

REVIEW AND ANALYSIS OF  
"MINERAL, COAL, AND AGGREGATED RESOURCE  
APPRAISAL OF  
ALASKA MENTAL HEALTH TRUST LANDS"  
BY  
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PREPARED FOR  
THE ALASKA DEPARTMENT OF NATURAL RESOURCES

BY  
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## Introduction

The Alaska Department of Natural Resources (DNR) has requested that the Institute of Social and Economic Research (ISER) review and analyze a document entitled "MINERAL, COAL, AND AGGREGATE RESOURCE APPRAISAL OF ALASKA MENTAL HEALTH TRUST LANDS", by Paul A. Metz and Colin Dixon (December 31, 1988).

The report presents an appraisal of the current market value of mineral, coal, and aggregate resources on Alaska's Mental Health Trust lands. The appraisal process is done in two major steps. First, the occurrence of resources is estimated, using various geological methods. Second, the current market value of resources identified is estimated.

## The Review

As indicated above, the Metz analysis considers metallic mineral resources, coal, and sand and gravel. Before turning to metallic minerals we comment very briefly on coal and sand and gravel. The production future of coal is at least as speculative as the future of nonfuel minerals. Given the level of uncertainty the Metz analysis is not unreasonable. The same conclusions hold with respect to sand and gravel.

The appraisal of coal and sand and gravel amounts to less than twenty million dollars, while the estimate of present value of the metallic minerals is over 1.5 billion dollars. For this reason our review has focused primarily on metallic mineral resources and the second aspect of the appraisal process, namely the estimation of the current market value of mineral resources. The review addresses two major issues, the appropriateness of the methodology in determining fair

market value, and the application of the methodology in the present case.

### Appraisal Method

The basic economic test of an appraisal method is whether it can be expected to result in a reasonable estimate of fair market value, and whether or not there are alternative methodologies available that would result in more accurate predictions of fair market value.

We do not profess to be experts in mineral valuation, but the general methodology employed in the Metz study appears to be valid from an economic standpoint. The work of Harris, referenced in the Metz study, and upon which the Metz study is based, is widely recognized, and has had extensive application in Alaska and Canada. Neither do we have alternatives to propose that would offer a superior approach.

There is one aspect of the process that raises a question in our minds. The methodology is more appropriate for evaluating large tracts. There are a number of instances in the Metz study where small (e.g., one to one hundred acres) parcels are evaluated. In some instances the mine types would probably not fit within the specified acreage. In instances such as this, it is not clear what the economic significance of the resource really is.

While the general methodology appears to be appropriate, we do have some serious reservations about the conclusions reached in the Metz analysis. The first of these reservations concerns the probability estimates of discovery.

It is unclear as to what the actual probability figures represent. In general, we cannot tell from the study how the probabilities were estimated or exactly what the probability estimates represent. First, the analysis is not specific as to how the per acre probability estimate was obtained. Secondly, it is asserted (on page 24) that the probabilities used are for world class deposits. Again, it is not clear how this conclusion is reached. Thirdly, in a number of cases deposits of different types are aggregated within single parcels. We question whether the probabilities of individual occurrences are additive within specific parcels. While we have reservations about the way in which the probabilities were calculated, these are questions that are more appropriately addressed by someone else.

The second set of concerns address the economic parameters upon which the mineral valuations are based. In general, these fall in three categories.

- a. The study assumptions relating to market conditions basic to the valuation of resources, including the history of resource development in Alaska,
- b. The study assumptions relating to anticipated rates of return to the resource owner, and
- c. The timing of the assumed production and income.

#### Minerals Markets Assumptions

There are a number of assumptions regarding general world and Alaska economic parameters that should be noted. First, total costs of production in Alaska have historically been higher than for most other parts of the world, and this would appear to remain the case. General wage rates have exceeded "lower 48" levels by significant amounts for at

least the last 25 years, and the current recession has not significantly altered this relationship. Most other costs of production also remain well above average U.S. levels.

These assessments of production costs differ from those presented in the Metz analysis. The assertion of lower production costs is in part attributed to excess production capacity (e.g., labor, electric power) in Alaska. The level of mining implicit in the Metz analysis would wipe out any excess capacity and put real upward pressure on Alaska factor prices in general. Among other consequences, this would adversely affect the assumed net smelter return.

Another assumption that is of concern is that projected Alaska production would have no impact on world prices. While this might be the case for some metals it is hard to believe that this would hold for some others, if production were to actually occur at projected levels.

To more accurately assess the scale of and potential impact of projected mineral output, the data in the Metz study has been incorporated into a model, as described in Appendix A. The model computes the sensitivity of both expected dollar and physical output levels in response to geologic and economic assumptions.

Table 1 summarizes annual projected production from Alaska Mental Health Lands (AMHTL) and compares output levels with 1986 U.S. production. The AMHTL copper production would equal almost 30 percent of other U.S. production, lead would be 150 percent and zinc 562 percent of U.S. production. Lead production is also about 15 percent of world new metal production. The projected level of zinc production is about 17 percent of 1986 world production. Alaska production of copper would equal about 4 percent of 1986 world production. Silver and gold production would also have a potentially

TABLE 1  
OUTPUT SUMMARY  
BASE CASE

MINERAL	GROSS PRODUCTION	GROSS METAL VAL	ANNUAL PRODUCTION	ANNUAL MET VAL	US PROD 1986	AK PROD, % OF US
COPPER (Cu)	3.616	6349.438	0.334	586.753	1.147	29.13
LEAD (Pb)	7.956	5241.402	0.512	337.029	0.340	150.56
TIN (Sn)	0.148	1338.929	0.010	90.198	0.180	5.52 W
ZINC (Zn)	16.210	13026.220	1.141	916.820	0.203	562.04
GOLD (Au)	53.615	24730.839	3.859	1780.172	3.733	103.38
PLATINUM (Pt)	0.191	116.441	0.012	7.086	7.834	0.15 W
SILVER (Ag)	1552.264	12201.541	108.528	853.082	34.220	317.15
ANTIMONY (Sb)	0.000	0.000	0.000	0.000	NA	NA
MERCURY (Hg)	0.000	0.000	0.000	0.000	NA	NA
MOLYBDENUM (Mo)	1.145	7675.810	0.057	383.791	41.953	0.14
NICKEL (Ni)	0.116	1848.658	0.006	30.811	0.001	541.91
BARIUM (BaSO4)	16.669	633.412	1.667	63.341	NA	NA
CHROMITE (Cr2O3)	0.004	30.141	0.002	15.070	10.173	0.02 W
NIOBIUM (Nb2O3)	0.000	0.000	0.000	0.000	NA	NA
URANIUM (U3O2)	0.078	2550.284	0.004	127.514	0.006	63.15
VANADIUM (V2O5)	0.031	238.018	0.002	11.901	NA	NA
TUNGSTEN (WO3)	0.041	273.450	0.003	18.230	0.103	2.68
RED	0.000	0.000	0.000	0.000	NA	NA
TOTALS (MIL DOLLARS)		76254.583		5221.798	PRES VALUE	
					NSR, MIL \$	1545.7

NOTE: PRODUCTION DATA ARE IN MILLION METRIC TONES EXCEPT FOR PRECIOUS METALS, WHICH ARE MILLION TROY OUNCES. VALUES ARE MILLIONS OF 1987 DOLLARS. "W" INDICATES WORLD PRODUCTION.

significant impact. To assume that these levels of production could be added to current world production (which is what the study implies) and have no impact on market prices is to assume that demand is infinitely elastic. Our judgement is that production at these levels would definitely impact prices.

In general, we would agree with the broad assumptions of relative stability in world mineral markets over the next twenty years. While the markets will reflect the cyclical nature of all natural resource markets, the long term trends will be relatively constant. However, this assumption also implies that the economic feasibility of Alaska resources will not be significantly different than it has been for the last twenty years (with the exception of gold). This would suggest that the projected production levels, even for some period in the future, are highly optimistic even if the minerals are present on these lands.

The choice of prices for the valuation of resources should also be noted. The study uses August 1987 prices. However, it is probably more appropriate to use some form of long run average (in constant dollars) prices than those for a single month. This is because metals prices exhibit a great deal of short term cyclical movement, but producers base their investment decision on long-run price expectations.

We have reviewed twenty year price histories for six metals (copper, lead, tin, zinc, gold, and silver) and adjusted these prices to 1987 levels. The constant dollar average price for each metal was then computed (as shown in Appendix B). These prices were then used to recompute projected gross and annual values of metal production, and the present value of net smelter returns. The results are shown in Table 2. These prices results in an increase of the estimate of present value from 1.54 billion dollars to about 1.73

TABLE 2  
 OUTPUT SUMMARY  
 LONG-RUN PRICES

MINERAL	GROSS PRODUCTION	GROSS METAL VAL	ANNUAL PRODUCTION	ANNUAL MET VAL	US PROD 1986	AK PROD, % OF US
COPPER (Cu)	3.616	9578.730	0.334	885.172	1.147	29.13
LEAD (Pb)	7.956	7602.706	0.512	488.864	0.340	150.56
TIN (Sn)	0.148	2188.826	0.010	147.453	0.180	5.52 W
ZINC (Zn)	16.210	18788.642	1.141	1322.394	0.203	562.04
GOLD (Au)	53.615	22308.282	3.859	1605.792	3.733	103.38
PLATINUM (Pt)	0.191	116.441	0.012	7.086	7.834	0.15 W
SILVER (Ag)	1552.264	11094.094	108.528	775.654	34.220	317.15
ANTIMONY (Sb)	0.000	0.000	0.000	0.000	NA	NA
MERCURY (Hg)	0.000	0.000	0.000	0.000	NA	NA
MOLYBDENUM (Mo)	1.145	7675.810	0.057	383.791	41.953	0.14
NICKEL (Ni)	0.116	2464.877	0.006	30.811	0.001	541.91
BARIUM (BaSO4)	16.669	633.412	1.667	63.341	NA	NA
CHROMITE (Cr2O3)	0.004	30.141	0.002	15.070	10.173	0.02 W
NIObIUM (Nb2O3)	0.000	0.000	0.000	0.000	NA	NA
URANIUM (U3O2)	0.078	2550.284	0.004	127.514	0.006	63.15
VANADIUM (V2O5)	0.031	238.018	0.002	11.901	NA	NA
TUNGSTEN (WO3)	0.041	273.450	0.003	18.230	0.103	2.68
REO	0.000	0.000	0.000	0.000	NA	NA
TOTALS (MIL DOLLARS)		85543.712		5883.072	PRES VALUE	
					NSR, MIL \$	1730.8

NOTE: PRODUCTION DATA ARE IN MILLION METRIC TONES EXCEPT FOR PRECIOUS METALS, WHICH ARE MILLION TROY OUNCES. VALUES ARE MILLIONS OF 1987 DOLLARS. "W" INDICATES WORLD PRODUCTION.



billion dollars. These results suggest that the resource valuation is highly sensitive to resource prices used.

We would also note two other minor items. On page 27 reference is made to multiplier effects. While these effects certainly exist they should not be construed as affecting the market value of the resource. The economic benefits of the multiplier effect are not something that the mineral resource developer can capture, and cannot be included in the market value of a resource.

It was also noted that the surface value of the land may exceed the initial cost of the mineral rights. While this may be the case, the example cited does not support the contention. The present value (in 1920) of the 1988 sale price of \$519 when discounted at 10 percent, is about \$1.06. Furthermore, there is no consideration of the cost of reclamation, or what this investment in the land may have contributed to its market value.

The above issues regarding economic assumptions are probably minor relative to our major points of concern. These relate to the assumed net smelter returns and the timing of the income stream from resource extraction.

#### Returns to the Resource Owner

The Metz study does not precisely define net smelter return. Our interpretation of the term is that it represent what the producer could pay to the resource owner and still earn a competitive return on investment. In this context the net smelter return is equivalent to economic rent, and as such implies that costs of production are less than the market value of the resource. The justification for this assumption (i.e., positive economic rent) includes "the expectation of

low operating costs" (page 25) and discovery of world class deposits.

The argument ignores the fact that there are known world class and other high grade deposits in the state that have not, and in some cases may never be, developed. There is a reason for this. The expected total costs of production exceed the expected total revenue. Some known deposits will be produced, and some future discoveries will result in production. However, it cannot be assumed that the net smelter return is always going to be positive. This simply is not the case. If it were, then the level of mining activity in the state would reflect this, and the value of mineral production would be substantially greater than it is. In fact, it is the absence of positive economic rent that explains the relatively low level of metallic mineral resource development in Alaska.

Even if production was to occur it does not ensure a specific net smelter return, i.e., the net smelter return could be less than the assumed four (or ten) percent. Since there are many known deposits in Alaska that are not producing, it is reasonable to assume that mines might come on line with a low (but positive) net smelter return.

#### The Timing of Production

Finally, the assumed timing of revenue flows needs to be addressed. A fundamental assumption of the Metz appraisal is that the projected royalties are already being paid. Alternatively stated, the study implies that all of the expected production is already in production now. This is obviously not the situation.

Under the assumptions of the Metz appraisal, current annual production of metallic minerals on the Mental Health Lands alone would be valued at about 5.2 billion dollars, with a net smelter return of about 200 million dollars. By way of contrast, the estimated gross value of metallic mineral production for all Alaska in 1988 is about 114 million dollars according to a preliminary report of the Alaska Division of Geological and Geophysical Survey.

A more appropriate assumption would be to distribute projected production over an extended period of time. The hypothesized resources have yet to be discovered, and there is usually substantial additional time between discovery and production. A more probable time path of revenues would be to assume a greatly extended production period and a ten or twenty year interval before any major net smelter returns commence.

Under the assumption of a one hundred year production period, the annual gross metal value projected would be about 762 million dollars per year, with a net smelter return (average of 6 percent) of about 46 million dollars. With the assumption that this return would begin in 10 years, the revenue stream would have a present value (10 percent discount rate) of about 177 million dollars. The sensitivity of the present value of net smelter returns to the timing of production is underscored by the fact that if the 46 million dollar income stream were to begin today, rather than in ten years, its present value would be 460 million dollars instead of 177 million dollars.

#### Summary

In summary, our review has identified a number of points that question some of the assumptions underlying the Metz appraisal. The three that are critical relate to the assumed

probabilities of discovery, the assumed net smelter return, and the timing of the income stream. The assumed values in the appraisal result in projected revenue and production estimates that do not currently exist and are highly improbable in the future.

The test of an appraisal, as mentioned above, is whether it approximates fair market value. Fair market value is what the asset would bring in a competitive market disposal held today. The historic levels of mining industry activity in Alaska, coupled with long term trends in world mineral markets, simply do not support the notion that the mineral rights on the Mental Health Trust Lands would command 1.5 billion dollars today, or at any time in the foreseeable future.

APPENDIX A

MODEL OUTPUT  
AND  
STRUCTURE

The review of the Metz appraisal required the computation of projected mineral production by individual commodity and the implicit dollar value of contained metal. The model permits recomputation of output and dollar values in response to different prices, different Net Smelter Return (NSR), different probabilities of discovery, and different timing of the income stream (or timing of production).

The Metz data (Appendix C) were grouped according to deposit type, and subgrouped according to probability of discovery. Starting on appendix page B-1, group 1 was defined as the first seven sections (i.e., deposit type 25), group 2, deposit type 4, group 3, deposit type 25, group 4 the next three deposit types 4, etc. A total of 121 groups were identified, with a new group starting each time the deposit type changed. Acreage data for each group and probability subgroup were entered.

The data of Metz appendix A were used to construct matrices of total and annual mineral production by deposit, or deposit group, type. The production, price, and group data were then used to compute the expected dollar value of production, and physical volume of production, by mineral type.

The following groups of tables provide an overview of the model. Table A-1 shows assumed prices and specific metal content of each deposit or deposit group, and various dollar valuations. Output is in million metric tons except for the precious metals, which are shown in million troy ounces. Output data are based on the mine models of Metz Appendix A.

Table A-2 shows the hypothesized annual production, by mineral, for each deposit or deposit group type.

Table A-3 shows the expected value of total output, annual output, annual net smelter return, and the present value of the net smelter return, by group.

Table A-4 shows the expected total production, by specific metal, by group.

Table A-5 shows expected annual production, by metal and by group.

Since these data were generated using the Metz data the totals should be close to those of the Metz study. The differences are primarily due to adjustments of the Metz data to correct for apparent errors. For example, in a few cases values stated as dollars were actually in pounds sterling. The corrections needed were minor.

TABLE A - 1 BASE MODEL PRICE AND OUTPUT VALUATION

EXCHANGE RATE	MINERAL	PRICE UNIT	1987 PRICE/L	1987 PRICE \$	DISC. RATE 0.1												
					MINE MOD 1	MINE MOD 2a	MINE MOD 2b	MINE MOD 3	MINE MOD 4(27)	MINE MOD 5	MINE MOD 6	MINE MOD 9	MINE MOD 10	MINE MOD 11	MINE MOD 12	MINE MOD 13	
	COPPER (Cu)	LS/TONNE	1097.51	1756.016	0	0.663	0.63	0	0	0.55	0.253	0	0.368	0	0.156	0	
	LEAD (Pb)	LS/TONNE	411.74	658.784	10	0	0.342	0	0	0	1.265	0	0	0	0.912	0	
	TIN (Sn)	LS/TONNE	5671.03	9073.648	0	0	0	0	0	0	0	0	0	0	0	0.3055	
	ZINC (Zn)	LS/TONNE	502.23	803.568	16.9	0.357	1.566	0	0	0	2.139	0	0	0	1.56	0	
	GOLD (Au)	LS/TROY	288.29	461.264	0	1.038	1.331	0	8.68	6.366	7.395	0	0.828	0	0	0	
	PLATINUM (Pt)	LS/TROY	381.67	610.672	0	0	0	0	0	0	0	0	0	0	0	0	
	SILVER (Ag)	LS/TROY	4.9128	7.86048	668.7	18.037	57.871	0	0	45.976	377.128	0	10.648	0	111.885	0	
	ANTIMONY (Sb)	LS/TROY	15.0291	24.04656	0	0	0	0	0	0	0	0	0	0	0	0	
	MERCURY (Hg)	LS/TONNE	5773.305263	9237.2884	0	0	0	0	0	0	0	0	0	0	0	0	
	MOLYBDENUM (Mo)	LS/TONNE	4188.8	6702.08	0	0	0	0	0	0	0	2.581	0	0	0	0	
	NICKEL (Ni)	LS/TONNE	3317.93	5308.688	0	0	0	0	0	0	0	0	0	0	0	0	
	BARIUM (BaSO4)	LS/TONNE	23.75	38	0	0	0	26.88	0	0	0	0	0	0	0	0	
	CHROMITE (Cr2O3)	LS/TONNE	4744	7590.4	0	0	0	0	0	0	0	0	0	0	0	0	
	NIODIUM (Ni2O3)	LS/TONNE	3584	5734.4	0	0	0	0	0	0	0	0	0	0	0	0	
	URANIUM (U3O2)	LS/TONNE		32774	0	0	0	0	0	0	0	0	0	0	0	0	
	VANADIUM (V2O5)	LS/TONNE		7647	0	0	0	0	0	0	0	0	0	0	0	0	
	TUNGSTEN (WO3)	LS/TONNE	4125	6600	0	0	0	0	0	0	0	0	0	0	0	0	
	RED	LS/TONNE	1680	2688	0	0	0	0	0	0	0	0	0	0	0	0	

(1) ASSUMED MINELIFE 20 10 10 10 20 10 15 20 10 15 10 10 20 15 10 20

(2) NET SHELTER RETURN (DECIMAL) 0.04 0.04 0.04 0.04 0.04 0.04 0.04 0.04 0.04 0.04 0.04 0.04 0.04 0.04 0.04 0.04 0.04

(3) GROSS METAL VALUE (MILLION \$) 25424.44 2071.683 3658.81791 1021.44 4003.771 4263.608 9371.920 17298.06 1111.838 2032.8 3007.785 2771.999

(4) ANNUAL PRODUCTION (MILLION \$) 1271.222 207.1683 365.881791 102.144 200.1885 426.3608 624.7946 864.9034 111.1838 135.52 300.7785 138.5999

(5) ANNUAL NET SHELTER RETURN (MILLION \$) 50.84888 8.286735 14.6352716 4.08576 8.007543 17.05443 24.99178 34.59613 4.447355 5.4208 12.03114 5.543998

(6) NET PRESENT VALUE OF MSR (MILLION \$) 432.9052 50.91840 89.9274089 25.10522 68.17272 104.7921 190.0895 294.5364 27.32707 41.23103 73.92615 47.19918

DISCOUNTED AT 10 PERCENT

TABLE A - 1 BASE MODEL PRICE AND OUTPUT VALUATION

MINERAL	PRICE UNIT	1987 PRICE/L	1987 PRICE \$	DISC. RATE															MINES 28,4,5,6	MINES 28,3,6	MINES 28,3	MINES 1,5,6	MINES 28,3,3	MINES 1,4,3,3
				MOD 15	MOD 16	MOD 23	MOD 24	MOD 25	MOD 26	MOD 28	MOD 29	MOD 29	MOD 29	MOD 29	MOD 29	MOD 29	MOD 29	MOD 29						
COPPER (Cu)	LS/TONNE	1097.51	1756.016	0.825	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.803	0.63	0.883	1.433		
LEAD (Pb)	LS/TONNE	411.74	658.784	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11.265	0.342	1.607	1.607		
TIN (Sn)	LS/TONNE	5671.03	9073.648	0	0	0	0	0	0	0.04	0	0	0	0	0	0	0	0	0	0	0	0		
ZINC (Zn)	LS/TONNE	502.23	803.568	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19.039	1.566	3.705	3.705		
GOLD (Au)	LS/TROY	288.29	461.264	0	0	0	0	0	0	0.356	0	0	0	0	0	0	0	0	13.761	1.331	8.726	23.772		
PLATINUM (Pt)	LS/TROY	381.67	610.672	1.76825	0	0	0	0	0	0	0	0	0	0	0	3.44	0	0	0	0	0	0		
SILVER (Ag)	LS/TROY	4.9128	7.86048	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1091.804	57.671	434.999	480.975		
ANTIMONY (Sb)	LS/TROY	15.0291	24.04656	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
MERCURY (Hg)	LS/TONNE	5773.305263	9237.2884	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
MOLYBDENUM (Mo)	LS/TONNE	4188.8	6702.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
NICKEL (Ni)	LS/TONNE	3317.93	5308.688	1.375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
BARIUM (BaSO4)	LS/TONNE	23.75	38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
CHROMITE (Cr2O3)	LS/TONNE	4744	7590.4	0	0.104	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
NIOBIUM (Nb2O3)	LS/TONNE	3584	5734.4	0	0	0	0	0	4.18	0	0	0	0	0	0	0	0	0	0	0	0	0		
URANIUM (U3O2)	LS/TONNE		32774	0	0	0.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
VANADIUM (V2O5)	LS/TONNE		7647	0	0	0.048	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
TUNGSTEN (WO3)	LS/TONNE	4125	6600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
REO	LS/TONNE	1680	2688	0	0	0	0.77	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		

- (1) ASSUMED MINELIFE 20 2 20 40 10 10 5 10 15
- (2) NET SHELTER RETURN (DECIMAL) 0.04 0.04 0.04 0.04 0.1 0.1 0.1 0.1 0.04
- (3) GROSS METAL VALUE (MILLION \$) 9827.979 789.4016 4299.936 26039.55 164.2099 362.9459 2100.711 4433.898 39059.97 4680.257 14052.17 21298.11
- (4) ANNUAL PRODUCTION (MILLION \$) 491.3989 394.7008 214.9968 650.9888 16.42099 72.58918 210.0711 295.5932 2322.377 468.0257 1092.820 1617.225
- (5) ANNUAL NET SHELTER RETURN (MILLION \$) 19.65595 15.78803 8.599872 26.03955 1.642099 7.258918 21.00711 11.82372 92.89510 18.72103 43.71261 64.68903
- (6) NET PRESENT VALUE OF NSR (MILLION \$) 167.3422 27.40071 73.21555 254.6420 10.08999 27.51701 129.0796 89.93222 727.7868 115.0326 305.1221 452.9817

10 PERCENT DISCOUNTED AT



TABLE A - 1 BASE MODEL PRICE AND OUTPUT VALUATION

EXCHANGE RATE	MINERAL	PRICE UNIT	1987 PRICE/L	1987 PRICE \$	DISC. RATE												MINES	MINES	MINES	MINES	MINES
					1.6 %/L	28,4,6	28,4,6,25	28,5	28,5,6	28,6,25	4,5,6,25	4,6	4,6,25	4,10,11,12	5,6	6,23					
	COPPER (Cu)	LS/TONNE	1097.51	1756.016	0.883	0.883	1.18	1.433	0.883	0.883	0.803	0.253	0.253	0.524	0.803	0.253	0.253	0.253	0.253		
	LEAD (Pb)	LS/TONNE	411.74	658.784	1.607	1.607	0.342	1.607	1.607	1.265	1.265	1.265	1.265	0.912	1.265	1.265	1.265	1.265	1.265		
	TIN (Sn)	LS/TONNE	5671.03	9073.648	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	ZINC (Zn)	LS/TONNE	502.23	803.568	3.705	3.705	1.566	3.705	3.705	2.139	2.139	2.139	2.139	1.56	2.139	2.139	2.139	2.139	2.139		
	GOLD (Au)	LS/TROY	288.29	461.264	17.406	17.406	7.697	15.092	9.082	22.797	16.075	16.431	16.431	9.508	13.761	7.395	7.395	7.395	7.395		
	PLATINUM (Pt)	LS/TROY	381.67	610.672	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	SILVER (Ag)	LS/TROY	4.9128	7.86048	434.999	434.999	103.947	480.975	434.999	423.104	377.128	377.128	377.128	122.533	423.104	377.128	377.128	377.128	377.128		
	ANTIMONY (Sb)	LS/TROY	15.0291	24.04556	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	MERCURY (Hg)	LS/TONNE	5773.305263	9237.2884	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	MOLYBDENUM (Mo)	LS/TONNE	4188.8	6702.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	NICKEL (Ni)	LS/TONNE	3317.93	5308.688	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	BARIUM (Ba804)	LS/TONNE	23.75	38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	CHROMITE (Cr2O3)	LS/TONNE	4744	7590.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	NIObIUM (Nb2O3)	LS/TONNE	3584	5734.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	URANIUM (U3O2)	LS/TONNE		32774	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	VANADIUM (V2O5)	LS/TONNE		7647	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	TUNGSTEN (WO3)	LS/TONNE	4125	6600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	RED	LS/TONNE	1680	2688	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		

- (1) ASSUMED MINELIFE
- (2) NET SHELTER RETURN (DECIMAL)
- (3) GROSS METAL VALUE (MILLION \$) 17034.50 17198.71 7922.426 17294.34 13194.94 17803.51 13375.69 13539.90 10156.195 13635.52 13671.85 9536.130
- (4) ANNUAL PRODUCTION (MILLION \$) 1190.865 1207.286 792.2426 1417.037 1007.097 1267.765 824.9832 841.4042 747.67100 1051.155 839.7914 641.2156
- (5) ANNUAL NET SHELTER RETURN (MILLION \$) 47.63460 49.27670 31.68970 56.68149 41.26915 51.69586 32.99933 34.64142 29.906840 42.04622 33.59165 26.63388
- (6) NET PRESENT VALUE OF NSR (MILLION \$) 348.1896 358.2796 194.7195 384.8090 290.1069 373.1443 258.2622 268.3522 210.65699 294.8816 263.3050 200.1795

DISCOUNTED AT 10 PERCENT

TABLE A - 1 BASE MODEL PRICE AND OUTPUT VALUATION

MINERAL	PRICE UNIT	1987 PRICE, L	1987 PRICE \$	DISC. RATE					
				1.6 %/L	9,10	9,13,25,26	MINES 15,16	MINES 16,28	MINES 23,25
COPPER (Cu)	LS/TONNE	1097.51	1756.016	0.368	0	0	0.825	0	0
LEAD (Pb)	LS/TONNE	411.74	658.784	0	0	0	0	0	0
TIN (Sn)	LS/TONNE	5671.03	9073.648	0	0.3455	0	0	0	0
ZINC (Zn)	LS/TONNE	502.23	803.568	0	0	0	0	0	0
GOLD (Au)	LS/TROY	288.29	461.264	0.828	0.356	0	0	0	0.356
PLATINUM (Pt)	LS/TROY	381.67	610.672	0	0	1.76825	3.44	0	0
SILVER (Ag)	LS/TROY	4.9128	7.86048	10.648	0	0	0	0	0
ANTIMONY (Sb)	LS/TROY	15.0291	24.04656	0	0	0	0	0	0
MERCURY (Hg)	LS/TONNE	5773.305263	9237.2884	0	0	0	0	0	0
MOLYBDENUM (Mo)	LS/TONNE	4188.8	6702.08	2.581	2.581	0	0	0	0
NICKEL (Ni)	LS/TONNE	3317.93	5308.688	0	0	1.375	0	0	0
BARIUM (BaSO4)	LS/TONNE	23.75	38	0	0	0	0	0	0
CHROMITE (Cr2O3)	LS/TONNE	4744	7590.4	0	0	0.104	0.104	0	0
NIObIUM (Nb2O3)	LS/TONNE	3584	5734.4	0	0	0	0	0	0
URANIUM (U3O2)	LS/TONNE		32774	0	0	0	0	0	0.12
VANADIUM (V2O5)	LS/TONNE		7647	0	0	0	0	0	0.048
TUNGSTEN (WO3)	LS/TONNE	4125	6600	0	0	0	0	0	0
REO	LS/TONNE	1680	2688	0	0	0	0	0	0

- (1) ASSUMED MINELIFE
- (2) NET SMELTER RETURN (DECIMAL)
- (3) GROSS METAL VALUE (MILLION \$)
- (4) ANNUAL PRODUCTION (MILLION \$)
- (5) ANNUAL NET SMELTER RETURN (MILLION \$)
- (6) NET PRESENT VALUE OF NSR (MILLION \$)

DISCOUNTED AT 10 PERCENT

TABLE A - 2 ANNUAL OUTPUT BY DEPOSIT TYPE

ANNUAL METAL PRODUCTION, BY MINE TYPE

MINE\MET	Cu	Pb	Sn	Zn	Au	Pt	Ag	Sb	Hg	Mo	Ni	BAR	CHR	NI0B
MOD 1	0	0.5	0	0.845	0	0	33.435	0	0	0	0	0	0	0
MOD 2a	0.0663	0	0	0.0357	0.1038	0	1.8037	0	0	0	0	0	0	0
MOD 2b	0.063	0.0342	0	0.1566	0.1331	0	5.7871	0	0	0	0	0	0	0
MOD 3	0	0	0	0	0	0	0	0	0	0	0	2.688	0	0
MOD4(27)	0	0	0	0	0.434	0	0	0	0	0	0	0	0	0
MOD 5	0.055	0	0	0	0.6366	0	4.5976	0	0	0	0	0	0	0
MOD 6	0.016666	0.084333	0	0.1426	0.493	0	25.1486	0	0	0.12905	0	0	0	0
MOD 9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MOD 10	0.0368	0	0	0.0828	0	0	1.0648	0	0	0	0	0	0	0
MOD 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MOD 12	0.0156	0.0912	0	0.156	0	0	11.1885	0	0	0	0	0	0	0
MOD 13	0	0	0.015275	0	0	0	0	0	0	0	0	0	0	0
MOD 15	0.04125	0	0	0	0.088412	0	0	0	0	0.06875	0	0	0	0
MOD 16	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MOD 23	0	0	0	0	0	0	0	0	0	0	0	0	0.052	0
MOD 24	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MOD 25	0	0	0	0.0356	0	0	0	0	0	0	0	0	0	0
MOD 26	0	0	0.008	0	0	0	0	0	0	0	0	0	0	0
MOD 28	0	0	0	0	0.344	0	0	0	0	0	0	0	0	0
MOD 29	0	0	0	0	0	0	0	0.032	0	0	0	0	0	0
1,5,6	0.071866	0.584333	0	0.9876	1.1296	0	63.17446	0	0	0	0	0	0	0
2B,3	0.063	0.0342	0	0.1566	0.1331	0	5.7871	0	0	0	0	2.688	0	0
2B,3,6	0.079866	0.118333	0	0.2992	0.6261	0	30.92896	0	0	0	0	2.688	0	0
2B,4,5,6	0.134866	0.118333	0	0.2992	1.6967	0	35.52656	0	0	0	0	0	0	0
2B,4,6	0.079866	0.118333	0	0.2992	1.0601	0	30.92896	0	0	0	0	0	0	0
2B,4,6,250	0.079866	0.118333	0	0.2992	1.0957	0	30.92896	0	0	0	0	0	0	0
2B,5	0.118	0.0342	0	0.1566	0.7497	0	10.3847	0	0	0	0	0	0	0
2B,5,6	0.134866	0.118333	0	0.2992	1.2627	0	35.52656	0	0	0	0	0	0	0
2B,6,25	0.079866	0.118333	0	0.2992	0.6617	0	30.92896	0	0	0	0	0	0	0
4,5,6,25	0.071866	0.084333	0	0.1426	1.5992	0	29.73946	0	0	0	0	0	0	0
4,6	0.016866	0.084333	0	0.1426	0.927	0	25.1486	0	0	0	0	0	0	0
4,6,25	0.016866	0.084333	0	0.1426	0.9626	0	25.1486	0	0	0	0	0	0	0
4,10,11,1	0.0524	0.0912	0	0.156	0.5168	0	12.2533	0	0	0	0	0	0	0
5,6	0.071866	0.084333	0	0.1426	1.1296	0	29.73946	0	0	0	0	0	0	0
6,23	0.016866	0.084333	0	0.1426	0.493	0	25.1486	0	0	0	0	0	0	0
6,25	0.016866	0.084333	0	0.1426	0.5286	0	25.1486	0	0	0	0	0	0	0
9,10	0.0368	0	0	0.0828	0	0	1.0648	0	0	0.12905	0	0	0	0
9,13,25,2	0	0	0.023275	0	0.0356	0	0	0	0	0.12905	0	0	0	0
15,16	0.04125	0	0	0	0.088412	0	0	0	0	0	0.06875	0	0.052	0
16,28	0	0	0	0	0.344	0	0	0	0	0	0	0	0.052	0
23,25	0	0	0	0.0356	0	0	0	0	0	0	0	0	0	0

TABLE A - 2 ANNUAL OUTPUT BY DEPOSIT TYPE

ANNUAL WE NINE/MET	UR	VAND	TUNG	RED
MOD 1	0	0	0	0
MOD 2a	0	0	0	0
MOD 2b	0	0	0	0
MOD 3	0	0	0	0
MOD4(27)	0	0	0	0
MOD 5	0	0	0	0
MOD 6	0	0	0	0
MOD 9	0	0	0	0
MOD 10	0	0	0	0
MOD 11	0	0.020533	0	0
MOD 12	0	0	0	0
MOD 13	0	0	0	0
MOD 15	0	0	0	0
MOD 16	0	0	0	0
MOD 23	0.006	0.0024	0	0
MOD 24	0	0	0.01925	0
MOD 25	0	0	0	0
MOD 26	0	0	0	0
MOD 28	0	0	0	0
MOD 29	0	0	0	0
1,5,6	0	0	0	0
28,3	0	0	0	0
28,3,6	0	0	0	0
28,4,5,6	0	0	0	0
28,4,6	0	0	0	0
28,4,6,25	0	0	0	0
28,5	0	0	0	0
28,5,6	0	0	0	0
28,6,25	0	0	0	0
4,5,6,25	0	0	0	0
4,6	0	0	0	0
4,6,25	0	0	0	0
4,10,11,15,6	0	0.020533	0	0
6,23	0.006	0.0024	0	0
6,25	0	0	0	0
9,10	0	0	0	0
9,13,25,12	0	0	0	0
15,16	0	0	0	0
16,28	0	0	0	0
23,25	0.006	0.0024	0	0

TABLE A - 3 EXPECTED VALUE OF OUTPUT, BY GROUP

GROUP	DEPOSIT TYPE	PROB OF DIS	TOTAL ACRES	EVAL \$M	EVAL ANPROD\$	PR VAL ANNSR\$
GROUP 1	25	21	2134	7.358906	0.735890	0.452172
GROUP 2	4	1	640	2.562413	0.128120	0.00512482
GROUP 3	25	21	640	2.206982	0.220698	0.135609
GROUP 4	4	1	1920	7.687241	0.384362	0.01537448
GROUP 5	25	21	3646	12.57290	1.257290	0.772550
GROUP 6	4	1	9600	38.43620	1.921810	0.07687241
		21	640	53.81068	2.690534	0.10762137
SUBTOTAL GROUP 6			10240	92.24689	4.612344	0.18449379
GROUP 7	25	21	6344	21.87671	2.187671	0.21876710
GROUP 8	4	1	18552	74.27796	3.713898	0.14855593
GROUP 9	25	21	4038	13.92467	1.392467	0.13924678
GROUP 10	6	1	2280	21.36797	1.424531	0.05698127
		7	4932	323.5561	21.57041	0.86281645
SUBTOTAL GROUP 10			7212	344.9241	22.99494	0.91979773
GROUP 11	6,23	21	985	282.8023	17.37108	0.69484346
GROUP 12	6	1	5532	51.84546	3.456364	0.13825456
		7	10601	695.4620	46.36413	1.85456554
SUBTOTAL GROUP 12			16133	747.3075	49.82050	1.99282010
GROUP 13	6,23	21	557	159.9197	9.623040	0.39292163
GROUP 14	6	7	10543	691.6570	46.11047	1.84441887
		1	8250	77.31834	5.154556	0.20618224

TABLE A - 3 EXPECTED VALUE OF OUTPUT, BY GROUP

GROUP	DEPOSIT TYPE	PROB OF DIS	TOTAL ACRES	EVAL GMV	EVAL ANPRD#	EVAL ANNSR#	PR VAL ANNSR#
	6	13	2479	302,0288	20,13525	0,80541032	6,126014
-----							
SUBTOTAL GROUP 14			21272	1071,004	71,40028	2,85601143	21,72305
-----							
GROUP 15	2B,3,6	1	8472	119,0500	9,258375	0,37033500	2,584994
	2B,3,6	7	7578	745,4118	57,96975	2,31879018	16,18550
	2B,3,6	13	8205	1498,875	116,5656	4,66262780	32,54585
	2B,3,6	21	5357	1580,827	122,9390	4,91756096	34,32532
	2B,3,6	30	823	346,9482	26,98173	1,07926949	7,533465
-----							
SUBTOTAL GROUP 15			30435	4291,113	333,7145	13,3485834	93,17515
-----							
GROUP 16	15	1	759	7,459436	0,372971	0,01491887	0,127012
	15	13	2853	364,5099	18,22549	0,72901989	6,204557
-----							
SUBTOTAL GROUP 16			3612	371,9693	18,59846	0,74393877	6,333570
-----							
GROUP 17	1,5,6	7	5575	1524,315	90,63078	3,62523154	28,40188
	1,5,6	13	80	40,62237	2,415272	0,09661091	0,756898
	1,5,6	21	1944	1594,584	94,80874	3,79234984	29,71117
	1,5,6	30	809	947,9855	56,36410	2,25456424	17,46338
-----							
SUBTOTAL GROUP 17			8408	4107,507	244,2189	9,76875653	76,53333
-----							
GROUP 18	2B,3	1	13861	64,87305	6,487305	0,25949222	1,594467
		7	13788	451,7197	45,17197	1,80687909	11,10248
		13	962	58,53130	5,853130	0,23412522	1,438598
		21	750	73,71406	7,371406	0,29485624	1,811764
-----							
SUBTOTAL GROUP 18			29361	648,8381	64,88381	2,59535278	15,94731
-----							
GROUP 19	2B,3,6	1	3300	46,37218	3,606307	0,14425230	1,006903
		7	15739	1548,170	120,3993	4,81597237	33,61622
		13	865	158,0167	12,28876	0,49155064	3,431098
		21	400	118,0382	9,179691	0,36718767	2,563026
-----							
SUBTOTAL GROUP 19			20304	1870,577	145,4740	5,81896300	40,61725

TABLE A - 3 EXPECTED VALUE OF OUTPUT, BY GROUP

GROUP	DEPOSIT TYPE	PROB OF DIS	TOTAL ACRES	EVAL GRV	EVAL ANPRD\$	EVAL ANNSR\$	PR VAL ANNSR\$
GROUP 20	2B,3	1	1713	8.017281	0.801728	0.03286912	0.197050
		7	1417	46.42347	4.642347	0.16589391	1.141008
		13	608	36.99275	3.69275	0.14777103	0.909217
-----							
SUBTOTAL GROUP 20			3738	91.43351	9.143351	0.36573407	2.247277
-----							
GROUP 21	15	1	87	0.855034	0.042751	0.00171006	0.014558
		13	2	0.255527	0.012776	0.00051105	0.004350
		21	215	44.37332	2.218666	0.08874665	0.753550
-----							
SUBTOTAL GROUP 21			304	45.48389	2.274194	0.09096778	0.774460
-----							
GROUP 22	2B,3,6	1	735	10.32835	0.803223	0.03212892	0.224264
		7	74	7.279028	0.566081	0.02264324	0.158053
		13	1252	228.7132	17.78674	0.71146983	4.966168
		30	84	35.41148	2.753907	0.11015630	0.768907
-----							
SUBTOTAL GROUP 22			2145	281.7321	21.90995	0.87639830	6.117394
-----							
GROUP 23	5,6	1	26	0.354523	0.027330	0.00109320	0.007666
		13	12	2.127142	0.163980	0.00655921	0.046001
		21	1493	427.5147	32.95688	1.31827521	9.245424
-----							
SUBTOTAL GROUP 23			1531	429.9944	33.14919	1.3252762	9.299092
-----							
GROUP 24	2B,3	1	525	2.457135	0.245713	0.00982854	0.060392
		13	222	13.50722	1.350722	0.05402889	0.331984
-----							
SUBTOTAL GROUP 24			747	15.96435	1.596435	0.06385743	0.392376
-----							
GROUP 25	5,6	1	1041	14.19458	1.094252	0.04377011	0.306971
		21	988	282.9099	21.80937	0.87237502	6.118204
-----							
SUBTOTAL GROUP 25			2029	297.1045	22.90362	0.91614514	6.425176
-----							
GROUP 26	6,25	1	8137	77.59549	5.217571	0.21671993	1.628860
		7	2711	180.9671	12.16834	0.50543127	3.798806
		13	10	1.239696	0.083358	0.00346240	0.026023

TABLE A - 3 EXPECTED VALUE OF OUTPUT, BY GROUP

GROUP	DEPOSIT TYPE	PROB OF DIS	TOTAL ACRES	EVAL GMV	EVAL ANPRD\$	EVAL ANNSR\$	PR VAL ANNSR\$
-----							
SUBTOTAL GROUP 26			10858	259,8023	17,46927	0,72561361	5,453690
-----							
GROUP 27+29	28,6,25	7	2031	187,5925	14,31790	0,58672362	4,124450
		13	2084	357,4775	27,28428	1,11806404	7,859576
		21	1696	469,9512	35,86878	1,46984235	10,33244
		30	732	289,7610	22,11586	0,90627072	6,370747
-----							
SUBTOTAL GROUP 27+29			6543	1304,782	99,58683	4,08090074	28,68722
-----							
GROUP 28	10	13	65	0,939503	0,073950	0,00375801	0,023091
-----							
GROUP 30	5	13	328	18,18002	1,818002	0,07272011	0,446833
		21	2856	255,7142	25,57142	1,02285681	6,285012
-----							
SUBTOTAL GROUP 30			3184	273,8942	27,38942	1,09557693	6,731845
-----							
GROUP 31	4,10,11,12	1	4344	44,11851	3,247882	0,12991531	0,915093
		13	9167	1210,324	89,10070	3,56402803	25,10420
		21	524	111,7887	8,227371	0,32909486	2,318069
-----							
SUBTOTAL GROUP 31			14035	1366,201	100,5759	4,02303822	28,33736
-----							
GROUP 32	4,6,25	13	291	51,22144	3,183032	0,13104852	1,015176
-----							
GROUP 33	28,5	7	88	4,880214	0,488021	0,01952085	0,119947
-----							
GROUPS 34,36,38,40,42,44,46,48	28,4,5,6	1	463	9,861028	0,748775	0,02995102	0,209730
		13	5560	1539,428	116,8930	4,67572360	32,74152
		21	2118	947,2977	71,93097	2,87723899	20,14772
-----							
SUBTOTAL 34,48			8141	2495,586	189,5728	7,58291362	53,09897
-----							
GROUPS 35,37,39,41,43,45,47	28,5,6	1	84	1,452725	0,119031	0,00476124	0,032323
		13	1267	284,8551	23,34002	0,93360088	6,338189
		21	7117	2584,761	211,7861	8,47144606	57,51240
-----							
SUBTOTAL 35,47			8468	2871,069	235,2452	9,40980820	63,88292



TABLE A - 3 EXPECTED VALUE OF OUTPUT, BY GROUP

GROUP	DEPOSIT TYPE	PROB OF DIS	TOTAL ACRES	EVAL GWV	EVAL ANPRD\$	EVAL ANNSR\$	PR VAL ANNSR\$
GROUP 49	4,6,25	7	2210	209,4622	13,01652	0,53590292	4,151409
		21	860	244,5306	15,19576	0,62562422	4,846441
		30	960	389,9491	24,23244	0,99767318	7,728544
-----							
SUBTOTAL GROUP 49			4030	843,9420	52,44472	2,15920032	16,72639
GROUP 50,52	28,5	13	51691	5323,736	532,3736	21,2949444	130,8482
GROUP 51,53	9,10	13	1280	306,3408	16,24209	0,64968371	5,355808
GROUP 54,56	9,13,25,26	1	610	12,56430	0,666433	0,02991510	0,231398
		7	17869	2576,362	136,6548	6,13421468	47,44931
		13	23185	6208,106	329,2890	14,7812490	114,3357
-----							
SUBTOTAL 54,56			41664	8797,033	466,6103	20,9453788	162,0164
GROUP 55,58,60,62,64,66	28,5	13	7645	423,9686	42,39686	1,69587467	10,42041
		13	19674	2026,255	202,6255	8,10502286	49,80185
-----							
SUBTOTAL 55,66			27319	2450,224	245,0224	9,80089753	60,22227
GROUP 57,90	25	1	57215	9,395274	0,9395274	0,09395274	0,577298
OF TYPE 25		13	840	1,793173	0,1793173	0,01793173	0,110182
-----							
SUBTOTAL 57,90			58055	11,18844	1,118844	0,11188447	0,687481
GROUP 68,85	4,5,6,25	1	661	11,76812	0,837992	0,03417096	0,246648
TYPE 4,5,6,25		7	18628	2321,506	165,3115	6,74093405	48,65653
		21	198	70,28825	5,005136	0,20409527	1,473173
		30	5986	3197,154	227,6652	9,28354349	67,00926
-----							
SUBTOTAL 68,85			25463	5600,717	398,8198	16,2627437	117,3856
GROUP 84,87,89	4,6	7	4801	449,5168	27,72521	1,10900848	8,679419
		13	1911	332,2923	20,49505	0,61980235	6,416009
-----							
SUBTOTAL 84,87,89			6712	781,8091	48,22027	1,92881084	15,09542

TABLE A - 3 EXPECTED VALUE OF OUTPUT, BY GROUP

GROUP	DEPOSIT TYPE	PROB OF DIS	TOTAL ACRES	EVAL GMV	EVAL ANPROD\$	EVAL ANNSR\$	PR VAL ANNSR\$
GROUP 91..101 OF TYPE 28,4,6,25	28,4,6,25	21	8533	3118.007	218.8725	8.93352106	64.95359
		30	17879	9224.877	647.5520	26.4305444	192.1704
SUBTOTAL 91..101			26512	12342.88	866.4245	35.3640654	257.1240
GROUP 92..110 OF TYPE 23,25	23,25	13	47390	2750.226	142.5695	6.30977159	51.32205
GROUP 103,112	1	1	34169	868.7277	43.43638	1.73745552	14.79193
		13	14547	4808.041	240.4020	9.61608336	81.86713
SUBTOTAL 103,112			48716	5676.769	283.8384	11.3535388	96.65907
GROUP 105,107,109	28,4,6	13	6956	1540.396	107.6875	4.30750176	31.48609
GROUP 111,114	4,6,25	7	2660	252.1129	15.66694	0.64502342	4.994718
		13	15724	2767.718	171.9931	7.08112397	54.85441
		21	637	181.1232	11.25546	0.46339840	3.589747
		30	2267	920.8487	57.22390	2.35596364	18.25063
SUBTOTAL 111,114			21288	4121.803	256.1394	10.5455094	81.69152
GROUP 113,115,119	25	1	31387	5.154058	0.515405	0.05154058	0.316694
		7	19000	21.83992	2.183992	0.21839927	1.341969
		13	3374	7.202578	0.720257	0.07202578	0.442567
SUBTOTAL 113,115,119			53761	34.19656	3.419656	0.34196564	2.101230
GROUP 116	16	1	3767	2.973675	1.486637	0.05947351	0.103218
GROUP 117	15,16	30	746	237.6169	19.83091	0.79323653	4.358347
GROUP 118	15	1	19564	192.2746	9.613730	0.3845492	3.273884
GROUP 120	16,28	1	12035	34.78251	7.278430	0.44282961	1.883241

TABLE A - 3 EXPECTED VALUE OF OUTPUT, BY GROUP

GROUP	DEPOSIT TYPE	PROB OF DIS	TOTAL		EVAL		EVAL		PR VAL	
			ACRES	GMV	ANPRD\$	ANNSR\$	ANNSR\$	ANNSR\$		
GROUP 121	25	1	313235	51,43631	5,143631	0,51436314	3,160538			
			594388	70347,06	4918,885	201,284570	1449,114			
			424396	4675,083	302,9126	13,0819271	96,57198			
=====										
TOTALS			1018784	75022,14	5221,797	214,346497	1545,686			
=====										
\$ VALUE OF PROD										MIL \$
-----										
			TOTAL		EVAL		EVAL		PR VAL	
			ACRES	GMV	ANPRD\$	ANNSR\$	ANNSR\$	ANNSR\$		

TABLE A - 4 EXPECTED TOTAL METAL PRODUCTION, BY GROUP

GROUP PRODUCTION VECTOR, TOTAL METAL	Cu	Pb	Sn	Zn	Au	Pt	Ag	Sb	Hg	Mg	Ni	BAR	CHR	NIOS	UR
GROUP 1	0	0	0	0.015953	0	0	0	0	0	0	0	0	0	0	0
GROUP 2	0	0	0	0.005555	0	0	0	0	0	0	0	0	0	0	0
GROUP 3	0	0	0	0.004784	0	0	0	0	0	0	0	0	0	0	0
GROUP 4	0	0	0	0.016665	0	0	0	0	0	0	0	0	0	0	0
GROUP 5	0	0	0	0.027257	0	0	0	0	0	0	0	0	0	0	0
GROUP 6	0	0	0	0.083328	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0.116659	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL GROUP 6	0	0	0	0.199987	0	0	0	0	0	0	0	0	0	0	0
GROUP 7	0	0	0	0.047427	0	0	0	0	0	0	0	0	0	0	0
GROUP 8	0	0	0	0.161031	0	0	0	0	0	0	0	0	0	0	0
GROUP 9	0	0	0	0.030188	0	0	0	0	0	0	0	0	0	0	0
GROUP 10	0.000576	0.002884	0	0.004876	0.016860	0	0.859851	0	0	0	0	0	0	0	0
	0.008734	0.043672	0	0.073846	0.255304	0	13.01996	0	0	0	0	0	0	0	0
SUBTOTAL GROUP 10	0.009311	0.046557	0	0.078723	0.272165	0	13.87981	0	0	0	0	0	0	0	0
GROUP 11	0.005233	0.026166	0	0.044245	0.152965	0	7.800892	0	0	0	0	0	0	0	0.002482
GROUP 12	0.001399	0.006997	0	0.011832	0.040907	0	2.086272	0	0	0	0	0	0	0	0
	0.018774	0.093871	0	0.158728	0.545760	0	27.98553	0	0	0	0	0	0	0	0
SUBTOTAL GROUP 12	0.020173	0.100869	0	0.170561	0.589669	0	30.07180	0	0	0	0	0	0	0	0
GROUP 13	0.002959	0.014796	0	0.025019	0.086499	0	4.411266	0	0	0	0	0	0	0	0.001403
GROUP 14	0.018671	0.093358	0	0.157660	0.545758	0	27.83242	0	0	0	0	0	0	0	0
	0.002687	0.010436	0	0.017646	0.061008	0	3.111306	0	0	0	0	0	0	0	0

TABLE A - 4 EXPECTED TOTAL METAL PRODUCTION, BY GROUP

GROUP PRODUCTION VECTOR, TOTAL METAL	Cu	Pb	Sn	Zn	Au	Pt	Ag	Sb	Hg	Mo	Ni	BAR	CHR	MIIB	UR
0.008153 0.040767	0	0.068933	0.238318	0	12.15370	0	0	0	0	0	0	0	0	0	0
SUBTOTAL GROUP 14	0.028912	0.144561	0	0.244440	0.845085	0	43.09743	0	0	0	0	0	0	0	0
GROUP 15	0.007480	0.013614	0	0.031388	0.073926	0	3.685311	0	0	0	0	0.227727	0	0	0
0.046839 0.085244	0	0.196535	0.462879	0	23.07495	0	0	0	0	0	0	1.425876	0	0	0
0.094185 0.171410	0	0.395193	0.930758	0	46.39916	0	0	0	0	0	0	2.867155	0	0	0
0.099334 0.180782	0	0.416801	0.981648	0	48.93608	0	0	0	0	0	0	3.023919	0	0	0
0.021801 0.039676	0	0.091476	0.215444	0	10.74012	0	0	0	0	0	0	0.663667	0	0	0
SUBTOTAL GROUP 15	0.269641	0.490729	0	1.131395	2.646658	0	132.8356	0	0	0	0	8.208345	0	0	0
GROUP 16	0.000626	0	0	0	0.001342	0	0	0	0	0	0.001043	0	0	0	0
0.030598	0	0	0	0	0.065582	0	0	0	0	0	0.050997	0	0	0	0
SUBTOTAL GROUP 16	0.031224	0	0	0	0.066924	0	0	0	0	0	0.052041	0	0	0	0
GROUP 17	0.031337	0.439616	0	0.742996	0.537023	0	42.60765	0	0	0	0	0	0	0	0
0.000835 0.011715	0	0.019800	0.014311	0	1.135476	0	0	0	0	0	0	0	0	0	0
0.032781 0.459882	0	0.77248	0.561779	0	44.57180	0	0	0	0	0	0	0	0	0	0
0.019488 0.273401	0	0.462076	0.333979	0	26.49808	0	0	0	0	0	0	0	0	0	0
SUBTOTAL GROUP 17	0.084442	1.184616	0	2.002122	1.447092	0	114.8130	0	0	0	0	0	0	0	0
GROUP 18	0.008732	0.004740	0	0.021706	0.018448	0	0.802149	0	0	0	0	0.372583	0	0	0
0.060805 0.033008	0	0.151144	0.128462	0	5.585477	0	0	0	0	0	0	2.594350	0	0	0
0.007878 0.004277	0	0.019584	0.016645	0	0.723734	0	0	0	0	0	0	0.336161	0	0	0
0.009722 0.005386	0	0.024664	0.020963	0	0.911468	0	0	0	0	0	0	0.42336	0	0	0
SUBTOTAL GROUP 18	0.087338	0.047412	0	0.217099	0.184520	0	8.022830	0	0	0	0	3.726455	0	0	0
GROUP 19	0.002913	0.005303	0	0.012226	0.028795	0	1.435496	0	0	0	0	0.088704	0	0	0
0.097282 0.177048	0	0.408190	0.961369	0	47.92314	0	0	0	0	0	0	2.961450	0	0	0
0.009929 0.018070	0	0.041662	0.098123	0	4.891663	0	0	0	0	0	0	0.302265	0	0	0
0.007417 0.013498	0	0.031122	0.073298	0	3.653991	0	0	0	0	0	0	0.225792	0	0	0
SUBTOTAL GROUP 19	0.117543	0.213920	0	0.493202	1.161587	0	57.90619	0	0	0	0	3.578211	0	0	0

TABLE A - 4 EXPECTED TOTAL METAL PRODUCTION, BY GROUP

GROUP PRODUCTION VECTOR, TOTAL METAL		Cu	Pb	Sn	Zn	Au	Pt	Ag	Sb	Hg	Mo	Ni	BAR	CHR	NIOP	UR
GROUP 20	0.001079 0.000585	0.002682	0.002280	0.0099133	0	0	0	0.046045	0	0	0	0.046045	0	0	0	0
	0.006248 0.003392	0.015533	0.013202	0.0574022	0	0	0	0.266622	0	0	0	0.266622	0	0	0	0
	0.004979 0.002703	0.012377	0.010520	0.0457412	0	0	0	0.212459	0	0	0	0.212459	0	0	0	0
SUBTOTAL GROUP 20	0.012307 0.006681	0.030593	0.026002	0.1130567	0	0	0	0.525127	0	0	0	0.525127	0	0	0	0
GROUP 21	0.000071	0	0	0.000153	0	0	0	0.000119	0	0	0	0.000119	0	0	0	0
	0.000021	0	0	0.000045	0	0	0	0.000035	0	0	0	0.000035	0	0	0	0
	0.003724	0	0	0.007983	0	0	0	0.006208	0	0	0	0.006208	0	0	0	0
SUBTOTAL GROUP 21	0.003818	0	0	0.008183	0	0	0	0.006363	0	0	0	0.006363	0	0	0	0
GROUP 22	0.000649 0.001181	0.002723	0.006413	0.0319724	0	0	0	0.019756	0	0	0	0.019756	0	0	0	0
	0.000457 0.000832	0.001919	0.004520	0.0225329	0	0	0	0.013923	0	0	0	0.013923	0	0	0	0
	0.014371 0.026155	0.060302	0.142024	0.7080043	0	0	0	0.437498	0	0	0	0.437498	0	0	0	0
	0.002225 0.004049	0.009336	0.021989	0.1096197	0	0	0	0.067737	0	0	0	0.067737	0	0	0	0
SUBTOTAL GROUP 22	0.017703 0.032218	0.074281	0.174947	0.8721294	0	0	0	0.538917	0	0	0	0.538917	0	0	0	0
GROUP 23	0.000020 0.000032	0.000055	0.000357	0.011000	0	0	0	0	0	0	0	0	0	0	0	0
	0.000125 0.000197	0.000333	0.002146	0.066004	0	0	0	0	0	0	0	0	0	0	0	0
	0.025176 0.039661	0.067064	0.431448	0.1326557	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL GROUP 23	0.025322 0.039891	0.067453	0.433953	0.1334258	0	0	0	0	0	0	0	0	0	0	0	0
GROUP 24	0.000330 0.000179	0.000822	0.000698	0.030382	0	0	0	0.014112	0	0	0	0.014112	0	0	0	0
	0.001818 0.000987	0.004519	0.003841	0.0167015	0	0	0	0.077575	0	0	0	0.077575	0	0	0	0
SUBTOTAL GROUP 24	0.002148 0.001166	0.005341	0.004540	0.0197397	0	0	0	0.091687	0	0	0	0.091687	0	0	0	0
GROUP 25	0.000835 0.001316	0.002226	0.014325	0.0440451	0	0	0	0	0	0	0	0	0	0	0	0
	0.016660 0.026246	0.044379	0.285513	0.8778561	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL GROUP 25	0.017496 0.027563	0.046606	0.299838	0.9219013	0	0	0	0	0	0	0	0	0	0	0	0
GROUP 26	0.002058 0.010293	0.017405	0.030649	0.3068690	0	0	0	0	0	0	0	0	0	0	0	0
	0.004801 0.024005	0.040591	0.147090	0.7156758	0	0	0	0	0	0	0	0	0	0	0	0
	0.000032 0.000164	0.000078	0.001007	0.049026	0	0	0	0	0	0	0	0	0	0	0	0

TABLE A - 4 EXPECTED TOTAL METAL PRODUCTION, BY GROUP

GROUP PRODUCTION VECTOR, TOTAL METAL	Cu	Pb	Sn	Zn	Au	Pt	Ag	Sb	Hg	Mo	Ni	BAR	CHR	NIBS	UR
SUBTOTAL GROUP 26	0.006892	0.034463	0	0.058274	0.211168	0	10.27447	0	0	0	0	0	0	0	0
GROUP 27+29	0.012553	0.022846	0	0.052673	0.129118	0	6.184360	0	0	0	0	0	0	0	0
	0.023922	0.043536	0	0.100375	0.246049	0	11.78499	0	0	0	0	0	0	0	0
	0.031448	0.057234	0	0.131957	0.323464	0	15.49292	0	0	0	0	0	0	0	0
	0.019390	0.035289	0	0.081361	0.199440	0	9.552578	0	0	0	0	0	0	0	0
SUBTOTAL GROUP 27+0.087315	0.158908	0.087315	0	0.366368	0.898073	0	43.01487	0	0	0	0	0	0	0	0
GROUP 28	0.000310	0	0	0.000699	0	0	0.008997	0	0	0	0	0	0	0	0
GROUP 30	0.002345	0	0	0.027144	0	0	0.196041	0	0	0	0	0	0	0	0
	0.032986	0	0	0.0381807	0	0	2.757456	0	0	0	0	0	0	0	0
SUBTOTAL GROUP 30	0.035332	0	0	0.408951	0	0	2.953498	0	0	0	0	0	0	0	0
GROUP 31	0.002276	0.003961	0	0.006776	0.041302	0	0.532283	0	0	0	0	0	0	0	0
	0.062445	0.108683	0	0.185906	1.133077	0	14.60238	0	0	0	0	0	0	0	0
	0.005766	0.010035	0	0.017166	0.104626	0	1.348353	0	0	0	0	0	0	0	0
SUBTOTAL GROUP 31	0.070487	0.122681	0	0.209849	1.279906	0	16.48301	0	0	0	0	0	0	0	0
GROUP 32	0.000957	0.004785	0	0.008091	0.062158	0	1.426675	0	0	0	0	0	0	0	0
GROUP 33	0.000726	0.000210	0	0.000964	0.004741	0	0.063969	0	0	0	0	0	0	0	0
GROUPS 34, 36, 38, 40, 42, 44, 46, 48	0.000663	0.000744	0	0.001715	0.011006	0	0.222691	0	0	0	0	0	0	0	0
	0.103577	0.116153	0	0.267797	1.718240	0	34.76487	0	0	0	0	0	0	0	0
	0.063736	0.071476	0	0.164790	1.057331	0	21.39280	0	0	0	0	0	0	0	0
SUBTOTAL 34..48	0.16777	0.188374	0	0.434303	2.786577	0	56.38037	0	0	0	0	0	0	0	0
GROUPS 41, 43, 45, 47	0.000120	0.000134	0	0.000311	0.001267	0	0.040401	0	0	0	0	0	0	0	0
	0.023602	0.026468	0	0.061025	0.248580	0	7.922139	0	0	0	0	0	0	0	0
	0.214171	0.240177	0	0.553738	2.255605	0	71.88508	0	0	0	0	0	0	0	0
SUBTOTAL 35..47	0.237895	0.266781	0	0.615074	2.505453	0	79.84762	0	0	0	0	0	0	0	0

TABLE A - 4 EXPECTED TOTAL METAL PRODUCTION, BY GROUP

GROUP PRODUCTION VECTOR, TOTAL METAL		Cu	Pb	Sn	Zn	Au	Pt	Ag	Sb	Hg	Mo	Ni	BAR	CHR	NIBS	UR
GROUP 49	0.003913 0.019569	0	0.033090	0.254187	0	5.834170	0	0	0	0	0	0	0	0	0	0
	0.004569 0.022845	0	0.038630	0.296743	0	6.810931	0	0	0	0	0	0	0	0	0	0
	0.007286 0.036432	0	0.061603	0.473212	0	10.86128	0	0	0	0	0	0	0	0	0	0
-----																
SUBTOTAL GROUP 49	0.015769 0.078847	0	0.133323	1.024144	0	23.50638	0	0	0	0	0	0	0	0	0	0
GROUP 50,52	0.792939 0.229818	0	1.052325	5.172253	0	69.78341	0	0	0	0	0	0	0	0	0	0
GROUP 51,53	0.006123	0	0	0.013777	0	0.177182	0	0.042947	0	0	0	0	0	0	0	0
GROUP 54,56	0	0	0.000210	0.000217	0	0	0	0.001574	0	0	0.001574	0	0	0	0	0
	0	0	0.043216	0.044529	0	0	0	0.322839	0	0	0.322839	0	0	0	0	0
	0	0	0.104135	0.107300	0	0	0	0.777926	0	0	0.777926	0	0	0	0	0
-----																
SUBTOTAL 54,56	0	0	0.147562	0.152046	0	0	0	1.102339	0	0	1.102339	0	0	0	0	0
GROUP 55,58,60,	0.063147 0.018302	0	0.083804	0.411904	0	5.557372	0	0	0	0	0	0	0	0	0	0
62,64,66	0.301799 0.087470	0	0.400523	1.968600	0	26.56011	0	0	0	0	0	0	0	0	0	0
-----																
SUBTOTAL 55,66	0.364946 0.105772	0	0.484327	2.380505	0	32.11748	0	0	0	0	0	0	0	0	0	0
GROUP 57,90	0	0	0	0.020368	0	0	0	0	0	0	0	0	0	0	0	0
OF TYPE 25	0	0	0	0.003887	0	0	0	0	0	0	0	0	0	0	0	0
-----																
SUBTOTAL 57,90	0	0	0	0.024256	0	0	0	0	0	0	0	0	0	0	0	0
GROUP 68,85	0.000530 0.000836	0	0.001413	0.015068	0	0.279671	0	0	0	0	0	0	0	0	0	0
TYPE 4,5,6,25	0.104707 0.164950	0	0.278917	2.972637	0	55.17106	0	0	0	0	0	0	0	0	0	0
	0.003170 0.004994	0	0.008444	0.090002	0	1.670414	0	0	0	0	0	0	0	0	0	0
	0.144202 0.227168	0	0.384121	4.093885	0	75.98101	0	0	0	0	0	0	0	0	0	0
-----																
SUBTOTAL 68,85	0.252611 0.397950	0	0.672897	7.171594	0	133.1021	0	0	0	0	0	0	0	0	0	0
GROUP 84,87,89	0.008502 0.042512	0	0.071885	0.540232	0	12.67414	0	0	0	0	0	0	0	0	0	0
	0.006285 0.031426	0	0.053139	0.399351	0	9.368990	0	0	0	0	0	0	0	0	0	0
-----																
SUBTOTAL 84,87,89	0.014787 0.073939	0	0.125024	0.939583	0	22.04313	0	0	0	0	0	0	0	0	0	0



TABLE A - 4 EXPECTED TOTAL METAL PRODUCTION, BY GROUP

GROUP PRODUCTION VECTOR, TOTAL METAL	Cu	Pb	Sn	Zn	Au	Pt	Ag	Sb	Hg	Mo	Ni	BAR	CHR	NIOB	UR
GROUP 91..101 OF	0.160081	0.291337	0	0.671690	3.220126	0	78.86227	0	0	0	0	0	0	0	0
TYPE 28,4,5,25	0.473614	0.861946	0	1.987250	9.527003	0	233.3204	0	0	0	0	0	0	0	0
SUBTOTAL 91..101	0.633696	1.153284	0	2.658941	12.74713	0	312.1826	0	0	0	0	0	0	0	0
GROUP 92..110 OF	0	0	0	0	0.219320	0	0	0	0	0	0	0	0	0	0.073928
TYPE 23,25															
GROUP 103,112	0	0.34169	0	0.577456	0	0	22.84881	0	0	0	0	0	0	0	0
	0	1.89111	0	3.195975	0	0	126.4585	0	0	0	0	0	0	0	0
SUBTOTAL 103,112	0	2.2328	0	3.773432	0	0	149.3073	0	0	0	0	0	0	0	0
GROUP 105,107,109	0.079847	0.145317	0	0.335035	1.573989	0	39.33608	0	0	0	0	0	0	0	0
GROUP 111,114	0.004710	0.023554	0	0.039828	0.305945	0	7.022123	0	0	0	0	0	0	0	0
	0.051716	0.258581	0	0.437237	3.358693	0	77.08948	0	0	0	0	0	0	0	0
	0.003384	0.016921	0	0.028613	0.219797	0	5.044841	0	0	0	0	0	0	0	0
	0.017206	0.086032	0	0.145473	1.117472	0	25.64847	0	0	0	0	0	0	0	0
SUBTOTAL 111,114	0.077018	0.385090	0	0.651152	5.001908	0	114.8049	0	0	0	0	0	0	0	0
GROUP 113,115,119	0	0	0	0	0.011173	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0.047348	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0.015614	0	0	0	0	0	0	0	0	0	0
SUBTOTAL 113,115,119	0	0	0	0	0.074136	0	0	0	0	0	0	0	0	0	0
GROUP 116	0	0	0	0	0	0	0	0	0	0	0	0	0.000391	0	0
GROUP 117	0.018463	0	0	0	0.039573	0	0	0	0	0.030772	0	0.002327	0	0	0
GROUP 118	0.016140	0	0	0	0.034594	0	0	0	0	0.026900	0	0	0	0	0
GROUP 120	0	0	0	0	0.041400	0	0	0	0	0	0	0.001251	0	0	0

TABLE A - 4 EXPECTED TOTAL METAL PRODUCTION, BY GROUP

GROUP PRODUCTION VECTOR, TOTAL METAL															
	Cu	Pb	Sn	Zn	Au	Pt	Ag	Sb	Hg	Mo	Ni	BAR	CHR	NIOB	UR
GROUP 1Z1	0	0	0	0	0.111511	0	0	0	0	0	0	0	0	0	0
	3.504198	7.571086	0.147562	15.55932	48.42781	0.075108	1437.459	0	0	1.145287	0.058404	16.66874	0	0	0.077814
	0.111621	0.385090	0	0.651152	5.187556	0.115567	114.8049	0	0	0	0.057673	0	0.003970	0	0
TOTALS	3.615820	7.956176	0.147562	16.21047	53.61536	0.190676	1552.264	0	0	1.145287	0.116077	16.66874	0.003970	0	0.077814
\$ VALUE OF PROD	6349.437	5241.401	1338.928	13026.21	24730.83	116.4405	12201.54	0	0	7675.810	616.2192	633.4123	30.14093	0	2550.283
	Cu	Pb	Sn	Zn	Au	Pt	Ag	Sb	Hg	Mo	Ni	BAR	CHR	NIOB	UR

TABLE A - 4 EXPECTED TOTAL METAL PRODUCTION, BY GROUP

GROUP	VANAD	TUNG	RED
GROUP 1	0	0	0
GROUP 2	0	0	0
GROUP 3	0	0	0
GROUP 4	0	0	0
GROUP 5	0	0	0
GROUP 6	0	0	0
GROUP 6	0	0	0
-----			
SUBTOTAL GROUP 6	0	0	0
GROUP 7	0	0	0
GROUP 8	0	0	0
GROUP 9	0	0	0
GROUP 10	0	0	0
GROUP 10	0	0	0
-----			
SUBTOTAL GROUP 10	0	0	0
GROUP 11	0.000992	0	0
GROUP 12	0	0	0
GROUP 12	0	0	0
-----			
SUBTOTAL GROUP 12	0	0	0
GROUP 13	0.000561	0	0
GROUP 14	0	0	0
GROUP 14	0	0	0

TABLE A - 4 EXPECTED TOTAL METAL PRODUCTION, BY GROUP

GROUP	VANAD	TUNG	REQ
	0	0	0
-----			
SUBTOTAL GROUP 14	0	0	0
-----			
GROUP 15	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
-----			
SUBTOTAL GROUP 15	0	0	0
-----			
GROUP 16	0	0	0
	0	0	0
-----			
SUBTOTAL GROUP 16	0	0	0
-----			
GROUP 17	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
-----			
SUBTOTAL GROUP 17	0	0	0
-----			
GROUP 18	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
-----			
SUBTOTAL GROUP 18	0	0	0
-----			
GROUP 19	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
-----			
SUBTOTAL GROUP 19	0	0	0

TABLE A - 4 EXPECTED TOTAL METAL PRODUCTION, BY GROUP

GROUP	VANAD	TUNG	RED
GROUP 20	0	0	0
	0	0	0
	0	0	0
SUBTOTAL GROUP 20	0	0	0
GROUP 21	0	0	0
	0	0	0
	0	0	0
SUBTOTAL GROUP 21	0	0	0
GROUP 22	0	0	0
	0	0	0
	0	0	0
	0	0	0
SUBTOTAL GROUP 22	0	0	0
GROUP 23	0	0	0
	0	0	0
	0	0	0
SUBTOTAL GROUP 23	0	0	0
GROUP 24	0	0	0
	0	0	0
SUBTOTAL GROUP 24	0	0	0
GROUP 25	0	0	0
	0	0	0
SUBTOTAL GROUP 25	0	0	0
GROUP 26	0	0	0
	0	0	0
	0	0	0

TABLE A - 4 EXPECTED TOTAL METAL PRODUCTION, BY GROUP

GROUP	VANAD	TUNG	RED
SUBTOTAL GROUP 26	0	0	0
GROUP 27+29	0	0	0
	0	0	0
	0	0	0
	0	0	0
SUBTOTAL GROUP 27+	0	0	0
GROUP 28	0	0	0
GROUP 30	0	0	0
	0	0	0
SUBTOTAL GROUP 30	0	0	0
GROUP 31	0	0.001337	0
	0	0.036704	0
	0	0.003389	0
SUBTOTAL GROUP 31	0	0.041431	0
GROUP 32	0	0	0
GROUP 33	0	0	0
GROUPS 34,36,38, 40,42,44,46,48	0	0	0
	0	0	0
SUBTOTAL 34..48	0	0	0
GROUPS 35,37,39, 41,43,45,47	0	0	0
	0	0	0
SUBTOTAL 35..47	0	0	0

TABLE A - 4 EXPECTED TOTAL METAL PRODUCTION, BY GROUP

GROUP	VANAD	TUNG	RED
GROUP 49	0	0	0
	0	0	0
	0	0	0
SUBTOTAL GROUP 49	0	0	0
GROUP 50,52	0	0	0
GROUP 51,53	0	0	0
GROUP 54,56	0	0	0
	0	0	0
	0	0	0
SUBTOTAL 54,56	0	0	0
GROUP 55,58,60, 62,64,66	0	0	0
	0	0	0
SUBTOTAL 55,66	0	0	0
GROUP 57,90 OF TYPE 25	0	0	0
	0	0	0
SUBTOTAL 57,90	0	0	0
GROUP 68,85 OF TYPE 4,5,6,25	0	0	0
	0	0	0
	0	0	0
SUBTOTAL 68,85	0	0	0
GROUP 84,87,89	0	0	0
	0	0	0
SUBTOTAL 84,87,89	0	0	0

TABLE A - 4 EXPECTED TOTAL METAL PRODUCTION, BY GROUP

GROUP	VARAD	TUNG	RED
GROUP 91..101 OF TYPE 2B,4,6,25	0	0	0
-----			
SUBTOTAL 91..101	0	0	0
GROUP 92..110 OF 0.029571 TYPE 23,25	0	0	0
GROUP 103,112	0	0	0
	0	0	0
-----			
SUBTOTAL 103,112	0	0	0
GROUP 105,107, 109	0	0	0
GROUP 111,114	0	0	0
	0	0	0
	0	0	0
	0	0	0
-----			
SUBTOTAL 111,114	0	0	0
GROUP 113,115, 119	0	0	0
	0	0	0
	0	0	0
-----			
SUBTOTAL 113,115,1	0	0	0
GROUP 116	0	0	0
GROUP 117	0	0	0
GROUP 118	0	0	0
GROUP 120	0	0	0



TABLE A - 4 EXPECTED TOTAL METAL PRODUCTION BY GROUP

GROUP	VANAD	TUNG	REO
GROUP 121	0	0	0
	0.031125	0.041431	0
	0	0	0
TOTALS	0.031125	0.041431	0
\$ VALUE OF PROD	238.0181	273.4502	0

TABLE A - 5 EXPECTED ANNUAL PRODUCTION, BY GROUP

GROUP PRODUCTION VECTOR, ANNUAL METAL PRODUCTION

	Cu	Pb	Sn	Zn	Au	Pt	Ag	Sb	Hg	Mo	Ni	BAR	CHR	NI0B
GROUP 1	0	0	0	0.001595	0	0	0	0	0	0	0	0	0	0
GROUP 2	0	0	0	0.000277	0	0	0	0	0	0	0	0	0	0
GROUP 3	0	0	0	0.000478	0	0	0	0	0	0	0	0	0	0
GROUP 4	0	0	0	0.000833	0	0	0	0	0	0	0	0	0	0
GROUP 5	0	0	0	0.002725	0	0	0	0	0	0	0	0	0	0
GROUP 6	0	0	0	0.004166	0	0	0	0	0	0	0	0	0	0
	0	0	0	0.005832	0	0	0	0	0	0	0	0	0	0
SUBTOTAL GROUP 6	0	0	0	0.009999	0	0	0	0	0	0	0	0	0	0
GROUP 7	0	0	0	0.004742	0	0	0	0	0	0	0	0	0	0
GROUP 8	0	0	0	0.008051	0	0	0	0	0	0	0	0	0	0
GROUP 9	0	0	0	0.003018	0	0	0	0	0	0	0	0	0	0
GROUP 10	0.000038	0.000192	0	0.000325	0.001124	0	0.057323	0	0	0	0	0	0	0
	0.000582	0.002911	0	0.004923	0.017020	0	0.867997	0	0	0	0	0	0	0
SUBTOTAL GROUP 10	0.000620	0.003103	0	0.005248	0.018144	0	0.925321	0	0	0	0	0	0	0
GROUP 11	0.000348	0.001744	0	0.002949	0.010197	0	0.520059	0	0	0	0	0	0	0
GROUP 12	0.000093	0.000466	0	0.000788	0.002727	0	0.139084	0	0	0	0	0	0	0
	0.001251	0.006258	0	0.010581	0.036584	0	1.865702	0	0	0	0	0	0	0
SUBTOTAL GROUP 12	0.001344	0.006724	0	0.011370	0.039311	0	2.004787	0	0	0	0	0	0	0
GROUP 13	0.000197	0.000986	0	0.001667	0.005766	0	0.294084	0	0	0	0	0	0	0
GROUP 14	0.001244	0.006223	0	0.010524	0.036383	0	1.855494	0	0	0	0	0	0	0
	0.000139	0.000695	0	0.001176	0.004067	0	0.207420	0	0	0	0	0	0	0

TABLE A - 5 EXPECTED ANNUAL PRODUCTION, BY GROUP

GROUP PRODUCTION VECTOR, ANNUAL METAL PRODUCTION														
	Cu	Pb	Sn	Zn	Au	Pt	Ag	Sb	Hg	Mo	Ni	BAR	CHR	NI08
	0.000543	0.002717	0	0.004595	0.015887	0	0.810246	0	0	0	0	0	0	0
-----														
SUBTOTAL GROUP 14	0.001927	0.005637	0	0.016296	0.056339	0	2.873162	0	0	0	0	0	0	0
-----														
GROUP 15	0.000676	0.001004	0	0.002534	0.005304	0	0.262030	0	0	0	0	0.022772	0	0
	0.004236	0.006287	0	0.015871	0.032212	0	1.646657	0	0	0	0	0.142587	0	0
	0.008518	0.012643	0	0.031914	0.066782	0	3.299038	0	0	0	0	0.286715	0	0
	0.008984	0.013334	0	0.033659	0.070434	0	3.479415	0	0	0	0	0.302391	0	0
	0.001971	0.002926	0	0.007387	0.015458	0	0.766636	0	0	0	0	0.066366	0	0
-----														
SUBTOTAL GROUP 15	0.024388	0.036196	0	0.091366	0.191192	0	9.444778	0	0	0	0	0.820834	0	0
-----														
GROUP 16	0.000031	0	0	0	0.000067	0	0	0	0	0.000052	0	0	0	0
	0.001529	0	0	0	0.003279	0	0	0	0	0.002549	0	0	0	0
-----														
SUBTOTAL GROUP 16	0.001561	0	0	0	0.003346	0	0	0	0	0.002602	0	0	0	0
-----														
GROUP 17	0.002804	0.022803	0	0.038541	0.044082	0	2.465383	0	0	0	0	0	0	0
	0.000074	0.006607	0	0.001027	0.001174	0	0.065701	0	0	0	0	0	0	0
	0.002933	0.023854	0	0.040317	0.046114	0	2.579034	0	0	0	0	0	0	0
	0.001744	0.014181	0	0.023969	0.027415	0	1.533244	0	0	0	0	0	0	0
-----														
SUBTOTAL GROUP 17	0.007557	0.061447	0	0.103855	0.118787	0	6.643363	0	0	0	0	0	0	0
-----														
GROUP 18	0.000873	0.000474	0	0.002170	0.001844	0	0.080214	0	0	0	0	0.037258	0	0
	0.006080	0.003300	0	0.015114	0.012846	0	0.558547	0	0	0	0	0.259435	0	0
	0.000787	0.000427	0	0.001958	0.001664	0	0.072373	0	0	0	0	0.033616	0	0
	0.000992	0.000538	0	0.002466	0.002096	0	0.091146	0	0	0	0	0.042336	0	0
-----														
SUBTOTAL GROUP 18	0.008733	0.004741	0	0.021709	0.018452	0	0.802283	0	0	0	0	0.372445	0	0
-----														
GROUP 19	0.000263	0.000391	0	0.000987	0.002066	0	0.102065	0	0	0	0	0.008870	0	0
	0.008799	0.013059	0	0.032963	0.068979	0	3.407537	0	0	0	0	0.296145	0	0
	0.000898	0.001332	0	0.003364	0.007040	0	0.347796	0	0	0	0	0.030226	0	0
	0.000670	0.000995	0	0.002513	0.005259	0	0.259803	0	0	0	0	0.022579	0	0
-----														
SUBTOTAL GROUP 19	0.010631	0.015778	0	0.039828	0.083345	0	4.117202	0	0	0	0	0.357821	0	0

TABLE A - 5 EXPECTED ANNUAL PRODUCTION, BY GROUP

GROUP PRODUCTION VECTOR, ANNUAL METAL PRODUCTION

	Cu	Pb	Sn	Zn	Au	Pt	Ag	Sb	Hg	Mo	Ni	BAR	CHR	NIOS
GROUP 20	0.000107	0.000058	0	0.000268	0.000228	0	0.009913	0	0	0	0	0.004604	0	0
	0.000624	0.000339	0	0.001553	0.001320	0	0.057402	0	0	0	0	0.026662	0	0
	0.000457	0.000270	0	0.001237	0.001052	0	0.045741	0	0	0	0	0.021245	0	0
SUBTOTAL GROUP 20	0.001230	0.000666	0	0.003059	0.002600	0	0.113056	0	0	0	0	0.025512	0	0
GROUP 21	0.000003	0	0	0	0.000007	0	0	0	0	0.000005	0	0	0	0
	0.000001	0	0	0	0.000002	0	0	0	0	0.000001	0	0	0	0
	0.000186	0	0	0	0.000399	0	0	0	0	0.000310	0	0	0	0
SUBTOTAL GROUP 21	0.000190	0	0	0	0.000409	0	0	0	0	0.000318	0	0	0	0
GROUP 22	0.000058	0.000087	0	0.000219	0.000460	0	0.022732	0	0	0	0.001975	0	0	0
	0.000041	0.000061	0	0.000154	0.000324	0	0.016021	0	0	0	0.001392	0	0	0
	0.001299	0.001929	0	0.004869	0.010190	0	0.503399	0	0	0	0.043749	0	0	0
	0.000201	0.000298	0	0.000753	0.001577	0	0.077940	0	0	0	0.006773	0	0	0
SUBTOTAL GROUP 22	0.001601	0.002376	0	0.005998	0.012552	0	0.620094	0	0	0	0.053891	0	0	0
GROUP 23	0.000001	0.000002	0	0.000003	0.000029	0	0.000773	0	0	0	0	0	0	0
	0.000011	0.000013	0	0.000022	0.000176	0	0.004639	0	0	0	0	0	0	0
	0.002253	0.002644	0	0.004470	0.035416	0	0.932421	0	0	0	0	0	0	0
SUBTOTAL GROUP 23	0.002266	0.002659	0	0.004496	0.035621	0	0.937834	0	0	0	0	0	0	0
GROUP 24	0.000033	0.000017	0	0.000082	0.000069	0	0.003038	0	0	0	0.001411	0	0	0
	0.000181	0.000098	0	0.000451	0.000384	0	0.016701	0	0	0	0.007757	0	0	0
SUBTOTAL GROUP 24	0.000214	0.000116	0	0.000534	0.000454	0	0.019739	0	0	0	0.009168	0	0	0
GROUP 25	0.000074	0.000087	0	0.000148	0.001175	0	0.030958	0	0	0	0	0	0	0
	0.001491	0.001749	0	0.002958	0.023456	0	0.617034	0	0	0	0	0	0	0
SUBTOTAL GROUP 25	0.001565	0.001837	0	0.003107	0.024632	0	0.647993	0	0	0	0	0	0	0
GROUP 26	0.000137	0.000686	0	0.001160	0.004301	0	0.204579	0	0	0	0	0	0	0
	0.000320	0.001600	0	0.002706	0.010031	0	0.477117	0	0	0	0	0	0	0
	0.000002	0.000010	0	0.000018	0.000068	0	0.003268	0	0	0	0	0	0	0

TABLE A - 5 EXPECTED ANNUAL PRODUCTION, BY GROUP

GROUP PRODUCTION VECTOR, ANNUAL METAL PRODUCTION														
	Cu	Pb	Sn	Zn	Au	Pt	Ag	Sb	Hg	Mo	Ni	BAR	CHR	NI0B
SUBTOTAL GROUP 26	0.000459	0.002297	0	0.003884	0.014401	0	0.684965	0	0	0	0	0	0	0
GROUP 27+29	0.001135	0.001685	0	0.004253	0.009407	0	0.439717	0	0	0	0	0	0	0
	0.002163	0.003211	0	0.008105	0.017926	0	0.837927	0	0	0	0	0	0	0
	0.002844	0.004221	0	0.010656	0.023567	0	1.101566	0	0	0	0	0	0	0
	0.001753	0.002602	0	0.006570	0.014530	0	0.679200	0	0	0	0	0	0	0
SUBTOTAL GROUP 27+0.007897	0.011721		0	0.027586	0.065432	0	3.058410	0	0	0	0	0	0	0
GROUP 28	0.000031	0	0	0.000069	0	0	0.000899	0	0	0	0	0	0	0
GROUP 30	0.000234	0	0	0.002714	0	0	0.019604	0	0	0	0	0	0	0
	0.003298	0	0	0.038180	0	0	0.275745	0	0	0	0	0	0	0
SUBTOTAL GROUP 30	0.003533	0	0	0.040895	0	0	0.295349	0	0	0	0	0	0	0
GROUP 31	0.000227	0.000396	0	0.000677	0.002244	0	0.053228	0	0	0	0	0	0	0
	0.006244	0.010868	0	0.018590	0.061587	0	1.46238	0	0	0	0	0	0	0
	0.000576	0.001003	0	0.001716	0.005686	0	0.13635	0	0	0	0	0	0	0
SUBTOTAL GROUP 31	0.007048	0.012268	0	0.020984	0.069519	0	1.648301	0	0	0	0	0	0	0
GROUP 32	0.000063	0.000319	0	0.000539	0.003641	0	0.095111	0	0	0	0	0	0	0
GROUP 33	0.000072	0.000021	0	0.000096	0.000474	0	0.006396	0	0	0	0	0	0	0
GROUPS 34,36,38, 40,42,44,46,48	0.000062	0.000054	0	0.000138	0.000785	0	0.016448	0	0	0	0	0	0	0
	0.009748	0.008567	0	0.021626	0.122637	0	2.567860	0	0	0	0	0	0	0
	0.005998	0.005272	0	0.013307	0.075465	0	1.580150	0	0	0	0	0	0	0
SUBTOTAL 34..48	0.015809	0.013894	0	0.035072	0.198888	0	4.164459	0	0	0	0	0	0	0
GROUPS 35,37,39, 41,43,45,47	0.000011	0.000009	0	0.000025	0.000106	0	0.002984	0	0	0	0	0	0	0
	0.002221	0.001952	0	0.004928	0.020797	0	0.585158	0	0	0	0	0	0	0
	0.020156	0.017715	0	0.044717	0.188719	0	5.309694	0	0	0	0	0	0	0
SUBTOTAL 35..47	0.022389	0.019677	0	0.049670	0.209423	0	5.897836	0	0	0	0	0	0	0

TABLE A - 5 EXPECTED ANNUAL PRODUCTION, BY GROUP

GROUP PRODUCTION VECTOR, ANNUAL METAL PRODUCTION

	Cu	Pb	Sn	Zn	Au	Pt	Ag	Sb	Hg	Mo	Ni	BAR	CHR	NI0B
GROUP 49	0.000260	0.001304	0	0.002206	0.014891	0	0.388944	0	0	0	0	0	0	0
	0.000304	0.001523	0	0.002575	0.017384	0	0.454052	0	0	0	0	0	0	0
	0.000485	0.002428	0	0.004106	0.027722	0	0.724085	0	0	0	0	0	0	0
SUBTOTAL GROUP 49	0.001051	0.005256	0	0.008888	0.059998	0	1.567092	0	0	0	0	0	0	0
GROUP 50,52	0.079293	0.022981	0	0.105232	0.517225	0	6.978341	0	0	0	0	0	0	0
GROUP 51,53	0.000612	0	0	0.001377	0	0.017718	0	0.002147	0	0.002147	0	0	0	0
GROUP 54,56	0	0.000041	0	0.000021	0	0	0	0.000078	0	0.000078	0	0	0	0
	0	0.0029113	0	0.004452	0	0	0	0.016141	0	0.016141	0	0	0	0
	0	0.0070152	0	0.010730	0	0	0	0.038896	0	0.038896	0	0	0	0
SUBTOTAL 54,56	0	0.0099407	0	0.015204	0	0	0	0.055116	0	0.055116	0	0	0	0
GROUP 55,58,60,	0.006314	0.001830	0	0.008380	0.041190	0	0.555737	0	0	0	0	0	0	0
62,64,66	0.030179	0.008747	0	0.040052	0.196860	0	2.656011	0	0	0	0	0	0	0
SUBTOTAL 55,58,60	0.036494	0.010577	0	0.048432	0.238050	0	3.211748	0	0	0	0	0	0	0
GROUP 57,90	0	0	0	0.002036	0	0	0	0	0	0	0	0	0	0
OF TYPE 25	0	0	0	0.000388	0	0	0	0	0	0	0	0	0	0
SUBTOTAL 57,90	0	0	0	0.002425	0	0	0	0	0	0	0	0	0	0
GROUP 68,85 OF	0.000047	0.000055	0	0.000094	0.001057	0	0.019657	0	0	0	0	0	0	0
TYPE 4,5,6,25	0.009371	0.010996	0	0.018594	0.208529	0	3.877907	0	0	0	0	0	0	0
	0.000283	0.000332	0	0.000562	0.006313	0	0.117411	0	0	0	0	0	0	0
	0.012905	0.015144	0	0.025608	0.287184	0	5.340613	0	0	0	0	0	0	0
SUBTOTAL 68,85	0.022608	0.026530	0	0.044859	0.503084	0	9.355590	0	0	0	0	0	0	0
GROUP 84,87,89	0.000566	0.002634	0	0.004792	0.031153	0	0.844942	0	0	0	0	0	0	0
	0.000419	0.002095	0	0.003542	0.023029	0	0.624599	0	0	0	0	0	0	0
SUBTOTAL 84,87,89	0.000985	0.004729	0	0.008334	0.054183	0	1.469542	0	0	0	0	0	0	0

TABLE A - 5 EXPECTED ANNUAL PRODUCTION, BY GROUP

GROUP PRODUCTION VECTOR, ANNUAL METAL PRODUCTION														
	Cu	Pb	Sn	Zn	Au	Pt	Ag	Sb	Hg	Mo	Ni	BAR	CHR	MOB
GROUP 91..101 OF	0.014479	0.021489	0	0.054242	0.198442	0	5.607205	0	0	0	0	0	0	0
TYPE 2R,4,6,25	0.042838	0.043577	0	0.160481	0.587700	0	16.58936	0	0	0	0	0	0	0
SUBTOTAL 91..101	0.057317	0.065066	0	0.214724	0.786143	0	22.19657	0	0	0	0	0	0	0
GROUP 92..110 OF	0	0	0	0	0.021932	0	0	0	0	0	0	0	0	0
TYPE 23,25														
GROUP 103,112	0	0.017084	0	0.028872	0	0	1.142440	0	0	0	0	0	0	0
	0	0.094555	0	0.159798	0	0	6.322926	0	0	0	0	0	0	0
SUBTOTAL 103,112	0	0.11164	0	0.188671	0	0	7.465366	0	0	0	0	0	0	0
GROUP 105,107,	0.007222	0.010718	0	0.027056	0.095862	0	2.796844	0	0	0	0	0	0	0
109														
GROUP 111,114	0.000314	0.001570	0	0.002655	0.017923	0	0.468141	0	0	0	0	0	0	0
	0.003447	0.017238	0	0.021149	0.196766	0	5.139299	0	0	0	0	0	0	0
	0.000225	0.001128	0	0.001907	0.012876	0	0.336322	0	0	0	0	0	0	0
	0.001147	0.005735	0	0.009698	0.065866	0	1.709898	0	0	0	0	0	0	0
SUBTOTAL 111,114	0.005134	0.025672	0	0.043410	0.293033	0	7.653661	0	0	0	0	0	0	0
GROUP 113,115,	0	0	0	0	0.001117	0	0	0	0	0	0	0	0	0
119	0	0	0	0	0.004734	0	0	0	0	0	0	0	0	0
	0	0	0	0	0.001561	0	0	0	0	0	0	0	0	0
SUBTOTAL 113,115,1	0	0	0	0	0.007413	0	0	0	0	0	0	0	0	0
GROUP 116	0	0	0	0	0	0	0	0	0	0	0	0	0.000195	0
GROUP 117	0.000923	0	0	0	0	0.001978	0	0	0	0	0.001538	0	0.001163	0
GROUP 118	0.000807	0	0	0	0	0.001729	0	0	0	0	0.001345	0	0	0
GROUP 120	0	0	0	0	0	0.004140	0	0	0	0	0	0	0.000625	0

TABLE A - 5 EXPECTED ANNUAL PRODUCTION, BY GROUP

GROUP PRODUCTION VECTOR, ANNUAL METAL PRODUCTION														
	Cu	Pb	Sn	Zn	Au	Pt	Ag	Sb	Hg	Mo	Ni	BAR	CHR	NI08
GROUP 121	0	0	0	0.011151	0	0	0	0	0	0	0	0	0	0
	0.327273	0.485919	0.0099407	1.097525	3.547735	0.003755	100.8743	0	0	0.057264	0.002920	1.666874	0	0
	0.006864	0.025672	0	0.043410	0.311598	0.007848	7.653661	0	0	0	0.002883	0	0.001985	0
TOTALS	0.334138	0.511592	0.0099407	1.140936	3.859333	0.011603	108.5279	0	0	0.057264	0.005803	1.666874	0.001985	0
* VALUE OF PROD 586.7526 337.0289 90.198466 916.8196 1780.171 7.086129 853.0819 0 0 383.7905 30.81096 63.34123 15.07046 0														
	Cu	Pb	Sn	Zn	Au	Pt	Ag	Sb	Hg	Mo	Ni	BAR	CHR	NI08



TABLE A - 5 EXPECTED ANNUAL PRODUCTION, BY GROUP

GROUP	UR	VAMAD	TUNG	REQ
GROUP 1	0	0	0	0
GROUP 2	0	0	0	0
GROUP 3	0	0	0	0
GROUP 4	0	0	0	0
GROUP 5	0	0	0	0
GROUP 6	0	0	0	0
GROUP 6	0	0	0	0
SUBTOTAL GROUP 6	0	0	0	0
GROUP 7	0	0	0	0
GROUP 8	0	0	0	0
GROUP 9	0	0	0	0
GROUP 10	0	0	0	0
GROUP 10	0	0	0	0
SUBTOTAL GROUP 10	0	0	0	0
GROUP 11	0.000124	0.000049	0	0
GROUP 12	0	0	0	0
GROUP 12	0	0	0	0
SUBTOTAL GROUP 12	0	0	0	0
GROUP 13	0.000070	0.000028	0	0
GROUP 14	0	0	0	0
GROUP 14	0	0	0	0

TABLE A - 5 EXPECTED ANNUAL PRODUCTION, BY GROUP

GROUP	UR	VANAD	TUNG	RED
	0	0	0	0
-----				
SUBTOTAL GROUP 14	0	0	0	0
-----				
GROUP 15	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
-----				
SUBTOTAL GROUP 15	0	0	0	0
-----				
GROUP 16	0	0	0	0
	0	0	0	0
-----				
SUBTOTAL GROUP 16	0	0	0	0
-----				
GROUP 17	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
-----				
SUBTOTAL GROUP 17	0	0	0	0
-----				
GROUP 18	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
-----				
SUBTOTAL GROUP 18	0	0	0	0
-----				
GROUP 19	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
-----				
SUBTOTAL GROUP 19	0	0	0	0

TABLE A - 5 EXPECTED ANNUAL PRODUCTION, BY GROUP

GROUP	UR	VANAD	TUNG	REC
GROUP 20	0	0	0	0
	0	0	0	0
	0	0	0	0
SUBTOTAL GROUP 20	0	0	0	0
GROUP 21	0	0	0	0
	0	0	0	0
	0	0	0	0
SUBTOTAL GROUP 21	0	0	0	0
GROUP 22	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
SUBTOTAL GROUP 22	0	0	0	0
GROUP 23	0	0	0	0
	0	0	0	0
	0	0	0	0
SUBTOTAL GROUP 23	0	0	0	0
GROUP 24	0	0	0	0
	0	0	0	0
SUBTOTAL GROUP 24	0	0	0	0
GROUP 25	0	0	0	0
	0	0	0	0
SUBTOTAL GROUP 25	0	0	0	0
GROUP 26	0	0	0	0
	0	0	0	0
	0	0	0	0

TABLE A - 5 EXPECTED ANNUAL PRODUCTION, BY GROUP

GROUP	UR	VANAD	TUNG	RED
SUBTOTAL GROUP 26	0	0	0	0
GROUP 27+29	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
SUBTOTAL GROUP 27+	0	0	0	0
GROUP 28	0	0	0	0
GROUP 30	0	0	0	0
	0	0	0	0
SUBTOTAL GROUP 30	0	0	0	0
GROUP 31	0	0.000089	0	0
	0	0.002446	0	0
	0	0.000225	0	0
SUBTOTAL GROUP 31	0	0.002762	0	0
GROUP 32	0	0	0	0
GROUP 33	0	0	0	0
GROUPS 34, 36, 38, 40, 42, 44, 46, 48	0	0	0	0
	0	0	0	0
SUBTOTAL 34..48	0	0	0	0
GROUPS 35, 37, 39, 41, 43, 45, 47	0	0	0	0
	0	0	0	0
	0	0	0	0
SUBTOTAL 35..47	0	0	0	0

TABLE A - 5 EXPECTED ANNUAL PRODUCTION, BY GROUP

GROUP	UR	VANAD	TUNG	RED
GROUP 49	0	0	0	0
	0	0	0	0
	0	0	0	0
SUBTOTAL GROUP 49	0	0	0	0
GROUP 50,52	0	0	0	0
GROUP 51,53	0	0	0	0
GROUP 54,56	0	0	0	0
	0	0	0	0
	0	0	0	0
SUBTOTAL 54,56	0	0	0	0
GROUP 55,58,60, 62,64,66	0	0	0	0
	0	0	0	0
SUBTOTAL 55,66	0	0	0	0
GROUP 57,90 OF TYPE 25	0	0	0	0
	0	0	0	0
SUBTOTAL 57,90	0	0	0	0
GROUP 68,85 OF TYPE 4,5,6,25	0	0	0	0
	0	0	0	0
	0	0	0	0
SUBTOTAL 68,85	0	0	0	0
GROUP 84,87,89	0	0	0	0
	0	0	0	0
SUBTOTAL 84,87,89	0	0	0	0

TABLE A - 5 EXPECTED ANNUAL PRODUCTION, BY GROUP

GROUP	UR	VANAD	TUNG	RED
GROUP 91..101 OF TYPE 2B, 4, 6, 25	0	0	0	0
SUBTOTAL 91..101	0	0	0	0
GROUP 92..110 OF 0.003696 0.001478 TYPE 23, 25	0	0	0	0
GROUP 103, 112	0	0	0	0
SUBTOTAL 103, 112	0	0	0	0
GROUP 105, 107, 109	0	0	0	0
GROUP 111, 114	0	0	0	0
SUBTOTAL 111, 114	0	0	0	0
GROUP 113, 115, 119	0	0	0	0
SUBTOTAL 113, 115, 119	0	0	0	0
GROUP 116	0	0	0	0
GROUP 117	0	0	0	0
GROUP 118	0	0	0	0
GROUP 120	0	0	0	0

TABLE A - 5 EXPECTED ANNUAL PRODUCTION, BY GROUP

GROUP	UR	VANAD	TUNG	REQ
GROUP 121	0	0	0	0
	0.003890	0.001556	0.002762	0
	0	0	0	0
TOTALS	0.003890	0.001556	0.002762	0
\$ VALUE OF PROD	127.5141	11.90090	18.23001	0

APPENDIX B  
PRICE AND PRODUCTION DATA  
FOR SELECTED MINERALS



Data on selected mineral production and prices are summarized in the following tables. Data are included for copper, lead, tin, zinc, gold and silver. In general, the data cover world production, U.S. production, and prices. The data are presented to provide a frame of reference against which projected Alaska Mental Health Trust Lands production can be viewed. The price data are also used to determine long run average prices (in 1987 dollars). These prices are compared with those used in the Metz appraisal.

All data are taken from various volumes of the Commodity Yearbook (Commodity Research Bureau, New York), including 1988 and selected earlier years.

0.892857

RESOURCE: COPPER

YEAR	(1) GNP DEFLAT	WORLD PROD (2)	US PROD	PRICE (3)	PRICE 1987 \$
1964	32.7	4729.5	1113.4	32.35	115.54
1965	33.8	4954.5	1207.1	35.36	122.92
1966	35.0	5178.6	1275.9	36.00	120.86
1967	35.9	4957.1	851.8	38.10	124.70
1968	37.7	5036.6	1075.9	41.17	128.31
1969	39.8	5557.1	1379.5	47.43	140.03
1970	42.0	5926.8	1535.7	58.07	162.46
1971	44.4	5972.3	1358.9	52.09	137.85
1972	46.5	6543.8	1486.6	51.44	129.98
1973	49.5	7004.5	1533.9	59.53	141.31
1974	54.0	7199.1	1425.9	77.06	167.68
1975	59.3	6856.3	1261.6	64.53	127.86
1976	63.1	7525.0	1457.0	69.62	129.64
1977	67.3	7739.0	1364.0	66.72	116.49
1978	72.2	7618.0	1358.0	66.53	108.27
1979	78.6	7691.0	1444.0	92.75	138.65
1980	85.7	7485.0	1181.0	102.19	140.11
1981	94.0	7777.0	1538.0	85.59	106.99
1982	100.0	7622.0	1147.0	74.56	87.61
1983	103.9	7662.0	1038.0	78.33	88.58
1984	107.7	7974.0	1103.0	68.77	75.03
1985	111.2	8088.0	1106.0	68.85	72.75
1986	114.1	8156.0	1147.0	67.90	69.92
1987	117.5		1260.0	64.80	84.80
1988					

116.26

(1) GNP DEFLATOR, 1982 = 100

(2) WORLD AND U.S. MINE PRODUCTION,  
THOUSAND METRIC TONS

(3) PRODUCER PRICE, ELECTROLYTIC WIREBAR DELIVERED  
TO U.S. DESTINATIONS, BEFORE 1973 PRICE  
IS F.O.B. CARS, CENTS PER POUND.

2649.117 \$/METRIC TON  
1655.698 LS/METRIC TON

RESOURCE: LEAD

YEAR	(1) GNP DEFLAT PROD (2)	WORLD PROD (2)	US MINE PROD (4)	PRICE (3)	PRICE 1987 \$
1964	32.9	2516.1	401.3	13.62	48.64
1965	33.8	2599.1	373.4	16.00	55.62
1966	35.0	2701.8	393.5	15.12	50.76
1967	35.9	2841.1	339.2	14.00	45.82
1968	37.7	2899.1	417.2	13.21	41.17
1969	39.8	3172.3	570.3	14.93	44.08
1970	42.0	3239.3	595.3	15.69	43.89
1971	44.4	3206.3	580.4	13.89	36.76
1972	46.5	3343.8	614.8	15.03	37.98
1973	49.5	3426.8	602.2	16.29	38.67
1974	54.0	3418.8	600.9	22.53	49.02
1975	59.3	3243.8	567.9	21.53	42.66
1976	63.1	4990.0	1251.0	23.10	43.02
1977	67.3	5140.0	1306.0	30.70	53.60
1978	72.2	5133.0	1337.0	33.65	54.76
1979	78.6	5628.0	1380.0	52.64	78.69
1980	85.7	5397.0	1224.0	42.46	58.22
1981	94.0	5384.0	1139.0	36.53	45.66
1982	100.0	5265.0	1088.0	25.54	30.01
1983	103.9	5239.0	1018.0	21.68	24.52
1984	107.7	5439.0	1029.0	25.55	27.87
1985	111.2	5587.0	1103.0	19.07	20.15
1986	114.1	5413.0	981.1	22.05	22.71
1987	117.5		310.5	35.94	
1988					

42.92610

(1) GNP DEFLATOR 1982 = 100  
 (2) WORLD AND U.S. PRIMARY AND SECONDARY  
 SMELTER PRODUCTION, THOUSAND METRIC TONS  
 (3) PRICE IS NEW YORK, CENTS PER POUND  
 (4) U.S. MINE PRODUCTION OF RECOVERABLE LEAD,  
 THOUSAND METRIC TONS

961.5446 \$ /METRIC TON  
 597.2326 LS/METRIC TON

RESOURCE: TIN

YEAR	(1) GNP DEFLAT PROD (2)	WORLD PROD (2)	US PROD	PRICE (3)	PRICE 1987 \$
1964	32.9	193.5	NONE	157.72	563.29
1965	33.8	201.1	REPT.	176.17	619.38
1966	35.0	208.1		164.02	550.64
1967	35.9	214.2		153.40	502.08
1968	37.7	228.3		148.11	461.62
1969	39.8	225.7		164.43	485.44
1970	42.0	228.5		174.13	487.15
1971	44.4	231.4		167.34	442.85
1972	46.5	240.3		177.47	448.45
1973	49.5	237.8		227.48	539.98
1974	54.0	232.9		395.75	861.12
1975	59.3	222.3		339.83	673.36
1976	63.1	218.4		383.34	713.83
1977	67.3	230.7		536.76	940.63
1978	72.2	241.1		633.34	1030.71
1979	78.6	245.9		756.87	1131.45
1980	85.7	244.7		840.73	1152.69
1981	94.0	251.9		728.05	910.06
1982	100.0	236.1		663.88	780.06
1983	103.9	196.6		660.34	746.78
1984	107.7	198.4		591.05	644.83
1985	111.2	188.7		564.88	596.88
1986	114.1	180.2		280.30	288.65
1987	117.5			320.83	320.83
1988					

- (1) GNP DEFLATOR 1982 = 100 662.1975
- (2) WORLD PRODUCTION IN 1000 METRIC TONS. 14833.22 \$/MET TON  
AND U.S. PRODUCTION REPORTED. 9270.765 LS/MET TON
- (3) PRICE IS NEW YORK, EX DUCK, IN CENTS PER POUND

RESOURCE: ZINC

SMELTER

YEAR	WORLD PROD (1)	US PROD (2)	US MINE PROD (2)	PRICE (3) DEFLATOR	(4) GNP DEFLATOR	PRICE 1987 \$
1964	3634.8	851.9	513.3	13.57	32.9	48.46
1965	3886.6	887.9	545.7	14.50	33.8	50.41
1966	4016.1	915.2	511.3	14.50	35.0	48.68
1967	4060.7	838.2	490.5	13.85	35.9	45.33
1968	4554.5	911.6	472.7	13.50	37.7	42.08
1969	4894.6	929.5	493.8	14.65	39.8	43.25
1970	4750.9	783.8	476.9	15.32	42.0	42.86
1971	4688.8	683.3	448.7	16.14	44.4	42.71
1972	5050.0	565.4	427.1	17.73	46.5	44.80
1973	5277.3	521.0	427.6	20.84	49.5	49.47
1974	5520.5	495.7	446.3	35.94	54.0	78.20
1975	4933.9	851.9	380.2	38.89	59.3	77.06
1976	5675.0	887.9	439.5	37.38	63.1	69.61
1977	5812.0	915.2	407.9	35.21	67.3	61.47
1978	5882.0	838.2	302.7	31.30	72.2	50.94
1979	6260.0	911.6	267.3	37.74	78.6	56.42
1980	6049.0	929.5	317.1	38.03	85.7	52.14
1981	6081.0	783.8	312.4	45.45	94.0	56.81
1982	5894.0	683.3	303.2	39.95	100.0	46.94
1983	6249.0	565.4	275.3	43.02	103.9	48.63
1984	6526.0	521.0	252.8	49.75	107.7	54.28
1985	6844.0	495.7	226.5	42.49	111.2	44.90
1986	6784.0	851.9	203.0	40.79	114.1	42.01
1987				44.36	117.5	44.36
1988						

51.74 1159.043 \$/METRIC TON  
724.4024 LS/METRIC TON

- (1) PRODUCTION DATA IN THOUSAND METRIC TONS, SMELTERS, PRIMARY AND SECONDARY OUTPUT
- (2) U.S. MINE PRODUCTION OF RECOVERABLE ZINC, THOUSAND METRIC TONS
- (3) PRICE IS CENTS PER POUND FOR DELIVERED (US) PRIME WESTERN SLAB, BEFORE 1971 PRICE IS DELIVERED TO E. ST. LOUIS
- (4) GNP DEFLATOR 1982 = 100

RESOURCE: GOLD

YEAR	(1) GNP DEFLAT PROD (2)	WORLD PROD (2)	US PROD (3)	PRICE (3)	PRICE 1987 \$
1964	32.9	45250.0	1456.0		
1965	33.8	46700.0	1705.0		
1966	35.0	46580.0	1803.0		
1967	35.9	45737.0	1584.0		
1968	37.7	46165.0	1478.0	39.26	122.36
1969	39.8	46612.0	1733.0	41.51	122.55
1970	42.0	47522.0	1743.0	36.41	101.86
1971	44.4	46495.0	1495.0	41.25	109.16
1972	46.5	46843.0	1450.0	58.60	148.08
1973	49.5	43297.0	1176.0	97.61	232.18
1974	54.0	40124.0	1127.0	161.08	350.50
1975	59.3	38476.0	1052.0	161.49	319.98
1976	63.1	39024.0	1048.0	125.32	233.36
1977	67.3	38906.0	1100.0	148.31	258.94
1978	72.2	39057.0	999.0	193.55	314.99
1979	76.6	38830.0	964.0	307.59	459.82
1980	85.7	39179.0	970.0	612.51	839.79
1981	94.0	41257.0	1379.0	459.61	574.51
1982	100.0	43083.0	1466.0	375.94	441.73
1983	103.9	44882.0	1957.0	423.83	479.31
1984	107.7	46475.0	2085.0	360.23	393.01
1985	111.2	46673.0	2427.0	317.31	335.29
1986	114.1	50937.0	3733.0	367.10	378.04
1987	117.5		4000.0	445.85	445.85
1988					

333.0648 (4)

(1) GNP DEFLATOR 1982 = 100

(2) WORLD AND U.S. PRODUCTION IN THOUSAND TROY OUNCES

(3) PRICES IN DOLLARS PER TROY OUNCE

(4) A MORE REPRESENTATIVE AVERAGE IS PROBABLY REFLECTED BY THE PERIOD STARTING ABOUT 1977, BASED ON THIS PERIOD THE AVERAGE IS \$416.08 IN 1987 DOLLARS.

RESOURCE: SILVER

YEAR	(1) GNP DEFLAT PROD (2)	WORLD PROD	US PROD	PRICE (3)	PRICE 1987 \$
1964	32.9	248.50	36.33	129.30	461.79
1965	33.8	257.40	39.81	129.30	449.49
1966	35.0	266.70	43.67	129.30	434.08
1967	35.9	258.20	32.12	155.00	507.31
1968	37.7	275.30	32.73	214.50	668.53
1969	39.8	295.70	41.91	179.10	528.75
1970	42.0	301.00	45.01	177.10	495.46
1971	44.4	294.70	41.56	154.60	409.13
1972	46.5	301.50	37.23	168.50	425.78
1973	49.5	307.90	37.83	256.00	607.68
1974	54.0	292.20	33.76	470.80	1024.43
1975	59.3	303.00	37.94	442.00	875.80
1976	63.1	316.40	34.33	435.40	810.77
1977	67.3	331.30	38.17	462.30	807.14
1978	72.2	345.00	39.39	540.00	878.81
1979	78.6	348.10	37.90	1109.00	1657.86
1980	85.7	342.80	32.33	2063.30	2828.91
1981	94.0	361.60	40.68	1048.10	1310.13
1982	100.0	371.20	40.25	795.00	934.13
1983	103.9	386.50	43.43	1143.90	1293.63
1984	107.7	412.10	44.59	814.10	888.18
1985	111.2	421.00	39.43	614.20	649.00
1986	114.1	419.80	34.22	547.00	563.30
1987	117.5		37.00	700.90	700.90
1988					

842.1234 (4)

- (1) GNP DEFLATOR 1982 = 100
- (2) WORLD AND U.S. PRODUCTION IN MILLION TROY OUNCES
- (3) PRICE IS NEW YORK, CENTS PER TROY OUNCE
- (4) EXCLUDING 1979 AND 1980 FROM THE AVERAGE RESULTS IN AN AVERAGE OF 714.74, AND IS PROBABLY MORE REPRESENTATIVE.