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COMBINED METALS REDUCTION CO.

INTER-OFFICE CORRESPONDENCE

Subject PROPOSED MECHANIZATION - CASELTON MINE

Date November 9, 1953

To E. H. Snyder, General Manager

From S. S. Arentz

Dear Mr. Snyder:

All industry has the problem of increasing the productivity of labor to keep pace with steadily increasing wage rates and supply costs. The mining industry is no exception; in fact with mining the problem is particularly acute because the industry generally has a higher than average ratio of labor to material costs. The answer to the problem lies in improved methods and better machines, but there is no final answer. The best methods and the most modern machines of yesterday may not be adequate to meet tomorrow's competition.

The metal mining industry has fallen behind the coal mining industry in underground mechanization. There are some notable exceptions, however, and as might be supposed, they are generally operations with large, uniform ore deposits of such low average value that they were forced to mechanize to survive. The Alabama iron mines and the low grade lead-zinc operations of the Tri-State, Tennessee and Washington are examples of successful mechanization. I recently observed the mechanized operations at the Grand View Mine of the American Zinc Company at Metalline Falls, Washington and a report of my observations ~~are~~ is attached hereto.

The Caselton mining operations are probably ahead of the industry average in adopting new methods and modern equipment, but the last major change at Caselton was during the period 1941 through 1943 when scrapers and slusher hoists replaced hand shovels and wheelbarrows. Constant improvement in the utilization of this equipment, improved drill bits and newer type rock drills have offset a substantial part of the steadily increasing wage and supply costs, but it has been apparent for some time that a major change in methods and equipment would ultimately be required. The mounting operating losses of the past year and the prospect of continued low metal prices necessitate an immediate change if operations are to continue.

The Caselton mine has the large, uniform ore deposits required to warrant capital expenditures for mechanized mining equipment, but the necessity for roof support and the relatively low headroom have been major obstacles to mechanization. During the past year roof bolting has been successfully applied to ground support in many sections of the mine, leaving the stopes clear for heavy equipment, and several types of equipment have become available that will operate within the headroom limitations of the ore bodies. The company was successful in having the Nevada Legislature amend the State Mining Law to permit the use of deisel equipment underground, which removed one other obstacle to mine mechanization.

As has been mentioned previously, an attached report describes the mechanization of the Grand View Mine. The key unit in that operation is a loading-hauling device called a "Gismo". It appears that the equipment and methods can be modified to meet the conditions at Caselton. Our Caselton Mine Superintendent and Caselton Mine Foreman are currently at Grand View studying the equipment and methods and upon their return to Caselton, Mr. Dale Hayes, Manager of Grand View and designer of the equipment and methods used there, will come to Caselton to obtain information at first hand on which to base the design of equipment for that operation and to work out methods with the local staff.

Assuming that the equipment will be available, it is proposed to install one unit in our 660 level Class I ore block and a second unit in our 840 level Class II ore block. Each unit would be designed to produce 7,000 tons of ore per month operating one shift. Because of the thinner ore and the necessity for roof support at Caselton, the Grand View system would require a number of modifications and would require more men to produce the same tonnage. An estimated 60 days would be required for equipment delivery. During this period work could be completed on level preparation, chute and dump installations, and on opening up ore faces. Because of space limitations in the Caselton shaft, the equipment will have to be delivered disassembled, and assembled on the shaft stations.

Attached hereto are tabulations showing details of estimated manpower requirements, mine production and operating costs. The estimated manpower requirements and costs may prove to be high because, to allow for the different conditions at Caselton, the stope crews on the 660 level have been estimated at twice, and on the 840 level at three times the number of men actually required to produce a greater daily tonnage at Grand View. The estimates are summarized as follows:

Production

15,000 tons of company ore per month. With an average of 26 working days per month, daily production is estimated at 577 tons per day of which 37 tons per day will come from square set stopes in sulphide ore, and 270 tons per day will come from each of two mechanized stoping areas in Class I and Class II ore.

Estimated Manpower Requirements

	Men	Tons Per Day	Tons Manshift
Stoping			
Sulphide Stopes	9	37	4.1
660 Level Class I Ore	11	270	24.5
840 Level Class II Ore	15	270	18.0
Total Stoping	35	577	16.5

	Men	Tons Per Day	Tons Manshift
Development	10	77	7.7
Transportation	13		
Equip. Maint.	6		
Mine Maint.	6		
Total Mine - Daily Wage	70	577	8.2

Estimated Costs

Account	Estimated Costs Total Month	Estimated Costs Cost Per Ton	Actual 1953	Actual 1952	Actual 1951
Stoping	$31,263	$2.07	$3.86	$ 3.90	$3.50
Development	8,645	0.57	0.64	1.31	0.78
Transportation	9,027	0.60	1.41	1.61	1.22
Equip. Maint.	5,995	0.40	0.53	0.72	0.56
Mine Maint.	4,755	0.31	0.67	1.26	1.14
Power	8,200	0.54	0.53	0.55	0.57
Sundry	9,547	0.64	1.05	1.47	1.42
Total Operating	$77,432	$5.13	$8.67	$10.82	$9.19
Average Tons Ore Per Month		15,100	17,251	15,263	15,993
Average Tons Waste		2,000	2,424	4,806	3,456
Average Tons Total Rock		17,100	19,675	20,069	19,449

The above tabulation indicates the saving anticipated by the proposed mechanization. While at first glance the cost reduction indicated would appear impossible unless our present and past operations are inexcuseably inefficient, it must be kept in mind that the proposed operations represent a radical departure in both methods and equipment. Under the proposed operation each man becomes a specialist in his particular job and works the full shift at his specialty. Operations will be confined to three stoping areas with the two main production areas working only one shift, resulting in substantial savings in transportation, service and supervision as well as in direct face costs. Our equipment will be reduced from fifty to sixty slusher hoists to three slusher hoists and two tractor units in the stopes.

On the basis of an indicated saving of $3.54 per ton from average costs for the first nine months of 1953, and on the anticipated tonnage of 15,000 tons per month, the equipment will repay its estimated $80,000.00 cost in less than two months.

I am having Messrs. Durk and Russell prepare an independent estimate covering the proposed operations as soon as they return from their trip to the Grand View Mine.

Very truly yours,

S. S. Arentz, Manager
Nevada Operations

SSA:sp

attach.

ESTIMATED MANPOWER REQUIREMENTS
PROPOSED OPERATIONS - 1954 FORECAST

Daily Wage Employees

Job Classification	Trib Sulph	660 Class I	840 Class II	Gen. Service	Total Men
Stope Miners	6	6	8	0	20
Gismo Operators	0	1	1	0	2
Roof Bolters	0	2	4	0	6
Powdermen	0	1	1	0	2
Utility	2	1	1	0	4
Timber Framers	1	0	0	0	1
Total Stoping	9	11	15	0	35
Develop. Miners	0	4	4	0	8
Trammers	0	1	1	0	2
Total Development	0	5	5	0	10
Maint. Timbermen	0	0	0	4	4
Shaft Repairmen	0	0	0	2	2
Total Mine Maint.	0	0	0	6	6
Motormen	1	1	1	0	3
Motor Helper	1	1	1	0	3
Shaft Cager	0	0	0	2	2
Shaft Hoistmen	0	0	0	2	2
Top Men	0	0	0	2	2
Truck Driver	0	0	0	1	1
Total Transportation	2	2	2	7	13
Black Smith	0	0	0	1	1
Drill Doctor	0	0	0	1	1
Mechanics	0	1	1	1	3
Electrician	0	0	0	1	1
Total Equip. Maint.	0	1	1	4	6
Total Daily Wage	11	19	23	17	70

ESTIMATED MANPOWER REQUIREMENTS
PROPOSED OPERATIONS - 1954 FORECAST

Salaried Employees

Job Title	No. of Men
General Mine Supt.	1/2
Caselton Mine Supt.	1
Caselton Mine Foreman	1
Caselton Mine Shift Boss	2
Mining Engineers	2
Working Boss - Development	1
Working Boss - Maintenance	1
Master Mechanic	1/2
Chief Electrician	1/2
Chief Clerk	1/2
Chief Chemist	1/2
General Mechanical Supt.	1/2
Timekeeper	1
Total Salaried	12

ESTIMATED PRODUCTION AND COSTS
CASELTON MINE
FORECAST - 1954

Production

Class of Ore	Dry Tons	Average Assays Au	Ag	Pb	Zn	Mn	Value Per Month	Per Ton
Sulphide Lead-Zinc Ore	1,000	.06	3.2	3.2	8.8		$ 7,910	$7.91
Sulphide Lease Ore	100	.03	4.1	4.1	12.0		468	4.68
Class I Manganese	7,000	.02	1.1	1.4	2.4	10.5	44,590	6.37
Class II Manganese	7,000	.03	2.7	1.9	1.2	15.0	55,790	7.97
Total Production	15,100						$108,758	$7.20
Development Waste	2,000							
Total Rock	17,100							

Estimated Expense

Account	Labor	Supplies	Other	Total	Ton
Stoping	$18,579	$12,684	$	$31,263	$2.07
Development	5,725	2,920		8,645	0.57
Transportation	7,727	1,300		9,027	0.60
Equip. Maint.	2,895	3,100		5,995	0.40
Mine Maint.	3,655	1,100		4,755	0.31
Power	100	100	8,000	8,200	0.54
Sundry	8,422	850	275	9,547	0.64
Total Operating	$47,103	$22,054	$ 8,275	$77,432	$5.13
General Expense	10,500	1,500	2,000	14,000	0.93
Total Mine Cost	$57,603	$23,554	$10,275	$91,432	$6.06
Equipment Amort.	- - -	- - -	3,593	3,593	0.23
Total Expense	$57,603	$23,554	$13,868	$95,025	$6.29
Estimated Profit				$13,733	$0.91

APPENDIX TO REPORT
ON
PROPOSED MECHANIZATION - CASELTON MINE

Basis for Mining Cost Estimate

(1) Labor

The cost of one daily wage employee per month was calculated from the miner rate of $14.54 per eight hour shift. This is actually slightly above the average base rate on the mine payroll. The monthly rate was calculated on the basis of a 6 days (48 hour) week and an average month of 26 working days.

Base wage (miners rate)		$ 14.54 per day
Add shift differential @ 1/2 time		0.24
Add overtime @ 1/12		1.23
Average daily wage		16.07 per day
F.O.A.B.	2-1/2%	
Unemployment Security	1-1/2%	
Compensation Insurance	5%	
Total Payroll Taxes	9%	1.44 per day
Total Cost per day		$ 17.45
Cost per month - 26 days @ $17.45		453.70 per month
Add Holiday Pay - 1/2 day per month		8.73
Add Hospital Surgical Insurance		3.00
Add bonus estimated to average $2.00 per day		52.00
Total estimated cost per month		$517.43

Vacation pay is charged seperately on our books to Sundry Expense and for that reason is not included in the above.

(2) Stoping

Labor - 35 men @ $517.45	$18,111.00
Lease Payments on 100 tons ore	486.00
Total estimated labor	$18,579.00
Supplies - Cost taken from nine months of 1953 averages 84¢ per ton - 15,000 @ 84¢	12,684.00
Total Estimated Stoping Cost	$31,263.00

It is estimated that tractor fuel cost will be offset by reduction in cost of slusher cable, sheaver blocks and small tools.

(3) Development

Labor - 10 men @ $517.45	$ 5,175.00
1 Working Boss	550.00
Total estimated labor	$ 5,725.00
Supplies - Average 1st nine months of 1953 $1.46 per ton waste - 2,000 @ $1.46	2,920.00
Total Estimated Development Cost	$ 8,645.00

No diamond drilling or churn drilling is included in proposed development. Proposed work is confined to preparatory work, haulage levels and ore pass raises under main 660 and 840 ore blocks.

(4) Transportation

Labor - Operating - 13 men - $517.45	$ 6,727.00
Maintenance - from operating statements	1,000.00
Total estimated labor cost	$ 7,727.00
Supplies - From 1953 actual costs reduced to number of operating units required	1,300.00
Total Estimated Cost of Transportation	$ 9,027.00

(5) Equipment Maintenance

Labor - 6 men @ $517.45	$ 3,105.00
Less 1/2 of maintenance to transportation	500.00
Less 1/2 of blacksmith charged to Sundry	260.00
Plus mechanical working boss	550.00
Total estimated labor cost	$ 2,895.00
Supplies - 1953 average - modified to revised program.	3,100.00
Total Estimated Equipment Maintenance	$ 5,995.00

(6) Mine Maintenance

Labor - 6 men @ $517.45	$ 3,105.00
Maintenance on pumps - 1953 average	550.00
Total estimated labor cost	$ 3,655.00
Supplies - On basis of 1953 average	1,100.00
Total Estimated Mine Maintenance	$ 4,755.00

(7) Power

Labor - estimated on basis of 1953	$ 100.00
Supplies - estimated on basis of 1953	100.00
Other - Cost of Power	8,000.00
Total Estimated Cost	$ 8,200.00

(8) Sundry

Item	Labor	Supplies	Other	Total
Assaying	$1,300	$ 400	$	$1,700
Blacksmithing	260	100		360
Change room	260	100		360
Engineering	1,000	50		1,050
Office	250			250
Supervision	2,600			2,600
Shop Expense	1,200	200		1,400
Vacation Pay	1,552			1,552
Mine Rental			200	200
Tax on Haulage			75	75
Total	$8,422	$ 850	$ 275	$9,547

Mechanical and electrical labor included in the estimate is as follows:

Transportation - equipment maintenance	$ 1,000.00
Equipment maintenance general	7,727.00
Mine Maint. - Pump maintenance	550.00
Power - Maintenance labor	100.00
Sundry - Blacksmith	260.00
Shop Expense	1,200.00
Total Mechanical Labor and Supervision	$11,033.00

Salaried staff, exclusive of mechanical supervision, charged into the above estimate include the following:

Development Working Boss	$ 550.00
Mining Engineers (2)	1,000.00
Mine Foreman	
Mine Superintendent	
Mine Shift Bosses (2)	
General Mine Supt. (1/2)	2,600.00
Total Mine Supervision	$ 4,150.00

Other salaried personnel, watchmen, offices, warehouse, camp maintenance, etc. are charged into general expense from which the mine receives a pro-ratal share.