COMPLETED AND PROPOSED DEVELOPEMENT

MT. WHEELER MINES
WHITE PINE CO. NEVADA

SCALE IN FEET
0 50 100 150 200