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A REPORT ON THE BRADSHAW MINING LEASE

by [redacted]

May 27th 1975

for

[redacted]

Manager - Mining & Exploration

IMCO Services

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CONCLUSIONS AND RECOMMENDATIONS

The Pits 101, 102, and 103 have been diligently and adequately explored and outlined by drilling. A total of around 78760 tons of recoverable Barite at a shipping grade of 4.22 S.G. is available from these three pits, if blended in the correct proportions. The additional 5,100 tons of low grade Barite in pit 102 will require the further development for blending of approximately 14,300 tons of ore in Pit 101. This tonnage would be represented by a volume in the order of 5' x 145' x 145'.

The overall stripping ratio in Pit 101 is not excessively high and hence more Barite might be recovered in the North East part of the Pit 101 where the Barite is thinning out, but drilling was stopped because the local stripping ratio was getting too high. The decision to extend the presently determined pit limits would be dependent on the Cost-Revenue effect of a higher stripping ratio. It should be noted that small increases in the pit perimeter will result in a rapidly increasing stripping ratio due to the depth of overburden and the thinning out of the Barite.

The decision to expand the present pit limits should be made as soon as possible, since it is more difficult to push back an established pit slope than to start from scratch. Some drilling and assaying in the North-East corner of pit 101 would help, since there are some areas open to question and only one assay was taken from the 0 row of drill holes. The other smaller pits discussed in the geologist report show little promise. Drilling has been completed in Pit 104 and has indicated very

little in terms of grade and tonnage. Drilling is underway at Pit 106, but to date no significant results have been realized.

The emphasis on additional exploration should be in the area of Pit 101 where there is greater potential for a higher grade Barite than in any of the other pits. If more high grade Barite cannot be found, then there seems little point in looking for extensions in the Pit 102 and 103 area since there is no evidence of a shipping grade being available from these pits without blending with a higher grade Barite. It should be pointed out that the weighted average shipping grade in Pit 101 is only 4.283, which is not significantly higher than the shipping grade of 4.22. In addition, examination of the grade distribution for Pit 101 indicates a significant left skew to the distribution. This would indicate that the chances of the average grade being lower than 4.283 are quite high.

This leads to the conclusion that the known ore reserves on the Bradshaw lease are marginal, if the 4.22 shipping grade criteria is used, and additional expenditures should be considered with this in mind.

INTRODUCTION

This report is the result of a request by IMCO to evaluate the Exploration and Mining Plan for the Barite deposits in Pits 101, 102, 103 located on the Bradshaw Mining Lease. It was specifically requested that evaluation and commentary be made on the following items.

(1) Barite ore reserve in each pit, utilizing the drill logs provided.

(2) Weighted average (by thickness) specific gravity of the Barite ore reserves in each pit, utilizing the assay results provided.

(3) Overburden stripping required to each pit using a 60 degree slope.

(4) Blending Ratio of the Barite from the pits to achieve a 4.22 S.G. minimum product.

(5) Practicality of selectively mining direct shipping ore from pit 101.

(6) Whether each ore body has been defined to its economic limit by present drilling.

(7) Whether additional exploration and drilling is warranted.

Item 7 and part of Item 6 are covered by Mr. [redacted] whose separate report is attached. IMCO provided the following assumptions to be utilized in the calculations:

Assay results are contaminated 1 1/2%

Tonnage lost in mining is 3% of Barite.

Tonnage lost in jigging is 7% of Barite.

Dilution of direct shipping Barite is 0.05 S.G.

PROCEDURE

IMCO provided the drill logs for Pit Nos. 101, 102, and 103, together with the assay results. IMCO also provided plans showing drill hole locations and elevation, and cross sections, which had been utilized by IMCO staff to calculate ore reserves and stripping requirements.

PIT 101

This pit was the largest in potential tonnage and highest in grade of the three pits, hence more emphasis was given to evaluating the ore reserves of this pit.

Tonnage and Volume of Overburden

The drill hole data was taken directly from the drill logs, and cross sections were drawn for drill hole rows 3-16. These cross sections were utilized to calculate the ore reserves, interbedded waste and overburden volume. Two methods of weighting the cross section areas were utilized as a check. One method used an area of influence of 12.5 feet each side of the cross section. The other method used the average of the two cross sections with the distance between the sections as the area of influence. Although in this particular case, the results should theoretically not have differed by very much, this extra calculation was carried out as a check more than for any other reason. On one of the more complicated sections a planimeter was utilized to check the volume obtained by using geometric shapes. The respective volumes differed by less than 100 cubic feet, hence it was assumed that the geometric method

was sufficiently accurate. Since the IMCO staff had utilized the polygonal method, a separate calculation was made using this method. It was decided that a dip correction was not necessary for the Barite tonnage since the areas of influence were horizontal and not in the plane of the orebody. The overburden calculations assume a pit slope from the bottom of the Barite zone and do not include haulage roads.

Grade

All the assays were utilized to calculate the weighted average specific gravity. Histograms were drawn to illustrate the distribution of specific gravity and weighted average specific gravity.

Direct Shipping Ore

All the assays indicating a grade greater than 4.27 and a thickness greater than 3 feet were utilized in calculating direct shipping ore. An area of influence for each assay of 25' x 25' was utilized.

PIT 102

Tonnage and Volume of Overburden

Cross sections were made utilizing the drill logs provided. Since this pit was of medium size, two different calculations of the Barite ore reserves were made as a check, using the same cross sectional area of influence methods employed in calculating the ore reserves for Pit 101. The overburden calculations assume a pit slope from the bottom of the orebody.

Grade

All the assays were utilized to calculate the weighted average grade. A histogram was made to illustrate the specific gravity distribution.

PIT 103

Tonnage and Volume of Overburden

Cross sections were made utilizing the drill logs provided. Since this pit was of medium size, two different calculations of the Barite ore reserves were made as a check, using the same cross sectional area of influence methods employed in calculating the ore reserves for Pit 101. The overburden calculations assume a pit slope from the bottom of the orebody.

Grade

All the assays were utilized to calculate the weighted average grade. A Histogram was made to illustrate the specific gravity distribution.

SUMMARY OF RESULTS

	Pit 101	Pit 102	Pit 103	Total
Barite (tons)	61756	8946[1]	19859	91033
Interbedded waste (cu. yd.)	16785	1065	542	18392
Overburden (cu. yd.)	53832	9861	9059	72875
Recoverable Barite (10% loss)	55580	8051	17873	81929
Average S.G.	4.283	4.043	4.075	

[1]Does not include 1900 tons from gouging in areas around Pit 102.

Blend for Pit 101 and 103

45707 tons from Pit 101 to blend with 19859 tons from Pit 103.

2.3:1 Blending ratio.

Blend for Pit 101 and 102

Remaining tons from Pit 101 = 61756 - 45707 = 16049

16049 tons from Pit 101 to blend with 5712 tons from Pit 102.

2.8:1 Blending ratio.

This leaves 3234 tons of average 4.043 S.G. from Pit 102.

If the potential 1900 tons from gouging around Pit 102 is included this leaves approximately 5100 tons of 4.043 S.G. ore available for blending with higher grade ore. Assuming a 4.283 grade is available, 14329 tons from Pit 101 to blend with 5100 tons from Pit 102. In order to find an additional 14329 tons in Pit 101 an additional volume of approximately 5' x 145' x 145' of Barite will need to be developed.

SUMMARY OF RESULTS FOR PIT 101

	IMCO	Polygonal	[redacted] Cross Sec. 1	Cross Sec. 2	Avg.
Barite (cu. ft.)	461814	463310	463094	463094	463166
Barite (tons)	59976[1]	61775	61746	61746	61756
Interbedded waste (cu. yd.)	16749	17130	16630	16630	16785
Overburden (cu. yd.)	44647[1]		53555	54110	53832

[1] Not included in average.

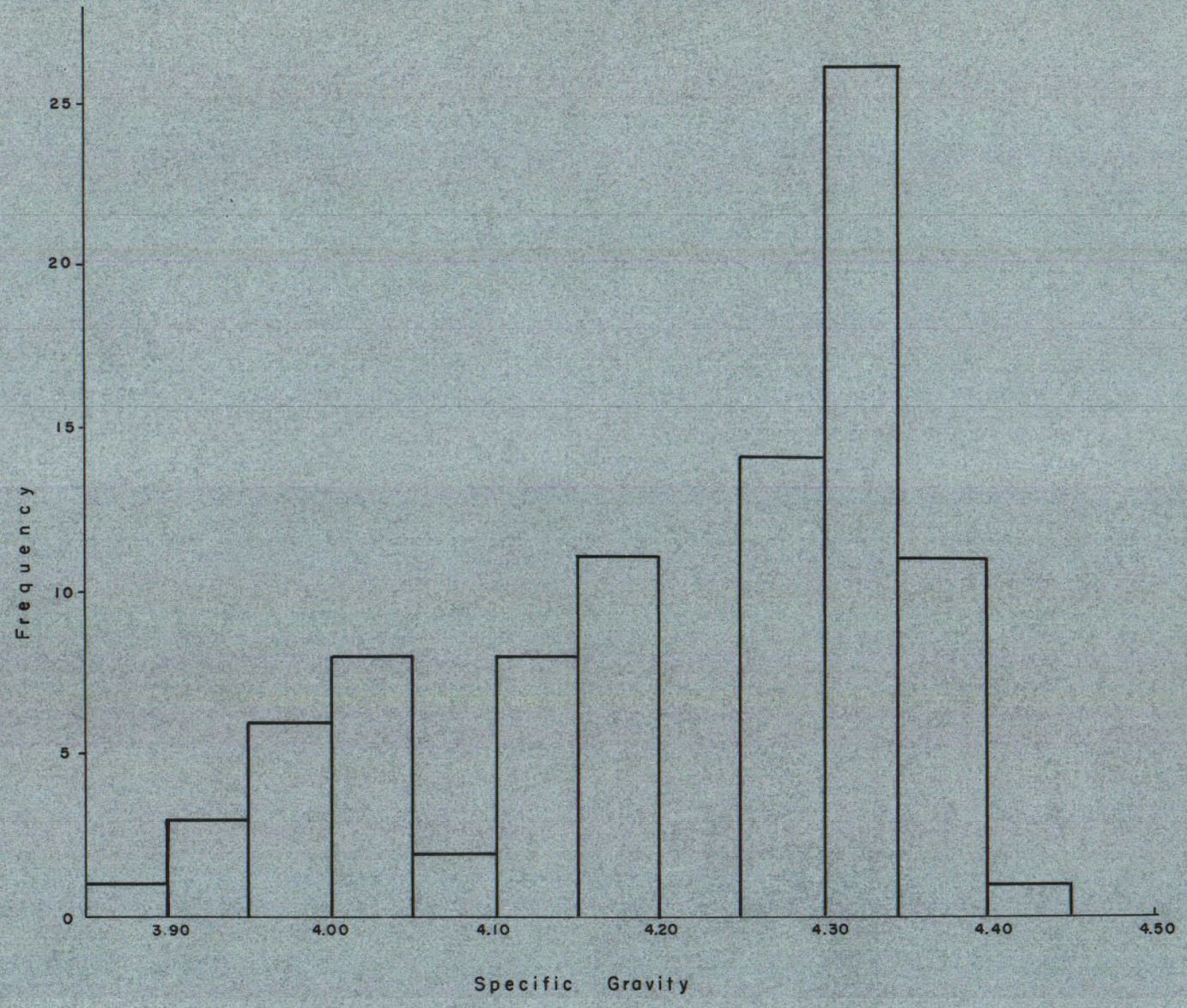
Weighted Average Specific Gravity:

$$= \frac{\Sigma \text{ Thickness x S.G.}}{\Sigma \text{ Thickness}} = \frac{986.03}{233.5} = 4.223 + 1\ 1/2\% \text{ dilution} = 4.283$$

	IMCO	[redacted]
Weighted Avg. S.G.	4.283	4.283
Tonnage factor (cu. ft/ton)	7.7 (using 4.20 S.G.)	7.5
Recoverable Barite (10% loss)	53978	55580
Stripping ratio (O/B cu.yd/ton)	0.74	0.97
Stripping Ratio (O/B + Interbedded waste cu.yd/ton)	1.02	1.14
Selectively mined Barite (tons)		7,270

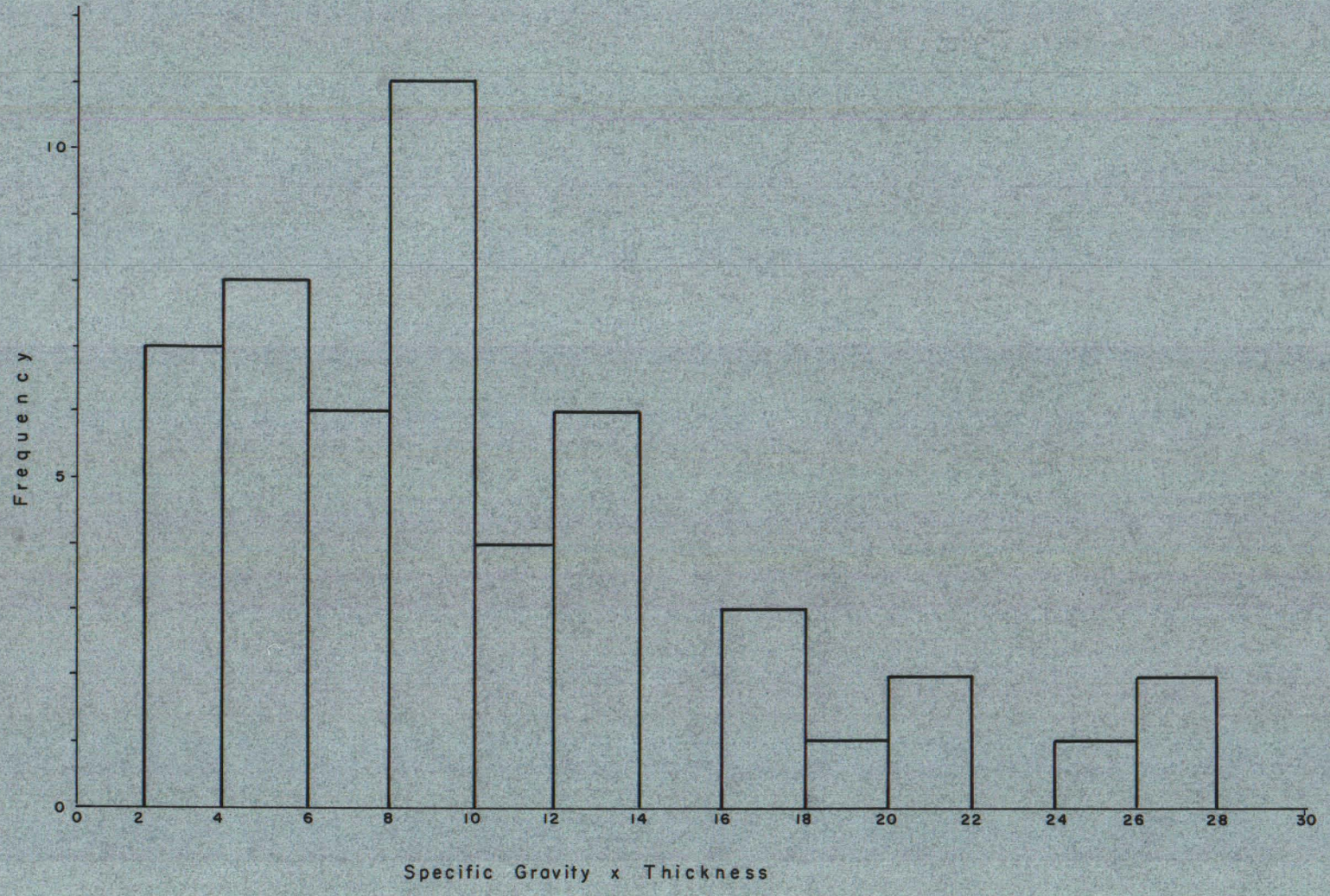
PIT 101

Histogram Of Specific Gravity



PIT 101

Histogram Of Weighted Average Specific Gravity



PIT 101

DIRECT SHIPPING ORE

Specific gravity greater than 4.27
Over 3 feet thick
Area of influence 25 feet x 25 feet

Hole No.	Footage		S.G.	Approx. Tonnage
K-16	53-57	(4)	4.372	335
	59-62	(3)	4.299	251
L-15	25-29	(4)	4.350	339
	33-36	(3)	4.300	252
L-16	36-39	(3)	4.296	251
M-10	13-17	(4)	4.299	335
M-11	41-46	(5)	4.320	421
	56-64	(5)	4.338	423
M-12	29-34	(5)	4.393	428
	41-46	(5)	4.296	419
	51-55	(4)	4.345	336
M-13	45-49	(4)	4.324	337
	49-55	(6)	4.379	512
M-14	36-39	(3)	4.353	255
M-16	79-82	(3)	4.336	254
N-12	59-62	(3)	4.430	259
	64-68.5	(4.5)	4.35	382
	71.5-75	(3.5)	4.438	303
N-13	43-46	(3)	4.376	256
N-15	52-55	(3)	4.348	255
N-16	71-76	(5)	4.274	417
O-10	72-75	(3)	4.274	250
	TOTAL TONS			7270

PIT 101

POLYGONAL CALCULATIONS

25 foot x 25 foot area of influence

Hole No.	Ore Thick	Barite Thick	Barite Vol.	Waste Thick	Waste Vol.	% Barite	Over-Burden Thick	Over-Burden Vol.
M-10	49.5	22	13750	27.5	17188	44	0	0
N-10	15.5	5.2	3250	10.3	6438	34	34	21250
M-11	50	23	14375	27	16875	46	14	8750
N-11	58	21	13125	37	23135	36	26	16250
M-12	57	33	20625	24	15000	58	15	9375
N-12	27	18	11250	9	5625	67	52	32500
O-12	29	11	6875	18	11250	38	46	28750
L-13	53	24	15000	29	18125	45	12	7500
M-13	45	29.5	18438	15.5	9688	66	15	9375
N-13	61	34	21250	27	16875	56	19.5	12188
K-14	32.5	15.5	9688	17	10625	48	17	10625
L-14	49	23	14275	26	16250	47	14	8750
M-14	61	42	26250	19	11875	69	15	9375
N-14	57	29.5	18438	27.5	17188	52	25	15625
K-15	33	11	6875	22	13750	33	26	16250
L-15	32	20	12500	12	7500	62	17	10625
M-15	16	9	5625	7	4375	56	45	28125
N-15	22.5	10.5	6562	12	7500	47	35	21875
O-10	8	4	2500	4	2500	50	60	37500
K-16	34	20.5	12812	13.5	8438	60	30	18750
L-16	25.5	12.5	7812	13	8125	49	33	20625
M-16	39.5	34	21250	5.5	3438	86	42.5	26562
N-16	19	14.5	9062	4.5	2812	76	57	35625
M-9	41.5	16	100000	25.5	15938	38	10	6250
N-9	51	8.5	5312	42.5	26562	17	19	11875
M-8	29	11	6875	18	11250	38	6	3750
M-7	28	17	10625	11	6875	61	1	625
N-7	22	11	6875	11	6875	50	21	13125
O-7	15.5	12.5	7812	3	1875	81	50	31250
M-6	36.5	21.5	13438	15	9375	59	0	0
N-6	22	10.5	6562	11.5	7188	48	18	11250
O-6	14	4.5	2812	9.5	5938	32	47.5	29688
M-5	13	8	5000	5	3125	62	17.5	10938
N-5	40.5	17	10625	23.5	14688	42	5.5	3438
O-5	36	14.5	9062	21.5	13438	40	22	13750
M-4	20	12	7500	8	5000	60	13	8125
N-4	19	8.5	5312	10.5	6562	45	10	6250
O-4	11.5	6	3750	5.5	3438	52	47.5	29688
O-3	55	17.5	10938	37.5	23438	32	3.5	2188
L-6	10	7	6300	3	2700	70	4	3600
L-8	7.5	5	6250	2.5	3125	67	1	1250
L-10	12	8.5	10625	3.5	4375	71	0	0
L-12	26	8	7200	18	16200	31	0	0
K-13	22	12.5	7812	9.5	5938	57	8	5000
O-14	40	17.5	10938	22.5	14062	44	35.5	22188
Total Vol. ft^3			463310		462530			620478

PIT 101 - Polygonal Calculations (continued)

Barite 463310 ft^3 @ 7.5 ft^3/ton = 61775 tons

Waste 462530 ft^3 = 17130 yd^3

Overburden 620478 ft^3 = 22980 yd^3

no allowance for surface irregularities

Tonnage factor (Pit 101) = 2000/(4.28 x 62.4) = 7.5 ft^3/ton

PIT 101

CROSS SECTION NO. 1 CALCULATIONS

Section	Vol. Overburden	Vol. Barite	Vol. Waste
3	52812.5	10937.5	23437.5
4	74637.5	16562.5	13281.25
5	59700.0	24687.5	30937.5
6	72418.75	27187.5	24375.0
7	78725.0	28515.625	18125.0
8	12812.5	9218.75	12812.5
9	53687.5	18906.25	31953.125
10	93800.0	24812.5	28312.5
11	76187.5	31875.0	45468.75
12	115250.0	43203.125	43125.0
13	87731.25	62500.0	50625.0
14	126031.25	79687.5	70625.0
15	125668.75	34062.5	33125.0
16	172962.5	50937.5	22812.5
North	168145.0	--	--
South	75417.0	--	--
	1445987 ft^3	463093.75 ft^3	449015.625 ft^3

Barite 463093.75 ft^3 @ 7.5 ft^3/ton = 61746 tons

Overburden 1445987 ft^3 = 53555 yd^3

Interbedded Waste 449015 ft^3 = 16630 yd^3

PIT 101

CROSS SECTION 2 CALCULATIONS

Section	Area O/B	Avg. Area O/B	Vol. O/B	Area Barite	Avg. Area Barite	Vol. Barite	Area Waste	Avg. Area Waste	Vol. Waste
3	2112.5		26406.25	437.5		5468.75	937.5		11718.75
		2549	63725.0		550	13750.0		734.375	18359.375
4	2985.5			662.5			531.25		
		2686.75	67168.75		825	20625.0		844.375	22109.375
5	2388			987.5			1237.5		
		2642.375	66059.375		1037.5	25937.5		1106.25	27656.25
6	2896.75			1087.5			975.0		
		3022.875	75571.875		1114.06	27851.56		850	21250.0
7	3149			1140.625			725.0		
		1830.75	45768.75		754.69	18867.19		618.75	15468.75
8	512.5			368.75			512.5		
		1330	33250.0		562.5	14062.5		895.31	22382.81
9	2147.5			756.25			1278.125		
		2949.75	73743		874.375	21859		1205.31	30132.81
10	3752			992.5			1132.5		
		3399.75	84993.75		1133.75	28343.75		1475.625	36890.625
11	3047.5			1275			1818.75		
		3828.75	95718.75		1501.56	37539.06		1771.875	44296.875
12	4610			1728.125			1725		
		4059.625	101490.625		2114.06	52851.56		1875	46875
13	3509.25			2500			2025		
		4575.25	114381.25		2843.75	71093.75		2425	60625
14	5641.25			3187.5			2825		
		5334	133350.0		2275	56875.0		2075	51875
15	5026.75			1362.5			1325		
		5972.625	149315.625		1700	42500.0		1118.75	27968.75
16	6918.5		86481.25	2037.5		25468.75	912.5		11406.25

PIT 101

CALCULATIONS (continued)

Section	Vol. O/B	Vol. Barite	Vol. Waste
North	168145		
South	75417		
Total	1460987 ft^3	463093.75 ft^3	949015.625 ft^3

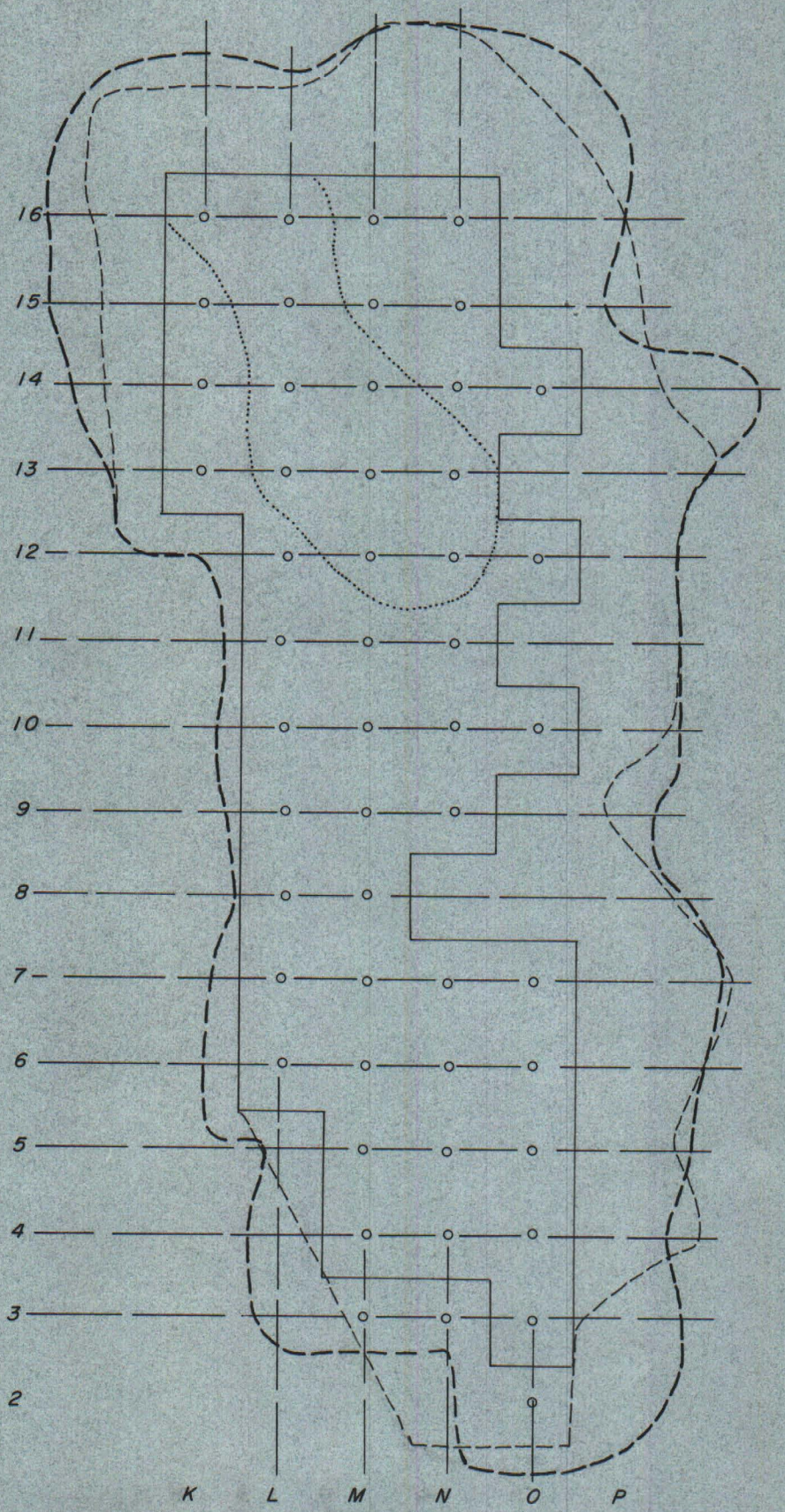
Barite 463093.75 ft^3 @ 7.5 ft^3/ton = 61746

Overburden 1460987 ft^3 = 54110 yd^3

Waste 449018 ft^3 = 16630 yd^3

PIT 101

Sketch Of Pit Limits



MAGNETIC NORTH

LEGEND

- Selected Drill Holes
- Pit Limit
- IMCO Pit Limit
- Area Of Ore Reserve Calculations
- 4 — Cross Section
- Selective Mining Area

SCALE

1" = 50'

LEGEND OF CROSS SECTIONS

DRILL HOLE  Drill Hole depth not to scale

SCALE 1 inch - 25 feet

TOP OF BARITE ZONE 

BLOCK DIVISION LINES

Elevation is based on Collar elevation of drill holes indicated in plans provided by IMCO

IMPORTANT NOTE

Please note that the block division between Barite and Waste below the top of the Barite Zone is a diagramatic representation of the relative thickness of Barite and interbedded waste and bears no relation to the actual geologic horizon.

PIT 101

SECTION 3

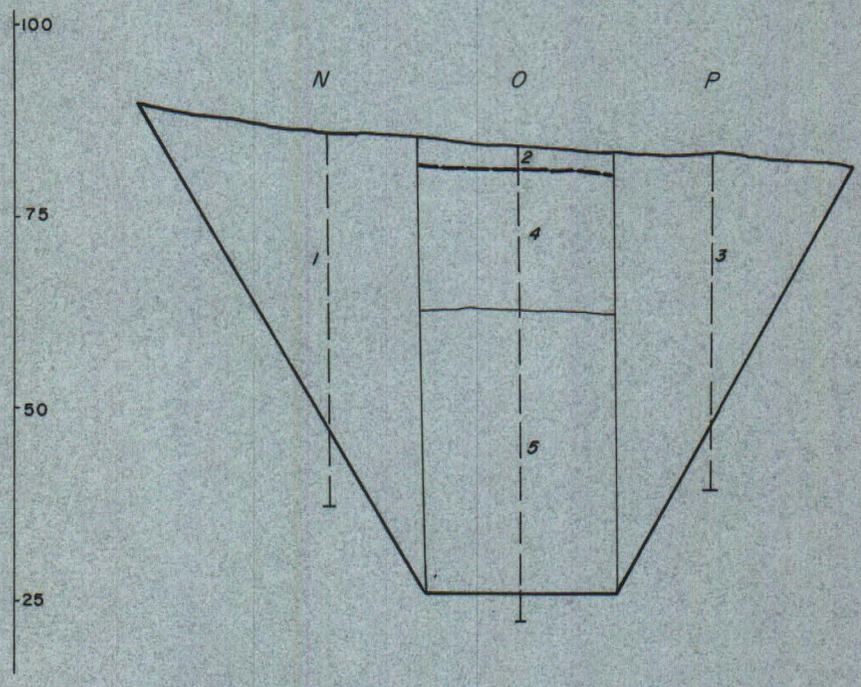
Block No.	Overburden	Blk. No.	Barite	Blk. No.	Waste
1	0.5(60x35) = 1050	4	17.5 x 25 = 437.5 ft^2	5	37.5 x 25 = 937.5 ft^2
3	0.5(60x32.5) = 975		x 25 = 10937.5 ft^3		x 25 = 23437.5 ft^3
2	3.5 x 25 = 87.5				
	2112.5 ft^2				
	x 25 = 52812.5 ft^3				

SECTION 4

Block No.	Overburden	Blk. No.	Barite	Blk. No.	Waste
1	35 x 21 x 0.5 = 367.5	7	12 x 12.5 = 150	11	8 x 12.5 = 100
2	13 x 12.5 = 162.5	8	$\frac{12+8.5}{2}$ x 25 = 256.25	12	$\frac{8+10.5}{2}$ x 25 = 231.25
3	$\frac{13+10}{2}$ x 25 = 287.5	9	$\frac{8.5+6}{2}$ x 25 = 181.25	13	$\frac{10.5+5.5}{2}$ x 25 = 200
4	$\frac{10+47.5}{2}$ x 25 = 718.75	10	6 x 12.5 = 75	14	5.5 x 12.5 = 68.75
5	59 x 29 x 0.5 = 855.5		662.5 ft^2		531.25 ft^2
6	47.5 x 12.5 = 593.75		x 25 = 16562.5 ft^3		x 25 = 13281.25 ft^3
	2985.5 ft^2				
	x 25 = 74637.5 ft^3				

PIT 101

Row 3



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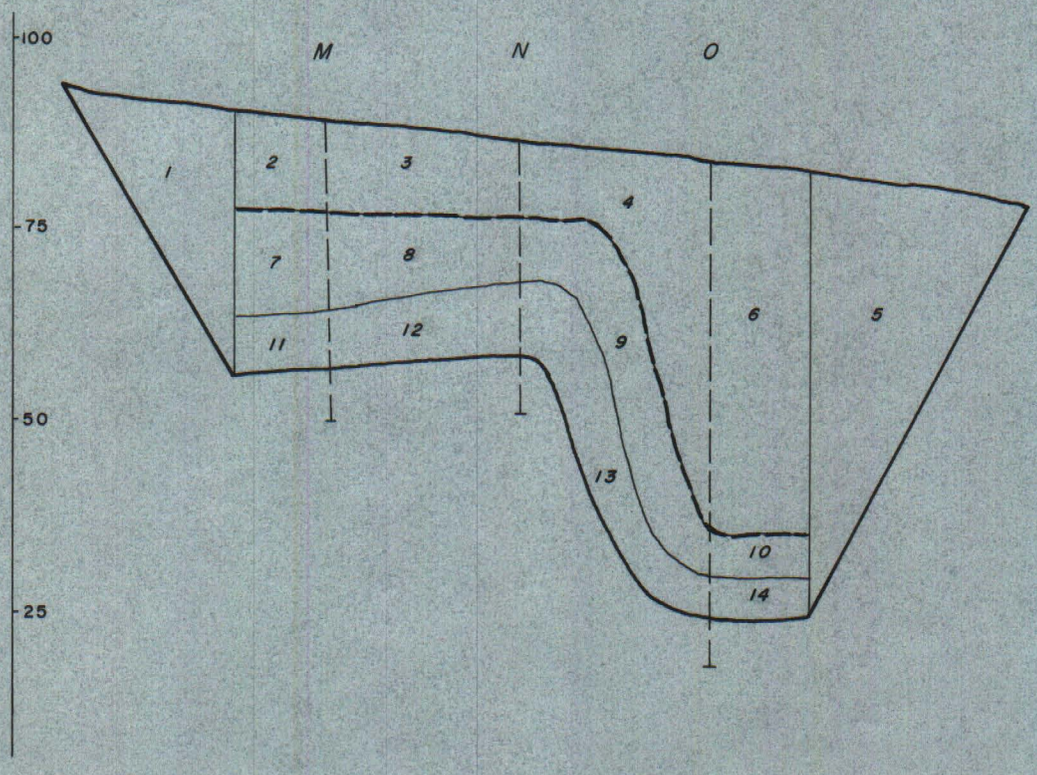


PIT 101

SECTION 5

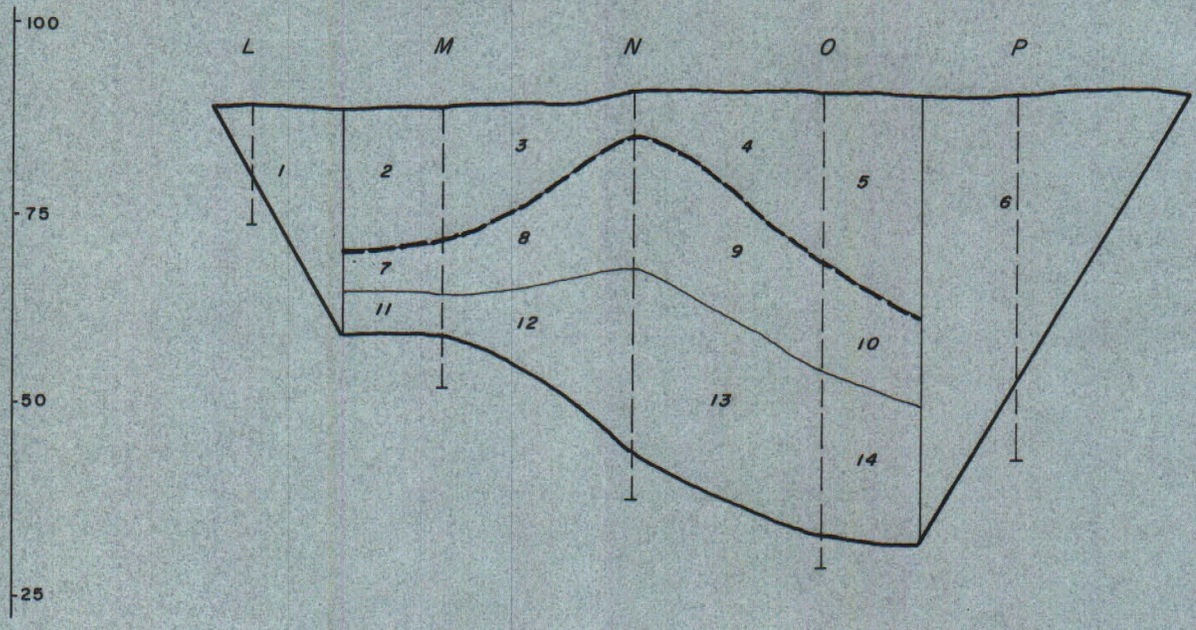
Block No.	Overburden	Blk. No.	Barite	Blk. No.	Waste
1	$17.5 \times 30 \times 0.5 = 262.5$	7	$8 \times 12.5 = 100$	11	$5 \times 12.5 = 62.5$
2	$17.5 \times 12.5 = 218.75$	8	$\frac{8+17}{2} \times 25 = 312.5$	12	$\frac{5+23.5}{2} \times 25 = 356.25$
3	$\frac{17.5+5.5}{2} \times 25 = 287.5$	9	$\frac{17+14.5}{2} \times 25 = 393.75$	13	$\frac{23.5+21.5}{2} \times 25 = 550$
4	$\frac{5.5+22}{2} \times 25 = 343.75$	10	$14.5 \times 12.5 = 181.25$	14	$21.5 \times 12.5 = 268.75$
5	$22 \times 12.5 = 275$		$987.5\ ft^2$		$1237.5\ ft^2$
6	$58 \times 34.5 \times 0.5 = 1000.5$		$\times 25 = 24687.5\ ft^3$		$\times 25 = 30937.5\ ft^3$
	$2388\ ft^2$				
	$\times 25 = 59700\ ft^3$				

SECTION 6

Block No.	Overburden	Blk. No.	Barite	Blk. No.	Waste
1	$14 \times 8 \times 0.5 = 56$	8	$7 \times 12.5 = 87.5$	13	$3 \times 12.5 = 37.5$
2	$12.5 \times 4 = 50$	9	$\frac{7+21.5}{2} \times 25 = 356.25$	14	$\frac{3+15}{2} \times 25 = 225.0$
3	$4 \times 25 \times 0.5 = 50$	10	$\frac{21.5+10.5}{2} \times 25 = 400$	15	$\frac{15+11.5}{2} \times 25 = 331.25$
4	$18 \times 25 \times 0.5 = 225$	11	$\frac{10.5+4.5}{2} \times 25 = 187.5$	16	$\frac{11.5+9.5}{2} \times 25 = 262.5$
5	$\frac{18+47.5}{2} \times 25 = 815$	12	$4.5 \times 12.5 = 56.25$	17	$9.5 \times 12.5 = 118.75$
6	$47.5 \times 12.5 = 593.75$		$1087.5\ ft^2$		$975.0\ ft^2$
7	$61.5 \times 36 \times 0.5 = 1107$		$\times 25 = 27187.5\ ft^3$		$\times 25 = 24375.0\ ft^3$
	$2896.75\ ft^2$				
	$\times 25 = 72418.75\ ft^3$				

PIT 101

Row 5



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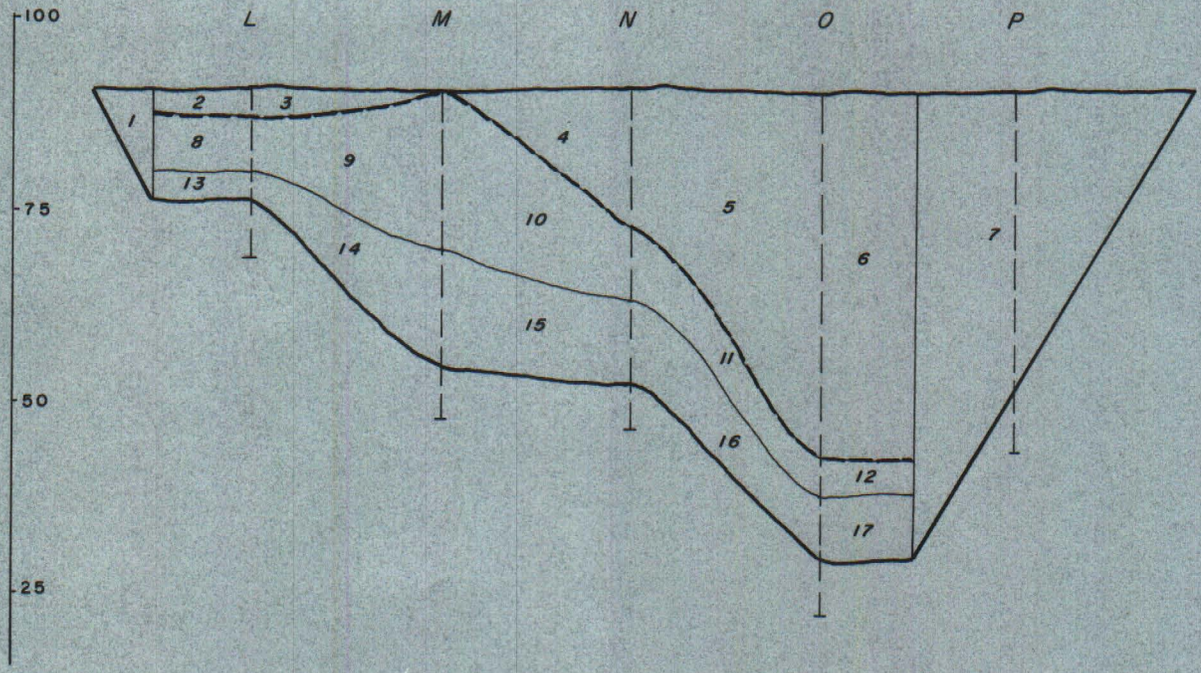


PIT 101

SECTION 7

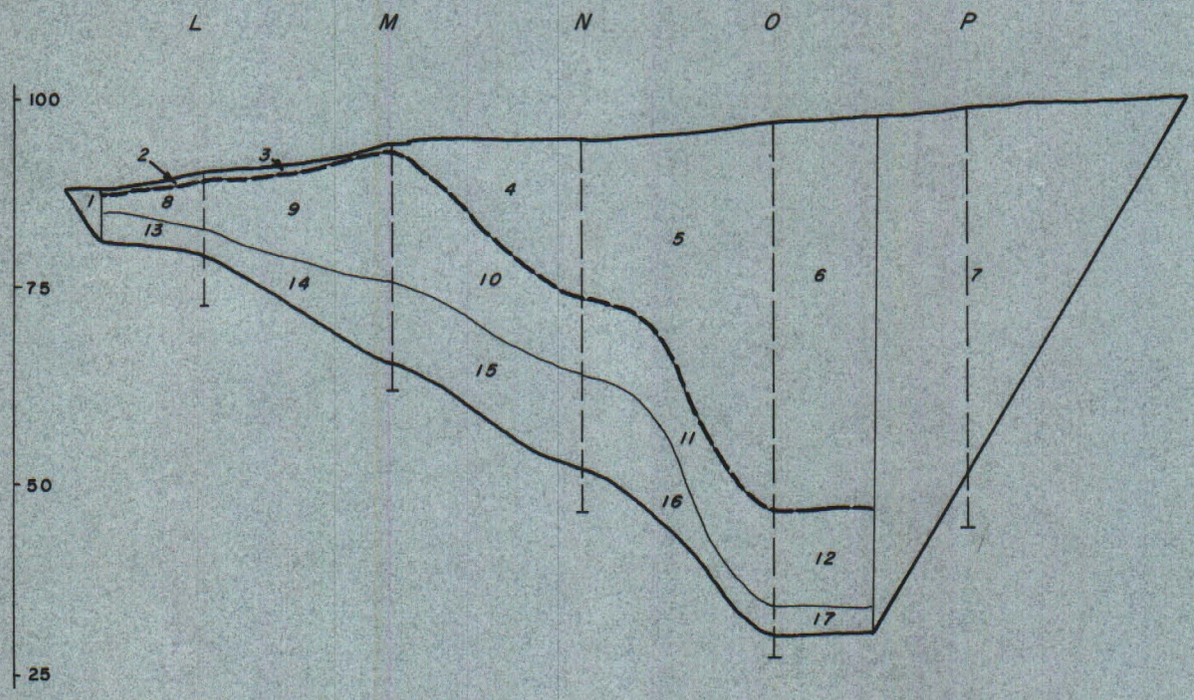
Block No.	Overburden		Blk. No.	Barite		Blk. No.	Waste	
1	7 x 4 x 0.5	= 14	8	$\frac{6+2.5}{2}$ x 12.5	= 53.125	13	4 x 12.5	= 50
2	1 x 12.5	= 12.5	9	$\frac{6+17}{2}$ x 25	= 287.5	14	$\frac{4+11}{2}$ x 25	= 187.5
3	1 x 25	= 25	10	$\frac{17+11}{2}$ x 25	= 350	15	11 x 25	= 275
4	$\frac{1+21}{2}$ x 25	= 275	11	$\frac{11+12.5}{2}$ x 25	= 293.75	16	$\frac{11+3}{2}$ x 25	= 175
5	$\frac{20+50}{2}$ x 25	= 887.5	12	12.5 x 12.5	= 156.25	17	3 x 12.5	37.5
6	50 x 125	= 625			1140.625 ft^2			725 ft^2
7	65.5 x 40 x 0.5	= 1310			x 25 = 28515.625 ft^3			x 25 = 18125 ft^3
		3149 ft^2						
	x 25	= 78725 ft^3						

SECTION 8

Block No.	Overburden		Blk. No.	Barite		Blk. No.	Waste	
1	$\frac{1+6}{2}$ x 25	= 87.5	4	5 x 12.5 x 0.5	= 31.25	7	2.5 x 12.5	= 31.25
2	6 x 12.5	= 75	5	$\frac{5+11}{2}$ x 25	= 200.0	8	$\frac{2.5+18}{2}$ x 25	= 256.25
3	35 x 20 x 0.5	= 350	6	11 x 12.5	= 137.5	9	18 x 12.5	= 225.
		512.5 ft^2			368.75 ft^2			512.5 ft^2
	x 25	= 12812.5 ft^3		x 25	= 9218.75 ft^3		x 25	= 12812.5 ft^3

PIT 101

Row 7



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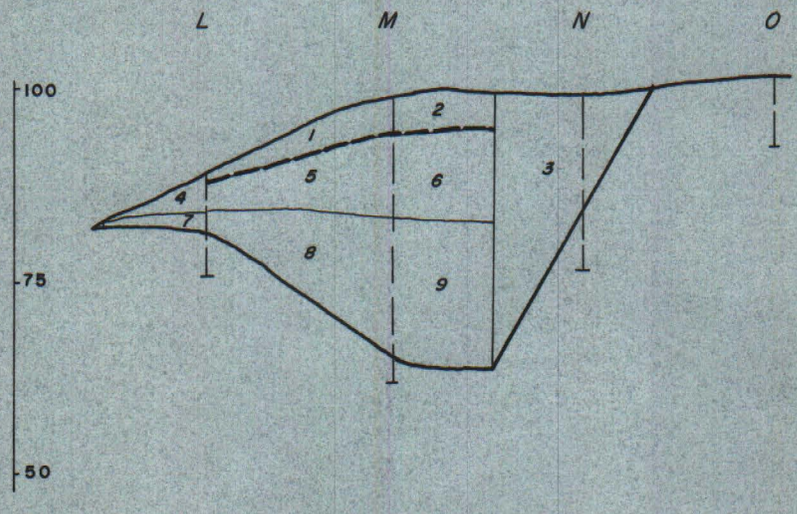


PIT 101

SECTION 9

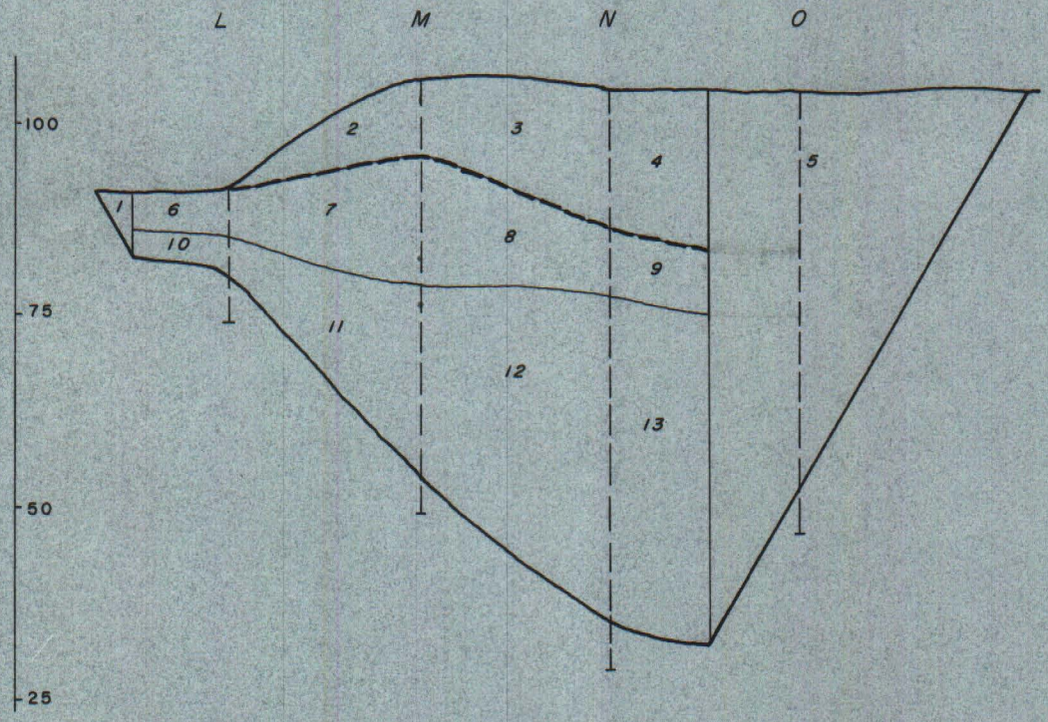
Block No.	Overburden	Blk. No.	Barite	Blk. No.	Waste
1	$9 \times 5 \times 0.5 = 22.5$	6	$\frac{5+6}{2} \times 12.5 = 68.75$	10	$\frac{4+4.5}{2} \times 12.5 = 53.125$
2	$10 \times 25 \times 0.5 = 125.$	7	$\frac{6+16}{2} \times 25 = 275.$	11	$\frac{4.5+25.5}{2} \times 25 = 375.$
3	$\frac{10+19}{2} \times 25 = 362.5$	8	$\frac{16+8.5}{2} \times 25 = 306.25$	12	$\frac{25.5+42.5}{2} \times 25 = 850$
4	$19 \times 12.5 = 237.5$	9	$8.5 \times 12.5 = 106.25$	13	$42.5 \times 12.5 = 531.25$
5	$70 \times 40 \times 0.5 = 1400$		$756.25\ ft^2$		$1278.125\ ft^2$
	$2147.5\ ft^2$		$\times 25 = 18906.25\ ft^3$		$\times 25 = 31953.125\ ft^3$
	$\times 25 = 53687.5\ ft^3$				

SECTION 10

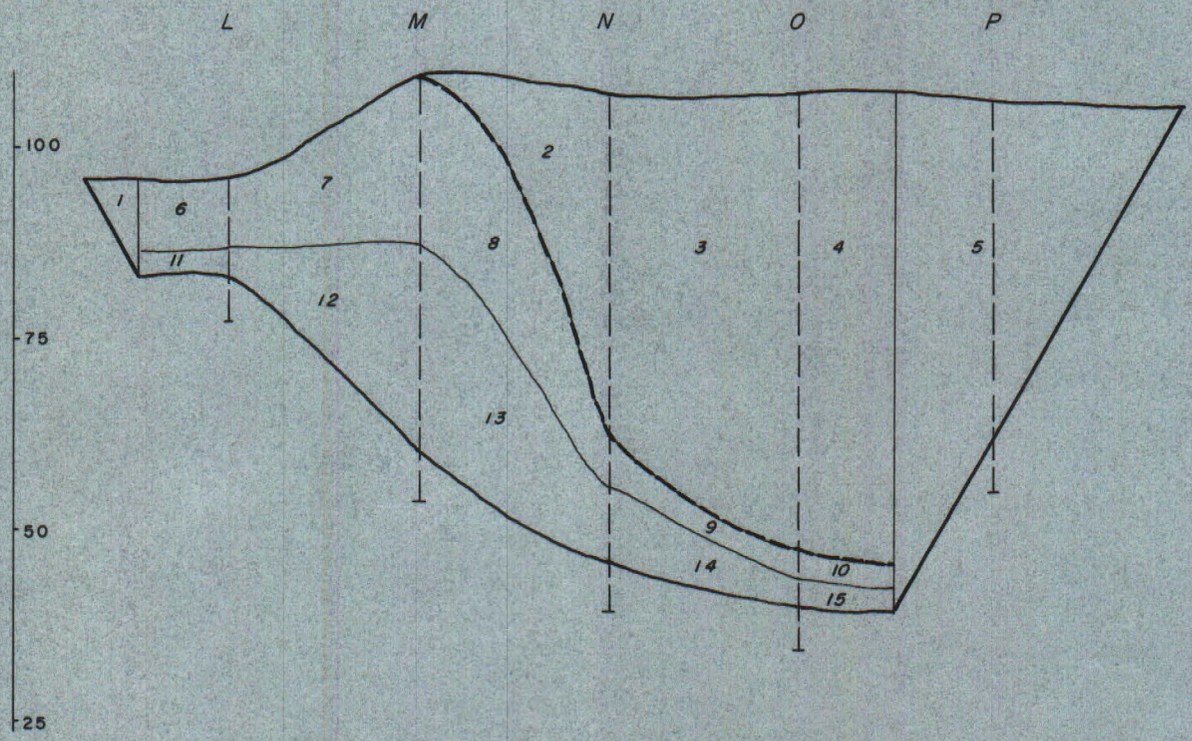
Block No.	Overburden	Blk. No.	Barite	Blk. No.	Waste
1	$12 \times 7 \times 0.5 = 42$	6	$8.5 \times 12.5 = 106.25$	11	$3.5 \times 12.5 = 43.75$
2	$34 \times 25 \times 0.5 = 425$	7	$\frac{8.5+22}{2} \times 25 = 321.25$	12	$\frac{3.5+27.5}{2} \times 25 = 387.5$
3	$\frac{34+60}{2} \times 25 = 1175$	8	$\frac{22+5.2}{2} \times 25 = 340$	13	$\frac{27.5+10.3}{2} \times 25 = 472.5$
4	$60 \times 12.5 = 750$	9	$\frac{5.2+4}{2} \times 25 = 115$	14	$\frac{10.3+4}{2} \times 25 = 178.75$
5	$68 \times 40 \times 0.5 = 1360$	10	$4 \times 12.5 = 50$	15	$4 \times 12.5 = 50$
	$3752\ ft^2$		$992.5\ ft^2$		$1132.5\ ft^2$
	$\times 25 = 93800\ ft^3$		$\times 25 = 24812.5\ ft^3$		$\times 25 = 28312.5\ ft^3$

PIT 101

Row 9



Row 10



PIT 101

SECTION 11

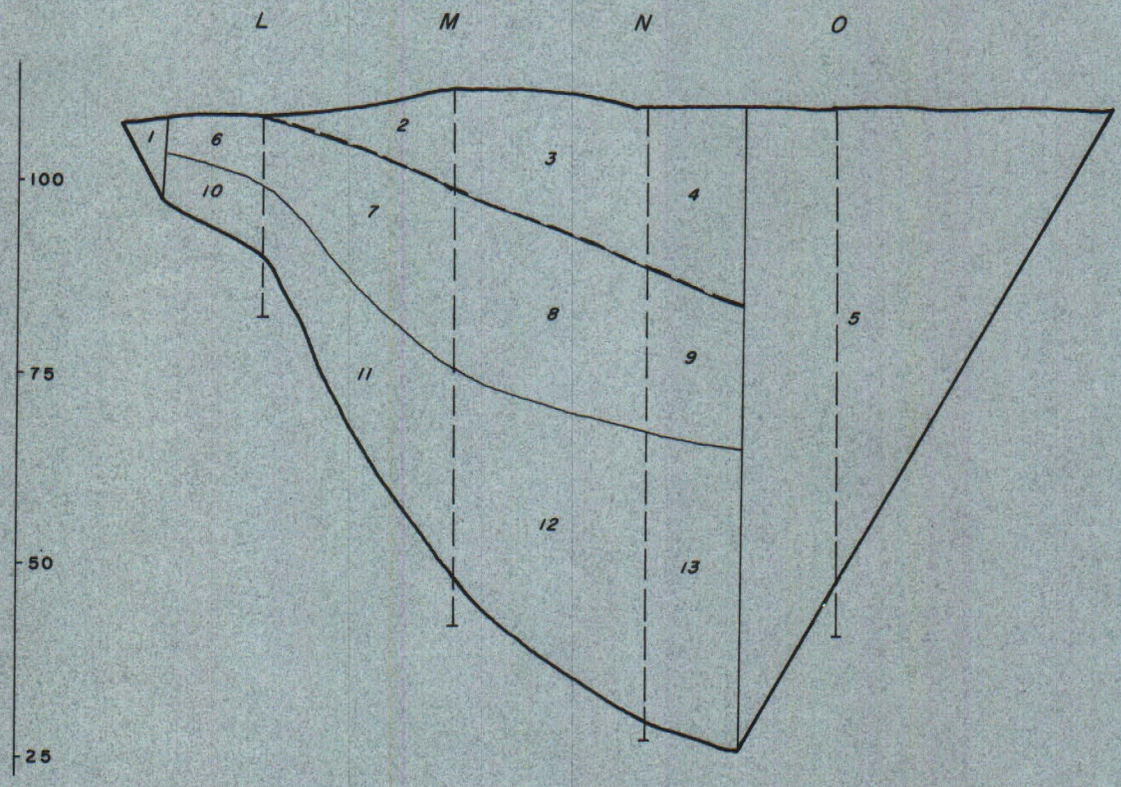
Block No.	Overburden	Blk. No.	Barite	Blk. No.	Waste
1	$10.5 \times 6 \times 0.5 = 31.5$	6	$\frac{4+8}{2} \times 12.5 = 75$	10	$\frac{6.5+9.5}{2} \times 12.5 = 100$
2	$14 \times 25 \times 0.5 = 175$	7	$\frac{8+23}{2} \times 25 = 387.5$	11	$\frac{9.5+27}{2} \times 25 = 456.25$
3	$\frac{14+26}{2} \times 25 = 500$	8	$\frac{23+21}{2} \times 25 = 550$	12	$\frac{27+37}{2} \times 25 = 800$
4	$26 \times 12.5 = 325$	9	$21 \times 12.5 = 262.5$	13	$37 \times 12.5 = 462.5$
5	$84 \times 48 \times 0.5 = 2016$		1275. ft^2		1818.75 ft^2
	3047.5 ft^2		$\times 25 = 31875$ ft^3		$\times 25 = 45468.75$ ft^3
	$\times 25 = 76187.5$ ft^3				

SECTION 12

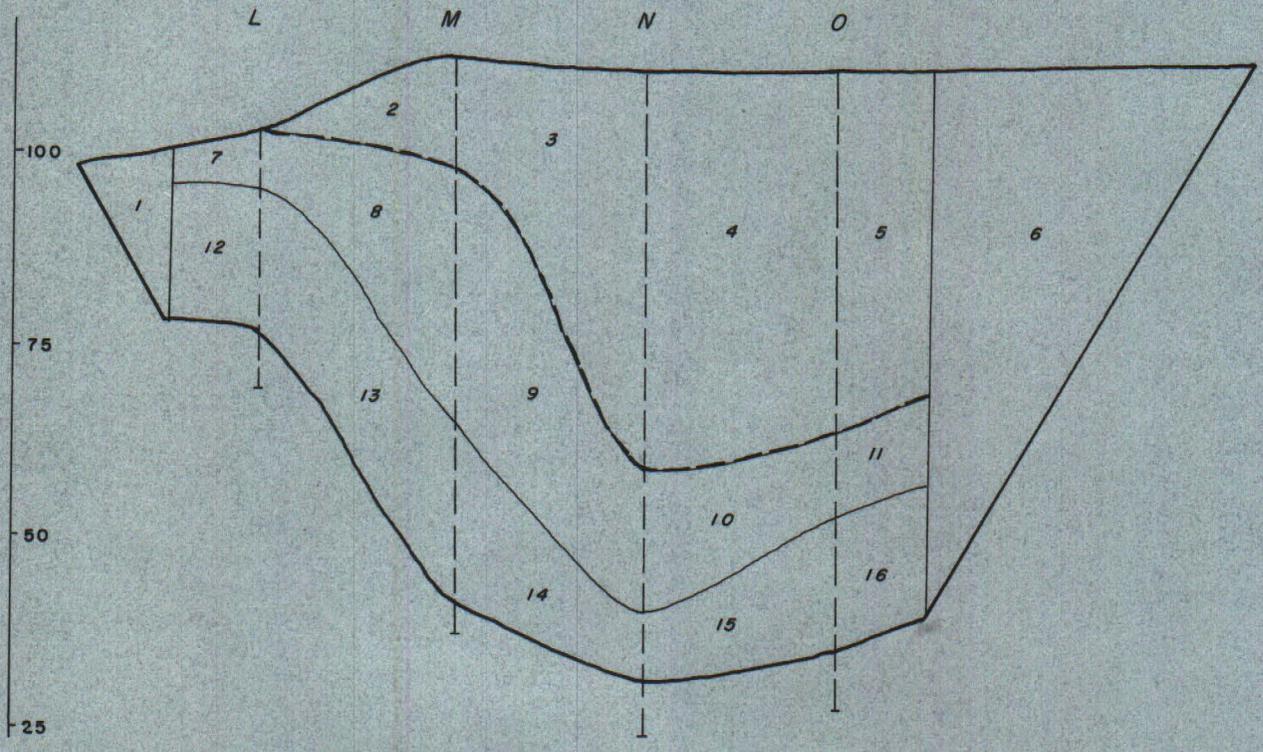
Block No.	Overburden	Blk No.	Barite	Blk No.	Waste
1	$22.5 \times 12 \times 0.5 = 135$	7	$\frac{4.5+8}{2} \times 12.5 = 78.125$	12	$18 \times 12.5 = 225$
2	$15 \times 25 \times 0.5 = 187.5$	8	$\frac{8+33}{2} \times 25 = 512.5$	13	$\frac{18+24}{2} \times 25 = 525$
3	$\frac{15+52}{2} \times 25 = 837.5$	9	$\frac{33+18}{2} \times 25 = 637.5$	14	$\frac{24+9}{2} \times 25 = 412.5$
4	$\frac{52+46}{2} \times 25 = 1225$	10	$\frac{18+11}{2} \times 25 = 362.5$	15	$\frac{9+18}{2} \times 25 = 337.5$
5	$46 \times 12.5 = 575$	11	$11 \times 12.5 = 137.5$	16	$18 \times 12.5 = 225$
6	$75 \times 44 \times 0.5 = 1650$		1728.125 ft^2		1725 ft^2
	4610 ft^2		$\times 25 = 43203.125$ ft^3		$\times 25 = 43125$ ft^3
	$\times 25 = 115250$ ft^3				

PIT 101

Row 11



Row 12



PIT 101

SECTION 13

Block No.	Overburden
1	30 x 17 x 0.5 = 255
2	8 x 12.5 = 100
3	$\frac{8+12}{2}$ x 25 = 250
4	$\frac{12+15}{2}$ x 25 = 337.5
5	$\frac{15+19.5}{2}$ x 25 = 431.25
6	19.5 x 12.5 = 243.75
7	80.5 x 47 x 0.5 = 1891.75
	3509.25 ft^2
	x 25 = 87731.25 ft^3

Blk No.	Barite
8	12.5 x 12.5 = 156.25
9	$\frac{12.5+24}{2}$ x 25 = 456.25
10	$\frac{24+29.5}{2}$ x 25 = 668.75
11	$\frac{29.5+34}{2}$ x 25 = 793.75
12	34 x 12.5 = 425
	2500 ft^2
	x 25 = 62500 ft^3

Blk No.	Waste
13	9.5 x 12.5 = 118.75
14	$\frac{9.5+29}{2}$ x 25 = 481.25
15	$\frac{29+15.5}{2}$ x 25 = 556.25
16	$\frac{15.5+27}{2}$ x 25 = 531.25
17	27 x 12.5 = 337.5
	2025. ft^2
	x 25 = 50625 ft^3

SECTION 14

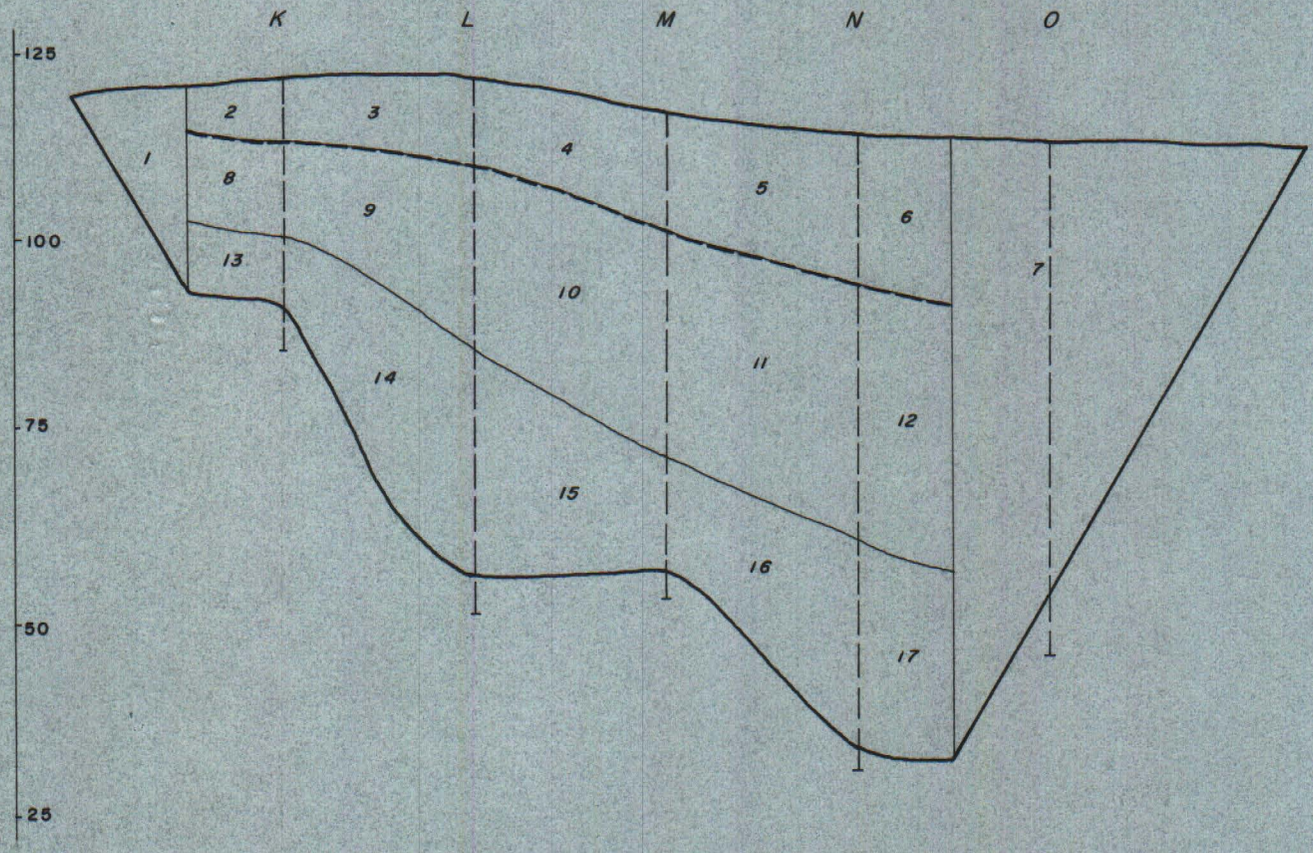
Block No.	Overburden
1	49.5 x 29 x 0.5 = 717.75
2	17 x 12.5 = 212.5
3	$\frac{17+14}{2}$ x 25 = 387.5
4	$\frac{14+15}{2}$ x 25 = 362.5
5	$\frac{15+25}{2}$ x 25 = 500
6	$\frac{25+35.5}{2}$ x 25 = 756.25
7	35.5 x 12.5 = 443.75
8	75.5 x 44 x 0.5 = 1661
	5641.25 ft^2
	x 25 = 126031.25 ft^3

Blk No.	Barite
9	15.5 x 12.5 = 193.75
10	$\frac{15.5+23}{2}$ x 25 = 481.25
11	$\frac{23+42}{2}$ x 25 = 812.5
12	$\frac{42+29.5}{2}$ x 25 = 893.75
13	$\frac{29.5+17.5}{2}$ x 25 = 587.5
14	17.5 x 12.5 = 218.75
	3187.5 ft^2
	x 25 = 79687.5 ft^3

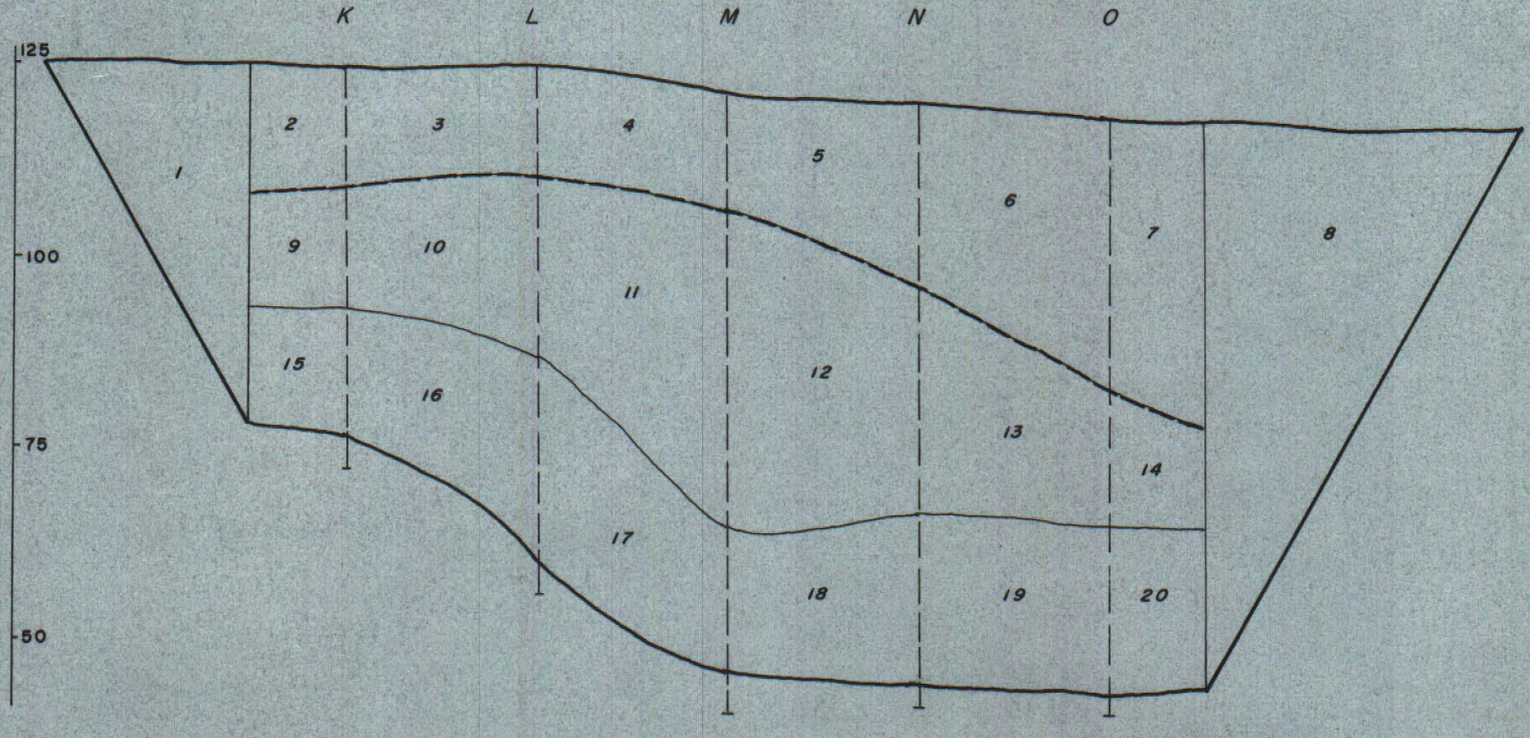
Blk No.	Waste
15	17 x 12.5 = 212.5
16	$\frac{17+27}{2}$ x 25 = 550
17	$\frac{27+19}{2}$ x 25 = 575
18	$\frac{19+27.5}{2}$ x 25 = 581.25
19	$\frac{27.5+22.5}{2}$ x 25 = 625
20	22.5 x 12.5 = 281.25
	2825 ft^2
	x 25 = 70625 ft^3

PIT 101

Row 13



Row 14



PIT 101

SECTION 15

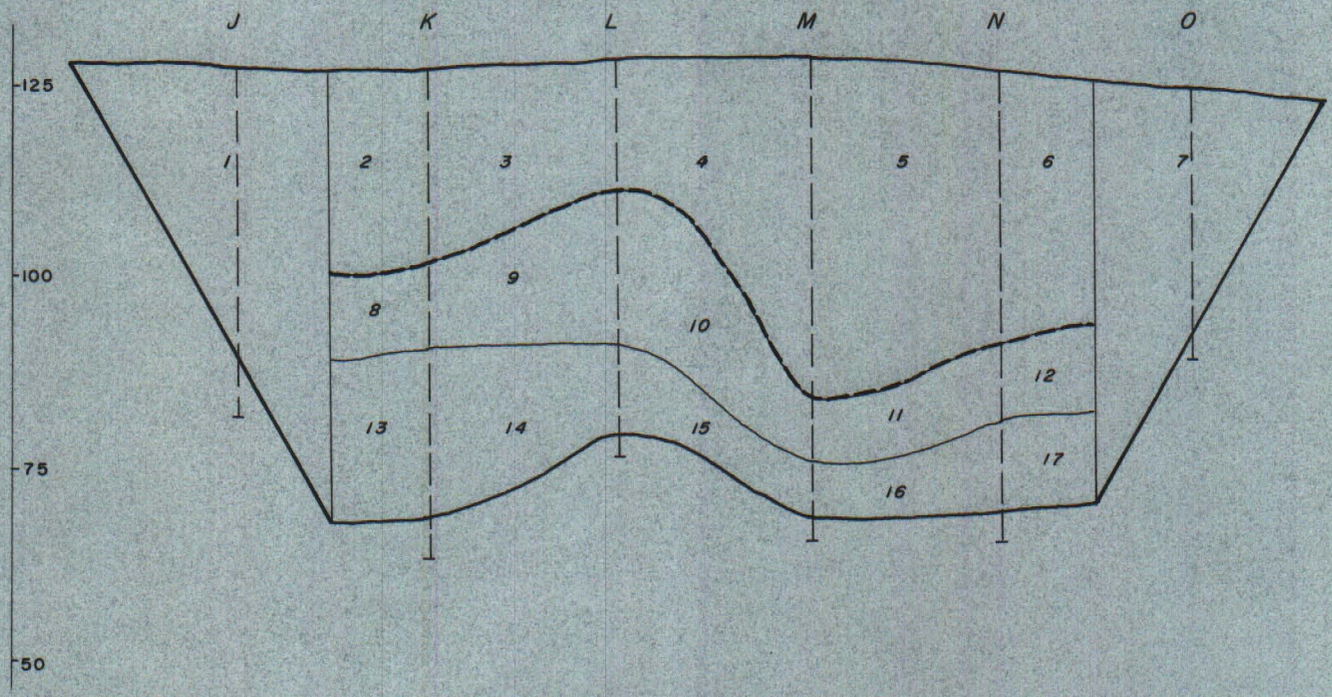
Block No.	Overburden	Blk No.	Barite	Blk No.	Waste
1	59 x 34 x 0.5 = 1003	8	11 x 12.5 = 137.5	13	22 x 12.5 = 275
2	26 x 12.5 = 325	9	$\frac{11+20}{2}$ x 25 = 487.5	14	$\frac{22+12}{2}$ x 25 = 425
3	$\frac{26+17}{2}$ x 25 = 537.5	10	$\frac{20+9}{2}$ x 25 = 362.5	15	$\frac{12+7}{2}$ x 25 = 237.5
4	$\frac{17+45}{2}$ x 25 = 775	11	$\frac{9+10.5}{2}$ x 25 = 243.75	16	$\frac{7+12}{2}$ x 25 = 237.5
5	$\frac{45+35}{2}$ x 25 = 1000	12	10.5 x 12.5 = 131.25	17	12 x 12.5 = 150
6	35 x 12.5 = 437.5		1362.5 ft^2		1325 ft^2
7	57.5 x 33 x 0.5 = 948.75		x 25 = 34062.5 ft^3		x 25 = 33125 ft^3
	5026.75 ft^2				
	x 25 = 125668.75 ft^3				

SECTION 16

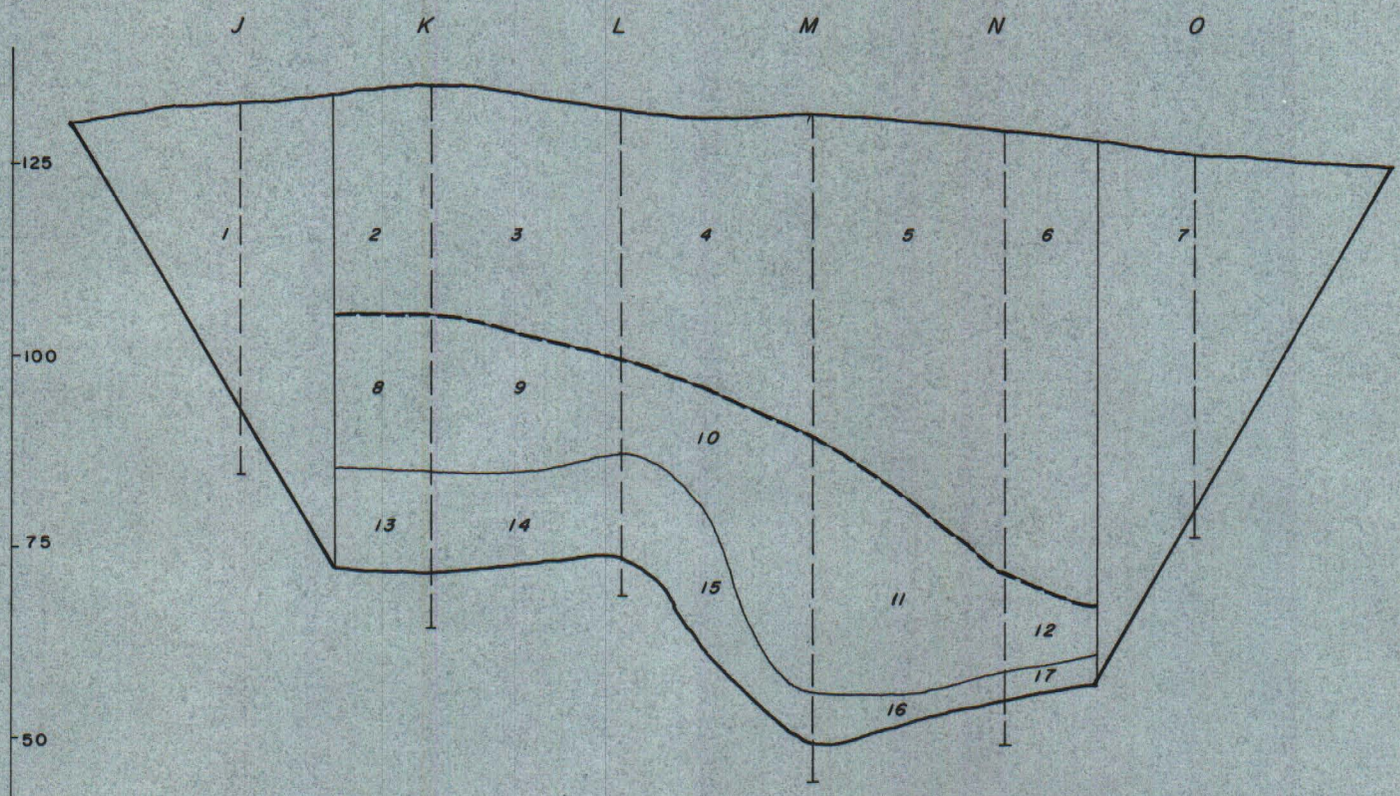
Block No.	Overburden	Blk No.	Barite	Blk No.	Waste
1	64 x 37 x 0.5 = 1184	8	20.5 x 12.5 = 256.25	13	13.5 x 12.5 = 168.75
2	30 x 12.5 = 375	9	$\frac{20.5+12.5}{2}$ x 25 = 412.5	14	$\frac{13.5+13}{2}$ x 25 = 331.25
3	$\frac{30+33}{2}$ x 25 = 787.5	10	$\frac{12.5+34}{2}$ x 25 = 581.25	15	$\frac{13+5.5}{2}$ x 25 = 231.25
4	$\frac{33+42.5}{2}$ x 25 = 943.75	11	$\frac{34+14.5}{2}$ x 25 = 606.25	16	$\frac{5.5+4.5}{2}$ x 25 = 125
5	$\frac{42.5+57}{2}$ x 25 = 1243.75	12	14.5 x 12.5 = 181.25	17	4.5 x 12.5 = 56.25
6	57 x 12.5 = 712.5		2037.5 ft^2		912.50 ft^2
7	76 x 44 x 0.5 = 1672.		x 25 = 50937.5 ft^3		x 25 = 22812.5 ft^3
	6918.5 ft^2				
	x 25 = 172962.5 ft^3				

PIT 101

Row 15



Row 16



PIT 101

SOUTH END

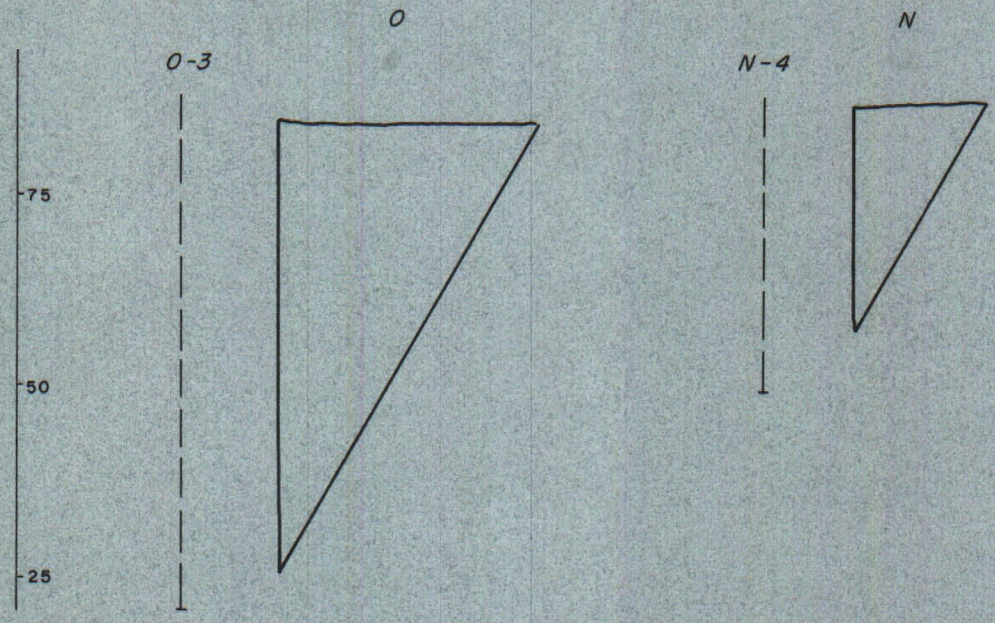
O	988 x 25	=	24700
N	243 x 25	=	6075
M	314 x 25	=	7850
L	56 x 25	=	1400
Corner at O	$34^2 \times \pi \times \frac{1}{6} \times 58.5$	=	35392
	Total		75417 ft^3

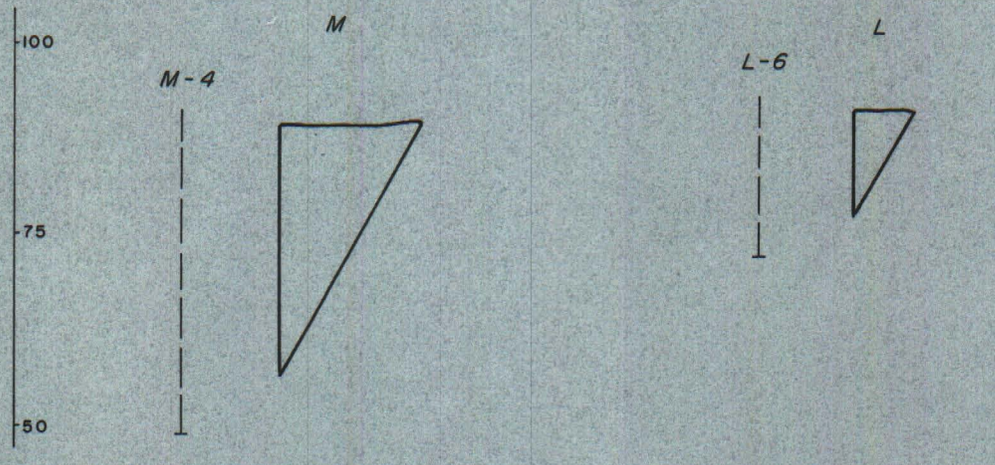
NORTH END

K-L	$\frac{1184+988}{2} \times 25$	=	27150
L-M	$\frac{988+1941}{2} \times 25$	=	36612.5
M-N	$\frac{1941+1672}{2} \times 25$	=	45162.5
Corner K			22876
Corner N			36344
	Total		168145 ft^3

PIT 101

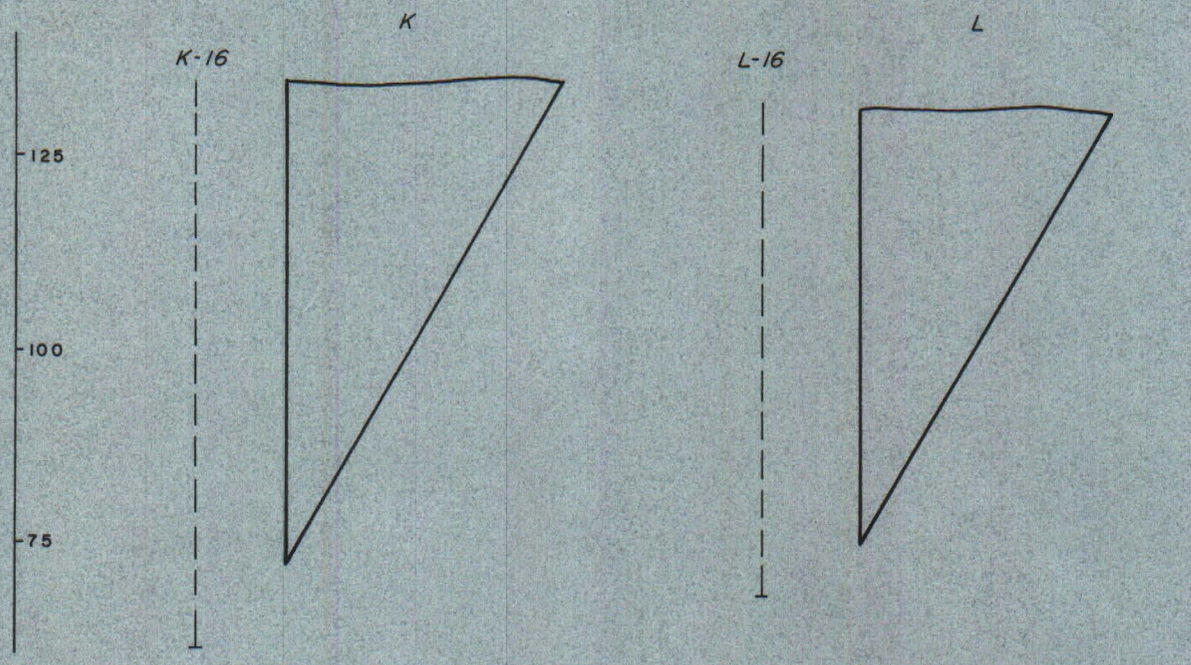
South End

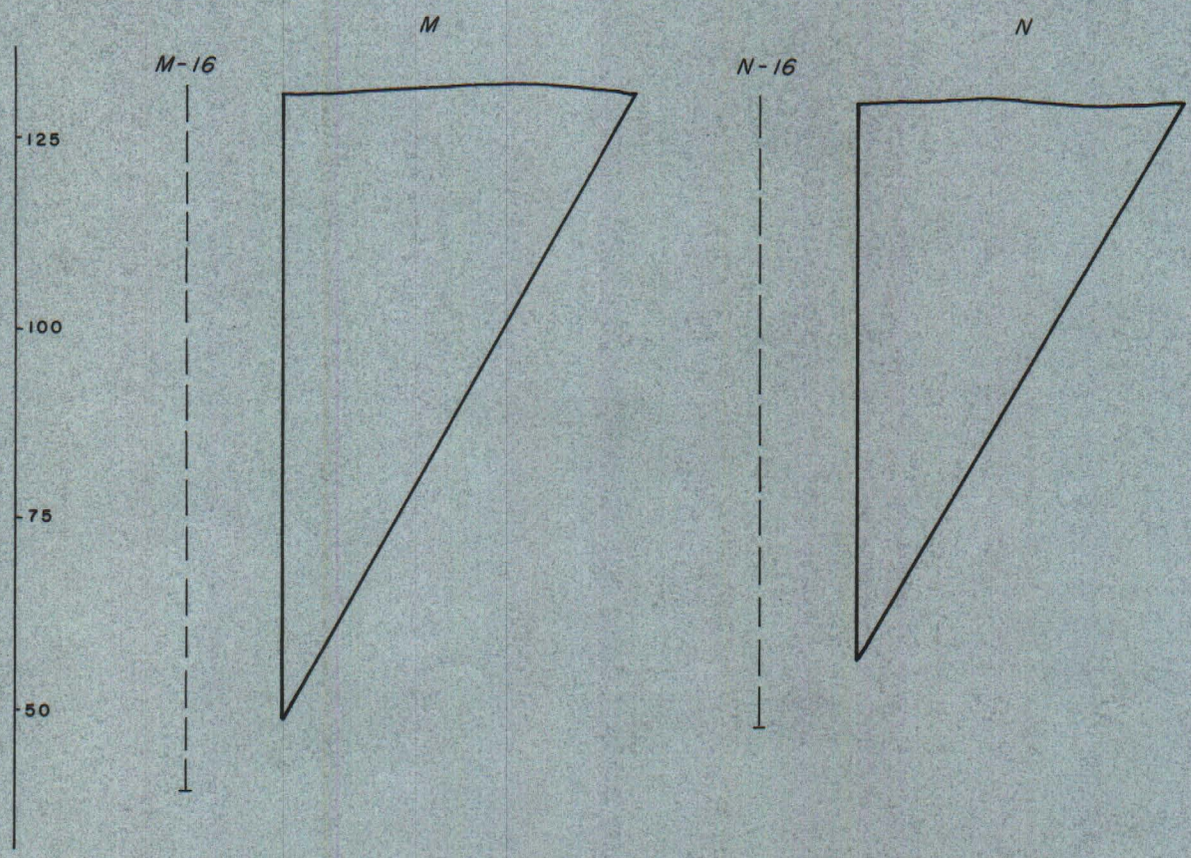




PIT 101

North End





PIT 102

SUMMARY OF RESULTS

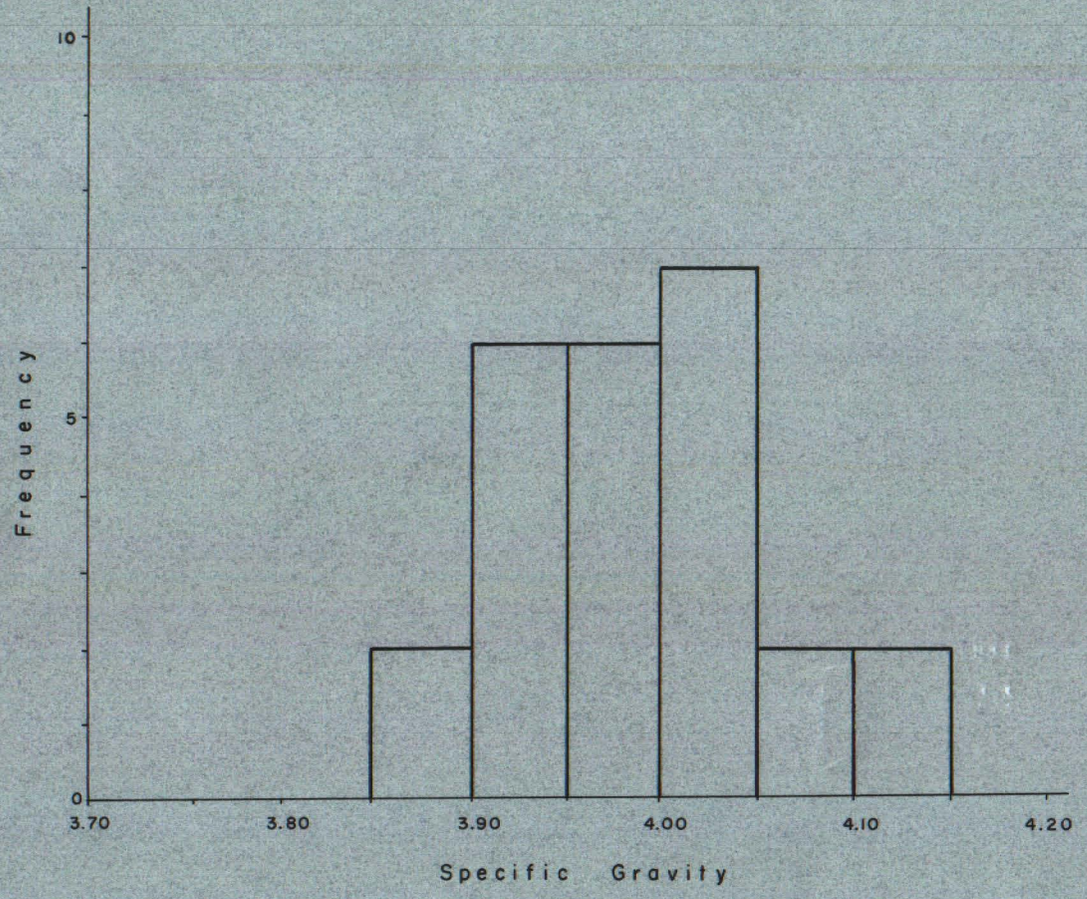
	IMCO	Poly.	Cross Sec.	Avg.
Barite (cu. ft.)	53915	71563	70313	70938
Barite (tons)	7002	9024	8867	8946
Interbedded Waste (cu. yd.)		1065	1065	1065
Overburden (cu. yd.)	6954		9861	9861

Weighted Average S.G. = $\frac{254.91}{64}$ = 3.98 +1 1/2% dilution = 4.043

	IMCO	[redacted]
Weighted Avg. S.G.	4.064	4.043
Tonnage Factor (cu. ft./ton)	7.7	7.93
Recoverable Barite (10% loss)	6302	8051
Stripping Ratio (O/B cu. yd./ton)	1.1	1.1
Stripping Ratio (O/B + interbedded waste cu. yd./ton)		1.22

PIT 102

Histogram Of Specific Gravity



PIT 102

POLYGONAL CALCULATION

25' x 25' area of influence

Hole	Ore Thick.	Barite Thickness	Vol.	Waste Thickness	Vol.	Overburden Thickness	Vol.
* M 10	8	8 low grade	5000	0	0	27.5	17187.5
O 10	23.5	15	9375	8.5	5312.5	31.5	19687.5
N 11	12.5	12.5	7812.5	0	0	26.5	16562.5
O 11	14.5	10	6250	4.5	2812.5	25	15625
N 12	5	5	3125	0	0	29	18125
N 13	31.5	11	6875	20.5	12812.5	0	0
O 13	12	11.5	7187.5	0.5	312.5	2	1250
N 14	4.5	4.5	2812.5	0	0	19.5	12187.5
* L 15	30.5	5	3125	25.5	15937.5	9.5	5937.5
N 15	22	10	6250	12	7500	1	625
M 16	5	5	3125	0	0	14	8750
N 16	9	9	5625	0	0	0	0
N 17	21	21	13125	0	0	0	0
* J 20	9	9	5625	0	0	8.5	5312.5
* K 20	2	2	1250	0	0	10	6250
Total			71562.5 ft^3		28750 $ft.^3$		92812.5 ft^3

*Not included in calculations.

Barite 71562.5 cu. ft. at 7.93 cu. ft./ton 9024 tons

CROSS SECTION CALCULATIONS

Section	Area Barite	Volume	Area Waste	Volume	Area Overburden	Volume
O	900	22500	337.5	8437.5	2803.375	70084.375
N	1787.5	44687.5	812.5	20312.5	2346.25	58656.25
M	125.0	3125	0	0	559.0	13975.0
N slope						51956.25
S slope						61688.75
Total		70312.5 ft^3		28750 ft^3		256360.625 ft^3
						9880
						266240.625 ft^3

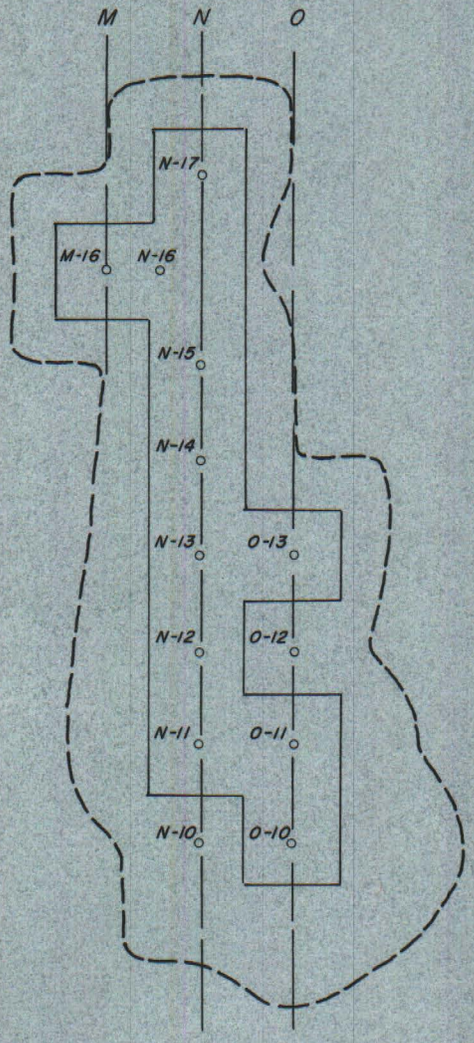
Barite 70312.5 ft^3 @ 7.93 ft^3/ton = 8867 tons

Waste 28750 ft^3 = 1065 yd^3

Overburden 266240 ft^3 = 9861 yd^3

PIT 102

Sketch Of Pit Limits



MAGNETIC
NORTH

LEGEND

N-14 ○ Drill Hole

Pit Limit (approximate)

Area Of Ore Reserve Calculations

N— —— Cross Section

SCALE

1" = 50'

PIT 102

SECTION M

Block No.	Overburden	Blk No.	Barite
1	19 x 11 x 0.5 = 104.5	4	5 x 25 = 125 ft^2
2	14 x 25 = 350		
3	19 x 11 x 0.5 = 104.5		
	559 ft^2		

NORTH SLOPE

Block No.	Area		Volume
0-10	896	(see sec. 0, Block No. 1)	22400
0-11	350	(see sec. 0, Block No. 5)	8750
0-13	56	(see sec. 0, Block No. 8)	1400
N-12	34 x 20 x 0.5 = 340		8500
N-14	24 x 14 x 0.5 = 109		4200
15	23 x 13 x 0.5 = 149.5		3737.5
16	9 x 5 x 0.5 = 225		562.25
17	96.25	(see sec. N Block No. 8)	2406.25
			51956.25 ft^3

SOUTH SLOPE

Block No.	Area	Volume
0-10	896	22400
N-11	39 x 22 x 0.5 = 429	10725
N-12	340	8500
N-13	31 x 5 x 18 x 0.5 = 283.5	7087.5
N-14	168	4200
N-15	149.5	3737.5
N-17	96.25	2406.25
M-16	104.5	2612.5
		61668.75 ft^3

PIT 102

SECTION N

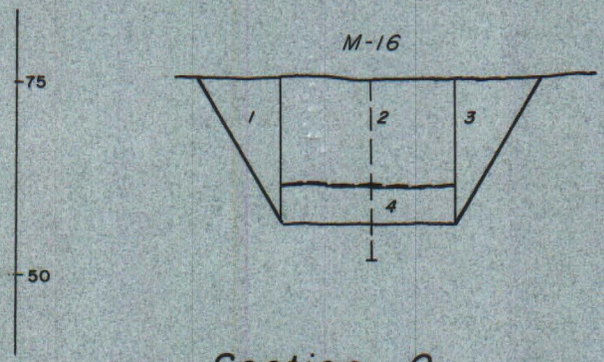
Block No.	Overburden		Blk No.	Barite		Blk No.	Waste	
1	35 x 20 x 0.5	= 350	9	$\frac{12.5+10}{2}$ x 12.5	= 140.625	17	20.5 x 25 x 0.5	= 256.25
2	26.5 x 12.5	= 331.25	10	$\frac{12.5+5}{2}$ x 25	= 218.75	18	20.5 x 25 x 0.5	= 256.25
3	$\frac{26.5+29}{2}$ x 25	= 693.75	11	$\frac{5+11}{2}$ x 25	= 200	19	12 x 25 x 0.5	= 150
4	29 x 25 x 0.5	= 362.5	12	$\frac{11+4.5}{2}$ x 25	= 193.75	20	12 x 25 x 0.5	= 150
5	19.5 x 25 x 0.5	= 243.75	13	$\frac{4.5+10}{2}$ x 25	= 181.25			812.5 ft^2
6	$\frac{19.5+1}{2}$ x 25	= 256.25	14	$\frac{10+9}{2}$ x 25	= 237.5			
7	1 x 25 x 0.5	= 12.5	15	$\frac{9+21}{2}$ x 25	= 375			
8	17.5 x 11 x 0.5	= 96.25	16	$\frac{21+17.5}{2}$ x 12.5	= 240.625			
		2346.25 ft^2			1787.5 ft^2			

SECTION O

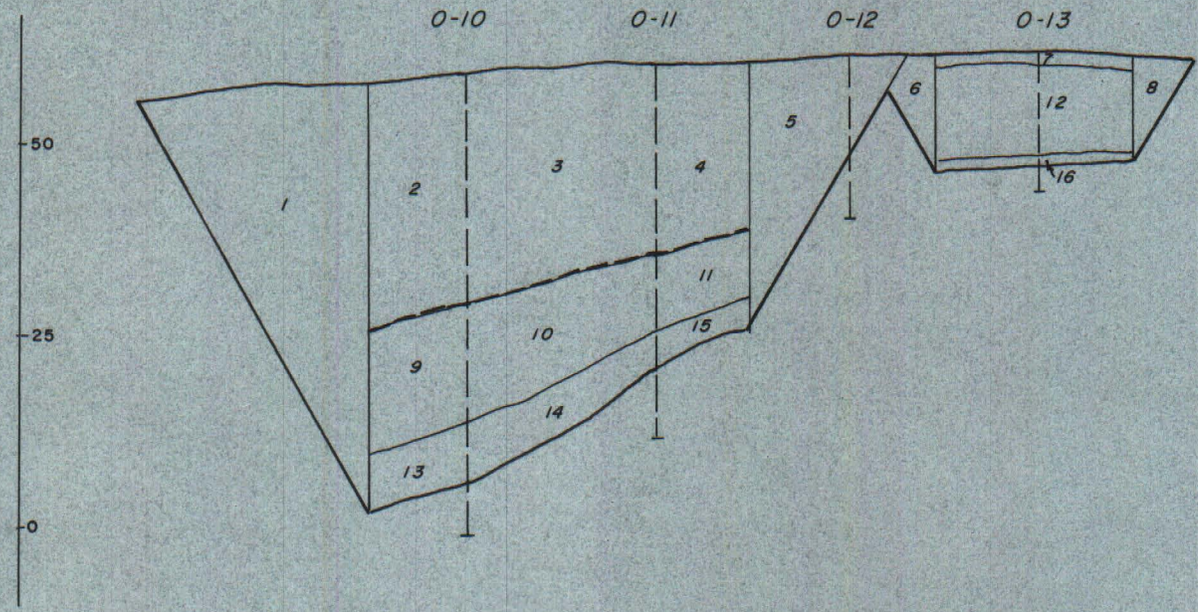
Block No.								
1	56 x 32 x 0.5	= 896	9	15 x 12.5	= 187.5	13	8.5 x 12.5	= 106.25
2	$\frac{31.5+33}{2}$ x 12.5	= 403.125	10	$\frac{15+10}{2}$ x 25	= 312.5	14	$\frac{8.5+4.5}{2}$ x 25	= 162.5
3	$\frac{31.5+25}{2}$ x 25	= 706.25	11	9 x 12.5	= 112.5	15	4.5 x 12.5	= 56.25
4	$\frac{25+23}{2}$ x 12.5	= 300	12	11.5 x 25	= 287.5	16	.5 x 25	= 12.5
5	35 x 20 x 0.5	= 350			900 ft^2			337.5 ft^2
6	14 x 6 x 0.5	42						
7	2 x 25	50						
8	14 x 8 x 0.5	56						
		2803.375 ft^2						

PIT 102

Section M

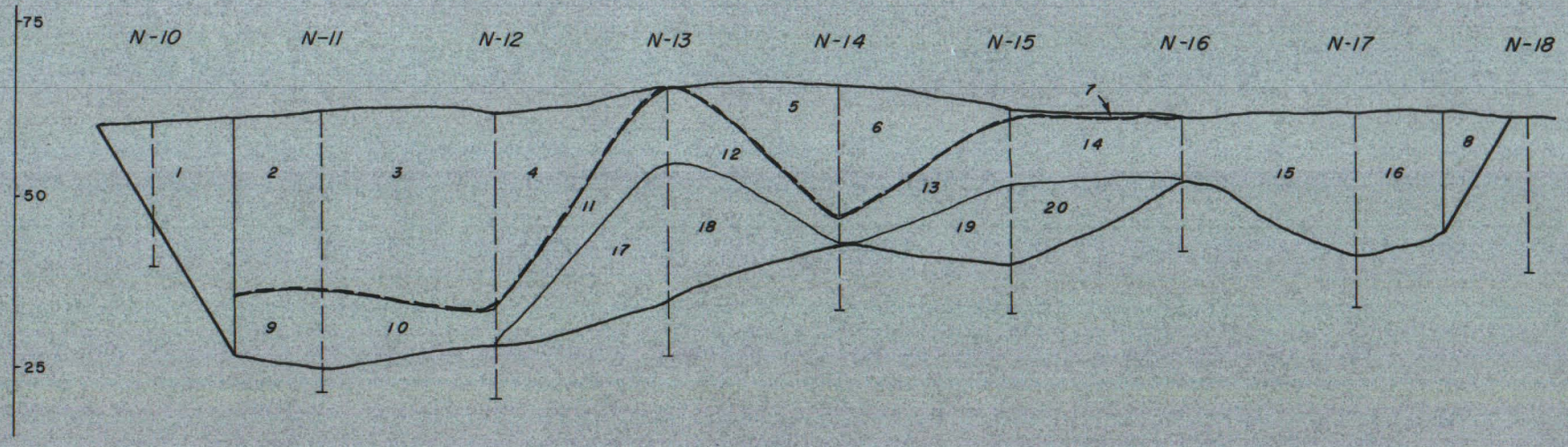


Section O



PIT 102

Section N



SUMMARY OF RESULTS FOR PIT 103

[redacted]

	IMCO	Cross Sec. 1	Cross Sec. 2	Avg.
Barite (cu. ft.)	99727	156288	156297	156293
Barite (tons)	12656			19859
Interbedded Waste (cu. yd.)		542		542
Overburden (cu. yd.)		9059		9059

Weighted Avg. S.G. $= \frac{550.01}{137} = 4.015 +$ 1½% dilution $= 4.075$

	IMCO	[redacted]
Weighted avg. S.G.	4.082	4.075
Tonnage factor (cu. ft./ton)	7.88	7.87
Recoverable Barite (10% loss)	11390	17873
Stripping Ratio (O/B cu. yd./ton)		0.46
Stripping Ratio (O/B + Interbedded waste cu. yd./ton)		0.48

PIT 103

Histogram Of Specific Gravity

PIT 103

DRILL HOLE DATA

Hole	Ore thick.	Barite	Waste	Overburden
3-1	9	9	0	0
3-2	1	1	0	6
3-3	4.5	4.5	0	0
3-4	4.5	4.5	0	5
3-5	2	2	0	4
3-6	8	8	0	4
3-7	4.5	4.5	0	8
3-8	6	6	0	21.5
3-9	5.5	4	1.5	30.5
3-11	37	35.5	1.5	0
3-12	28.5	22.5	6	1
3-13	22	22	0	0
3-14	29	29	0	0
3-15	5	5	0	18.5
3-17	9	5	4	12
3-19	7	7	0	7
3-20	22.5	22.5	0	0.5
3-21	3.5	3.5	0	0
3-22	22	22	0	0
3-23	15	10	5	11
3-32	5	5	0	4
3-38	10	10	0	1
3-41	7	7	0	0

PIT 103

CROSS SECTION CALCULATIONS NO. 1

Section No.	Area Barite	Vol.	Area Waste	Vol.	Area Overburden	Vol.
1	175	4375	0	0	287	7175
2	100	2500	37.5	937.5	1674.75	41868.75
3	420	10500	180	4500	1433.5	35837.5
4	125	3125	100	2500	635.625	
5	422.5	10562.5	0	0	883.25	22081.25
6	863.5	21587.5	0	0	293	7325
7	795.75	19893.75	0	0	298.125	7453.125
8	650	16250	118.125	2953.125	183.75	4593.75
9	967.25	24181.25	42	1050	348	8700
10	812.5	20312.5	107.5	2687.5	454	11350
11	545	13625.0	0	0	95	2375
12	125	3125	0	0	142.75	3568.75
13	250	6250	0	0	103.75	2593.75
		156287.5 ft^3		14628.125 ft^3		170812.5
	Pit ends					73773
	Total					244585.5 ft^3

Barite 156293 cu. ft. @ 7.87 cu. ft/ton = 19859 tons

Overburden 244586 cu. ft. = 9059 yd^3

Waste 14628 cu. ft. = 542 yd^3

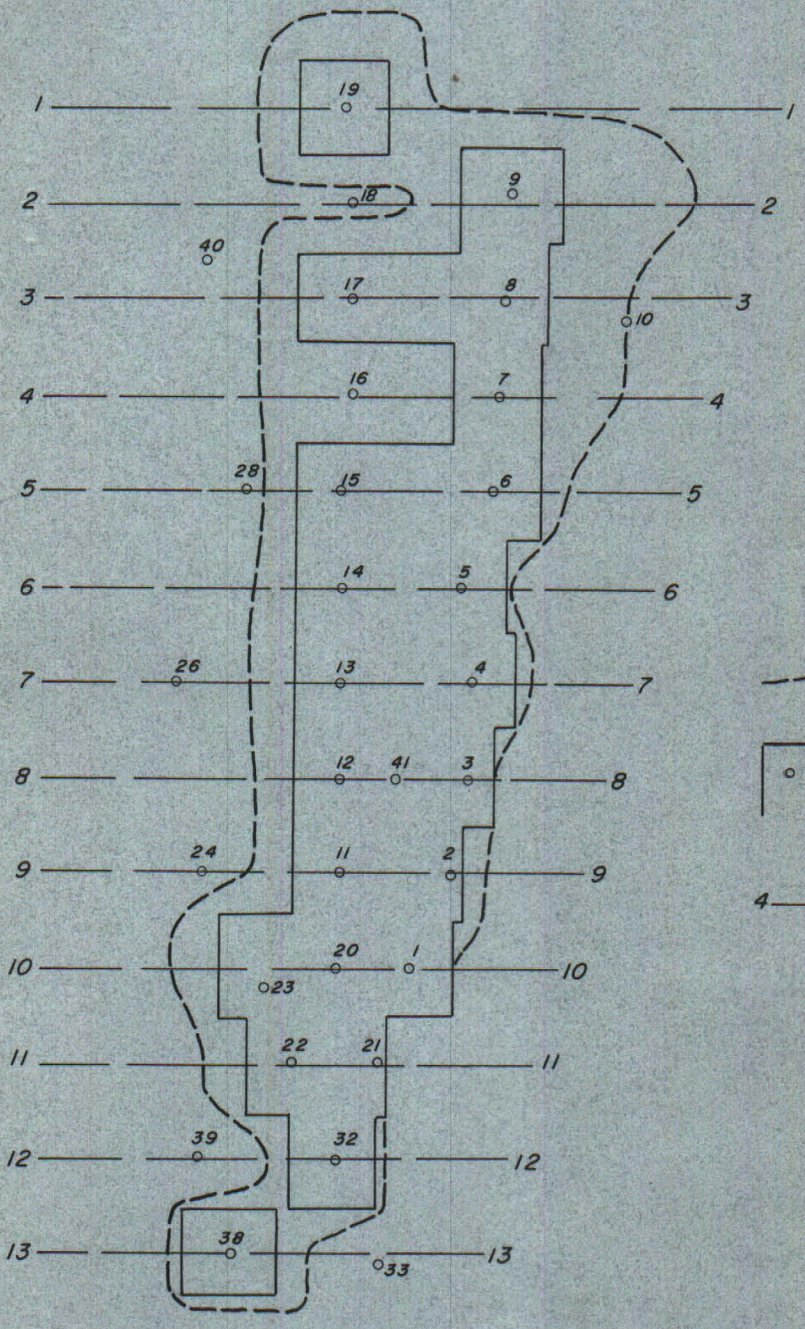
PIT 103

CROSS SECTION CALCULATION NO. 2 (BARITE ONLY)

Sec. No.	Area (ft^2)	Ave. Area (ft^2)	Volume (ft^3)
1	175		4375
		260	6500
2	100		1250
		272.5	6812.5
3	420		
		273.75	6843.75
4	125		
		643	16075
5	422.5		
		829.75	20743.75
6	863.5		
		723	18075
7	796		
		808.63	20215.63
8	560		
		890	22250
9	967.25		
		678.75	16968.75
10	812.5		
		335	8375
11	545		
			1562.5
12	125		
			6250
13	250		
			156296.88 ft^3

PIT 103

Sketch Of Pit Limits



MAGNETIC NORTH

LEGEND

Drill Hole

Pit Limit (approximate)

Area Of Ore Reserve Calculations

4 — Cross Section

SCALE

1" = 50'

PIT 103

SECTION 1

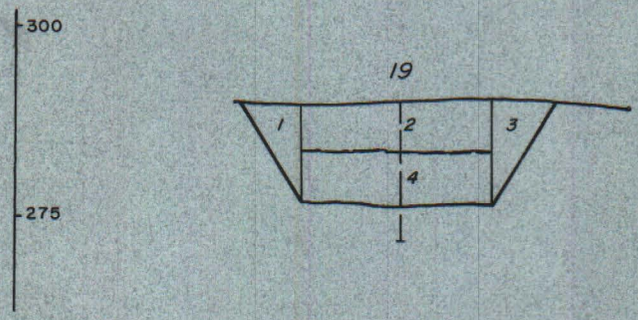
Block No.	Overburden	Blk. No.	Barite
1	14 x 8 x 0.5 = 56	4	7 x 25 = 175
2	7 x 25 = 175		175 ft^2
3	14 x 8 x 0.5 = 56		
	287 ft^2		

SECTION 2

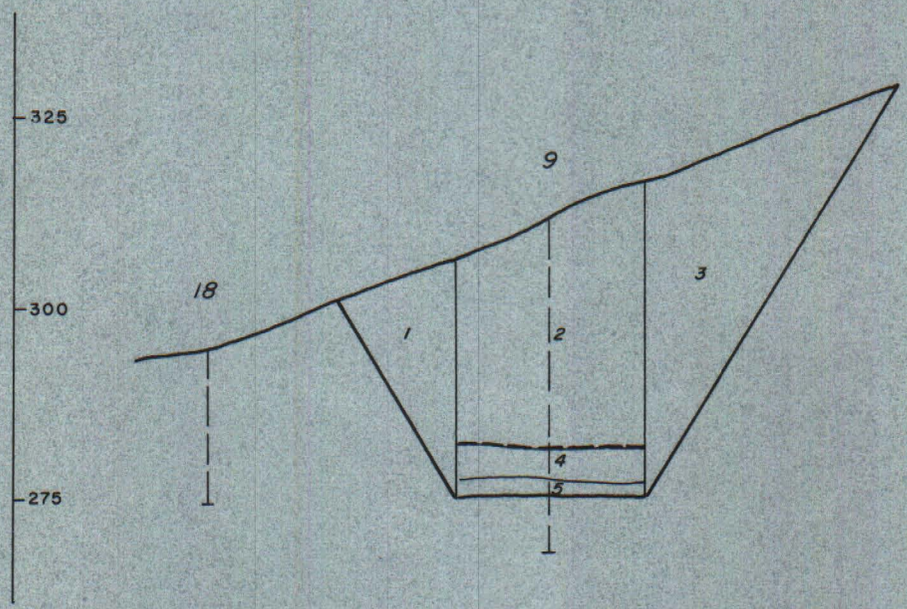
Block No.	Overburden	Blk. No.	Barite	Blk. No.	Waste
1	31 x 15.5 x 0.5 = 240.25	4	4 x 25 = 100.0 ft^2	5	1.5 x 25 = 37.5 ft^2
2	30.5 x 25 = 762.5				
3	21 x 64 x 0.5 = 672				
	1674.75 ft^2				

PIT 103

Section 1



Section 2



PIT 103

SECTION 3

Block No.	Overburden		Blk No.	Barite		Blk No.	Waste	
1	16 x 9 x 0.5	= 72	6		= 125	9		= 100
2	$\frac{12+7}{2}$ x 12.5	106.25	7	$\frac{5+6}{2}$ x 40	= 220	10	4 x 40 x 0.5	= 80
3	$\frac{12+21.5}{2}$ x 40	= 670	8	6 x 12.5	= 75			180 ft^2
4	$\frac{21.5+24}{2}$ x 12.5	= 284.375			420 ft^2			
5	14.5 x 41.5 x 0.5	= 300.875						
		1433.5 ft^2						

SECTION 4

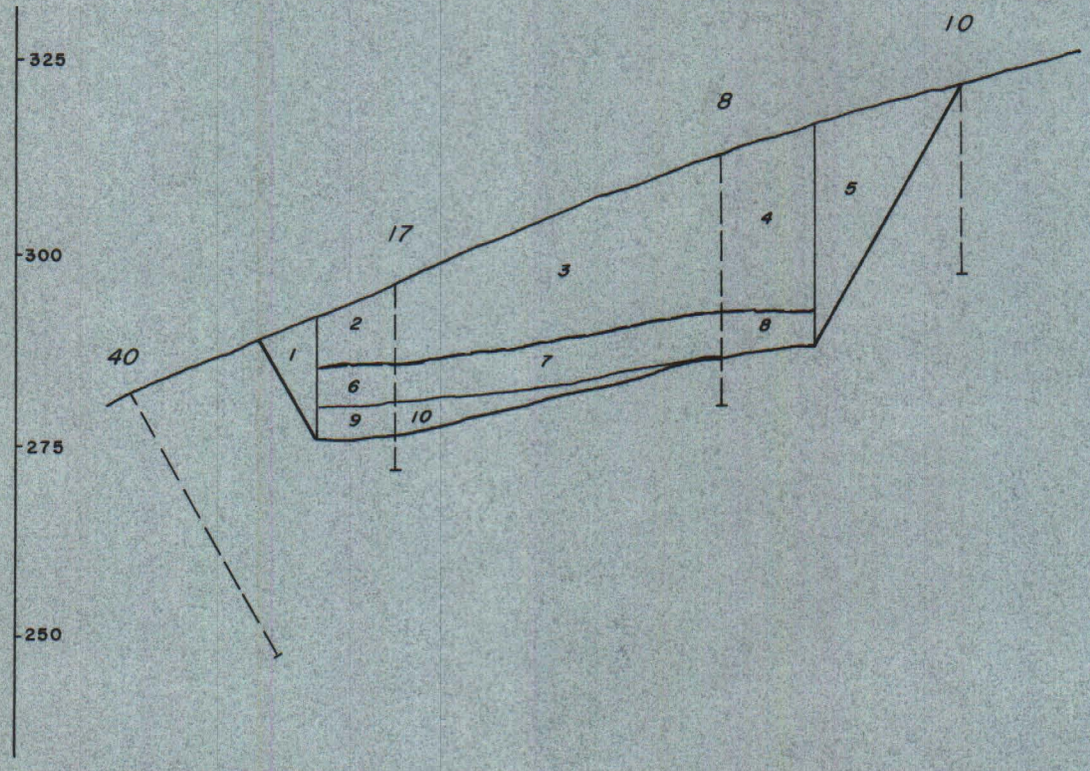
Block No.	Overburden		Blk No.	Barite		Blk No.	Waste	
1	17.5 x 5 x 0.5	= 70	4	5 x 25	= 125 ft^2	5	4 x 25	= 100 ft^2
2	12 x 25	= 300						
3	42.5 x 12.5 x 0.5	= 265.625						
		635.625 ft^2						

SECTION 5

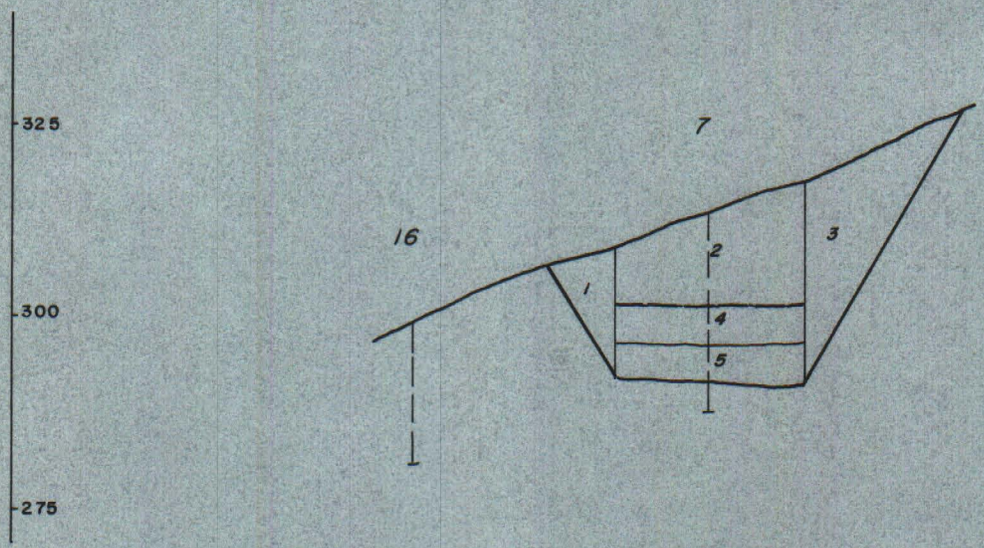
Block No.	Overburden		Blk No.	Barite		Waste
1	22 x 10 x 0.5	= 110	6	5 x 12.5	= 62.5	0.0
2	18.5 x 12.5	= 231.25	7	$\frac{5+8}{2}$ x 40	= 260	
3	$\frac{18.5+4}{2}$ x 40	= 450	8	8 x 12.5	= 100	
4	4 x 12.5	= 50			422.5 ft^2	
5	12 x 7 x 0.5	42				
		883.25 ft^2				

PIT 103

Section 3

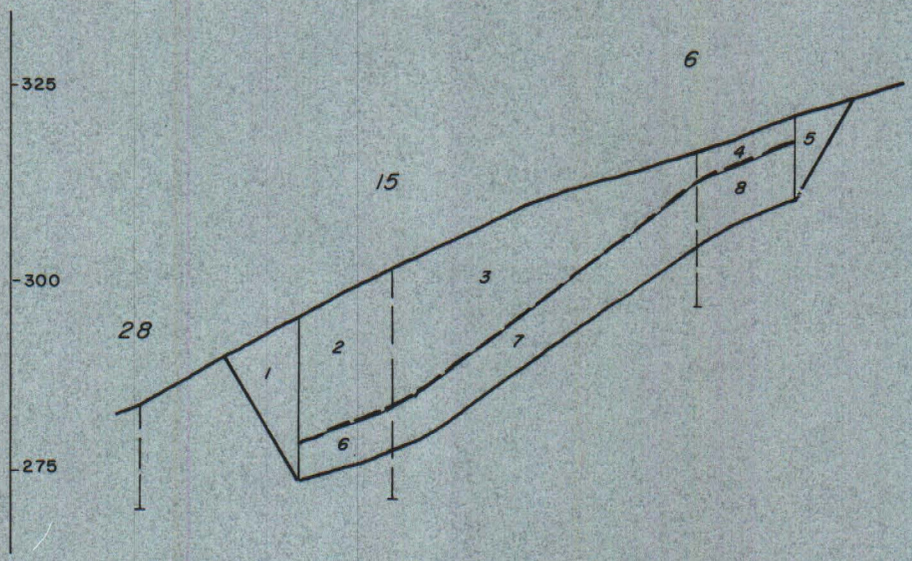


Section 4

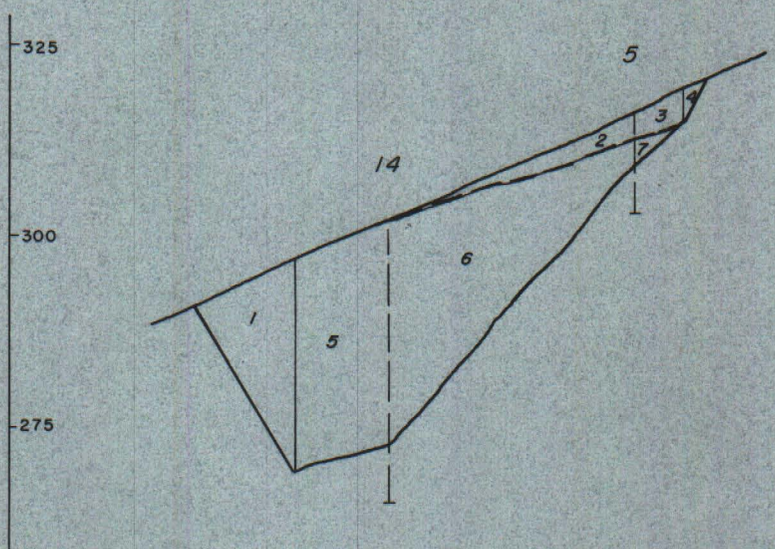


PIT 103

Section 5



Section 6



PIT 103

SECTION 6

Block No.	Overburden	Blk No.	Barite	Waste
1	29 x 14 x 0.5 = 203	5	29 x 12.5 = 362.5	0.0
2	4 x 32 x 0.5 = 64	6	$\frac{20+2}{2}$ x 32 = 496	
3	4 x 5 = 20	7	2 x 5 x 0.5 = 5	
4	4 x 3 x 0.5 = 6		863.5 ft^2	
	293 ft^2			

SECTION 7

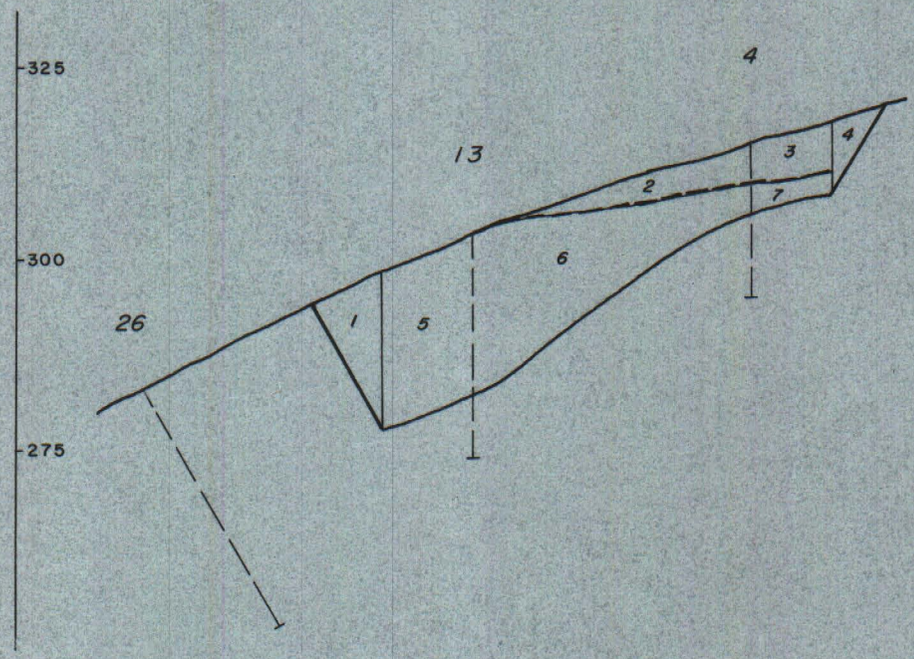
Block No.	Overburden	Blk No.	Barite
1	20 x 10 x 0.5 = 100	5	$\frac{22+20}{2}$ x 12.5 = 262.5
2	5 x 36 x 0.5 = 90	6	$\frac{22+4.5}{2}$ x 36 = 477
3	$\frac{5+7.5}{2}$ x 12.5 = 75.125	7	4.5 x 12.5 = 56.25
4	12 x 5 x 0.5 = 30		795.75 ft^2
	298.125 ft^2		

SECTION 8

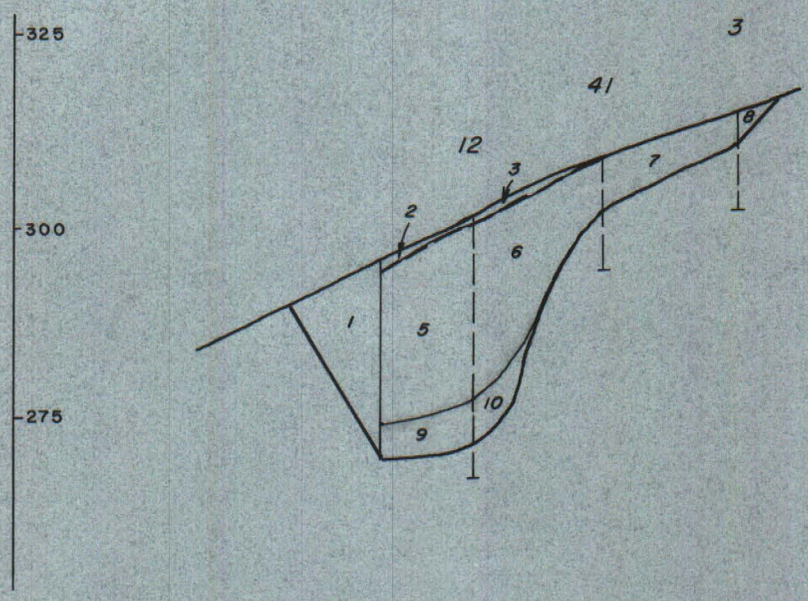
Block No.	Overburden	Blk No.	Barite	Blk No.	Waste
1	26 x 12.5 x 0.5 = 162.5	5	$\frac{20.5+22.5}{2}$ x 12.5 = 268.75	9	$\frac{4.5+6}{2}$ x 12.5 = 65.625
2	1 x 12.5 = 12.5	6	$\frac{22.5+7}{2}$ x 17.5 = 258.125	10	6 x 17.5 x 0.5 = 52.5
3	1 x 17.5 x 0.5 = 8.75	7	$\frac{7+4.5}{2}$ x 17.5 = 100.625		118.125 ft^2
	183.75 ft^2	8	4.5 x 5 = 22.5		
			650.00 ft^2		

PIT 103

Section 7



Section 8



PIT 103

SECTION 9

Block No.	Overburden	Blk No.	Barite	Blk No.	Waste
1	30 x 14 x 0.5 = 210	5	$\frac{28.5+35.5}{2}$ x 12.5 = 400	8	1.5 x 12.5 = 18.75
2	6 x 31 x 0.5 = 93	6	$\frac{35.5+1}{2}$ x 31 = 565.75	9	1.5 x 31 x 0.5 = 23.25
3	$\frac{6+9}{2}$ x 3 = 22.5	7	1 x 3 x 0.5 = 1.5		42. ft^2
4	9 x 5 x 0.5 = 22.5		967.25 ft^2		
	348 ft^2				

SECTION 10

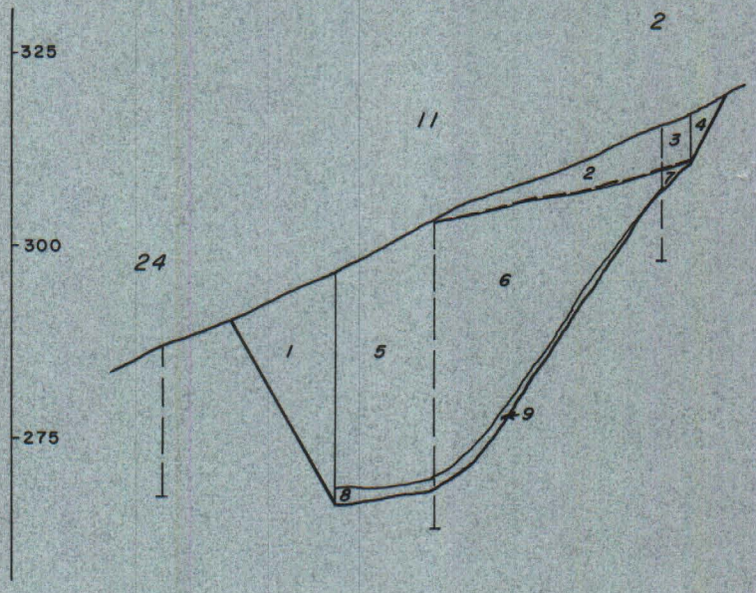
Block No.	Overburden	Blk No.	Barite	Blk No.	Waste
1	28 x 13 x 0.5 = 182	6	11 x 12.5 = 137.5	10	5 x 12.5 = 62.5
2	12 x 12.5 = 150	7	$\frac{12.5+22.5}{2}$ x 18 = 315	11	5 x 18 x 0.5 = 45
3	$\frac{12.5+.5}{2}$ x 18 = 117	8	$\frac{22.5+9}{2}$ x 20 = 315		107.5 ft^2
4	.5 x 20 x 0.5 = 5	9	9 x 10 x 0.5 = 45		
	454.ft^2		812.5 ft^2		

SECTION 11

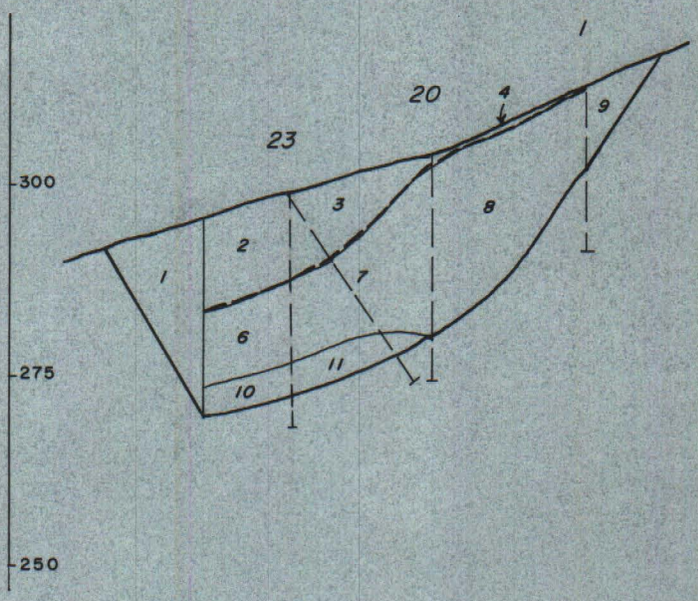
Block No.	Overburden	Blk No.	Barite	Waste
1	20 x 9.5 x 0.5 = 95 ft^2	3	$\frac{20+24}{2}$ x 10 = 220	0.0
		4	$\frac{24+3.5}{2}$ x 23 = 316.25	
		5	3.5 x 2.5 x 5.0 = 8.75	
			545 ft^2	

PIT 103

Section 9



Section 10



PIT 103

SECTION 12

Block No.	Overburden	Blk No.	Barite	Waste
1	9 x 4 x 0.5 = 18	4	5 x 25 = 125 ft^2	0.0
2	4 x 25 = 100			
3	9 x 5.5 x 0.5 = 24.75			
	142.75 ft^2			

SECTION 13

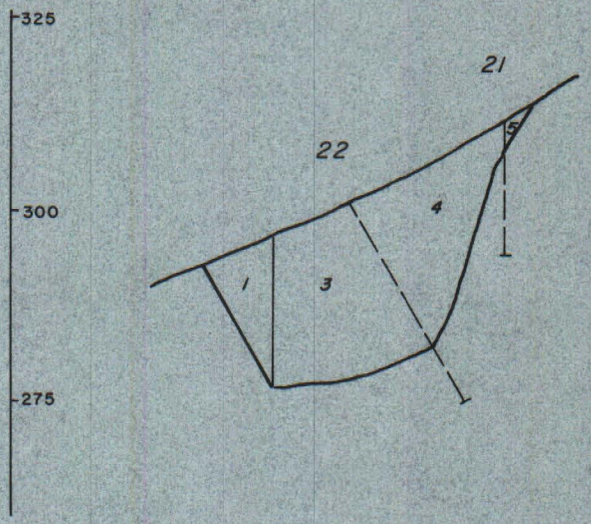
Block No.	Overburden	Blk No.	Barite	Waste
1	9 x 5 x 0.5 = 22.5	4	10 x 25 = 250 ft^2	0.0
2	1 x 25 = 25			
3	15 x 7.5 x 0.5 = 56.25			
	103.75 ft^2			

Misc. Ends of Pit Volumes

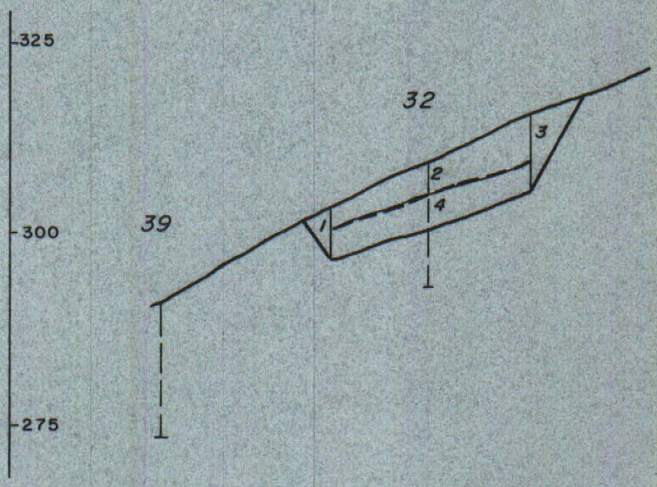
1000	(N of 38)
1000	(S of 38)
625	(N of 32)
950	(N of 22)
500	(W of 5)
3000	(SE of 23)
18750	(Hole 16)
2700	(S of 17)
42000	(S of 9)
70525	
3248	(N & S of 19)
73773 ft^3	

PIT 103

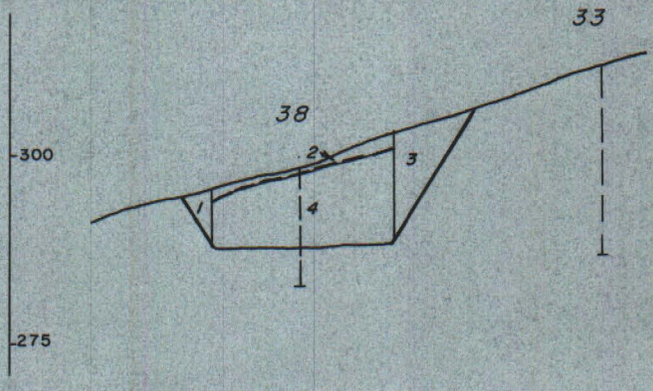
Section 11



Section 12



Section 13



COMMENTS ON RESULTS

Pit 101

The difference in the total overburden figure and that calculated by IMCO is primarily due to the fact that IMCO took the pit slope from the top of the orebody and assumed a vertical wall when mining the Barite. These calculations utilized a pit slope from the bottom of the orebody.

In some areas of the mine the Barite can be up to 50 ft. thick. If mined with a vertical wall, this would result in some stability problems and probably some back stripping will be needed to prevent major sloughing of the wall. The stability of the vertical wall is dependent on time exposed and the erosion effects of weather. Since the pit will be mined out in a three month period through the summer, the time exposed will be minimum. However should run-off occur, as a result of a major thunder-storm in the area, then there might be a possibility of wall failure. For this reason a conservative approach was used by taking the pit slope from the bottom of the orebody.

IMCO included holes O-2, N-3 and M-3 in their pit design. It was felt that to be consistent with the rest of the pit, the area of influence could not be extended to include these holes. Hole numbers O-8, N-8, O-9, O-11 were included in their stripping calculations, together with holes O-13, and O-15, even though these holes indicated little or no Barite. However, these differences are minor, since the overall pit outlines are very similar in that area.

The net result is that the extra stripping which IMCO included in their plan is not enough to offset the extra stripping required when

measuring the pit slope from the bottom of the orebody.

The difference in Barite tonnage is a result of the difference in calculated tonnage factor. The plan showing the different outlines can be seen on page 20.

The tonnage of selectively mined Barite was based on :

1) Holes for which there were assays a) greater than 3' thickness and b) greater than 4.27 S.G.

2) Area of influence 25' x 25'

This should be considered as an approximate figure and will vary depending on operating practice and control. The main area for selective mining is indicated on the Pit 101 plan on page 20

Pit 102

Holes M-10, L-15, J-20, and K-20, indicate approximately 1900 tons of Barite. However these holes do not form a continuous pit, but the Barite may be reached by small independent gouges around the holes.

Pit 103

The main difference in the Barite tonnage figures from those calculated by IMCO is because IMCO did not include holes 3-7, 3-8, 3-9, 3-17, 3-19 or 3-38 in their calculations. Since these holes indicate the presence of Barite, they were included in these calculations.

Another cause for the disparity was because the ore zone was projected in the cross sections to extend a short distance to the west of the hole nos. 3-1 to 3-6. IMCO did not make such projections in their cross sections.

GEOLOGY OF THE BRADSHAW MINING LEASE, LANDER COUNTY, NEVADA

by

[redacted]

May 13, 1975

SUMMARY AND CONCLUSIONS

The method of evaluation in use by the staff of IMCO Services on the Bradshaw Mining Lease has adequately outlined the barite ore bodies at the 101, 102, and 103 pits. This method, involving drilling a closely spaced pattern of holes in the vicinity of exposed ore to the actual or economic limit of the ore, should suffice in delineating the remainder of the known ore bodies on the property, and it might turn up some blind ore bodies in the vicinity of the 105 and 106 pits.

It is recommended that a small amount of additional drilling be conducted at the northeast end of the 101 pit. Detailed mapping and stratigraphic studies in the pit areas could more closely define the ore bodies, but the potential gain probably does not justify the effort.

Additional ore bodies may be discovered by widely spaced drilling along favorable stratigraphic horizons described herein, by tracing barite float, and by conducting geochemical sampling along the predicted extensions of known favorable stratigraphic horizons.

The known ore bodies are covered with an overburden of chert or argillite, each of which must be drilled and blasted. Usually this is overlain by up to 2 ft. of soil.

INTRODUCTION

This report summarizes an examination conducted on May 9 and 10th 1975 of the Bradshaw Mining Lease (embraced by parts of secs. 6, 7, 8, 17, 18, and 19, T. 29 N., and part of sec. 31, T. 30 N., R. 47 E., M. D. B. & M.) in the northern Shoshone Range, Lander County, Nevada.

The examination was conducted to:

(1) Determine if the ore bodies at the 101, 102, and 103 pits had been drilled out completely.

(2) Recommend additional drilling required.

(3) Suggest possible additional exploration work.

(4) Note the character of the overburden.

GEOLOGY

The barite deposits of the Bradshaw Mining Lease, as well as the barite deposits in the rest of the Shoshone Range (Ketner in Gilluly and Gates, 1965), are hosted by the Slaven Chert, of Devonian age, which has a total thickness of approximately 4,000 ft. (Gilluly and Gates, 1965). The Slaven Chert is exposed extensively in the northern Shoshone Range; is locally masked by thrust plates of other formations and by younger (Tertiary and Quaternary) volcanic rocks and sedimentary deposits; and is intruded locally by younger igneous rocks. The following stratigraphic section summarizes the characteristics of the Slaven Chert exposed over the Bradshaw Mining Lease:

		Est. thickness (ft.)
	Intrusive contact	
Unit 4	Argillite, black, locally fissile, with occasional interbedded pale chert.	1,500

		Est. thickness (ft.)
Unit 3	Chert, pale to white, medium bedded, internally thin bedded, locally laminated on weathered surfaces.	400
Unit 2	Chert, black, gray, or pale colored, texture similar to Unit 3.	100
Unit 1	Argillite, black, blocky fracture, slope forming	500
Fault		
	Total thickness	2,500

Irregular patches of red jasper or of iron oxide, on the average up to 1 in. in diameter, occur locally on some of the dark rocks given above.

The Slaven Chert generally dips west, but the bedding is reversed locally by folding and by dragging in faults. In the area of the Bradshaw Mining Lease, the Slaven Chert is cut by numerous north-trending high-angle faults, which exhibit minor displacement, and by at least one inferred, approximately east-trending high-angle fault. Some internal thrusting is apparent. (See attached figure.)

BARITE DEPOSITS

Biconvex lensiatic barite ore bodies are localized in apparently discrete stratigraphic horizons within units 1 and 3 of the Slaven Chert at the Bradshaw Mining Lease. The ore bodies consist of one to several, horizontally and vertically arrayed, discontinuous lenses of barite interbedded with modified varieties of the prevailing country rock. The ore bodies encompass areas up to approximately 450 ft. in diameter and are up to 60 ft. thick.

The barite is usually white and medium to coarse grained; some is dark, fine grained, and locally cut by veinlets of white barite. The white barite is probably the product of the recrystallization of the black barite. A minor amount of iron oxide locally stains the barite; this probably originates from oxidation of pyrite which probably formed pene-contemporaneously with the barite. The specific gravity of the barite is apparently greater near the centers and bases of the ore bodies.

The ore body at the 101 pit and the barite occurrences in the NW 1/2 sec. 6 are localized in a stratigraphic horizon near the center of Unit 1 of the Slaven Chert. The ore bodies at the 103, 104, 105, and 106 pits are in a horizon near the center of Unit 3. The ore body at the 102 pit is in a similar appearing horizon near the base of Unit 3. The rocks intervening between the barite lenses which comprise the ore bodies localized in Unit 1 are black cherts, which contrast with the surrounding black argillite. The ore bodies in Unit 3 have associated rocks ranging in composition from cherty black argillite to gray chert, and these, in turn, contrast with the pale chert which comprises the rest of the unit.

OVERBURDEN

The ore bodies localized in Unit 1 of the Slaven Chert are overlain by argillite, which is of moderate durability and must be drilled and blasted; those occurring in Unit 3 are overlain by chert, which is very durable. In general, unconsolidated soil comprises the uppermost 2 ft. of overburden. Locally, this is a talus, but the talus particles seldom exceed small boulder (1-ft-diameter) size.

There has been some stripping over the 101, 102, and 103 pits. Apparantly this is reflected in the drill logs and pit sections furnished by

IMCO Services.

101 PIT

The 101 pit is on a north-northwest-trending ore body which is approximately 450 ft. long, over 125 ft. wide, and attains a maximum orthogonal thickness of 60 ft. The ore body, which is conformable, dips approximately 30° east and is cut by some minor postore faults.

The ore body has generally been drilled to its economic limits (in terms of thickness and stripping ratio) although apparently substantial ore remains beyond reasonable depth east of the 12, 13, and 14 lines. The ore body probably continues north and east of the area drilled; a gulley in that area reduces the relative depth to the ore. This continuity can be confirmed by drilling some approximately 50-ft-deep holes at some of the sites: M 20, N 20, O 20, P 15, 16, 17, 18, 19, 20.

102 PIT

A body of discontinuous blocks of ore is present which has been disrupted considerably by postore faulting. The ore occurs throughout a 300 ft. by 150 ft. area and one drill hole indicated a thickness of 21 ft. A reasonable amount of drilling has been conducted to determine the limits of the ore body.

103 PIT

An ore body 280 ft. long, 100 ft. wide, and a maximum of 30 ft. thick trends north northwest. Apparently being cut by some postore faulting, the ore body, which initially was conformable, now dips 30° east. The ore body has been drilled to or beyond adequate limits. Consideration

should be given to mining some ore, which has not been delineated, exposed in a road cut approximately 300 ft. north of the pit site.

104 PIT

A conformable ore body consisting of two parallel lenses of barite 50 ft. long in outcrop and apparently 3 ft. thick are terminated on the east by a north-trending, postore, high angle fault. The offset extension of the ore body probably is out of mining reach. Although the ore body is comfortable, it dips east because it is dragged against the fault. The ore body has been adequately defined through drilling and geology.

105 PIT

A 300-ft-long open cut exposes parts of a conformable ore body in the upper of the two barite-bearing stratigraphic horizons in Unit 3 of the Slaven Chert. The ore body is composed of barite lenses up to 5 ft. thick and is offset slightly by a north-trending, postore fault. The favorable stratigraphic horizon may continue to carry barite for some as yet unknown--say, greater than 200 ft.--distance south and extends, with intermittent bodies of barite, to the 106 pit.

106 PIT

Lenses of barite within the ore-bearing stratigraphic horizon in Unit 3 of the Slaven Chert are dramatically exposed where dragged into subverticallity in a north-trending, postore fault developed with an open cut 300 ft. long. An ore body of appreciable thickness was mined, the thickness having been attained by recrystallization and by repetition of barite lenses in the fault. Relations suggest that no additional ore is

present in this favorable stratigraphic horizon beyond the limits of that exposed in the north face of the open cut.

EXPLORATION POSSIBILITIES

The following ideas are the most obvious, inexpensive, and likely to find accessible ore and they can be carried out in conjunction with other work on the property with the equipment available.

Drilling can be carried out at a periodic spacing along the projected outcrop of the ore-bearing stratigraphic horizon in Unit 3 of the Slaven Chert from approximately 500 ft. south of the 103 pit to a position on the hillside below the 104 pit. Similar drilling also can be conducted along the projected outcrop southwest of the 105 pit, north of the 106 pit, and between the two. This drilling can be extended west to the limit imposed by a reasonable stripping ratio (the ore-bearing stratigraphic horizon dips west while the hillside ascends to the west).

Sources of barite float occurrences can be sought. Two were recognized during this examination; additional ones may be discovered with more scouting. The first is situated on the road to the 102-106 pit area approximately 500 ft. south of the fork of that road with the road to the placer camp and the 101 pit. The second float occurrence is located beyond the area of the Bradshaw Mining Lease on the north slope of the gulley faced from the south by the barite mine at the north end of sec. 6.

The locations of soil-, talus-, and alluvium-covered outcrops of the favorable stratigraphic horizons can be determined within fair limits with a little geologic mapping (an enlargement of the appropriate area from Army Map Service, 25 Oct. 53, Frame 10434 would make a suitable base and permit concurrent photo interpretation). Pits dug in areas downhill

from these locations can be sampled for barium and strontium at some to-be-determined interval. This work should be preceded by a pilot survey in the vicinity of known ore bodies.

The area south of Mud Spring Gulch was not examined as critically as was the area to the north. The apparent lack of barite occurrences there suggests that this is not a favorable area to prospect for barite.

REFERENCES

Army Map Service, 25 Oct 53, Aerial photographs: Project VV HU, Mission M 82, Roll 109, Frames 10433 and 10434, scale approximately 1:62, 500.

_____, 1955 (rev. 1962), Winnemucca, Nevada topographic quadrangle map; Scale 1:250,000.

Gilluly, James, and Gates, Olcott, 1965. Tectonic and igneous geology of the northern Shoshone Range, Nevada (with supplemental sections by Plouff, Donald, Gravity in Crescent Valley, and Ketner, K. B., Economic geology): U. S. Geol. Survey Professional Paper 465, 153 p. and 6 pl.

Stewart, J. H., and McKee, E. H., 1970, Geologic map of Lander County: U. S. Geol. Survey Open File Map (Nevada Bur. Mines and Geology Reference No. 86), scale 1:200,000. Compiled, in part, with geology simplified from Gilluly and Gates (1965).

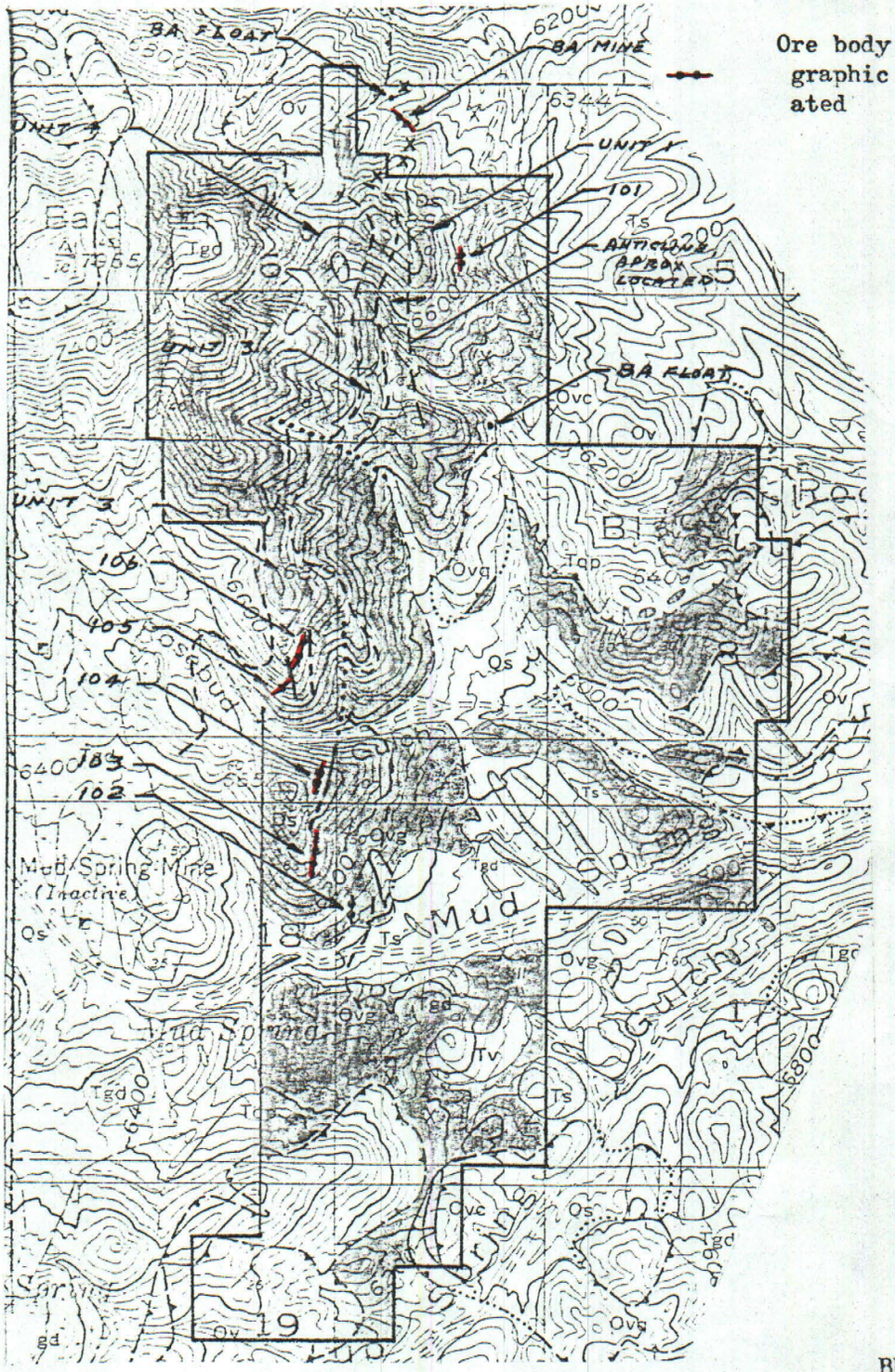
U. S. Geological Survey, 1949, Crescent Valley, Nev., (15') topographis quadrangle map: Scale 1:62,500.

EXPLANATION

Slaven Chert—Not differentiated at east and south parts of lease

Fault—Dashed where approximately located, dotted where uncertain

Ore body or ore-bearing stratigraphic horizon—Size exaggerated



Modified from Gilluly and Gates (1965)

Accompanies report by [redacted]
May 13, 1975

IMCO Services
BRADSHAW MINING LEASE
Reconnaissance Geologic Map

1:31,680
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