8340 0119

REPORT ON THE AUSTIN MINE DUMPS, AUSTIN, NEVADA

By F. A. Gowing
Sept. 15, 1945

SCOPE OF REPORT

The following report covers the sampling and metallurgical test work done on the material composing the Austin Mine dumps from March, 1944, to July, 1945, and also covers the economic factors related to the profitable handling of these dumps.

LOCATION

The waste dumps from former mining operations at Austin, Nevada, are situated principally on Lander Hill and also a minor portion on Union Hill which adjoins Lander Hill, and are about one-half mile from the Town of Austin, and are all located within an area of about one-half mile square, as shown by the accompanying map, which shows the patented claims. They are all connected by good dirt roads with the Town of Austin and with the State Highway 50 connecting with Austin and on to Salt Lake City. The ground on which these dumps are situated has a general slope of 15 to 20 degrees toward the Town of Austin.

OWNERSHIP

Lander County has taken over title to the mines upon which the dumps are located under tax sale and has owned them for a number of years. Appended is a list of the patented claims and reference to the accompanying map shows the location of these.

Lander County has sold to the writer the dumps for a consideration of $100.00 paid and five percent of the net smelter returns on sale of product. Operations to commence within one year, and ten years within which to remove the dumps. Lander County has also leased the portion of the millsite shown on maps containing the buildings useful for milling installation and also the use of the water from the long Austin drainage tunnel for a period of ten years at an annual rental of One Hundred Dollars. Copies of the bill of sale and lease are apended hereto.

HISTORY

The dumps comprise the waste material taken from the operation of the mines, which were worked from about 1862 until about 1889. According to Frances Church Lincoln in his bulletin, Mining Districts and Mineral Sources of Nevada, the district produced about $50,000,000. He also states that the Manhatten Silver Mining Company from 1872 to 1877 produced more than $19,000,000.00 from 100,000 tons of ore from Lander Hill. In any event the production was very large. The mines were worked both through inclined shafts sunk on the veins and by vertical shafts with crosscuts run to the veins. The ores were in part sorted and the waste dumps contain the rejects from mining operations and the rejects from sorting. The tailings from these mill operations were subsequently cyanided. Very little production has been made since the original bonanza period of operation, although the surface of some of the dumps were sorted slightly, which tends to lower the values at the dump surfaces.

CHARACTER OF THE DUMP MATERIAL

The following description of the veins taken from the above mentioned Lincoln Bulletin is inserted as it bears on the character of the material making up the dumps. "The principal formation is quartz-monzonite, probably of cretaceous age. The ore bodies of the district occur in lenticular shoots in fissure veins. While there are numerous small veins in the district, there are five principal veins on Lander Hill. The main production of the camp has come from these veins which are parallel, extend in a N. W. -S. E. direction for over a half mile and dip to the N. E. They are cut by a series of N. S. faults with W. dip. The ore occurs in shoots which vary in thickness from several inches to five feet and in length from 100 feet to 1200 feet, averaging 12 to 14 inches of high grade ore. The gangue at the surface is a somewhat rusty quartz, strongly impregnated and blackened with pyrolusite and psilomelane. In depth the gangue is white quartz and some dark quartz with rhodochrosite. The veins are sometimes banded, with quartz on the outside, quartz and rhodochrosite next and quartz in the center. The ore minerals are chiefly associated with the quartz and Hill (U. S. G. S.) says they were probably deposited in the following order: pyrite and chalcopyrite, arsenopyrite, galena, sphalerite, quartzite, and tetrahedrite rich in silver. All the sulphides except the pyrite and possibly sphalerite are argentiferous.

Accompanying the quartz filling there appears to be a filling of the fissure in addition to the quartz, of a certain amount of thermally altered quartz-monzonite, and the alteration extends slightly into the wall rock. The disintegration of this altered quartz-monzonite has given rise to a high percentage of fine material in the dumps and this has probably been increased by air-slacking of the dump material since being mined. As these dumps have been subject to exposure to the elements for over fifty years this probably accounts for at least a part of the disintegration.

The dumps therefore are made up principally of quartz-monzonite and quartz wasted during mining operations and quartz rejected in sorting of the mined ore. As milling costs under the Reese River processed employed, involving roasting of the ore, were quite high, considerable quartz was rejected in sorting and forms a portion of the dump material.

TONNAGE

In June, 1945, at the instance of the writer, C. V. Gutensohn, C. E., measured the dumps shown on the accompanying map. A number of dumps lying outside the dumps measured, as well as some of the small dumps were not measured. These probably will aggregate fifty thousand tons or more. As these dumps are well compacted 17 cu. ft. has been adopted as a ton. On this basis the measured tonnage is 813, 810 tons. As it is considered that about five percent at the ground level will be lost in handling, the available tonnage is thus reduced to about 773, 119 tons, to which may be added the unmeasured tonnage. The calculations in this report are based on the measured tonnage of 773, 000 tons. Appended is a list of the dumps measured and the calculated tonnage of each:

	Tons		Tons
Curtis.....	55,205	Toyabe.....	19,140
Florida.....	30,160	Union.....	39,880
Frost.....	18,220	Ward.....	16,700
Great Easter....	9,570	A unnamed.....	5,990
Isabella.....	49,260	B unnamed.....	6,170
Diana.....	6,280	C unnamed.....	7,750
Lander.....	117,810	D unnamed.....	4,820
Magnolia.....	29,215	E unnamed.....	3,620
North Star.....	17,390	F unnamed.....	21,670
Oregon.....	59,290	G unnamed.....	5,680
Paxten.....	69,010	H unnamed.....	12,610
Plymouth.....	9,830	J unnamed.....	3,120
Ruby.....	95,270	K unnamed.....	6,180
Savannah.....	20,020	L unnamed.....	35,480
S. American.....	7,590	M unnamed.....	4,900

Total..... 813,810 Tons

SAMPLING AND METALLURGICAL TEST WORK

Preliminary samples taken in March, 1944, indicated that the dumps might be susceptible to heavy-media treatment as a test made on a sample from the Curtis dump gave about 72% concentration by this method. Accordingly some trenches were run and a few of the dumps sampled. These gave an indicated average value of the dump material of about $2.00, of which about $1.70 was in silver and the balance in gold. In making the sink-float test it was found that the percentage of -10 mesh material was high, averaging about 36% and that the fines assayed only 47% in silver. This indicated that there was a possibility of partial concentration of the values by screening at coarser meshes.

The following steps were then taken in stages:

Samples were secured from various dumps for screen analysis. Samples of the oversize were subjected to sink-float tests; samples of oversize were subjected to floatation tests; dumps were re-sampled for percentage and value of oversize; oversize from this sampling was subjected to flotation tests. Concentrates from these tests were submitted to smelters for schedule of smelter charges to apply.

A number of dumps were sampled as follows: A three feet side cut was run completely around the dump. Samples were shovel quartered from the inside corner of the cut for twenty feet length for each sample, to about a hundred pounds and then hamper broken and quartered to about 15 pounds and sent in for assay. The Ruby, Paxton, Isabel and North Star dumps were so sampled, about 1600 feet of cuts being represented by this sampling. Following are the averages of the assay results:

Dump	No. Samples	Au Oz.	Au $	Ag Oz.	Ag $	Total $
Ruby	19	.01	0.35	2.30	1.63	$ 1.98
Paxton	22	.015	0.52	2.00	1.42	$ 1.94
Isabel	14	.015	0.52	1.92	1.36	$ 1.88
North Star	6	.02	0.70	2.36	1.85	$ 2.55

Assays by Nevada Mineral Laboratories and C. A. Johnson, Reno, Nevada.

This gives an indicated average of about $1.50 in silver and $0.50 in gold.

A preliminary sink-float test on a sample from the Curtis dump gave the following result:

Concentrate	27.2 oz.	% Wt. 25	Calculated head	5.2
Tails	3.2 oz.	% Wt. 75	% recovery	72.5

A sample of the Ruby -10 mesh material assayed 0.40 Ag and indicated that the fines might be discarded as the percentage of -10 mesh material in this case was 43% of the total wt.

Samples were next secured from the Isabella, Oregon, Upper and Lower Paxton dumps for screen analysis. These were screened at 10 mesh at 1/4" mesh at 1/2" mesh and oversize and assayed for Ag content. The results were consistent and the average results were as follows:

Average calculated head $1.52

	$ per ton	% Weight	$ per dump ton
-10 mesh	0.47	36.5	0.17
-1/4" plus 10 mesh	0.96	26.25	0.22
-1/2" plus 1/4" mesh	2.69	4.6	0.12
Plus 1/2" mesh	3.69	32.65	1.11

This series of assayed showed that the minus 1/4" material amounting to 62.75% could be rejected.

Combining the -1/2" and the plus 1/2", it is seen that the following is the result:

Mesh	$ per ton	% weight	$ per dump ton	% value
-1/4	0.66	62.75	0.39	22.7
Plus 1/2"	3.37	37.25	1.22	77.3

Assays and weights of the screen tests were made by C.M. Ball of Berkeley, California. Following are his assays:

Dump	Heads (Calc)	Ag Oz.	AG $	Wt. %	$per dump ton
-10 mesh					
Isabel	$ 1.31	0.70	0.50	36	0.18
Oregon	1.64	0.75	0.53	37	0.19
Paxton	2.15	0.55	0.38	43	0.16
Paxton	1.00	0.70	0.50	30	0.15
Average	1.52	0.67	0.47	36.5	0.17
-1/4 mesh Plus 10					
Isabel		1.95	1.38	19	0.26
Oregon		1.30	0.92	30	0.27
Paxton		0.55	0.36	25	0.09
Paxton		1.65	1.17	23	0.27
Average		1.36	0.96	26.25	0.22

Dump	Heads (Calc)	Ag. Oz.	Ag $	Wt. %	$ per dump ton
-1/2 Mesh					
Isabel		5.90	4.19	4.5	0.19
Oregon		2.65	1.88	4.5	0.09
Paxton		4.00	2.84	5.0	0.14
Paxton		2.60	1.85	4.4	0.08
Average		3.79	2.39	4.6	0.12
Plus 1/2"					
Isabel		2.35	1.57	40.5	0.68
Oregon		5.20	3.09	28.5	1.09
Paxton		10.55	7.49	27.0	2.01
Paxton		2.15	1.53	40.4	0.65
Average		5.04	3.59	34.1	1.11

Pan tests were made on the -10 mesh material and the concentrate from panning assayed, showing only 1.4 oz. in the concentrate, demonstrating that the fines could be discarded as non-commercial.

The screen tests indicated that about 60% of the Austin dump material could be rejected by screening through about one-quarter inch screen, and that about 80% of the values remained in the oversize, amounting to about 40% of the tonnage, and that the grade of this oversize could be raised by screening to about $3.37 in silver alone.

Accordingly the dumps were re-sampled in part for oversize to secure material for further sink-float and for flotation tests on the oversize. Samples taken from the following dumps, to-wit, Ruby, Oregon, Paxton, Paxton lower dump, Curtis, Isabel, Lander and Magnolia gave the following composite results. These were screened through one-eighth, one-quarter as follows:

	$ per ton	% Weight	$ dump ton	% Value
-1/8"	0.75	37.7	$ 0.27	12.2
-1/4"	1.74	10.5	0.18	8.4
Plus 1/4"	3.19	52.8	1.68	79.4
			$ 2.13	

Calculated value per dump ton
Assays by C. M. Ball and C. A. Johnson

These results closely check the first above screen test. About 700 lbs. of this oversize was sent to American Cyanamid at Stamford, Conn. for sink-float tests and about 300 lbs. to Amador Metals at Jackson, California for flotation test work by O.R. Brown of American Cyanamid.

A composite by American Cyanamid at Stamford assayed 4.01 oz. Ag and .006 oz. Au. The sink-float tests showed that the sink-product consisted of 55.5% of the total and carried 79.4% of the gold and 87.4% of the silver. Due to the low ratio of loss than two to one of concentration by heavy meadia further consideration of this treatment was eliminated. Appended is a copy of this test.

Flotation tests were run on the material sent Amador Metals, at Jackson, California, by O.R. Brown of American Cyanamid Co., and assays by V.R. Fitzsimmons with the following results:

Test #1	Gold Oz. per ton	Gold Value $ per ton	Ozs./ton Heads Silver	$	% Wt.	A.T. Assayed
Cleaner Con.	.26	9.10	144.3	102.45	3.2	.655
Cleaner Tails	.034	1.19	9.22	6.54	3.6	.737
Rougher Tails	.0018	.06	.23	.14	93.2	3-1-1/2
Ratio of concentration - 31 into 1						
#2						
Cleaner Con.	.23	9.80	187.7	133.26	8.4	.497
Cleaner Tails	.029	1.02	10.9	7.74	4.2	.874
Rougher Tails.	.0033	.12	.20	.14	93.4	3-1-1/2
Ratio of Concentration - 41 into 1						
#3						
Cleaner Con.	.22	7.79	140.3	99.61	2.8	.586
Cleaner Tails	.037	1.30	9.15	6.49	3.2	.669
Rougher Tails	.0033	.12	.15	.11	94.0	3-1-1/2

The average shown in these tests gave tails of 24¢ and were consistent both as to gold and silver recovery. The recovery shown of 93% is very good. These tests were run on a composite from samples from the following dumps assaying as follows:

Dump	Gold Ozs. per ton	Gold $	Silver Ozs.		
Isabel	.005	.18	1.38		
Lander	.005	.18	7.02		
Paxton Lower	.025	.88	6.92		
Magnolia	.02	.70	7.02		
Ruby	.005	.18	5.79		
Oregon	.01	.35	7.48		
Oregon B	.0025	.09	1.57		
Curtis	.0025	.09	1.84		
Paxton	.0075	.26	1.86		
Combined wt.	Gold Mgs. .165				
Average	.009166	.3208	4.54	$3.223	Tot. $3.54

Above assays run at two assay tons

In view of the favorable results obtained from flotation tests of the plus 1/4" material in the Austin dumps and to fully check these as well as to ascertain the percentage of oversize available, about 130 new samples were taken as follows:

These samples were obtained by running cuts into the slopes of the dumps at about forty foot intervals entirely around the dump in each case at an elevation of about two-thirds of the way up the slope. These were screened after weighing through a one-quarter inch screen, the oversize was split once, one-half being sacked for flotation work and the other halp put through a laboratory crusher set up in Austin for this purpose and quartered to about a two-pound sample. These samples and the half set aside for metallurgical work were sent to the Amador Metals at Jackson, California for assay and flotation test work. Following are the averages for the dumps so sampled.

Dump	No. Samples	Au Ozs.	Au $	Ag. Ozs.	Ag $	Total $	% plus 1/4"
North Star	9	.0053	.19	4.16	2.95	3.14	44%
Paxton	23	.0085	.24	5.90	4.19	4.43	44%
Oregon	12	.0062	.19	2.04	1.45	1.64	42.2%
Lander	25	.0059	.21	6.31	4.48	4.69	42%
Ruby	16	.0075	.26	3.03	2.10	2.37	42%
Isabel	37	.0045	.14	3.36	2.40	2.54	46%
Union	2	.0025	.09	7.00	4.97	5.06	37.5%

Weighting the number of samples in each dump as approximating the proportional tonnage, the weighted average of the above sampling is as follows:

Gold Ozs.	Gold $	Silver Ozs.	Silver $	Total $
.00571	0.20	4.62	3.10	3.30

The average shown of the plus 1/4" material in the above sampling as to percentage of the dump material shows a weighted average of 44.8%, which is about 5% higher than the first screen tests indicated. As the dumps had been subjected to heavy rains just prior to the sampling, screening was slightly less efficient which may account in part for the higher percentages of oversize obtained.

Following is a tabulation of the averages of all samples taken for the dumps sampled, tonnages and gross values for the plus 1/4" tonnage.

Dump	Tonnage	% of Plus 1/4"	Millhead Tons	$ per ton	$ Total
Isabel	49,260	46.2	22,758	2.42	53,074
Union	59,880	37.5	22,456	4.98	104,326
Oregon	59,280	42.2	25,016	2.52	63,041
Paxton	69,010	44	30,364	3.32	100,809
Curtis	55,205	50.5	29,785	3.40	84,869
Lander	117,810	42	70,686	4.79	237,010
Ruby	95,270	42	40,013	2.40	96,452
No. Star	17,390	44	7,051	3.10	23,720
Magnolia	29,215	48	14,023	4.90	91,137
Totals	562,320		262,751		$856,438

Average value per millhead ton $3,2593

Average percentage of plus 1/4" material 46.6%

Applying this figure to the measured tonnage of 773,119 tons considered available, 360,273 plus tons of mill heads are available, neglecting the unmeasured tonnage and of this tonnage 70% may be considered to have been sampled.

As a comparison of the results of sampling, the following tabulation shows a very uniform and consistent set of averages.

Calculated value of plus 1/4" of trench samples based on 77% of values is 37.25% of wt.

	Ag Ozs.	Ag $	Au $	Total
	4.36	3.10	0.25	$3.36
700#				
Mine dumps sent Cyanamid at Stanford, Conn. Heavy-media test	4.01	2.80	0.21	3.01
Ball screen test 4 dumps	4.81	3.30	not run	
Fitzsimmons 9 dumps, average 9 samples	4.54	3.22	0.32	3.54
C.A. Johnson, 10 dumps	4.56	3.24	not run	
Flotation tests by Brown of Cyanamid	4.92	3.51	0.35	3.86
Oversize sampling 7 dumps June, 1945 - 124 samples	4.62	3.10	0.20	3.30

This shows an average value of Silver $3.18, Gold $0.266, Total $3.446.

The oversize samples from the 124 samples last taken and shipped to Amador Metals was subjected to the following tests. A composite was made for flotation test work.

10 lbs. of head sample was tumbled in laboratory ball mill for four minutes in two lots and screened respectively through 1/4" screen and through 3/8" screen, with the result that the undersize carried too much value for rejection.

A large sample from an unmeasured dump west of the measured dumps was rescreened through 1/4" screen, the plus carrying 9.0 ozs. and the minus 1/4" 4.5 ozs. silver, indicating that the material of this dump constitutes similar grade material to that of the measured dumps. The tonnage in this dump is about 30,000 tons.

A composite made from the oversize was made as per appended data, and a flotation test repeated fourteen times in the laboratory Fagergren to produce 225 grams of concentrate for submission to various smelters for schedule of smelter rates on such a product.

This sample did not check with the average of the samples assayed, running about 6 ozs. higher in silver. As some of the ore mined at Austin carried several thousand ozs. silver, it is probable that the sample contained a spot of this, raising the grade. The concentrate as a result of much higher than that obtained in the preceding flotation tests showing about 440 ozs. silver. The metallurgical recovery was good, being about 94%. The head sample for this testing ran about 12 ozs. silver.

It is considered that peripheral sampling on the slope of the dump carries a small factor of safety as the fading last period of operation of mines in general produces a lower grade of ore and this should be reflected in the outside of the dump. For this reason the mass of the dump should be if anything somewhat better in grade than the above sampling would indicate.

The material forming these dumps will average less than three inches in size, with fines composed largely of decomposed coarse granitic sand. The quartz itself is compact, showing very little fracturing and sulphide minerals well imbedded. Consequently the quartz has formed relatively few fines and no

oxidation of the sulphides is evident. This accounts for the concentrating effect of screening out of the fines. The material coarser than three inches is largely undecomposed granite and its percentage very small.

Copies of the above assays and flotation tests are appended to this report.

PROPOSED SCHEDULE OF OPERATIONS

It is proposed to handle the dumps as follows:

Screening at dumps.
Haul to central plant
Flotation milling.
Marketing of concentrate.

Screening: Screening is proposed at the dumps, utilizing a vibrating screen and rejecting both the plus3-4" material and also the minus 1/4" material, with direct loading of trucks by means of short conveyor from screen to truck.

It is proposed to set screen, which is to be a portable one, at toe of lower side of dump and to feed same by using a bulldozer over a short ramp to the screen. Direct loading will avoid the necessity of loading bin and use of bulldozer will facilitate removal down hill of rejects from screening.

Haul to central plant: The average haul to central plant as shown by accompanying map will be under two miles and of this one and one-half miles will be over paved highway and will be over about a 7% down grade to plant. As all of the dumps are accessible by presently built roads with good grades, hauling presents no problem. The Lander dump however will require about one-eighth of a mile of new road to reach toe of dump. Ten ton dump trucks appear to be most suitable for the above haul as to capacity. It will be probably found advantageous to establish a stock pile at the mill to avoid interruption to haul, due to adverse weather conditions which may arise at periods during winter storms.

Flotation Milling: Based on flotation test work done by American Cyanamid Co., straight flotation milling of the plus 1/4" material of the dumps is all that is necessary to make a recovery of from 90 to 94% of the gold and silver values in the material.

As none of the delivered material will exceed four inches in size, primary crushing, by rock-breaker, is unnecessary, and cone crushing to minus 1/2" preliminary to ball-milling and flotation recovery of value is proposed.

Also as at least 50% of the material to be milled consists of partially disintegrated quartz-monzonite, steel consumption in milling will be very light.

It is proposed to use the old mill buildings to install the milling equipment, as these were of stone and with comparatively small repairs to roofing and windows can be adapted to handle all necessary milling steps. The mill building itself has suitable excavation in benches and good concrete floors, so that it affords a large saving in capital outlay in the construction of plant.

It also permits the use of the water from the long drainage tunnel, whose portal is about five hundred feet from the mill building. Another large adjacent building lends itself to installation of the necessary power unit for the mill.

WATER SUPPLY

The water supply must be obtained in part from the more than a mile long drainage tunnel whose portal is at the millsite. This must be supplemented by first a cased well situated about a mile down the Pony wash which runs from Lander hill area through the town of Lander, and which is owned by Lander County. Also the town of Lander water supply, piped from the head of Marshall canyon may be purchased as to its excess of needs of the town. A further source of water is Yankee Blade canyon about two miles to the north. Under the Nevada statutes, application must be made for the use of this water.

As the original mill had a capacity of about one hundred tons and was a stamp mill, its water consumption was about twice that of a flotation mill, and a further saving of water can be effected by reclaiming about thirty to forty percent of the water, which was not practiced in the former operation.

For the above reasons it is considered that sufficient water is and can be made available for the tonnage proposed to be handled.

OPERATING COSTS

Screening through vibrating screen with short conveyor loading of trucks and moving of material to screen is estimated to cost as follows:

Delivery to screen.....	$0.05 per ton dump material
Screening and loading....	$0.07 per ton dump material
	$0.12

DELIVERY TO MILL

As the average haul is about 1.8 miles, allowing 15¢ per ton mile, the cost is as follows:

Haul to plant, 1.8 mile .... $0.27 per delivered ton.

As the percentage of material to be delivered is about 45% of the dump tonnage, 2.2 tons must be screened for each delivered ton, which at 12¢ is 28.4¢, so that the cost per ton of delivered material of the screening and haul is as follows:

	Per ton of mill head feed
Screening and loading....	$ 0.284
Haulage.....	0.27
Total.....	$ 0.554

It is probable that the above operations can be contracted at a somewhat lower cost than above estimated.

MILLING

As about 50% of the material is semi-disintegrated quartz-monzonite, a light ball consumption is anticipated. Also the flotation tests made show a simple reagent set-up. Also as the mill feed will not exceed 3 1/2" in size, primary crushing is obviated and a cone crusher to give to one-half inch ball mill feed is all that is necessary, which is a factor in reducing milling cost. Based on

250-300 tons daily tonnage the cost is estimated at or below $0.75 per ton including the power factor, and is broken down as follows, per 24 hours.

Labor, 7 men at $7.50	$ 52.50
Superintendence	10.00
Reagents and minor supplies	30.00
Ball and liner consumption at 6¢ lb	18.00
Power 300 H.P. at $8 per H.P. month	80.00
Daily total expenses	$190.00

This is 78¢ per ton at 260 tons, or 64¢ per ton at 300 tons.

MARKETING COSTS

Using the schedules based on samples of concentrates sent to various smelters, following is a calculation of the cost per ton of mill feed.

As the haul approximates 400 miles either to Selby smelter in California or to the smelters at Garfield and Tooele in Utah, based on one cent a ton miles with twenty-ton trucks, all of the haul being over highway, the haul will cost $4.00 per ton.

Based on the average grade of concentrate made from the flotation tests made on the average millhead feed of $3.44 per ton and a ratio of concentration of 36 into 1, shown in the tests, the cost of smelting will be $5.00 per ton and deductions will be $5.65 per ton of concentrates. The total therefore is $14.65 per ton concentrate.

At the ratio of 36 to 1 the cost per ton of mill feed is therefore $0.406.

As analysis of the concentrates made shows silica content of more than 25%, it may be possible to increase the ratio of concentration by further re-cleaning of the concentrate, thus lowering the marketing cost. Below is an analysis of concentrate made.

Au Oz	Ag Oz	Lead %	Copper %	Zn	Insoluable	A%	Sulphur %	Iron %	Sb
0.81	408.7	3.2	1.02	2.9	26.4		29.0	25.0	
0.80	399.4	2.0	.3	2.8	26.4	4.0	23.0	25.6	1.8

INDIRECT COSTS

ROYALTY

As metallurgical leases and marketing costs aggregate $0.656 per ton, royalty will be paid on $2.79 at 5%, or 14¢ per ton.

PLANT RETIREMENT

Due to the fact that building and excavation will not be required, it is estimated that a mill may be constructed including diesel power plant of 300 H.P. at about $500 per ton of capacity and that salvage may be considered to be 30% of plant cost. On this basis a 300 ton plant will cost $150,000, and writing off 70% of this cost against 350,000 tons milled, the cost per ton of mill feed will be 29.2¢ per ton.

Interest on plant investment figured at 4% for a period of four years amounts to $24,000.00, which is 6.6¢ per ton.

Personal property tax on improvements will be less than 2¢ per ton, but are placed at 2¢, or $7,200.00.

SUMMARY OF COSTS

Operating: Per ton mill feed		
Screening and delivery to mill	$0.554	
Milling	0.75	
Marketing	0.406	
		$ 1.71
Indirect:		
Royalty	$0.14	
Plant retirement	0.292	
Interest	0.066	
Taxes	0.02	$ 0.518
Total		$ 2.228

ESTIMATED EARNINGS

According to the averages obtained in sampling and test work done, 352,000 tons of material of a grade of $3.446 per ton is available, with a probable additional tonnage of thirty to fifty thousand tons of similar average grade.

Following is a tabulation of the gross figures, using above cost data.

Gross Value	$1,249,300.00
Recoverable Value	$1,158,700.00

Costs at Dumps	
Screening and Haul	$ 200,600.00
Milling	271,500.00
Marketing	147,000.00
Royalty	50,700.00
Plant	105,000.00
Interest on plant at 4%	24,000.00
Taxes	7,200.00
Total	$ 806,000.00

Total Recovery	$1,158,700.00
Total Costs	806,000.00
Net Estimated Profit	$ 352,700.00

This is a profit per ton of $0.974.

At the rate of 250 tons per day it will require a mill operating period of about four years to work the tonnage estimated, so that during this period the annual profits are indicated at $90,000.00 per year in round numbers.

As this would also result in stimulating of work in some of the mines themselves, there is apt to be a certain amount of tonnage produced by such work, and while this would not result in any marked increase of earnings it would be helpful to the local community to mill such ore as was so produced.

It is of course quite possible that development in the area might result in considerable tonnage development, in which case undoubtedly an arrangement could be made to dispose of the plant at the expiration of the time necessary to work the dump material.

CAPITAL REQUIREMENTS

It is proposed to arrange with contractors for screening and haulage of the oversize to milling plant, therefore this does not involve the employment of capital.

It is anticipated that the mill can be constructed with power plant and accessories, such as pumping plants, etc. for one hundred fifty thousand dollars.

As the monthly operating cost will approximate fifteen thousand dollars and smelter returns may be delayed as much as thirty days, it is considered that a working capital of thirty thousand dollars should be available.

On the above basis the capital required for the operation is thus one hundred eighty thousand dollars. However, if one of the mills now owned by the Reconstruction Finance Corporation at Gabbs Valley is found to be obtainable at reasonable cost, the capital requirement as to cash may be sharply reduced.

CONCLUSION

The costs estimated in the above have been carefully checked with competent authorities on screening, hauling and milling, and the estimated margin of profit is wide enough to permit of variation from the estimated profits without jeopardizing the operation.

It is therefore recommended that the operation be undertaken as soon as reconversion permits the free use of the necessary equipment and construction can be carried out at reasonable cost and operation will not be restricted.

SUMMARY

LOCATION

The waste dumps are located on Lander Hill, one-half mile east of Austin, Lander County, Nevada, and are connected by existing roads from each dump to Highway 50, which runs through the Town of Austin.

OWNERSHIP

Lander County, owner of the patented ground, has sold the dumps to F. A. Gowing for a cash consideration and for 5% of the net smelter returns, removal over a period of ten years and has leased the former millsite and buildings thereon and the use of the water from the long Austin drainage tunnel at the millsite.

CHARACTER

The dumps consist of partially disintegrated quartz-monzonite, together with quartz wasted during mine operations, and rejects from sorting operations, and will average less than three inches in size of material.

TONNAGE

Within area of one-half mile square are 813,000 tons of measured tonnage of dumps and extraneous in excess of 50,000 tons. Considering that 5% at ground level with included small amount of coarse material cannot be obtained, there is available 773,000 tons of dump material.

SAMPLING

Peripheral side cuts on slopes gave an average of about $2.00 per ton. Silver $1.70, Gold $0.30. Screen testing demonstrated that about 60% of values are contained in 46.6% of the material coarser than 1/4" and that the grade of the plus one-quarter material was raised by screening to $3.446 per ton, - Silver $3.18, Gold $0.266.

METALLURGY

Straight flotation on the plus 1/4" gave a recovery of about 93% of the values, showing a tailing loss of 24¢ per ton, and high silica percentage indicates further cleaning is possible.

PROPOSED OPERATION

Screening at dumps, rejecting the minus 1/4" material and plus 3 1/2". Hauling average two miles to millsite below Austin. Cone crushing to minus 1/4" followed by straight flotation milling. Marketing of concentrate by truck haulage to smelter.

OPERATING COSTS

Screening 2.2 tons to produce one ton mill feed and hauling one ton 2 miles to plant.....	$ 0.554	
Milling one ton.....	0.75	
Marketing one ton.....	0.406	
Total Operating Costs.....		$1.71

INDIRECT COSTS

Royalty.....	$ 0.14	
Retirement of 70% of plant investment.....	0.292	
Interest on plant investment 4 years at 4%.....	0.066	
Personal property tax.....	0.02	
Total Indirect Costs.....		$0.518
Total cost per ton mill head.....		$2.228

PLANT INVESTMENT

Screening and hauling to be contracted. Vibrating screen outfit may form part of investment and if so will cost _____. Figuring a minimum capacity of 250 tons daily the mill is figured at $500.00 per ton of capacity as no

building or excavation is necessary and probably good used equipment may be available by 1945. This cost is thus $125,000.00. Working capital of $25,000.00 is needed as monthly operation will cost about $15,000.00, and thirty days should be allowed for marketing delays.

ESTIMATED EARNINGS

Of 773,000 tons, being 95% of measured tonnage, 48.6% is available as mill heads of a grade of $3,446 per ton. Mill tonnage 362,000 tons.

Gross value 362,000 tons at $3.446	$1,249,300.00
Recoverable value at $3.20	$1,158,700.00
Dump cost 362,000 tons, screening and haul	$ 200,600.00
Milling	$ 271,500.00
Marketing	$ 147,000.00
Royalty	$ 50,700.00
Plant	$ 105,000.00
Interest	$ 24,000.00
Taxes	$ 7,200.00
Total costs	$ 806,000.00
Recoverable value	$1,158,700.00
Total costs	$ 806,000.00
Gross net profits	$ 352,700.00

Profit per ton.....$0.974

At 250 tons per day, approximately a milling period of four years will be required for operation.

The annual profits are therefore about $90,000.00.

As the estimated profit is about 30% of the recoverable values, reasonable variation from the estimated costs will not preclude a successful operation.