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BACON & CROWHURST
CONSULTING ENGINEERS

PRELIMINARY REPORT
PRIVATE & CONFIDENTIAL

April 14th, 1968.

The President & Directors,
Utica Mines Ltd.,
510 West Hastings St.,
Vancouver, 2, B.C.

Dear Sirs:

Pursuant to your request, as expressed to me by Mr. Albert Koffman, Director, on behalf of the Board, I visited your property at Keremeos, B.C., on the 9th and 10th of April, 1968, and submit a preliminary report herewith.

The terms of reference were essentially as follows. I was asked to inspect the property generally, and in particular to examine and make recommendations regarding mining methods, with emphasis on dilution and daily rate of production, determine whether proper security is being applied to concentrate handling, investigate staff and employee moral, examine mill recovery figures, and look into assaying procedures.

My immediate recommendations are as follows:

(1) Staff - Mr. Steve Radvak, and his present staff, should be retained as is, subject to other recommendations following. Morale is reasonably good, and I believe that the work on the job has been carried out quite well under the usual trying circumstances that always accompany the start of production at a new mine.

A mine superintendent, preferably a mining engineer with practical experience, should be hired immediately to supervise mining procedures, and in particular the daily decisions now being made by Arnold Zelmer, the mine foreman. The mine superintendent would also serve as an assistant manager in Mr. Radvak's absence. In my opinion (which admittedly represents a snap judgment), Mr. Livgard, who has filled in for this latter duty, is not experienced enough for this responsibility.

One or two men should be selected from the present underground crew to act as junior shift bosses, and to provide much stricter and closer supervision over the stope crews, in particular. The mine is already spread out so far that it is physically impossible for a foreman or a shift boss to visit working places more than once per day effectively, even if the work is split up. On night shift, for example, one shift boss is expected to cover 17 stope working faces. As a result, and particularly since miners are paid on feet of advance under the present bonus system, stoping is producing far too much dilution from waste rock surrounding the valuable parts of the veins.

Under this arrangement, by adding three more supervisors, Mr. Egil Livgard will be able to devote his whole time to geological and engineering work, and to a thorough investigation of sampling practices together with correlation of results therefrom. In addition, more of his time would be available for examining and directing exploration work. A decision concerning more geological staff should be deferred until the above changes are made.

(2) Rate of Production, Dilution & Ore Grade

The concentrator is capable of treating an average of 450 tons per day, and maintaining the present 90% recovery of precious metals. This should be the target, to be achieved by successive steps as soon as possible, representing an increase from the present 375 tons per day.

Sufficient ore has now been mined to show conclusively that an average of 13 or 14 ounces of silver per ton of ore as mined will be produced if more attention is paid to grade control, and dilution. Hindsight is always easy, but it would appear that the parts of the veins which were exposed in the old stopes, and along the exploration drifts, show quite plainly that the veins pinch and swell frequently, are displaced often up to two or three feet by faulting, and split into two or three pay-streaks separated by two or three feet of waste rock. This is displayed throughout all the stoping to date, as may have been expected, and presents a constant mining problem.

Under these circumstances, and adding the effect of stope heights up to 8.0 feet in places, grade of ore mined is of course much lower than the values obtained by sampling across the veins themselves. I was informed that the average of the spot heights as recorded by the survey crew during February amounted to 6.0 feet. I am quite sure that the current average is over 7.0 feet. Correct and adequate supervision, coupled with proper rock-bolting practice, should correct this. Not less than 6.0 feet average will however result, because present day miners will resist vigorously working in headings that are less than five feet high.

Figures supplied by Mr. Livgard regarding the estimated mine production, and by Mr. Eakins regarding the estimated mill production, are as follows for the period October 1967 to February 1968 inclusive.

MINE

Source	Tons Delivered to mill	Grade - Ozs. Ag per ton	Ozs. Ag
Stope faces	25,426	15.8	402,100
Stope preparation	11,709	10.9	128,100
Sub Total	37,135	14.3	530,200
Exploration	4,257	4.9	20,706
Sub Total	41,392	13.3	550,906
"Slide"	3,426	3.6	12,234
To Mill	44,818	12.6	563,140

MILL

Figures quoted are after monthly adjustment to estimated concentrate production.

Tons Delivered	Grade - Ozs. Ag per ton	Ozs. Ag
46,680	11.2	522,389

Average mill recovery - 90.7%

Ounces silver produced - 473,800

Average tons treated per day currently - 375

Mill capacity - 450 tons per day (G. Eakins)

COMMENTS

(1) Mr. Livgard did not always adjust his figures to those quoted by Mr. Eakins. In addition, my figures are probably not strictly correct, regarding tonnages, due no doubt to inventory in the supply system.

(2) Mr. Livgard is obtaining his average assays from sampling stope faces on a regular basis, mine car samples, and occasional (two or three times a month) sampling of "slide" material. Rounds from exploration faces are sampled, but results are not obtained in time to permit accurate selection re an ore or waste decision.

(3) Mr. Eakins is estimating the weight of daily concentrate produced by using silver assays and the usual formula. Theoretically this should give the correct figure, but in practice an adjustment of minus 15% should always be applied. This is determined by experience, but this adjustment corresponds for example to that being used by Highland Bell. Small and reasonable errors in assaying plus the natural tendency for heads to be maximized and tailings to be minimized will produce this sort of an error.

Final concentrate results as obtained from Cominco should be promptly returned to Mr. Radvak, at least in terms of weights and assays and penalties, in order that proper estimating, record keeping, and determination of mill procedures can be achieved. Mr. Eakins figures regarding estimated production are based on his samples and assays as taken at the mine. The samples taken by Cominco, on which payment is based, should be sent to the mine, even if checked elsewhere.

A comparison of the two sets of assay results on mine and smelter samples, however, for bulk concentrates to date, shows a difference of 6.8%, the mine results being higher than the smelter. This is obtained by averaging 17 lot assays, after discarding 3 erratic results.

A similar comparison for 9 jig concentrate assays shows an average of 803.6 against 804.2 ounces per ton between Cominco and Utica, and for a further 5 assays between Okanagan Falls and Utica, a comparison of 827.4 against 830.2 ounces per ton.

These assays are on different samples for the same lots, and individually vary considerably. These also represent arithmetic averages and should be calculated on a weighted basis.

Jig concentrates are notoriously difficult to sample. Either Mr. Radvak or Mr. Eakins, or preferably both, should visit the smelter at Trail, and discuss sampling methods. If a representative is not already employed to watch Cominco sampling on a steady basis, this should be done.

(4) A rough estimate regarding the extra revenue vs. the extra costs incurred by milling the exploration and "slide" material, shows that about $21,000 profit resulted from the exploration ore and $5,000 profit from the "slide" ore during the five months under review, or about $5,000 per month average.

The assay results of the "slide" ore are suspect, however, since they have been taken too infrequently.

(5) After adjusting Mr. Livgard's results to those of Mr. Eakins, an average grade of $\frac{13.3 \times 522{,}389}{563{,}140}$ or 12.3 ounces of silver per ton of ore resulted from the combination of stope faces and stope preparations, during the period under review.

(6) It is recommended that the present 17 working faces in the stopes be increased to 25 as soon as the necessary men and equipment can be secured. Exploration and stockpiled ore representing lower grade material should not displace higher grade stope ore, particularly during the initial 3 year tax free period, but should be kept for later treatment. The mill should be run at capacity, with grade of ore as high as possible.

The production and operating profit projected as commencing three months from now is as follows:

	Tons of ore	Grade-ozs/ton	Ozs. Ag
Stope faces	9,000	14.0	126,000
Stope preparation	4,000	10.0	40,000
Total - feed to mill	13,000	12.77	166,000

Ounces recovered at 90% recovery - 149,400

Monthly revenue - 149,400 @ net of $1.90/ounce	$284,000
Monthly operating costs	144,000
Operating profit - monthly	$140,000

Mr. Livgard's figures show currently a total of 110,000 tons with an average grade of 15.1% in the proven and measured category. This represents about another 9 months after considering the proposed increase, in daily tonnage rate.

Exploration and development should be vigorously pursued therefore to transfer some of the inferred ore reserves into the proven and measured reserves on a continuous basis.

I did not investigate in detail the factors concerning rate of exploration and development, during my visit, neither did I check very closely Mr. Livgard's calculations.

I believe however that, subject to more and stricter ore grade control by the recommended supervision, that the above figures can be attained.

Mining Method

The present room-and-pillar method is the correct one. The ore sections mined so far contain too many sheared and friable sections to permit any successful re-SUing method, such as undermining the ore by first taking the waste, and then subsequently blasting the ore separately, or vice versa.

The hanging wall rock overlying the ore is weak, and requires support in many instances. Narrow initial openings of the order of 6 to 7 feet wide, 5 to 7 feet high, with at least one line of rock bolts down the centre of an arched back (to be placed at all times) will help control dilution.

Stope layouts should be made by the mine geologist working in close cooperation with the mine superintendent. The present practice of sampling and marking pillars with numbers is good, and should be continued conscientiously. No blasting should be completed unless first inspected by one of the supervisors.

Security

I believe that the discrepancies in estimates of concentrate production and actual production results from normal operating errors, as outlined previously under my remarks concerning production, rather than from any possibilities of theft.

Two watchmen are on shift almost continuously, and a collaboration would have to be arranged between the mill operators, the mill helpers and the watchmen for any sizeable amount of concentrate to be stolen. This is extremely unlikely. In addition, to the best of my knowledge, Mr. Eakins' reputation is good. Mr. Eakins also hired operators who were previously known to him.

The jig hutch products are removed on an average of twice per shift, and are immediately weighed, before being placed in the container for shipment to Trail. A comparison of these shift weights and the weight received by the smelter should disclose any irregularities.

Number of Employees

On the whole, I think that Mr. Radvak does not have too many men on the mine payroll. It is always easy to challenge particular categories during a visit, but usually the mine manager has a reason. I would question the use of two men on shift in the concentrator, but the security checks mentioned above partly justify this arrangement. The payroll shows eight men as operators and helpers, due to continuous operation, and the need for a swing shift.

Four men are listed under "Crusher", but in reality one of these is now a flotation operator, and another man is a mechanic and is used elsewhere.

I am informed by the assayer that two men are required in the bucking room to prepare samples because atomic absorption requires extremely fine "mulling" for accurate results with this type of ore. I am not familiar enough with the method to pass criticism. The assayer would prefer a change to fire assaying, but I would not recommend this change at present.

Since the mine is spread out up a steep hillside and three levels are involved, a relatively large number of vehicles are involved. I think that with proper programming this could be altered, with probable reduction in maintenance requirements.

I would expect the proposed mine superintendent to assist Mr. Radvak with some of these problems, even if only by freeing him from constant pressure concerning underground problems.

Respectfully submitted,

BACON and CROWHURST

J.J. Crowhurst

J.J. Crowhurst

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TABLE #1

ATTEMPTED RECONCILIATION - Ag IN HEADS, RECOVERY & PRODUCTION

Month	Head Assay from Ball Mill Belt Sample	Production Estimated from Daily Calculation			Production Estimate Adjusted Monthly to Mill Shipments			Head Assay Calc. from Shipments plus Tails	Recovery Using "Shipment" Heads
		Jig Conc.	Bulk Conc.	Total	Jig Conc.	Bulk Conc.	Total		
Sept. 67	?	Not Calculated			14,600	79,700	94,300	14.5	89.5%
Oct. 67*	13.2	20,300	87,500	107,800	18,900	76,600	95,500	12.8	92.4
Nov. 67	13.8 (approx.)	16,200	99,200	115,400	13,400	88,600	102,000	12.8	90.2
Dec. 67	13.8	14,900	93,200	108,100	17,800	73,000	90,800	11.8	91.0
Jan. 68	12.8	15,300	107,400	122,700	11,200	91,200	102,400	10.9	90.2
Feb. 68	9.5	11,400	83,100	94,500	13,200	69,900	83,100	8.5	89.7
Mar. 68	10.8	21,000	95,000	116,000	20,800	81,400	102,200	10.0	89.4
Period Oct. to Feb. inc.				548,500			473,800		

* Conveyor Ball Mill Belt Scale Trouble

Note - Above figures are from Mill daily assay sheets and reconciliation made monthly by Mr. Eakins, after weighing and shipping concentrates from each month's production.

TABLE #2

Cominco's Sample Taken at Smelter		Utica's sample corresponding lot - taken at mine		Difference Cominco Assay Minus Utica Assay Ozs. Ag per ton
Lot No.	Assay Ozs. Ag per ton	Lot No.	Assay Ozs. Ag per ton	
377030	290.4	43 & 44B	281.3	- 9.1
377061	271.2	45 & 46B	271.6	+ 0.4
377608	242.5	47 & 48B	242.3	- 0.2
377133	222.2	49 & 50B	230.1	+ 7.9
377041	227.5	51 & 52B	218.9	+ 1.4
377152	244.2	53 & 54B	248.7	+ 4.5
377136	284.6	55 & 56B	278.7	- 4.1
377673	266.7	57 & 58B	272.7	+ 6.0
377164	274.7	59 & 60B	280.0	+ 5.3
377090	246.9	61 & 62B	254.4	+ 7.5
377092	-	63 & 64B	239.6	?
377023	274.8	65 & 66B	276.2	+ 1.4
377137	239.8	67 & 68B	256.8	+17.0
377124	264.6	69 & 70B	285.0	+20.4
377120	235.6	72 & 73B	232.8	- 2.8
377088	244.0	74 & 75B	233.8	-10.2
337230	243.7	76 & 77B	249.0	+ 5.3

Table #2 - cont'd.

Cominco's Sample Taken at Smelter		Utica's Sample corresponding lot - taken at mine		Difference Cominco Assay minus Utica Assay Ozs. Ag per ton
Lot No.	Assay Ozs. Ag per ton	Lot No.	Assay Ozs. Ag per ton	
377037	229.8	78 & 79B	225.9	- 3.9
377147	200.6	80 & 81B	202.7	+ 2.1
377167	212.4	90 & 91B	207.2	- 5.2
TOTALS	3967.8		4212.1	(ignoring Cominco Lots #377137 and 377124 as erratics)

(1) DIFFERENCE -

$$\begin{array}{r} 4212.1 \\ -3967.8 \\ \hline 244.3 \end{array}$$

(2) $\frac{244.3}{4212} = 5.8\%$

(3) $\frac{2443}{3968} = 6.2\%$

TABLE #3

JIG CONCENTRATE ASSAYS - OZS. Ag/TON OF CONCENTRATE

Lot	Cominco	Utica	Okanagan Falls
10J	1371.7		
11J	1099.0	936.7	
12J	709.1	676.2	
13J	812.9	839.0	
14J	730.1	460.7	
15J	452.4	590.4	
16J	576.6	508.7	
17J	972.6	1595.7	1257.5
18J	1318.0	1032.6	1013.2
19J	561.3	597.9	
20J			569.6
21J		705.7	697.6
22J		297.3	367.4
23J		1026.9	1022.2
24J		1339.5	1282.7
25J		781.4	766.9
26J			791.8
27J			913.4

Table #3 - cont'd.

	Average Assays - Ozs. Ag		
	Okanagan Falls	Cominco	Utica
(1) Lots Nos. 11J to 19J incl.		$\frac{7232.0}{9} = 803.6$	$\frac{7237.9}{9} = 804.2$
(2) Lots Nos. 21J to 25J inc.	$\frac{4136.8}{5} = 827.4$		$\frac{4150.8}{5} = 830.2$

TABLE #4

POSSIBLE ERROR DAILY CONCENTRATE WEIGHT CALCULATION

An analysis of possible errors in calculated daily tonnage of concentrate by differences in head and tailing assays shows the following would result, as based on treatment of 11,000 tons per month:

		Classifier O'flow i.e. Heads after Jig Concentrate	Bulk Concentrate (Ozs. Ag/ton)	Tails (Ozs. Ag/ton)	Tons of Conc. as calc.	Diff. in Weight Tons Conc. from #1	Ozs. Ag per month-loss
Assume:	1	9.5	220	1.2	418	-	-
	2	8.5	220	1.2	367	51	11,400
	3	8.0	220	1.2	342	76	16,700
	4	8.84	204.5	1.12	418	-	-
	5	8.84	220	1.2	385	33	7,250
	6	8.84	220	1.4	374	44	9,700

Note - #1 example is assumed as showing true assays.
#2 example shows effect, if head sample, by reason of sampling or assaying, or both, drops to 8.5 ozs. from the assumed assay.
#3 shows similar effect for 8.0 ozs.
#4 shows effect (nil) if all assays are lower by 7% from the true value.
#5 shows effect if head assay alone is lower by 7% from the true value.
#6 shows effect if head assay is lower by 7% and the tail assay higher by 0.2 ozs./ton

TABLE #5

SOURCE OF ORE

(67-68)	Stope Faces			Stope Preparation			Total			Exploration			Total			"Slide"		
Month	Tons	Grade	Ozs.Ag	Tons	Grade	Ozs.Ag	Tons	Grade	Ozs.Ag	Tons	Grade	Ozs.Ag	Tons	Grade	Ozs.Ag	Tons	Grade	Ozs.Ag
Oct.	2781	18.2	50,500	3359	12.3	41,400	6140	15.0	91,900	1143	4.9	5601	7283		97,501	660	4.2	2772
Nov.	4367	15.3	66,800	2419	12.4	30,000	6786	14.3	96,800	380	4.2	1596	7166		98,396	144	5.0	720
Dec.	5562	17.4	96,800	1894	14.0	26,500	7456	16.5	123,300	526	5.2	2735	7982		126,035	912	2.2	2006
Jan.	6776	14.7	99,500	1019	7.7	7,850	7795	13.8	107,350	1764	5.0	8820	9559		116,170	344	3.3	1135
Feb.	5940	14.9	88,500	3018	7.4	22,350	8958	12.4	110,850	444	4.4	1954	9402		112,804	1366	4.1	5601
	25,426	15.8	402,100	11,709	10.9	128,100	37,135	14.3	530,200	4257	4.86	20,706	41,392	13.31	550,906	3426	3.57	12,234

	TOTALS		
	Tons	Grade	Ozs.Ag
Oct.	7943	12.6	100,273
Nov.	7310	13.6	99,116
Dec.	8894	14.4	128,041
Jan.	9903	11.8	117,305
Feb.	10768	11.0	118,405
	44,818	12.56	563,140

Notes -

(1) Table compiled from information submitted by Mr. Livgard from his month-end reports. The tonnages and grades are reportedly adjusted to conform with the mill ball mill belt sample figures.

(2) Mill figures - Oct. to Feb. incl. 548,500 ozs. Ag from daily calculation and 473,800 ozs. Ag after monthly reconciliation.

(3) $\frac{548,500}{563,140} = 97.4\%$

(4) $\frac{473,800}{563,140} = 84.14\%$