AURUN MINES LTD. 589-5000
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SURREY, B.C. V3R 1R1

MEMO TO: W.L. Brown May 30, 1974.

FROM: J.E. Kraft

823848

SUBJECT: Harper Creek - Sensitivity Analysis

REFERENCE:

At a recent meeting with Messrs. Furman Burge and Herman Fergusson of U.S. Steel, yourself, Dave Lowrie and myself, it was decided that a complete sensitivity analysis should be conducted on the Harper Creek basic case (11.65% R of R). Accordingly, 25 independent runs have been made and are reported herewith.

SUMMARY & CONCLUSIONS:

As might be expected, the project rate of return is most sensitive to those parameters directly concerned with copper revenue, i.e. recovery, price and grade. The rate of return is less sensitive to changes to the capital and operating costs and, although it is sensitive to the inclusion of gold, silver and molybdenum revenue, it is relatively insensitive to the price or recovery of these metals.

It must be noted that all of the cases examined have made no allowance for the detrimental effect of the Proposed B.C. Bill 31 which could reduce the rate of return up to 3 percentage points.

It would appear that a viable operation will not be possible at Harper Creek unless several parameters are determined to be more attractive than those estimated for this study.

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For example if copper recovery is say 88%, operation costs are 5% less than estimated and depreciable asset costs are 10% less than estimated, the rate of return would be 15.86%.

As previously reported, there is a discrepancy in mill feed grade as calculated b y the computer and by long-hand methods. This discrepancy which amounts to about a 10% variance is currently being investigated. If the results of the investigationtion are favourable to the computer, no further work is recommended at this time. However, if the investigation favours the long-hand calculation, then the basic rate of return would be about 15.5% as opposed to 11.6% and further work would be warranted on operating and capital cost estimates.

Case	Alteration to Basic	R of R %	P.V. @ 15%	P.V. Differential	Relative Change
Basic		11.65	-4,356,840	-	
2	Copper grade +5%	13.63	-1,805,579	+ 2,551,261	+ 59%
3	Copper grade +10%	15.55	+ 739,273	+ 5,096,113	+117%
4	Copper recovery @ +5%	14.03	-1,278,957	+ 3,077,883	+ 71%
5	Copper recovery @ -5%	9.32	-7,282,662	- 2,925,822	- 67%
6	Copper N.S.R.@ +5¢	15.16	+ 216,075	+ 4,572,915	+105%
7	Copper N.S.R.@ -5¢	7.92	-8,965,678	- 4,608,838	-106%
8	Excluding gold	10.48	-5,830,161	- 1,473,321	- 34%
9	Excluding silver	10.27	-6,100,880	- 1,744,040	- 40%
10	Excluding moly	10.38	-5,965,524	- 1,608,684	- 37%
11	Gold @ $175/oz.	11.82	-4,129,289	+ 227,551	+ 5%
12	Gold @ $125/oz.	11.39	-4,675,412	- 318,572	- 7%
13	Silver @ $5/oz.	11.82	-4,129,289	+ 227,551	+ 5%
14	Silver @ $4/oz.	11.47	-4,584,392	- 227,552	- 5%
15	Moly @ $2.00	11.75	-4,228,942	+ 127,898	+ 3%
16	Moly @ $1.80	11.54	-4,484,738	- 127,898	- 3%
17	Moly recovery @ 35%	11.97	-3,952,201	+ 404,639	+ 9%
18	Moly recovery @ 25%	11.32	-4,761,850	- 405,010	- 9%
19	Oper. costs @ +10%	8.57	-8,198,274	- 3,841,434	- 88%
20	Oper. costs @ -10%	14.33	- 886,228	+ 3,470,612	+ 80%
21	Escalation @ 7.5%	6.83	-8,539,754	- 4,182,914	- 96%
22	Escalation @ 10.0%	<0.00	-15,473,057	-11,116,217	-255%
23	Tangible Assets +10%	10.27	-6,682,259	- 2,325,419	- 53%
24	Tangible Assets -10%	13.10	-2,268,670	+ 2,088,170	+ 48%
25	Annual Cap.Exp.+10%	11.58	-4,436,044	- 79,204	- 2%
26	Annual Cap.Exp.-10%	11.70	-4,284,835	+ 72,005	+ 2%
27	Combination of 4,6,20,24	15.86			

BASIC PARAMETERS

Production Schedule

Year	MATERIAL MILLED 100's Ore	% Cu	S.P.	% Cu	Year O.B.	Waste S.P.
			pre-production			
1973					1,760	-
1974					1,300	1,000
1975					1,300	1,000
			production			
1976	5,700	.459	-			12,100
1977	5,700	.427	-			12,100
8	5,450	.413	250	.228		12,100
9	5,700	.402	-		1,389.5	7,583
1980	5,675	.387	25	.228	1,389.5	7,083
1	5,700	.348	-			12,100
2	5,700	.348	-			12,100
3	5,700	.385	-			12,100
4	5,683	.348	17	.227		12,100
5	5,608	.365	92	.227		12,100
6	5,700	.380	-			12,100
7	5,700	.353	-			6,710
8	5,700	.385	-			2,050
9	5,700	.404	-			-
1990	3,791	.429	750	.227		-
Totals	83,207	.388	1,134	.227	7,139	134,325

Tons direct mill feed @ 0.388% Cu & 0.016% Mo	83,207,000	tons
Tons stockpile feed @ 0.277% Cu & 0.010% Mo	1,134,000	
Total tons treated 0.386% Cu & 0.0159% Mo	84,314,000	tons
Total waste stripped	133,192,000	tons
Total stockpile stripped	1,134,000	
Total rock stripped	134,326,000	tons
Total overburden stripped	7,139,000	yards
Copper recovery	85%	
Molybdenum recovery	30%	
Gold @ 0.09 ounces per ton concentrate		
Silver @ 2.85 " " " "		
Copper market	$0.75/lbs	
Copper toll	0.19	
N.S.R. Copper	$0.56/lbs[1]	
N.S.R. Molybdenum	$1.90/lb[2]	
Gold	150.00/oz[3]	
Silver	4.50/oz[4]	
Operating cost per ton ore	$1.43	
per ton waste	0.28	
per ton stockpile pick-up	0.15	
per yard of overburden	1.00	
Preproduction expenses year 1	$1,800,000	
2	1,800,000	
3	1,700,000	
	$5,300,000	

Tangible Asset costs year 1		$ -
	2	17,400,000
	3	26,100,000
		$43,500,000
Working Capital Costs year 1		500,000
	2	500,000
	3	1,650,000
		$ 2,650,000
Working Capital recovery year 18		2,655,000
Ongoing capital expenditure per year		300,000

Provincial tax calculation
example year 1979

Operating profit		$10,831,816
less: capital cost allowance @ 100% initial total major capital expenditures	$43,500,000	
Taken 1976-1978 as required*	41,879,980	
remaining		1,620,020
		$ 9,211,796
less: preproduction expenses		5,300,000
		$ 3,911,796
less: capital cost allowance of ongoing capital at 30% declining balance @ 30% on $1,200,000 to date =		360,000
		$ 3,551,796
less: processing allowance @ 15% of income before processing allow.		532,769**
Equals taxable income		$ 3,019,027
Tax @ 15% =		$ 452,854

* to a maximum of 8% of milling assets or $1,426,000

**as required to = profit.

Federal Income Tax calculation

example year 1979

Operating profit	$10,831,816
less: capital cost allowance	
43,500,000 -41,879,980	1,620,021
	$ 9,211,795
less: 30% D.B. on ongoing expend.	360,000
	$ 8,851,795
less: pre-production expend.	5,300,000
	$ 3,551,795
less: depletion - equal to 1/3 of pre-production and major capital expenditures excluding ongoing capital and limited to 1/3 of income before depletion in any given year. 1/3 of 43,500,000 + 5,300,000 = 16,266,667	
maximum for 1979 = 3,551,795/3 =	$ 1,183,932
Taxable income	$ 2,367,863
Tax @ 37%	$ 876,109

Note 1

1 s.d.t. concentrate @ 26% copper contains			520.0 lbs. Cu.
Transit loss @ 0.75% =			3.9 " "
Smelter deduction @ 1.2 units =			24.0 " "
Accountable copper =			492.1 lbs. Cu.
492.1 lbs. Copper @ 75¢ per lb. =			$369.08
less: Rail $8.50/SWT x 1.06 =		$ 9.01	
Handling $2.50/SWT x 1.06 =		2.65	
Ocean freight $10/LWT x 1.06 x .8928 =		9.46	
Smelting $30/dmt x .907		27.21	
Refining $0.06/lb x 492.1 =		29.53	
Representation, etc. $1/swt x1.06=	1.06		78.92
Net value per ton of concentrate			$290.16

Net value per lb. of copper contained in concentrate = $\frac{290.16}{520} = 0.56$

Market price	$ .75
N.S.R.	.56
Toll	$ .19

Note 2

Market for molybdenum metal	$1.92/lb
Handling & representation	.02
N.S.R.	$1.90/lb

Note 3

Gold contained in concentrate	0.09	ounces/ton
Value @ $150/ounce	$13.50	per ton conc.
less smelter payment at .03 oz/ton conc.	4.50	
Net value of gold	$ 9.00	per ton conc.
or $9/520 lbs. copper contained =	$0.017	per lb. of copper contained in concentrate.

Note 4

Silver contained in concentrate	2.85	ounces/ton
Value @ $4.50/ounce	$12.83	per ton conc.
less smelter payment 0.5 oz/ton conc.	2.25	
Net value of silver	$10.58	per ton conc.
or $10.58/520 lbs. copper contained =	$0.020	per lb. of copper contained in concentrate.