APPENDIX III

METALLURGICAL REPORTS, LADNER CREEK PROJECT
IDAHO ZONES AND TAILINGS

STATUS REPORTS, SMELTER RETURNS & SALE OF CONCENTRATES, REPROCESSING OF TAILINGS, MISCELLANEOUS REPORTS, AND REMAINING METALLURGICAL TESTWORK FOR FINAL FEASIBILITY

By MELIS ENGINEERING LTD.

SEPTEMBER 21, 1995 TO APRIL 23, 1996

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FAXED →

September 21, 1995

Athabaska Gold Resources Ltd.
1200 - 1185 West Georgia St.
Vancouver BC V6E 4E6

MELIS Project No. 319

By Fax (604)684-4601

Attention: Mr. J.S. Kermeen, P.Eng.

Dear Mr. Kermeen:

Re: Ladner Creek Gold Mine - Proposed Metallurgical Test Program

INTRODUCTION

Detailed below is a proposed metallurgical test program for the Ladner Creek gold mine which is aimed at identifying acceptable operating conditions for the Ladner Creek Mill and determining attainable gold recoveries using various processing options. The program described will establish the most suitable process design criteria to be used for the feasibility study on reactivation of the Ladner Creek Gold Mine.

The testwork will be completed at Lakefield Research in Lakefield, Ontario under the direct supervision of Melis Engineering Ltd. Mr. Ed Thornton, Milling Consultant, will act in an advisory capacity in the course of the test program. Status reports will be issued on a regular basis during the testwork to keep Athabaska Gold Resources Ltd. (Athabaska) abreast of results and current with the direction of testwork.

Metallurgical testwork, to be carried out on representative test samples of Ladner Creek mineralization and on a sample of existing tailings, will include investigations of gold recovery by gravity, flotation and/or cyanidation. Batch and lock-cycle testing will be carried out on a blended overall mine composite followed by confirmation and variability testing on composites from different areas of the mineralization. If pertinent to the selected process, cyanide destruction testwork using the Inco SO_2/air destruction process will be completed on tailings generated from the testwork. The test program will also include the generation of environmental data as required for regulatory approval of operating permits.

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519 45TH STREET WEST, SASKATOON, SASKATCHEWAN, CANADA S7L 5Z9 (306) 652-4084 FAX: (306) 653-3779

TEST SAMPLES

From discussions with J.T. (Jo) Schearer, P.Geo., samples from underground workings will be obtained by drilling 2' holes in working faces (or in pillars) to blast a small amount of broken rock for sample collection. Samples from target deposits will be collected as half drill core from exploration and delineation drill holes. The collection of samples from underground will be done in such a way as to ensure a representative sample is taken from each stope and that only fresh broken rock is sampled. Drill core samples are to be collected on a weighted basis, representative of mineralization intersection.

A blended tailings sample will also need to be taken from different areas of the existing tailings pond by drilling, once the overlying water has been removed.

The following samples are expected to be supplied for testing:

Ladner Creek Test Samples			
Zone	Stope No.	Description	Quantity (kg)
1	79 88	Underground Workings Underground Workings	200 200
2	68 71 72 73	Underground Workings Underground Workings Underground Workings Underground Workings	200 200 200 200
3	-	Target Deposit	200
McMaster	-	Target Deposit	200
North Side	-	Exploration Target	200
Tailings	-	Tailings Sample	200

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The preceding is our interpretation of sample selection. Final sample selection will need to be confirmed by Athabaska geologists.

COMPOSITE PREPARATION AND ANALYSIS

The individual samples received for testing will first be blended and crushed to 6 mesh (3.36 mm). A Zone 1 composite and Zone 2 composite will be made up by blending a portion of the individual stope samples in a ratio which reflects the mining plan. An overall blended mine composite will be prepared for initial testing by combining a portion of the Zone 1 and Zone 2 composites in a 55/45 ratio, since Zone 1 and Zone 2 make up 55% and 45% of current mine reserves (conversation with Jo Schearer, September 18, 1995).

The other test samples (Zone 3, McMaster, "North Side", and Tailings samples) will be kept as separate samples for testing as they become available.

Each individual sample will be analysed for Au, Ag, Cu, Pb, Zn, Ni, As, Fe, S and S^{2-}, as well as Ca, Mg, Al and Na to check on the relative gangue make-up in each sample. The overall blended mine composite will also be submitted to an ICP analysis and a whole rock analysis.

A rod mill and ball mill Bond Work Index test will be completed on the Zone 1 composite and the Zone 2 composite to check on the relative hardness of each composite.

METALLURGICAL TESTWORK

All initial testing will be completed on the blended mine composite to arrive at a suitable processing option for the Ladner Creek mineralization. Once suitable process conditions are established, confirmation tests will be completed on the individual composites to check on metallurgical variability in the deposit, if any.

Gravity Recovery

To determine the possibility of using gravity gold recovery, three gravity recovery tests will be completed using a table or Knelson Concentrator on samples of the blended mine composite ground to 40% minus 200 mesh (approximately minus 35 mesh), 60% minus 200 mesh and 80% minus 200 mesh.

Flotation

Batch Tests

Batch flotation tests will be completed on the blended mine composite to investigate the following:

- primary grind requirements,
- rougher/scavenger flotation time (kinetic tests),
- regrind requirements,
- concentrate upgrading,
- use of a slimes dispersant such as sodium silicate, sodium carbonate, CMC/WW82,
- different pH modifiers,
- pH levels required (natural pH versus alkaline pH),
- effect of copper sulphate activation, and
- desliming of rougher tails followed by scavenger flotation of sands.

Reagent combinations to be used as a starting point will include:

- $CuSO_4$ (copper sulphate) activator, PAX (potassium amyl xanthate) collector, Aerofloat 31 or Aerofloat 242 promoter and Pine Oil frother, and
- PAX collector, Aerofloat 208 promoter and MIBC frother.

The nature of gold losses to tails will be checked by screen analysis on tailings and gold assays of individual screen fractions.

Lock-cycle Tests

Once suitable flotation conditions are established one or two lock-cycle tests will be completed on the blended mine composite to check on metallurgical response under conditions approaching steady-state.

Variability Tests

A batch flotation test will be completed on each composite to check on metallurgical variability in the Ladner Creek mineralization. The batch test results for each individual composite will be compared against the batch and lock-cycle test results on the blended mine composite as a measure of expected results under conditions approaching steady-state.

Concentrate Analysis

The final concentrate produced in the lock-cycle test on the blended mine composite will be submitted for a detailed smelter-type analysis (Au, Ag, Pt, Pd, Cu, Pb, Zn, Fe, Ni, Co, As, Sb, Bi, Hg, SiO_2, CaO, MgO, Al_2O_3, S, F, and Cl). The concentrates produced from the batch tests on the individual composites will be submitted for Au and Ag analysis as well as other key elements identified from the detailed smelter analysis.

Cyanidation

Initial cyanidation tests will be completed on the blended mine composite to provide direction for cyanidation conditions required for flotation concentrate.

Mine Composite

The blended mine composite will be submitted to bottle roll cyanidation leach tests to investigate the following:

- primary grind requirements,
- pre-aeration at different pH levels, with and without lead nitrate,

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- free cyanide levels,
- leach time,
- two-stage leach with intermediate solution change,
- carbon-in-leach, and
- barren solution recycle (at 0%, 25%, 50%, 75% and 100%).

The pregnant solution in each test will be monitored for pH, O_2 and cyanide levels and assayed for reducing power, copper, ferric iron, CNS (thiocyanate) and CNO (cyanate). A metallurgical balance will be completed for both gold and silver in each test. Lime and sodium cyanide consumptions will be determined for the various leach conditions.

Flotation Concentrate

Flotation concentrate for cyanidation testing will be produced from the blended mine composite using 10 kg floats in a large flotation cell. A suitable quantity of concentrate will be prepared using the flotation conditions identified in the flotation testwork as described above.

It is anticipated that only a minimum number of concentrate leach tests will be required since cyanidation conditions will have been, for the most part, identified from the cyanidation tests on the blended mine composite. Regrinding of concentrate will be evaluated and the metallurgical response of concentrate to cyanidation will be measured.

Lock-Cycle Test

A 5-cycle cyanidation leach test will be completed on the blended mine composite using barren solution recycle. The metallurgical efficiency of each cycle will be determined. The pregnant solution from each cycle will be checked for O_2 content, reducing power, Cu, Fe^{3+}, CNS and CNO.

If necessary, the flotation concentrate produced from the blended mine composite will be submitted to a similar lock-cycle cyanidation test.

Variability Tests

Each individual composite will be submitted to a bottle roll cyanidation leach test to check on the variability of cyanide extraction of gold in the Ladner Creek mineralization. Metallurgical efficiencies and pregnant solution quality will be measured in each test.

If necessary, flotation concentrate produced from each individual composite will be submitted to a bottle roll cyanidation leach test.

Flocculation/Settling Tests

Flocculation tests will be completed on both the blended mine composite and flotation concentrate to identify a suitable flocculant for the Ladner Creek mill. Settling tests will be completed to confirm thickener sizing.

Cyanide Destruction Testing

Inco Exploration and Technical Services will complete cyanide destruction tests at Lakefield Research on barren solution generated in the cyanidation testwork on both blended mine composite and flotation concentrate. The effect of aging on washed cyanide leach residue will be simulated and any residual treatment requirements identified. The optimum conditions for the Inco SO_2/air cyanide destruction process will be determined.

Testing of Existing Tailings for Flotation Gold Recovery

The tailings sample from the existing tailings pond will be blended and submitted to a head assay of key elements. A screen analysis will also be done to check on gold distribution by size fraction.

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Batch flotation tests will be done on the tailings composite with and without regrinding using, as a starting point, the flotation conditions established from testing of the blended mine composite. Concentrate upgrading will also be evaluated. Once suitable flotation conditions are established, a lock-cycle test will be completed to check on metallurgical efficiencies under conditions approaching steady-state. The concentrate from the lock-cycle test will be submitted for a detailed smelter-type analysis.

ENVIRONMENTAL DATA

Environmental data will be generated as required for regulatory approval of operating permits using a representative sample of tailings produced from the selected process.

These data may include:

- acid generating potential tests on some or all of the following:
  - head samples
  - flotation tails,
  - concentrate leach residue,
  - a mixture of flotation tails and concentrate leach residue, and
  - residue from cyanidation of the blended mine composite.
- low level analysis of pertinent tailings solids,
- low level analysis of pertinent tailings supernatant,
- low level analysis of treated cyanidation barren solution,
- SWEP (Special Waste Extraction Procedure) test on pertinent tailings solids,
- simulated rainfall test on pertinent tailings solids, and
- 96-hour LC_{50} bio-assays on flotation tails water and treated cyanidation tails water.

SCHEDULE

It should be possible to complete the test program described above within a total of four months, depending on availability of test samples. Flotation testwork and cyanidation testwork will be done concurrently to expedite the test program.

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Results will be reviewed and analysed as the work progresses. Depending on the results of the tests, some of the testwork described above may prove unnecessary. For example, cyanide destruction testing will not be necessary if an economically viable flotation scheme is established.

COSTS

The overall cost of the test program will depend on the extent of testwork required to establish suitable process conditions for the Ladner Creek mineralization. If flotation alone proves adequate then the extent of the testwork will be less than what would be required for a combined flotation/cyanidation process. Test results will be reviewed and analysed as the testwork progresses in order to expedite the work and to keep costs at a minimum.

If all the work is completed as described above, then Lakefield Research costs for the test program detailed above are expected to be in the range of $150,000 to $200,000. Melis Engineering Ltd. costs would be approximately $75,000 to $100,000 including reimbursable expenses and an allowance for some involvement and contribution by Mr. E. Thornton, Milling Consultant.

I trust the above adequately describes the metallurgical testing approach to be used for the feasibility study on the reactivation of the Ladner Creek Mine. If you have any questions or need further details please do not hesitate to call. I have contacted both Lakefield Research and Ed Thornton and we are ready to proceed as soon as the test samples become available.

Respectfully submitted,
MELIS ENGINEERING LTD.

L.A. Melis, P.Eng.
President
LAM:mlb (L099585.319)

Athabaska Gold

Melis Engineering
519 45th St. West
Saskatoon, Saskatchewan
S7L 5Z9

October 23, 1995

ATTN: MR. LAWRENCE MELIS, P.ENG.

Dear Lawrence,

RE: LADNER CREEK METALLURGICAL TEST PROGRAM

Further to your letter of Oct. 20/95 addressing Ed Thornton's comments and our conversation of todays date we hereby give our approval to proceed with the work on the above as per your Sept.21, 1995 proposal and any modifications to be incorporated based on Ed Thornton's comments, the writer, and various changes as agreed by all concerned from time to time as the program proceeds.

It is our understanding you will be reporting twice a month on the programs progress as well as directions the work is taking. As well, we would expect that changes that deviate significantly from the proposed program would be addressed, discussed, and agreed on prior to proceeding.

We will forward a copy of your October 20/95 letter to Ed Thornton along with a copy of this letter of acceptance.

We look forward to working with you on this property, a successful metallurgical test program leading to a positive feasibility and resumption of production.

Yours very truly,

M.P. Dickson, P.Eng.
Manager

cc: Ed Thornton

Athabaska Gold Resources Ltd. 1200 - 1185 West Georgia St. Vancouver, B.C., Canada V6E 4E6 Tel (604) 688-3144 Fax (604) 684-4601

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November 9, 1995

FAXED

Athabaska Gold Resources Ltd.
1185 West Georgia Street, Suite 1200
Vancouver BC V6E 4E6

MELIS Project No. 319

By Fax (604)684-4601

Attention: Mr. M.P. Dickson, P.Eng.
Manager

Dear Mr. Dickson:

Re: Ladner Creek Mine Samples - Preparation and Analysis

Nine drums of Ladner Creek mine samples taken from the underground workings were received at Lakefield Research on October 26, 1995. Each sample was crushed to minus 12.7 mm (½ inch), blended and a cut taken for analysis.

The description of samples provided by Athabaska Gold Resources Ltd. is provided in Table 1 and assay results are summarized in Table 2. Graphical representation of results is depicted in Figures 1 to 10.

Organic carbon and calcium assays will only be available early next week.

The average gold grade for the Zone 1 samples is 6.24 g Au/tonne (0.182 oz/ton) and for the Zone 2 samples, 3.51 g Au/tonne (0.102 oz/ton).

The Ladner Creek samples contain no lead or nickel and only low levels of zinc (range of 0.007% Zn to 0.017% Zn). Copper content is low (range of 0.009% Cu to 0.047% Cu) but still significant in terms of metallurgical and environmental concerns associated with a cyanidation circuit.

Using aluminum assays as a guide, the samples from Zone 1 (Drums 1,2,3 and 5) appear high in chlorite and/or sericite whereas samples from Zone 2 are moderately high in chlorite content. Based on sodium assays there appears to be a similar albite content in Zone 1 and Zone 2.

Observations made from the graphs comparing gold assays to other constituents (Figures 1 to 10) suggest the following:

- there is a definite correlation of increasing gold content with increasing sulphide sulphur content and increasing arsenic content but there is no correlation with iron content. This suggests that the gold is perhaps more associated with arsenopyrite than with pyrite or pyrrhotite,

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- there is a slight correlation of increasing gold content with increasing copper content,

- gold content seems to increase with an increase in gangue minerals containing sodium and aluminum,

- silver grades, although low (<0.5 g Ag/tonne to 2.40 g Ag/tonne) increase as gold grades increase, and

- there is no correlation of gold content with zinc or magnesium.

It may be best to wait for the organic carbon assay before deciding on the blend for the Zone 1 and Zone 2 composites which in turn will be blended into an overall mine composite for initial testing. I presume preparation of composites will be done on a weighted basis based on estimated mineable reserves represented by each sample. If blending ratios can be simply decided on gold assays, then please forward blending instructions and we will proceed with preparation of appropriate composites.

Also, for future reference and for formal reporting later, could you have Jo Shearer write up a brief (2 pages ?) description of how the samples were taken (oxidized layer removed ?, 2' blast taken, etc.) and a sketch showing the location of each sample.

Test composites will be prepared next week and I plan to start the test program on November 20, 1995. I will be there to initiate the work and Bruce Fielder, Senior Process Engineer with Melis Engineering Ltd., will work on a hands-on basis at Lakefield Research to supervise the work. I will make arrangements with Ed Thornton to be at Lakefield Research for the first week or so.

Yours truly,
MELIS ENGINEERING LTD.

L.A. Melis, P.Eng.
President

B.C. Fielder
Senior Process Engineer

LAM/BCF:mlb

(L1195B1.319)

TABLE 1

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK PROJECT

METALLURGICAL SAMPLES 1-10

Oct. 1995
Prepared by J. Shearer & W. Zerb

Drum No.	Location	Description
(1)	900 level-804 N. Pillar, South wall Full Drum, clean chl gw	Low grade Chloritic Greywake est. grade 0.06 oz/ton Typical #1 zone
(2)	900 level-804 N. Pillar Southwall Nice clean high grade zone Full Drum	highgrade est. grade 0.200 oz/ton typical #1 zone material
(3)	900 level-804 N. Pillar eastwall weak graphitic sc list with slight oxidation	waste, graphitic material Hanging well #1 zone
(4)	NO SAMPLE--DISCARDED	
(5)	950 level-664N south end 675S tope nearIU-11 Full Drum, good zone Large chunks on drum bottom	Zone material est. grade 0.150 oz/ton #1 zone
(6)	950 level-620N, east wall 95-000 X-Cut Full drum, moderately good zone Slightly Oxidized??	Zone material, upper est. grade >0.15g/ton #2 zone
(7)	960 level-715N west wall 71 R+P Pillar Good clean muck	Zone material #2 zone
(8)	970 level-651N, southwall 63A Cascade Pillar ½ drum. Weak Zone	Zone material #2 zone
(9)	980 level-595N west wall 58 Pillar area 7/8 Drum Good zone clear	Typical #2 Zone ore
(10)	875 level-804 Pillar north wall	Mainly chloritic Greywake, some 2m layers of zone. est. grade 0.08-0.10oz/ton #1 zone

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Project No. 319
November 9, 1995

TABLE 2

LADNER CREEK PROJECT
ANALYSIS OF MINE SAMPLES

Drum	Sample Location	Au		Ag	Cu	Pb	Zn	Ni	As	Fe	S_T	S^{2-}	CaO	MgO	Al_2O_3	Na_2O	Organic C
		g/t	oz/ton	g/t	%	%	%	%	%	%	%	%	%	%	%	%	%
Zone 1																	
1	900L - 804NP SW	0.59	0.017	<0.50	0.022	<0.002	0.017	<0.002	0.009	8.43	0.38	0.26		4.46	13.8	5.14	
2	900L - 804NP SW	13.3	0.388	2.40	0.047	<0.002	0.008	<0.002	0.74	8.16	5.20	5.03		2.30	14.1	7.33	
3	900L - 804NP EW	1.98	0.058	<0.50	0.015	<0.002	0.010	<0.002	0.092	8.91	0.99	0.99		4.71	13.4	4.99	
5	950L - 664N 675	14.3	0.417	1.90	0.022	<0.002	0.009	0.001	0.93	8.50	4.00	3.94		2.24	13.3	6.59	
10	875L - 804 P NW	1.02	0.030	<0.50	0.017	<0.002	0.011	<0.002	0.042	9.23	0.58	0.53		7.79	4.04	4.81	
Zone 2																	
6	950L -620N EW 95-000 X Cut	3.27	0.095	1.00	0.009	<0.002	0.007	<0.002	0.50	4.87	2.42	2.42		2.17	11.7	6.52	
7	960L - 715 NWW 71 (R+P) P	4.33	0.126	1.00	0.015	<0.002	0.011	<0.002	0.40	7.19	3.22	3.22		2.70	9.50	4.53	
8	970L - 651 N SW 63A Cascade P	1.23	0.036	0.50	0.017	<0.002	0.010	<0.002	0.18	8.93	1.99	1.81		3.27	11.0	4.64	
9	980L - 595 N WW 58 P	5.19	0.151	1.00	0.010	<0.002	0.007	<0.002	0.13	5.26	3.71	3.30		1.16	11.4	7.48	

Notes:

L - Level
N - North Wall
NP - North Pillar
P - Pillar
SW - South Wall
EW - East Wall
NW - North Wall
WW - West Wall

FIGURE 1

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK MINE SAMPLES
GOLD CONTENT vs SULPHIDE SULPHUR CONTENT

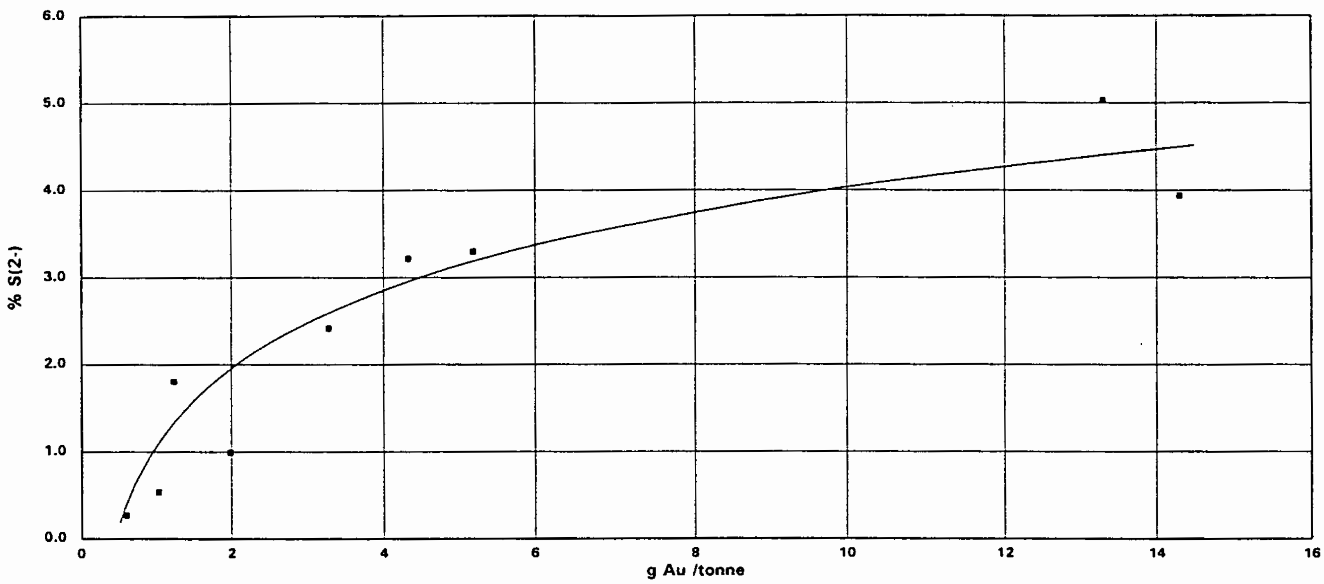
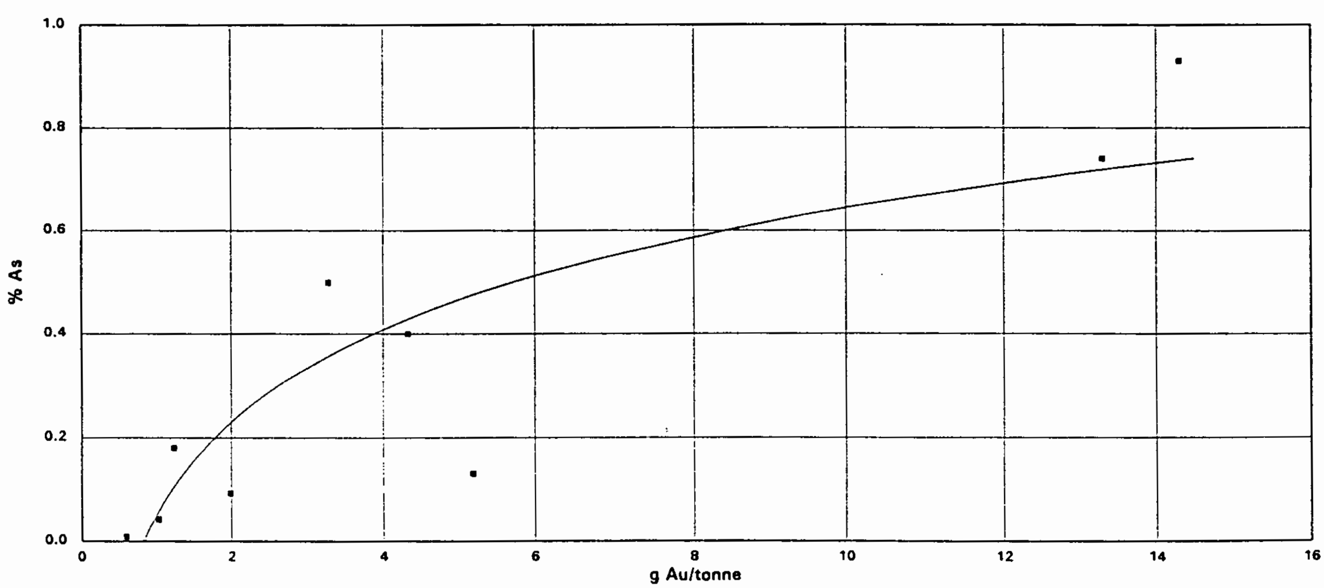


FIGURE 2

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK MINE SAMPLES
GOLD CONTENT vs ARSENIC CONTENT



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Project No. 319
November 9, 1995

FIGURE 3

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK MINE SAMPLES
GOLD CONTENT vs IRON CONTENT

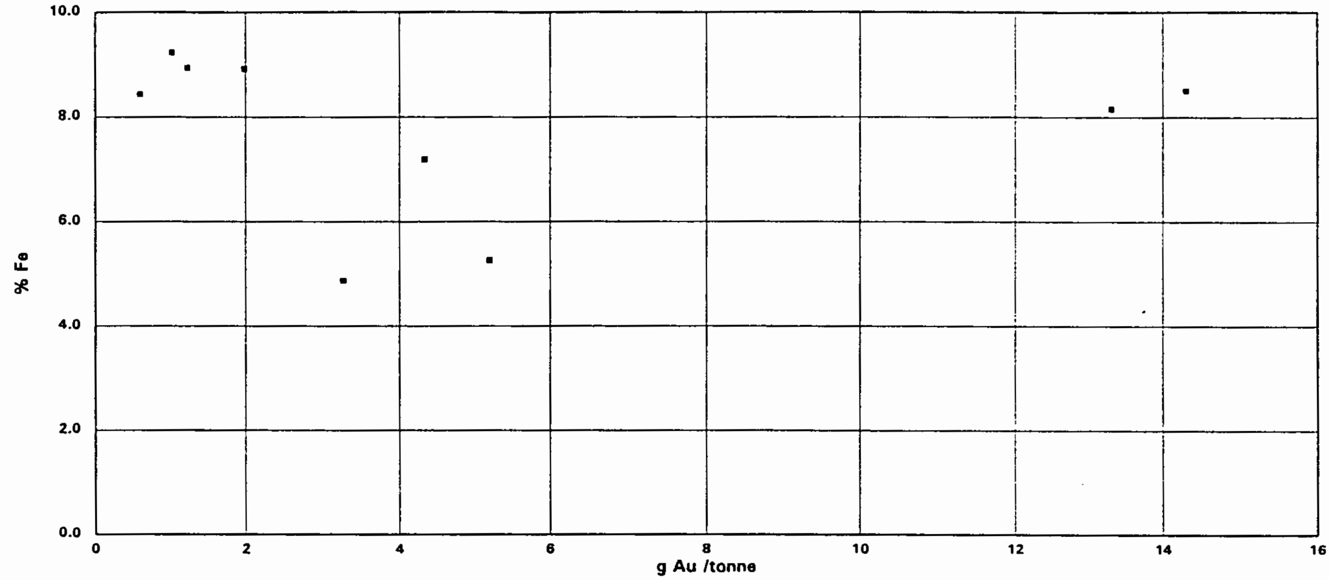
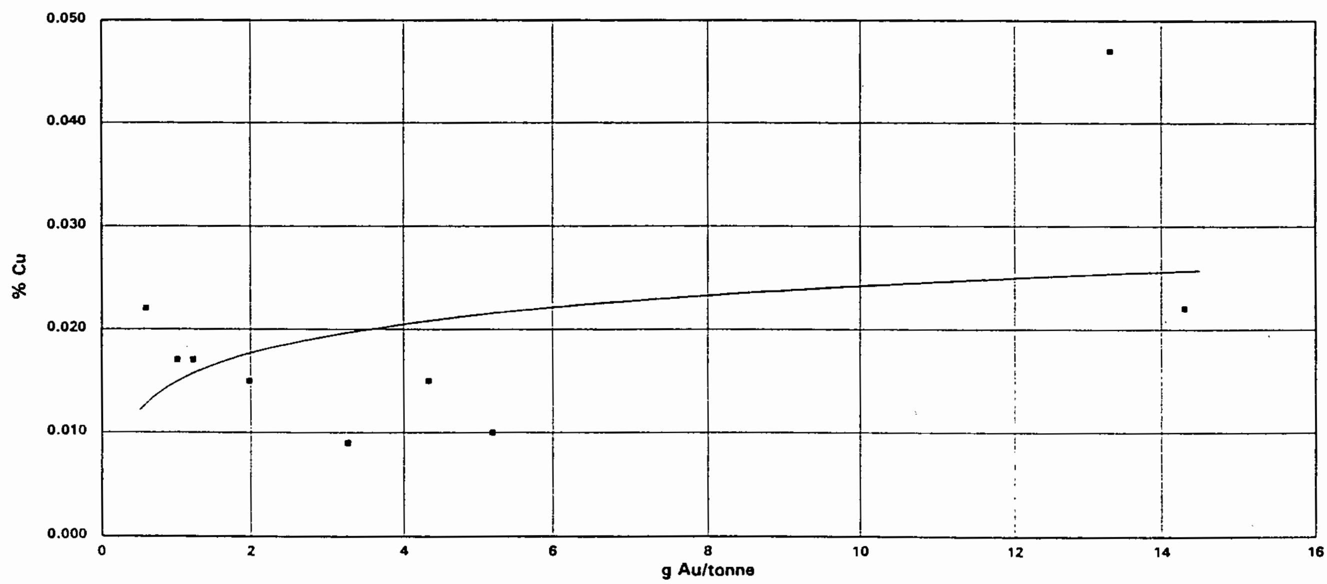


FIGURE 4

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK MINE SAMPLES
GOLD CONTENT vs COPPER CONTENT



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November 9, 1995

FIGURE 5

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK MINE SAMPLES
GOLD CONTENT vs ZINC CONTENT

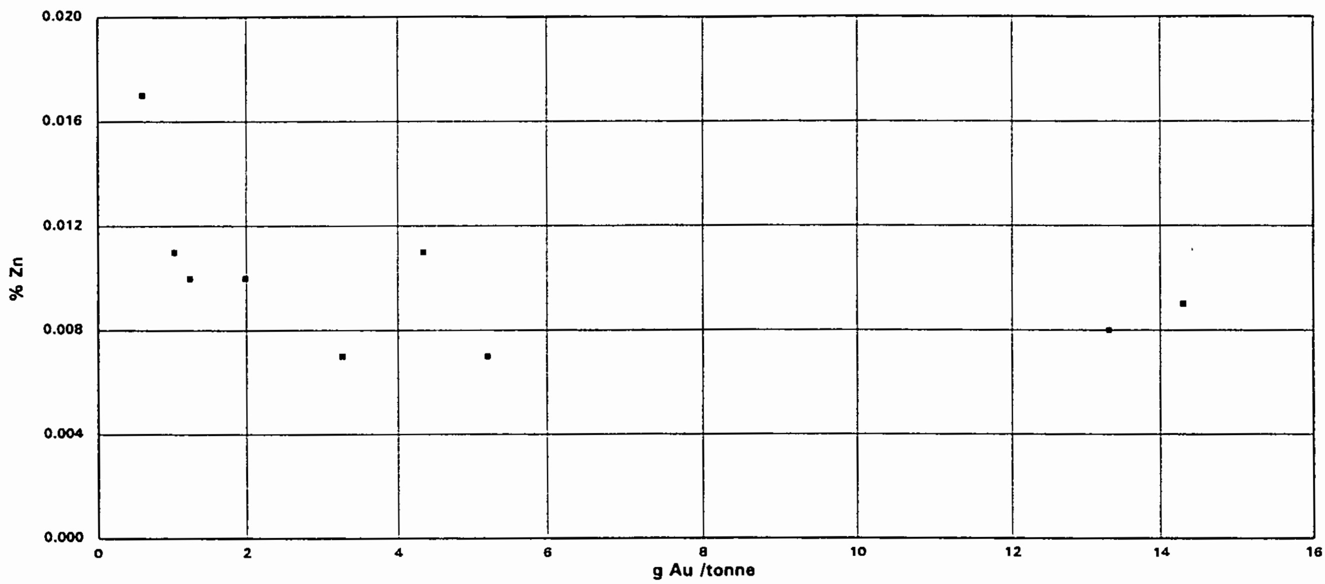

FIGURE 6

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK MINE SAMPLES
GOLD CONTENT vs MAGNESIUM CONTENT

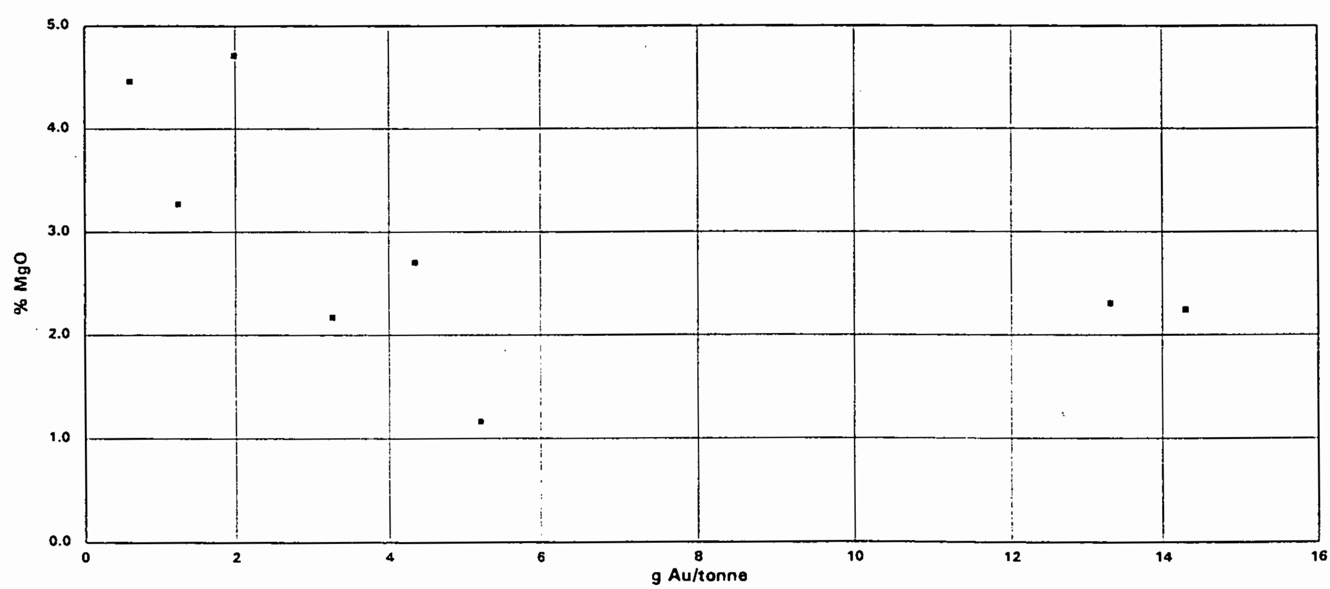

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FIGURE 7

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK MINE SAMPLES
GOLD CONTENT vs ALUMINUM CONTENT

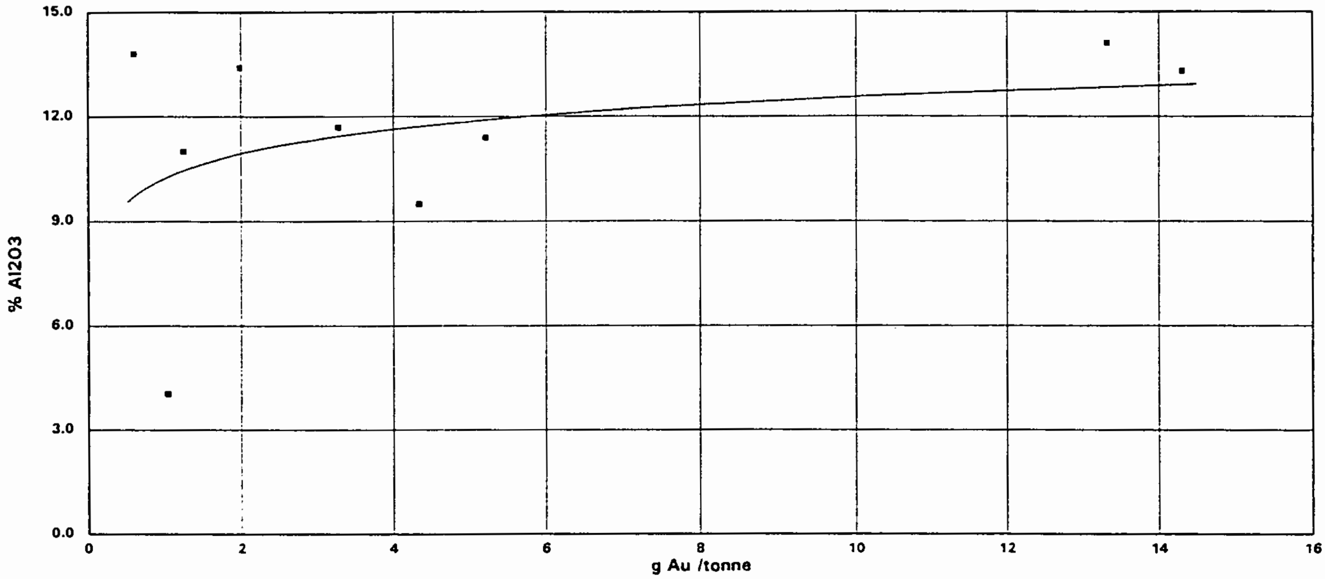
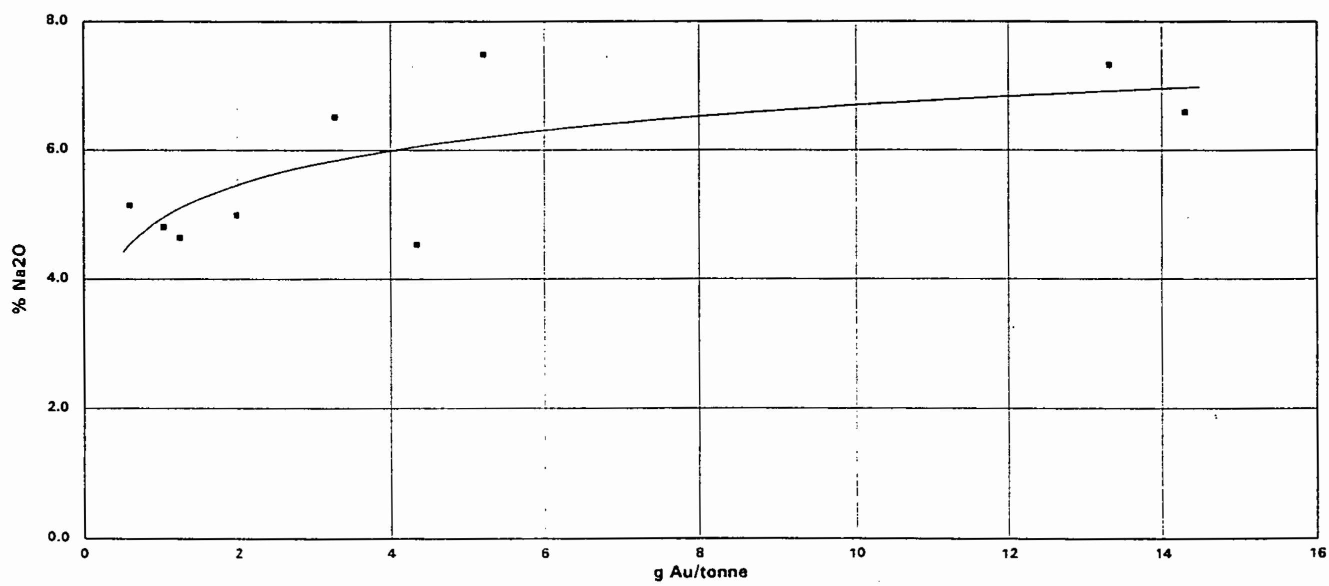


FIGURE 8

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK MINE SAMPLES
GOLD CONTENT vs SODIUM CONTENT



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November 9, 1995

FIGURE 9

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK MINE SAMPLES
GOLD CONTENT vs SILVER CONTENT

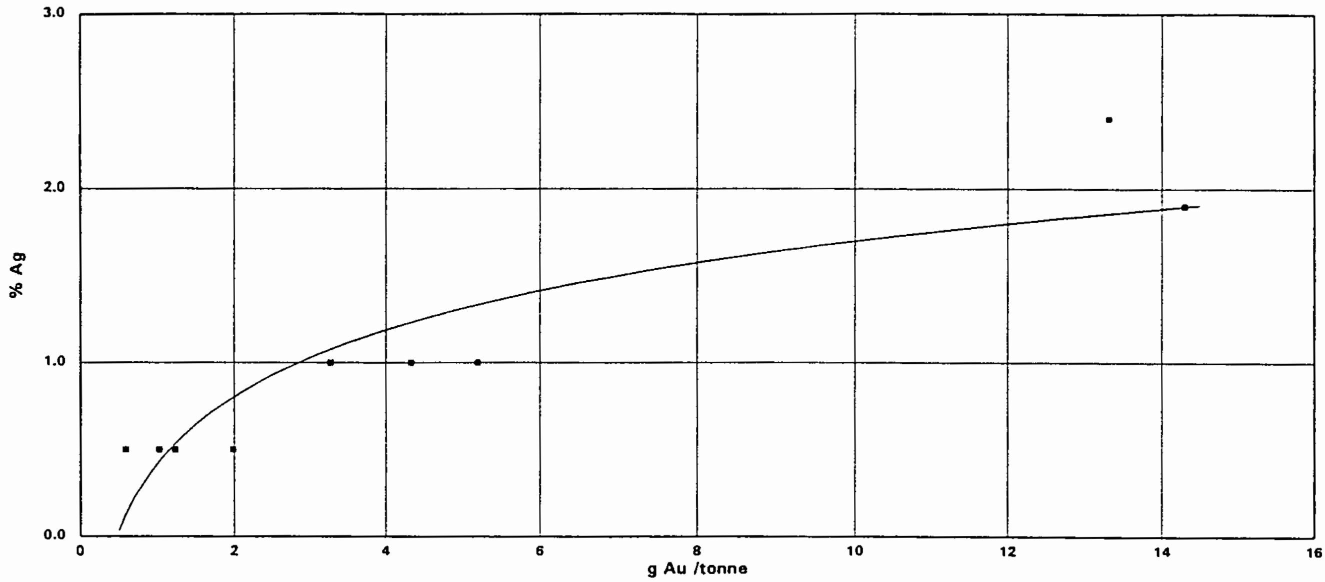
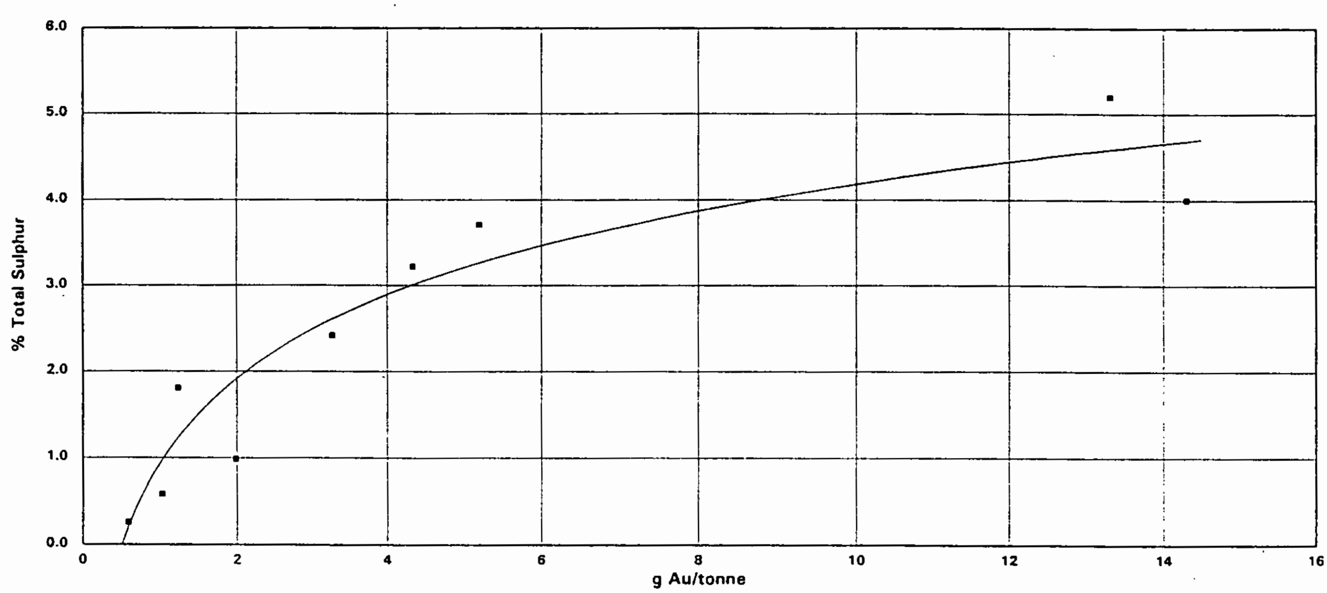


FIGURE 10

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK MINE SAMPLES
GOLD CONTENT vs TOTAL SULPHUR CONTENT



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Athabaska Gold

November 16, 1995

Melis Engineering Ltd.
519 45th Street West
Saskatoon, Saskatchewan
S7L 5T9

Attention: Mr. L. Melis, P.Eng

Dear Mr. Melis:

Re: Ladner Creek metallurgical sample

Following are the blends for Zone I and Zone II and the blend for Zone I and Zone II combination:

Zone I

Sample No.	%
1	20
2	20
3	20
10	10
6	30

Zone II

Sample No.	%
7	15
8	10
9	60
5	15

Zone I & Zone II Combination

Zone I	70%
Zone II	30%

Athabaska Gold Resources Ltd. 1200 - 1185 West Georgia St. Vancouver, B.C., Canada V6E 4E6 Tel (604) 688-3144 Fax (604) 684-4601

According to my calculations, Zone I should be close to 0.125 oz/ton and Zone II should be around 0.176 oz/ton if assays for individual samples are somewhere close to average.

The blend of Zone I and II above should be about 0.139 oz/ton.

Jo Shearer feels this is close to reality and it looks good to me.

Yours very truly,

M.P. Dickson, P.Eng
Manager

MELIS
ENGINEERING LTD.

December 8, 1995

MELIS Project No. 319

Athabaska Gold Resources Ltd.
1185 West Georgia St. Suite 1200
Vancouver BC V6E 4E6

By Fax (604) 684-4601

Attention: Mr. Plen Dickson

RE: **Ladner Creek Gold Mine - Metallurgical Test Program**
Status Report November 20, 1995 to December 8, 1995

INTRODUCTION

Melis Engineering Ltd. initiated a metallurgical test program on the Ladner Creek Project at Lakefield Research on November 20, 1995 using mine samples taken from the Ladner Creek underground workings by Athabaska Gold Resources Ltd. (Athabaska). Mr. Ed Thornton, Consultant on behalf of Athabaska, was present at Lakefield Research in this initial phase of testwork. Bruce Fielder is supervising the test program on behalf of Melis Engineering Ltd. and Lawrence Melis was at Lakefield Research to initiate the test program.

Test composites were prepared and the following initial testing completed:

- composite analysis,
- grindability tests,
- batch flotation tests,
- gravity recovery tests,
- magnetic separation tests, and
- whole ore cyanidation tests.

SUMMARY

The overall composite prepared for initial testing, a blend of Zone 1 and Zone 2 composites, assayed 4.73 g Au/tonne (0.138 oz Au/ton), 1.05 g Ag/tonne (0.031 oz Ag/ton) and 0.28% As.

The initial flotation testwork indicates that an achievable flotation tails grade for the Ladner Creek overall composite is approximately 0.4 to 0.5 g Au/tonne (0.012 to 0.015 oz Au/ton) using a 77%

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minus 200 mesh grind. From a head grade of 4.73 g Au/tonne (0.138 oz Au/ton) this represents an approximate gold recovery of 91% to 93% to a bulk rougher concentrate. Suitable flotation conditions appear to be a simple xanthate/208 gold float at natural pH with MIBC as frother. The use of a gangue depressant/dispersant was found to be beneficial in terms of concentrate grade.

With respect to concentrate grades, selective flotation can result in high grade concentrates being produced. Concentrate grades ranging from 249 g Au/tonne (7.26 oz Au/ton) to 633 g Au/tonne (18.46 oz Au/ton) were produced in initial tests. A two-stage rougher/scavenger float, keeping concentrates separate, appears to be a viable flotation approach to yield an overall net gold recovery of approximately 80% to 85% to saleable flotation concentrate.

Grindability tests show that the Ladner Creek mineralization is of medium hardness, having a Bond rod mill work index ranging from 15.3 to 15.9 (metric).

Gravity recovery of gold from mill feed does not appear suitable since gravity recoveries of only 4% and 6.9% were achieved from the Zone 1 and Zone 2 composites. Upgrading of concentrate for refining would lead to further reductions in recovery. However, gravity recovery from flotation concentrate yielded a high grade concentrate (12.8% Au) representing 37.4% of the gold in the feed. This approach will be investigated further since it offers the potential of recovering a portion of the gold as bullion on site.

Magnetic separation for removal of sulphide-bearing pyrrhotite from mill feed does not appear feasible since 27.9% removal of sulphur was accompanied with a 9.7% loss of gold. Scalping of the flotation tails by magnetic separation as a means of recovering residual gold is also not warranted. In the tests completed, the magnetic concentrate collected averaged 4.08 g Au/tonne and represented only 1.1% of the gold in the feed.

Initial whole ore cyanidation tests are being completed on the overall composite to give an indication of gold extractions under various pre-aeration and cyanidation conditions. Complete results will be reported when available.

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COMPOSITE PREPARATION AND ANALYSIS

The preparation of test composites was described in an earlier MELIS letter report dated November 9, 1995. Analyses of the mine samples received for composite preparation and testing are listed in Table 1.

An overall test composite was made up from the Zone 1 and Zone 2 composites, which were themselves mixed from the individual drum samples. The make-up of the overall composite is given in Table 2, that of the Zone 1 composite is given in Table 3, and that of the Zone 2 composite is given in Table 4.

The calculated head assays for the Ladner Creek test composites are given in Table 5. These calculated head assays are based upon weighted averages of the assays done by Lakefield Research on Ladner Creek Mine Samples 1, 2, 3, 6, 10 (Zone 1) and 5, 7, 8, 9 (Zone 2). It should be noted that the grades for silver, lead, nickel, and organic carbon may be slightly overestimated due to the detection limit for the respective element being taken as the absolute grade for calculation purposes.

In summary, the following are the calculated head analyses of the test composites:

Ladner Creek Mine Test Composites						
Composite	g Au/tonne	oz Au/ton	g Ag/tonne	% As	% S	% $C_{organic}$
Overall	4.73	0.138	1.047	0.31	2.52	0.051
Zone 1	4.17	0.122	1.030	0.32	2.10	0.056
Zone 2	6.03	0.176	1.085	0.30	3.51	0.040

Analysis of the mine samples are compared graphically against gold grade in Figures 1 to 12. As noted in the MELIS November 9, 1995 status report the following observations can be made from these graphs:

- there is a definite correlation of increasing gold content with increasing sulphide sulphur content and increasing arsenic content but there is no correlation with iron content. This suggests that the gold is perhaps more associated with arsenopyrite than with pyrite or pyrrhotite,

- there is a slight correlation of increasing gold content with increasing copper content,
- gold content seems to increase with an increase in gangue minerals containing sodium and aluminum,
- silver grades, although low (<0.5 g Ag/tonne to 2.40 g Ag/tonne) increase as gold grades increase, and
- there is no correlation of gold content with zinc, magnesium, iron, calcium or organic carbon.

The rock scan ICP assays done on the Ladner Creek overall composite sample are listed in Table 6. The calculated gold head grade is the average calculated head grade from 26 tests. The other calculated head assays were calculated from the individual drum assays.

There is excellent agreement between calculated head grades and assay head grades.

GRINDABILITY TESTS

Grinding for the flotation tests was done in a mild steel rod mill using stainless steel rods. Size fraction analysis was carried out on the discharges of two grinds, the first on a 30-minute grind, the second on a 40-minute grind. The 30-minute grind produced a product with 77.1 % minus 200 (Tyler) mesh, the 40-minute grind produced a product with 94.5% minus 200 (Tyler) mesh. The 30-minute grind was used in the initial flotation testwork.

Standard Bond rod mill grindability tests were conducted on the Zone 1 and Zone 2 composites. The rod mill work index for the Zone 1 composite was 15.9 (metric) (14.5 imperial). The rod mill work index for the Zone 2 composite was 15.3 (metric) (13.9 imperial). The rod mill work index for the composite sample is thus expected to be 15.7 (metric) (14.3 imperial).

FLOTATION TESTWORK

Rougher Flotation Tests

Initial batch flotation tests were completed on the overall composite to ascertain flotation conditions for the Ladner Creek mineralization.

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A description of the conditions of the initial flotation tests is given in Table 7 and a full description of the reagents used in the flotation tests is listed in Table 8. The main purpose of these initial tests was to assess rougher/scavenger flotation recoveries under different reagent schemes. Results of the rougher flotation tests are summarized in Table 9. Gold grade/recovery curves are compared in Figures F-1 to F-8.

The two best performing flotation tests were Tests No. 6 and 11. Respective bulk rougher recoveries of 93.8% and 94.0% were achieved, with rougher tails grades of 0.40 g Au/tonne and 0.39 g Au/tonne being attained. These two tests used SIBX (sodium isobutyl xanthate) and Aerofloat 208 as collectors. In Test No. 11, CMC/WW82 solution was added as a gangue depressant/dispersant resulting in a slightly improved grade/recovery curve compared to Test No. 6 as shown in Figure F-1 where the grade/recovery curves for both tests are plotted.

Comparison of Xanthate Collectors
The results of different xanthate collectors are compared in Figure F-2. PAX (potassium amyl xanthate) was used in Tests No. 1 and No. 17, SIBX (sodium isobutyl xanthate) was used in Tests No. 6 and 11 and SIPX (sodium isopropyl xanthate) was used in Test No. 21. Conditions and results for these tests can be summarized as follows:

Summary of Results - Tests No. 1, 6, 11, 17 and 21 (Figure F-2)										
	Reagent Addition (g/tonne)							Rougher Concentrate		Rougher Tails
Test No.	SIBX	SIPX	PAX	CMC/ WW82	208	MIBC	pH	Grade (g Au/t)	Recovery (%)	Grade (g/Au/t)
1			47.5		30	17.5	7.6	34.1	93.1	0.35
6	47.5				30	17.5	8.4	34.7	93.8	0.40
11	47.5			250	30	17.5	8.4	41.5	94.0	0.39
17			47.5			17.5	8.1	39.3	89.9	0.55
21		47.5			27.5	22.5	7.6	26.1	92.7	0.43

The benefit of using Aerofloat 208 as a promoter in conjunction with xanthate collector is evident when comparing the results of Tests No. 1 and 17. Although the above five tests produced a tightly grouped set of grade/recovery curves, Tests No. 6 and 11 yielded the best results.

The benefit of using CMC/WW82 as a gangue depressant/dispersant is obvious from the results of Test No. 11 where the highest rougher concentrate grade was achieved (41.5 g Au/tonne) while maintaining rougher recovery (94.0%).

CMC/WW82 Dosage

Dosages of CMC/WW82 gangue depressant/dispersant were evaluated in Tests No. 6, 11, 18, 19 and 20. Test No. 22 checked on pulp pre-aeration conditioning ahead of flotation. Grade/recovery curves for these tests are compared in Figure F-3. Conditions and results for these tests can be summarized as follows:

Summary of Results - Tests No. 6, 11, 18, 19 20 and 22 (Figure F-3)										
	Reagent Addition (g/tonne)							Rougher Concentrate		Rougher Tails
Test No.	SIBX	SIPX	PAX	CMC/ WW82	208	MIBC	pH	Grade (g Au/t)	Recovery (%)	Grade (g Au/t)
6	47.5				30	17.5	8.4	34.7	93.8	0.40
11	47.5			250	30	17.5	8.4	41.5	94.0	0.39
18		47.5		125	30	17.5	8.3	38.4	90.7	0.52
19		47.5		500	30	17.5	8.3	50.9	78.1	1.09
20		47.5		250*	30	17.5	-	39.8	87.4	0.68
22		50		125	30	22.5	8.1	20.5	89.2	0.50

* CMC only.

The grade/recovery curves for Tests No. 18, 19, 20 and 22 all fell below those of Tests No. 6 and 11. Using SIPX (sodium isopropyl xanthate) as collector, it is apparent that high CMC/WW82 dosages (Test No. 19) are detrimental to recovery. Pulp pre-aeration results in a decrease in rougher concentrate grade (a grade of 20.5 g Au/tonne was achieved in Test No. 22 where pulp pre-aeration was used compared to a grade of 38.4 g Au/tonne in Test No. 18). Using CMC without WW82 results in a decrease in recovery (Test No. 20).

Ladner Creek Flotation Conditions

Flotation conditions used previously at the Ladner Creek mine were tested in Tests No. 2 and 8. Soda ash was used as a pH modifier in Test No. 8. Results, which are presented graphically in Figure F-4, are summarized as follows:

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Summary of Results - Tests No. 6, 11, 2 and 8 (Figure F-4)													
	Reagent Addition (g/tonne)										Rougher Concentrate		Rougher Tails
Test No.	SIBX	PAX	CMC/ WW82	Na_2CO_3	$CuSO_4$	208	242	MIBC	Pine Oil	pH	Grade (g Au/t)	Recovery (%)	Grade (g Au/t)
6	47.5					30		17.5		8.4	34.7	93.8	0.40
11	47.5		250			30		17.5		8.4	41.8	94.0	0.39
2		47.5			400		26		17.5	7.8	31.0	92.4	0.42
8				315	400		88.5		15	9.1	28.2	92.5	0.39

Rougher recoveries achieved were similar to those achieved in Tests No. 6 and 11 but recovery dropped rapidly with an increase in concentrate grade. The use of soda ash as a pH modifier did not appear to be beneficial.

Flotation Without Xanthate

Figures F-5 and F-6 show the grade/recovery curves for the series of tests run without a xanthate collector. The results of these tests, Tests No. 3, 4, 5 7, 12, 13 and 14 can be summarized as follows:

Summary of Results - Tests No. 6, 11, 3, 4, 5, 7, 12, 13 and 14 (Figures F-5 and F-6)												
	Reagent Addition (g/tonne)									Rougher Concentrate		Rougher Tails
Test No.	SIBX	CMC/ WW82	Na_2CO_3 or CaO	208	5415	S5688	CA829	MIBC	pH	Grade (g Au/t)	Recovery (%)	Grade (g Au/t)
6	47.5			30				17.5	8.4	34.7	93.8	0.40
11	47.5	250		30				17.5	8.4	41.8	94.0	0.39
3				92.5				15	7.8	52.9	71.6	1.43
4					92.5			15	8.4	37.1	62.6	1.97
5						92.5			8.4	23.5	64.9	1.87
7			315 (Na_2CO_3)	92.5				10	9.2	39.4	69.5	1.56
12 *				92.5				15	8.4	31.6	79.0	1.18
13			175 (CaO)	92.5				15	9.5	42.7	72.9	1.48
14							92.5	15	-	39.5	88.0	0.66

*40-minute grind

The use of Aerofloat 208 without xanthate (Test No. 3) yielded a lower rougher recovery (71.6%) compared to Tests No. 6 and 11 but produced a higher grade rougher concentrate (52.9 g

Au/tonne). Cytec collectors 5415 and S5688 (Tests No. 4 and 5) and Allied Colloids CA829 (TestNo. 14) were inferior to xanthate/208 collectors. The use of soda ash or lime as pH modifier was observed to be of no benefit (Tests No. 7 and 13 compared to Test No. 3). Finer grinding in Test No. 12 (94.5% minus 200 mesh compared to 77.1% minus 200 mesh in the other tests) yielded an improvement in rougher recovery (79.0% in Test No. 12 versus 71.6% in Test No.3) but the rougher concentrate grade was lower (31.6 g Au/tonne in Test No. 12 versus 52.9 g Au/tonne in Test No. 3).

Cleaner Flotation

Five flotation tests were done incorporating cleaner flotation. Results are listed in Tables 9 and 10 and depicted graphically in Figures F-7 and F-8. Cleaner flotation test results are summarized as follows:

Summary of Cleaner Flotation Tests No. 16, 23, 24, 25 and 26 (Figures F-7 and F8)							
Test No.	Reagents	Rougher Float	Scav. Float	Regrind	Ro/Scav Recovery (%)	Ro Cleaner Conc (g Au/t)	Ro Tail (g Au/t)
16	208, MIBC, PAX (Scav only)	4'	4'	yes (scav)	90.1	481	0.54
23	CMC/WW82, SIPX, 208, MIBC	4'	-	yes	80.2	249	0.99
24	CMC/WW82, SIPX, 208, MIBC	4'	-	yes	79.9	633	0.92
25	CMC/WW82, SIPX, 208, MIBC	4'	-	no	82.3	346	0.87
26	Na_2CO_3, $CuSO_4$, 242, MIBC	8'	-	no	93.1	70.5	0.41

Two stage roughing and two stage scavenging with the rougher concentrate and the scavenger concentrate cleaned once was tested in Test No. 16. Results are compared to Tests No. 6 and 11 in Figure F-7. With the use of only Aerofloat 208 in the rougher stage, a single cleaning stage on rougher concentrate yielded a high grade cleaner concentrate [481 g Au/tonne (13.8 oz Au/ton)] containing 62.3% of the gold in the feed. Scavenging of rougher tails with xanthate and further Aerofloat 208 yielded an additional 25.3% gold recovery to a bulk scavenger concentrate. Magnetic separation of the scavenger tails only recovered a small amount (0.3%) of additional gold. Cleaning of the scavenger concentrate produced a scavenger first cleaner concentrate assaying 60.5 g Au/tonne containing 18.7% of the gold in the feed. Further scavenging of the scavenger first cleaner tails did not recover sufficient gold to be able to discard scavenger cleaner tails. The combined rougher first cleaner concentrate and scavenger first cleaner concentrate assayed 185 g Au/tonne (5.40 oz Au/ton) and contained 81.0% of the gold in the feed.

One stage cleaner flotation on reground rougher concentrate in Tests No. 23 and 24 yielded cleaner concentrates grading 249 g Au/tonne (7.26 oz Au/ton) and 633 g Au/tonne (18.46 oz Au/ton). Although reagent conditions were similar to Test No. 11, rougher flotation recoveries were not as high as evident from the high gold content in the rougher tails (0.99 g Au/tonne and 0.92 g Au/tonne versus the 0.39 g Au/tonne tails grade achieved in Test No. 11) and the lower grade/recovery curves shown in Figure F-8.

Gravity (Mozley Concentrator) processing of the cleaner concentrate in Test No. 24 recovered 55% of the gold in the concentrate (37.4% of the gold in the feed) into a gravity concentrate assaying 12.8% Au. As noted elsewhere in this letter report, this may provide a means of producing bullion on site for a portion of the recovered gold.

In Test No. 25, the rougher concentrate was cleaned without regrinding and a high grade concentrate was achieved [346 g Au/tonne (10.09 oz Au/ton)]. Again rougher recoveries for this test were low compared to results achieved earlier in Test No. 11.

Test No. 26 evaluated flotation with Aerofloat 242 promoter in the presence of soda ash and copper sulphate but with no xanthate. An 8-minute rougher float yielded excellent results, similar to earlier results achieved in Tests No. 6 and 11 (see Figure F-8). The cleaner concentrate however was low grade [70.5 g Au/tonne (2.06 oz Au/ton)], indicating that regrinding of rougher concentrate ahead of cleaning is required under these flotation conditions. However, the arsenic content in the concentrate from this test was high (4.95% As) with 98.2% of the arsenic reporting to the rougher concentrate.

Gold Losses to Tails

Tailings particle size distribution and gold losses to tails are displayed in Figures T-1 and T-2 for Test No. 6 bulk rougher tails. From the bar graph in Figure T-2, it appears that finer grinding would result in further liberation of gold. Finer grinding will be tested in on-going work.

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GRAVITY RECOVERY

A gravity recovery test was completed on the Zone 1 composite (Test No. 9) and on the Zone 2 composite (Test No. 10) using a Wilfley table and a Mozley concentrator for upgrading table concentrate. Results presented in Table 11 can be summarized as follows:

Composite	Mozley Gravity Concentrate			
	Weight %	Grade		% Recovery
		g Au/t	% Au	
Zone 1	0.001	14,496	1.45	4.0
Zone 2	0.009	4,408	0.44	6.9

Based on these results gravity recovery of gold direct from Ladner Creek mill feed does not appear suitable. Further upgrading of concentrate for refining into bullion would lead to further reductions in gravity gold recovery.

The flotation concentrate from Test No. 24 was submitted to gravity recovery on the Mozley concentrator. Of the 67.6% of the gold recovered in the first cleaner concentrate from this test, which assayed 633 g Au/tonne (18.46 oz Au/ton), 37.4% of the gold in the feed reported to the Mozley concentrate which assayed 12.8% Au. This test implies that gravity concentrating of flotation concentrate could yield a gold gravity concentrate which can be refined on site as bullion, thereby realizing a higher gold payment for some of the recovered gold compared to smelter terms for flotation concentrate.

MAGNETIC SEPARATION

A magnetic separation test (Test No. 15) was completed on the overall composite. Results are summarized in Table 12. The magnetic rougher concentrate collected represented 3.07% of the feed weight. A 27.9% removal of sulphur to the concentrate was associated with 9.7% of the gold and only 1.2% of the arsenic. The high loss of gold to the magnetic concentrate would preclude magnetic separation as a means of removing sulphide-bearing pyrrhotite ahead of flotation.

Partial scalping of the flotation tails with a hand magnet in Tests No. 17,18, 21, 22, 23, 24 and

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25 recovered some residual gold but recoveries would likely not be high enough to warrant operation of a scavenger magnetic separation circuit. The magnetic separation concentrate pulled from the flotation tails assayed from 3.46 g Au/tonne to 5.17 g Au/tonne (average of 4.08 g Au/tonne) and represented only 0.1% to 2.2% (average of 1.1%) of the gold in the feed.

CYANIDATION TESTS

Initial whole ore cyanidation tests are being completed on the overall composite to give a preliminary indication of gold extractions under various conditions. A 30-minute grind (77% minus 200 mesh) was used in all the tests. The following tests are being completed. Results will be provided when available.

- *Single Stage Leaching*
  Cyanide leach at 33% solids(w/w) for 72 hours with a free cyanide level of 0.5 g NaCN/L and alkalinity held at pH 10 to 10.5 using lime.

- *Pre-Aeration/Single Stage Leaching*
  Pre-aerate at 33% solids(w/w) for two hours in an aerated column with the alkalinity held at pH 10 using lime and a lead nitrate added at 0.375 kg $Pb(NO_3)_2$/tonne. Cyanide leach at 33% solids(w/w) for 72 hours with the alkalinity held at pH 10 to 10.5 with lime and free cyanide held at 0.5 g NaCN/L.

- *Two Stage Leaching*
  Cyanide leach at 33% solids(w/w) for 24 hours with the alkalinity held at pH 10 to 10.5 with lime and free cyanide held at 0.5 g NaCN/L. Filter the leach slurry and retain the filtrate. Repulp the filter cake to 33% solids(w/w) with water and leach for a further 48 hours with the alkalinity held at pH 10 to 10.5 with lime and free cyanide held at 0.5 g NaCN/L.

- *Pre-Aeration/Single Stage Leaching*
  Pre-aerate at 33% solids(w/w) for two hours in an aerated column with the alkalinity held at pH 10 using lime and lead nitrate added at 0.375 kg $Pb(NO_3)_2$/tonne. Cyanide leach at 33% solids(w/w) for 72 hours with the alkalinity maintained at pH 10 to 10.5 with lime and free cyanide held at 0.5 g NaCN/L.

- *Pre-Aeration/Two Stage Leaching*
  Pre-aerate at 33% solids(w/w) for two hours with the alkalinity held at pH 10 using lime and

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lead nitrate added at 0.375kg $Pb/(NO_3)_2$/tonne. Filter the pre-aerated slurry and retain the filtrate. Cyanide leach at 33% solids(w/w) for 24 hours with the alkalinity held at pH 10 to 10.5 with lime and the free cyanide held at 0.5 g NaCN/L. Filter the leach slurry and retain the filtrate. Repulp the filter cake to 33% solids(w/w) with water and cyanide leach for 48 hours with the alkalinity held at pH 10 to 10.5 with lime and the free cyanide held at 0.5 g NaCN/L.

- ***Single Stage Leaching of Magnetic Separator Tails***
  Grind a 2 kg sample of the overall composite for 30 minutes in the rod mill and remove the magnetics by magnetic separation. Cyanide leach the non-magnetics at 33% solids(w/w) for 72 hours with the alkalinity held at pH 10 to 10.5 with lime and the free cyanide held 0.5 g NaCN/L.

- ***Single Stage Leaching with 25% Barren Solution Recycle***
  Slurry a 330 g sample of the overall composite with 0.5 L of water and 0.17 L of barren solution prepared by zinc precipitation of pregnant solution from Tests No. C-1 and C-3. Cyanide leach this slurry at 33% solids(w/w) for 72 hours with the alkalinity held at pH 10 to 10.5 with lime and the free cyanide held at 0.5 g NaCN/L.

- ***Single Stage Leaching with 50% Barren Solution Recycle***
  Slurry a 330 g sample of the overall composite with 0.33 L of water and 0.33 L of barren solution prepared by zinc precipitation of pregnant solution from Tests No. C-1 and C-3. Cyanide leach this slurry at 33% solids(w/w) for 72 hours with the alkalinity held at pH 10 to 10.5 with lime and the free cyanide held at 0.5 g NaCN/L.

- ***Single Stage Leaching with 75% Barren Solution Recycle***
  Slurry a 330 g sample of the overall composite with 0.17 L of water and 0.5 L of barren solution prepared by zinc precipitation of pregnant solution from Tests No. C-1 and C-3. Cyanide leach this slurry at 33% solids(w/w) for 72 hours with the alkalinity held at pH 10 to 10.5 with lime and the free cyanide held at 0.5 g NaCN/L.

A metallurgical balance is to be completed for each cyanidation test and the pregnant solution is to be analyzed for reducing power, oxygen content, copper, iron, thiocyanate and cyanate. Results will be provided when available.

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PLANNED TESTWORK

Flotation testing will continue on the basis of the above results. Cleaner flotation, incorporating separate rougher and scavenger flotation, will be evaluated to quantify achievable concentrate grades and recoveries for a flotation-only process.

The initial cyanidation results, along with results of any additional whole ore cyanidation tests, will be evaluated to arrive at a preliminary indication of cyanidation conditions for flotation concentrate. Bulk flotation concentrate will be prepared using a xanthate/208 float and the recovered concentrate wil be cyanided to give a preliminary indication of achievable recoveries from a combined flotation-cyanidation process.

Other associated testwork will be completed as planned in earlier correspondence (MELIS letter dated September 21, 1995).

Yours truly,
MELIS ENGINEERING LTD.

L.A. Melis, P.Eng.
President

B.C. Fielder
Senior Process Engineer

LAM/BCF:mlb

cc: Tom Adamson
Jim Kermeen

MELIS ENGINEERING LTD.
Project No. 319
December 8, 1995

TABLE 1

LADNER CREEK MINE
ANALYSIS OF MINE SAMPLES

Drum	Sample Location	Au		Ag	Cu	Pb	Zn	Ni	As	Fe	S_T	S^{2}	CaO	MgO	Al_2O_3	Na_2O	Organic C
		g/t	oz/ton	g/t	%	%	%	%	%	%	%	%	%	%	%	%	%
Zone 1																	
1[1]	900L - 804NP SW	0.59	0.017	<0.50	0.022	<0.002	0.017	<0.002	0.009	8.43	0.38	0.26	5.708	4.46	13.8	5.14	<0.01
2	900L - 804NP SW	13.3	0.388	2.40	0.047	<0.002	0.008	<0.002	0.74	8.16	5.20	5.03	5.274	2.30	14.1	7.33	<0.01
3	900L - 804NP EW	1.98	0.058	<0.50	0.015	<0.002	0.010	<0.002	0.092	8.91	0.99	0.99	5.204	4.71	13.4	4.99	<0.01
6[1]	950L -620N EW 95-000 X Cut	2.99	0.087	1.00	0.009	<0.002	0.007	<0.002	0.50	4.87	2.42	2.42	6.38	2.17	11.7	6.52	0.14
10	875L - 804 P NW	1.02	0.030	<0.50	0.017	<0.002	0.011	<0.002	0.042	9.23	0.58	0.53	6.58	7.79	4.04	4.81	0.08
Zone 2																	
5	950L - 664N 675	14.3	0.417	1.90	0.022	<0.002	0.009	0.001	0.93	8.50	4.00	3.94	7.275	2.24	13.3	6.59	0.01
7	960L - 715 NWW 71 (R+P) P	4.33	0.126	1.00	0.015	<0.002	0.011	<0.002	0.40	7.19	3.22	3.22	7.85	2.70	9.50	4.53	0.17
8	970L - 651 N SW 63A Cascade P	1.23	0.036	0.50	0.017	<0.002	0.010	<0.002	0.18	8.93	1.99	1.81	7.34	3.27	11.0	4.64	<0.01
9	980L - 595 N WW 58 P	5.19	0.151	1.00	0.010	<0.002	0.007	<0.002	0.13	5.26	3.71	3.30	8.06	1.16	11.4	7.48	0.02

NOTES:

1. Gold re-assays are listed for Drums 1 and 6.

2. Legend:

L	Level	SW	South Wall
N	North Wall	EW	East Wall
NP	North Pillar	NW	North Wall
P	Pillar	WW	West Wall

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TABLE 2

LADNER CREEK MINE
OVERALL COMPOSITE MAKE-UP

Composite	Weight %	Au	
		g/tonne	oz/ton
Zone 1	70	4.17	0.122
Zone 2	30	6.03	0.176
Overall	100	4.73	0.138

TABLE 3

LADNER CREEK MINE
ZONE 1 COMPOSITE MAKE-UP

Sample No.	Weight %	Au	
		g/tonne	oz/ton
1	20	0.59	0.017
2	20	13.3	0.388
3	20	1.98	0.058
10	10	1.02	0.030
6	30	2.99	0.087
Zone 1 Composite	100	4.17	0.122

TABLE 4

LADNER CREEK MINE
ZONE 2 COMPOSITE MAKE-UP

Sample No.	Weight %	Au	
		g/tonne	oz/ton
7	15	4.33	0.126
8	10	1.23	0.036
9	60	5.19	0.151
5	15	14.3	0.417
Zone 2 Composite	100	6.03	0.176

TABLE 5

LADNER CREEK MINE
CALCULATED ASSAYS OF ZONE 1, ZONE 2, AND OVERALL COMPOSITES

Assay	Unit	Zone 1	Zone 2	Overall Composite
Au	g/t	4.173	6.032	4.731
Au	oz/ton	0.122	0.176	0.138
Ag	g/t	1.030	1.085	1.047
Cu	%	0.021	0.013	0.019
Pb	%	0.002	0.002	0.002
Zn	%	0.010	0.008	0.010
Ni	%	0.002	0.002	0.002
As	%	0.322	0.296	0.314
Fe	%	7.484	6.403	7.160
S_{T}.	%	2.098	3.508	2.521
S^{2-}	%	2.035	3.235	2.395
CaO	%	5.809	7.839	6.418
MgO	%	3.724	1.764	3.136
Al_2O_3	%	12.174	11.360	11.930
Na_2O	%	5.929	6.620	6.136
$C_{(Organic)}$	%	0.056	0.040	0.051

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TABLE 6

LADNER CREEK MINE
COMPARISON OF CALCULATED AND ROCK SCAN ICP ASSAYS

Assay	Composite Assays		
	Unit	Calculated	Assayed
Au	g/t	4.76(2)	4.730
Au	oz/ton	0.138(2)	0.138
Ag	g/t	1.047	(3)
Cu	%	0.019	0.021
Pb	%	0.002	<0.010
Zn	%	0.010	0.013
Ni	%	0.002	0.003
As	%	0.314	0.283
Fe	%	7.160	7.405
S_T	%	2.521	2.450
S^{2-}	%	2.395	2.210
CaO	%	6.418	5.763
MgO	%	3.136	2.830
Al_2O_3	%	11.930	13.621
Na_2O	%	6.136	5.650
$C_{(Organic)}$	%	0.051	-
Ba		-	0.009
Be		-	<0.001

Assay	Composite Assays	
	Calculated	Assayed
Cd	-	<0.001
Co	-	0.009
Cr_2O_3	-	0.004
K_2O	-	0.310
La	-	<0.001
Mn	-	0.125
Mo	-	<0.001
P_2O_5	-	0.114
Sb	-	<0.001
Se	-	<0.005
SiO_2	-	51.800
Sn	-	<0.002
Te	-	<0.001
TiO_2	-	1.060
Y	-	<0.001
LOI	-	3.480

NOTES:

1. Calculated gold grade is average calculated head from 26 tests. All other calculated grades are calculated as weighted averages from the composite make-up (as listed in Table 5).

2. Average from head assays 5.45, 5.13, 4.17 and 4.17 g Au/tonne.

3. Assay not yet available.

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LADNER CREEK MINE
INITIAL FLOTATION TESTS ON LADNER CREEK OVERALL COMPOSITE
SUMMARY OF FLOTATION CONDITIONS

Test No.	Figure No.	Reagent Addition (g/tonne)													pH	Float Time (min)	Flotation Conditions
		SIBX	SIPX	PAX	CMC/ WW82	Na_2CO_3 or CaO	$CuSO_4$	208	242	5415	S5688	CAB29	MIBC	Pine Oil			
1	F-2			47.5				30					17.5		7.6	8	Initial test
2	F-4			47.5			400		26					17.5	7.8	8	Conditions previously used at Ladner Creek mill
3	F-5							92.5					15		7.8	8	Flotation without xanthate
4	F-5									92.5			15		8.4	8	Test No. 3 replacing 208 with Aerofloat 5415
5	F-5										92.5		15		8.4	8	Test No. 3 replacing 208 with Aerofloat 5688
6	F-1	47.5						30					17.5		8.4	8	Test No. 1 replacing PAX with SIBX
7	F-5					315 (Na_2CO_3)		92.5					10		9.2	8	Test No. 3 with Na_2CO_3
8	F-4					315 (Na_2CO_3)	400		88.5					15	9.1	8	Test No. 2 modified
11	F-1	47.5			250			30					17.5		8.4	8	Test No. 6 with CMC7LT /WW82 gangue depressant
12	F-6							92.5					15		8.4	8	Test No. 3 repeated with a 40 minute grind
13	F-6					175 (CaO)		92.5					15		9.5	8	Test No. 7 with 175 g CaO/t.
14	F-14											92.5	15			8	Test No. 3 replacing 208 with Procol CA829
16	F-7			42.5				60					32.5		8.1	15.5	Two stage roughing-scavenging using Test No. 1 conditions
17	F-2		47.5										17.5		8.1	8	Test No. 6 with SIPX and without 208
18	F-3		47.5		125			30					17.5		8.3	8	Test No. 11 with less CMC /WW82.

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LADNER CREEK MINE
INITIAL FLOTATION TESTS ON LADNER CREEK OVERALL COMPOSITE
SUMMARY OF FLOTATION CONDITIONS

Test No.	Figure No.	Reagent Addition (g/tonne)													pH	Float Time (min)	Flotation Conditions
		SIBX	SIPX	PAX	CMC/ WW82	Na_2CO_3 or CaO	$CuSO_4$	208	242	5415	S5688	CA829	MIBC	Pine Oil			
19	F-3		47.5		500			30					17.5		8.3	8	Test No. 11 with more CMC 767/WW82.
20	F-3		47.5		250			30					17.5			8	Test No. 11 with CMC 767 only (no WW82).
21	F-2		47.5					27.5					22.5		7.6	8	Test No. 6 with aeration prior to flotation.
22	F-3		50		125			30					22.5		8.1	8	Test No. 18 with aeration prior to flotation.
23			42.5		275			25					22.5		7.7	7.4	Test No. 11 roughing, adding cleaning, regrind, and scavenging.
24			35		275			20					17.5		8.2	5.7	Test No. 23 and gravity treating 1st cleaner conc.
25			42.5		275			25					22.5		8.3	6.6	Test No. 23 without regrind.
26						800	400		101				17.5		9.0	11	Test No. 8 roughing and Test No. 25 cleaning.

NOTES:

The primary grind in Tests No. 1 to 11 and Tests No. 13 to 26 was 77.1% minus 200 mesh and for Test No. 12 it was 94.5% minus 200 mesh.

TABLE 8

LADNER CREEK FLOTATION TESTWORK
SUMMARY OF FLOTATION REAGENTS

Abbreviation	Full Name	Description	Purpose
SIBX		Sodium isobutyl xanthate	Sulphide Collector
SIPX		Sodium isopropyl xanthate	Sulphide Collector
PAX		Potassium amyl xanthate	Sulphide collector
CMC	Metso CMC 7LT	Carboxyl methyl cellulose	Gangue depressant/dispersant
WW82	Quebracho WW82	Silicate	Gangue depressant/dispersant
CMC/WW82		50:50 mixture of CMC and WW82 with a solution strength totalling 1%	Gangue depressant/dispersant
Na_2CO_3		Sodium carbonate/Soda ash	pH adjustment
$CuSO_4$	$CuSO_4 \cdot 5H_2O$	Copper sulphate pentahydrate	Sulphidizer/activator
208	Aerofloat 208	Dithiophosphate	Collector/promoter
242	Aerofloat 242		Collector/promoter
5415	Cytec 5415	Modified thiocarbamate in isobutanol	Collector
S5688	Cytec S5688	Monothiophosphate salt in water	Collector
CA829	Procol CA829	Sodium mercaptobenothiazole	Sulphide collector
MIBC		Methyl isobutyl carbonyl	Frother
Pine Oil			Frother

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LADNER CREEK MINE
INITIAL FLOTATION TESTS ON LADNER CREEK OVERALL COMPOSITE
SUMMARY OF ROUGHER FLOTATION RESULTS

Test No.	Calculated Head			Total Rougher Concentrate						Total Bulk Rougher Tails		
				Grade			Recovery, %			Grade		
	g Au/t	% S	% As	g Au/t	% S	% As	Au	S	As	g Au/t	% S	% As
1	4.43	2.26	-	34.1	18.6	-	93.1	99.6	-	0.35	<0.01	-
2	4.75	2.42	-	31.0	17.1	-	92.4	99.6	-	0.42	<0.01	-
3	4.71	2.49	-	52.9	4.21	-	71.6	10.8	-	1.43	2.37	-
4	4.84	2.30	-	37.1	4.77	-	62.6	17.0	-	1.97	2.08	-
5	4.64	2.36	-	23.5	1.95	-	64.9	10.6	-	1.87	2.42	-
6	5.48	2.46	-	34.7	16.2	-	93.8	97.2	-	0.40	0.08	-
7	4.70	2.42	-	39.4	3.18	-	69.5	10.9	-	1.56	2.35	-
8	4.44	2.52	-	28.2	16.9	-	92.5	97.3	-	0.39	0.08	-
11	5.68	2.45	-	41.5	17.4	-	94.0	91.1	-	0.39	0.25	-
12	4.92	2.48	-	31.6	2.55	-	79.0	12.7	-	1.18	2.47	-
13	4.99	2.55	-	42.7	2.90	-	72.9	9.7	-	1.48	2.52	-
14	4.91	2.52	-	39.5	16.3	-	88.0	70.7	-	0.66	0.83	-
16	4.86	2.27	0.39	38.4	18.5	2.11	90.1	93.1	61.5	0.54	0.18	0.17
17	4.81	2.60	-	39.3	18.7	-	89.9	79.4	-	0.55	0.60	-

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LADNER CREEK MINE
INITIAL FLOTATION TESTS ON LADNER CREEK OVERALL COMPOSITE
SUMMARY OF ROUGHER FLOTATION RESULTS

Test No.	Calculated Head			Total Rougher Concentrate						Total Bulk Rougher Tails		
				Grade			Recovery, %			Grade		
	g Au/t	% S	% As	g Au/t	% S	% As	Au	S	As	g Au/t	% S	% As
18	4.90	2.29	-	38.4	17.6	-	90.7	89.1	-	0.52	0.28	-
19	4.62	2.33	-	50.9	11.1	-	78.1	33.9	-	1.09	1.66	-
20	4.82	1.90	-	39.8	16.7	-	87.4	92.5	-	0.68	0.16	-
21	4.87	2.99	-	26.1	16.9	-	92.7	97.5	-	0.43	0.09	-
22	3.84	3.16	-	20.5	17.8	-	89.2	94.0	-	0.50	0.23	-
23	4.67	2.40	0.31	59.3	15.5	1.0	80.2	40.9	19.7	0.99	1.52	0.27
24	4.30	-	-	60.7	-	-	79.9	-	-	0.92	-	-
25	4.76	1.87	-	119	20.3	1.2	82.3	35.7	-	0.87	1.24	0.22
26	4.92	2.40	0.32	28.0	14.2	-	93.1	96.5	-	0.41	0.10	-

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TABLE 10

LADNER CREEK MINE
INITIAL FLOTATION TESTS ON LADNER CREEK OVERALL COMPOSITE
SUMMARY OF CLEANER FLOTATION RESULTS

Test No.	Calculated Head					Ro. First Cleaner + Scav. First Cleaner Concentrates					Total Bulk Tails				
	g Au/t	g Ag/t	% S	% As	% C_{org}	g Au/t	g Ag/t	% S	% As	% C_{org}	g Au/t	g Ag/t	% S	% As	% C_{org}
16	4.86	-	2.27	0.39	-	185(1)	-	25.5	1.92	0.42	0.54	-	0.18	0.17	-
23	4.67	1.40	2.40	0.31	0.035	249	43	20.5	0.92	0.21	0.99	0.73	1.52	0.27	0.030
24	4.30	-	-	-	-	633(2)	-	-	-	-	0.92	-	-	-	-
25	4.76	1.48	1.87	-	-	276(3)	53.0	38.2	-	-	0.87	0.73	1.24	0.22	-
26	4.92	1.39	2.40	0.32	-	51.1(4)	10.4	24.1	3.57	-	0.41	0.51	0.10	-	-

% Distribution										
Test No.	Ro. First Cleaner + Scav. First Cleaner Concentrates					Bulk Tails				
	Au	Ag	S	As	C_{org}	Au	Ag	S	As	C_{org}
16	81.0(1)	-	23.9	10.4	-	9.9	-	6.9	38.5	-
23	70.4	40.4	11.3	3.9	7.9	19.8	49.1	59.1	80.3	80.4
24	67.6(2)	-	-	-	-	20.1	-	-	-	-
25	79.8(3)	49.3	28.3	-	-	17.7	47.9	64.3	-	-
26	91.3	65.6	88.2	97.0	-	6.9	30.6	3.5	1.8	-

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NOTES:
1. The rougher cleaner concentrate assayed 481 g Au/tonne and contained 62.3% of the gold in the feed; the scavenger cleaner concentrate assayed 60.5 g Au/tonne and contained 18.7% of the gold in the feed.
2. Rougher cleaner only.
3. Rougher first cleaner concentrate assayed 346 g Au/tonne and contained 52.8% of the gold in the feed.
4. Rougher first cleaner concentrate assayed 70.5 g Au/tonne and contained 89.1% of the gold in the feed.

TABLE 11

LADNER CREEK MINE
GRAVITY TESTS ON LADNER CREEK COMPOSITES

		Calculated Head		Wilfley Concentrate			Mozley Concentrate			Wilfley Tail
Test No.	Composite	g Au/t	% As	Weight (%)	Grade (g Au/t)	Recovery (%)	Weight (%)	Grade (g Au/t)	Recovery (%)	Grade (g Au/t)
9	Zone 1	3.52	0.32	5.68	34.3	55.3	0.001	14,946	4.0	1.67
9	Zone 2	5.70	0.30	5.80	61.3	62.3	0.009	4,408	6.9	2.28

TABLE 12

LADNER CREEK MINE
MAGNETIC SEPARATION TEST ON OVERALL COMPOSITE

					Magnetic Rougher Concentrate								
	Calculated Head					Grade				% Recovery			
Test No.	g Au/t	% Fe	% S	% As	Weight %	g Au/t	% Fe	% S	% As	Au	Fe	S	As
15	4.55	7.29	2.16	0.31	3.07	14.4	33.5	19.7	0.12	9.7	14.1	27.9	1.2

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FIGURE 1

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK MINE SAMPLES
GOLD CONTENT vs SULPHIDE SULPHUR CONTENT

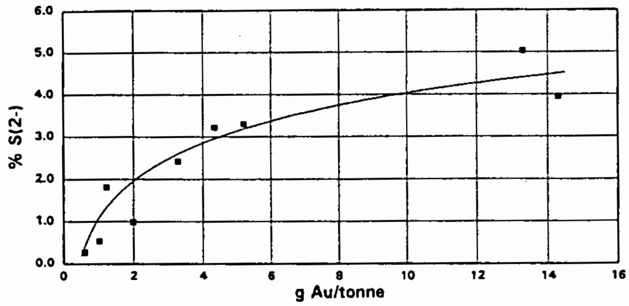

FIGURE 2

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK MINE SAMPLES
GOLD CONTENT vs ARSENIC CONTENT

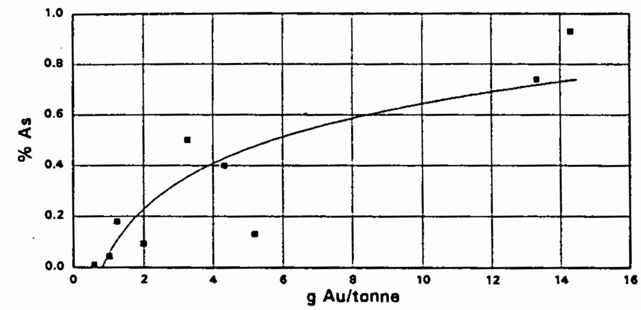

FIGURE 3

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK MINE SAMPLES
GOLD CONTENT vs IRON CONTENT

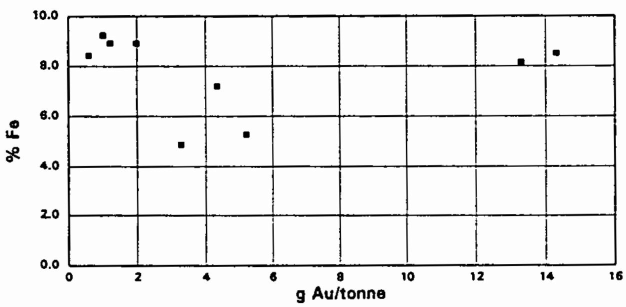

FIGURE 4

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK MINE SAMPLES
GOLD CONTENT vs COPPER CONTENT

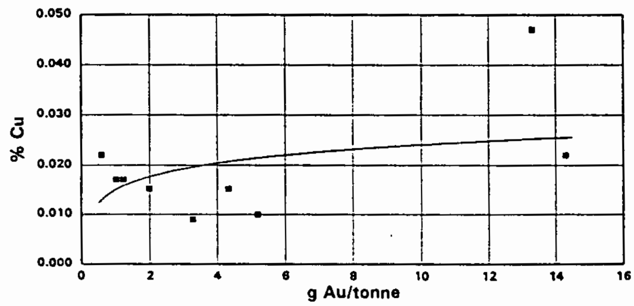

FIGURE 5

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK MINE SAMPLES
GOLD CONTENT vs ZINC CONTENT

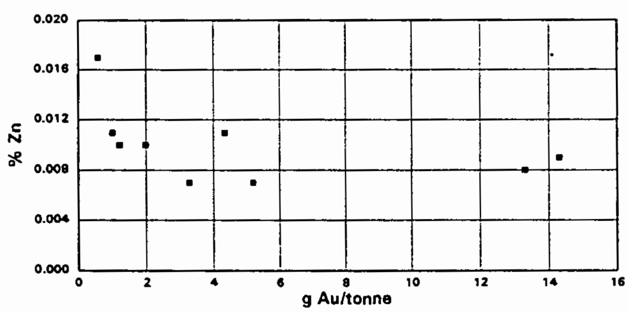

FIGURE 6

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK MINE SAMPLES
GOLD CONTENT vs MAGNESIUM CONTENT

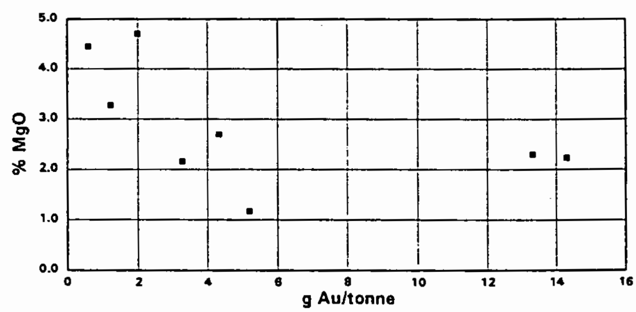

FIGURE 7

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK MINE SAMPLES
GOLD CONTENT vs ALUMINUM CONTENT

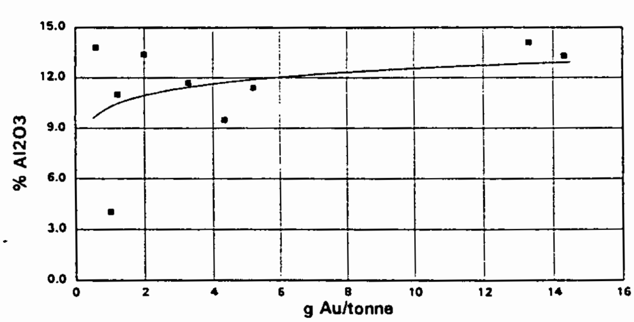

FIGURE 8

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK MINE SAMPLES
GOLD CONTENT vs SODIUM CONTENT

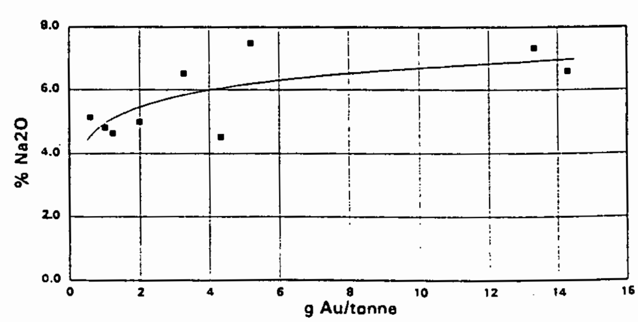

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FIGURE 9

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK MINE SAMPLES
GOLD CONTENT vs SILVER CONTENT

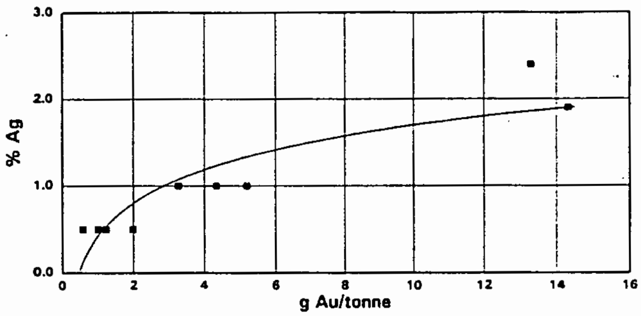

FIGURE 10

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK MINE SAMPLES
GOLD CONTENT vs TOTAL SULPHUR CONTENT

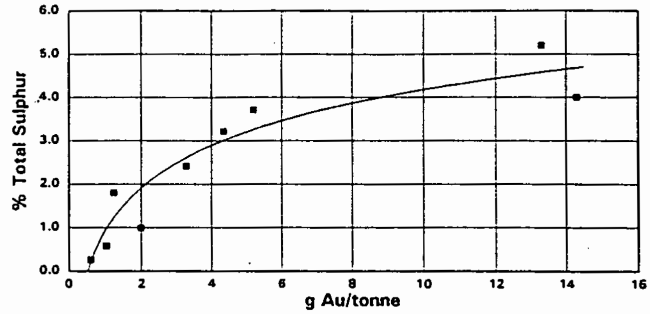

FIGURE 11

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK MINE SAMPLES
GOLD CONTENT vs ORGANIC CARBON CONTENT

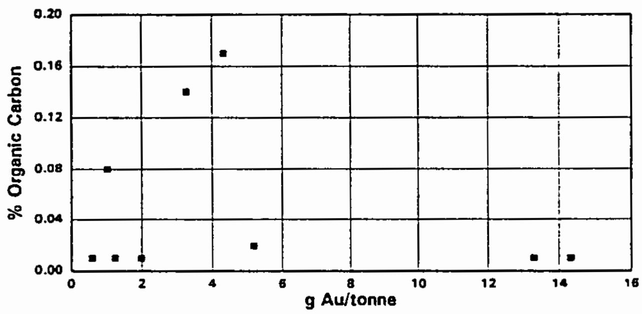

FIGURE 12

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK MINE SAMPLES
GOLD CONTENT vs CALCIUM CONTENT

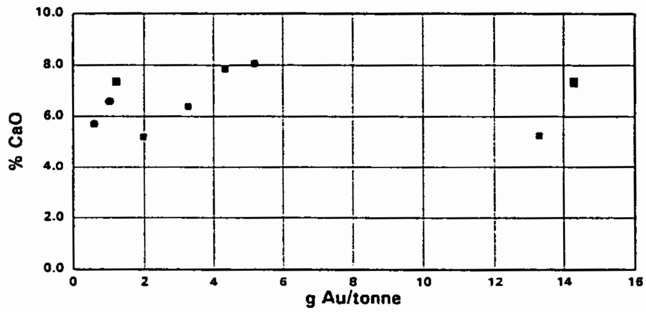

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FIGURE F-1

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
ROUGHER FLOTATION TESTS NO. 6 AND 11
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

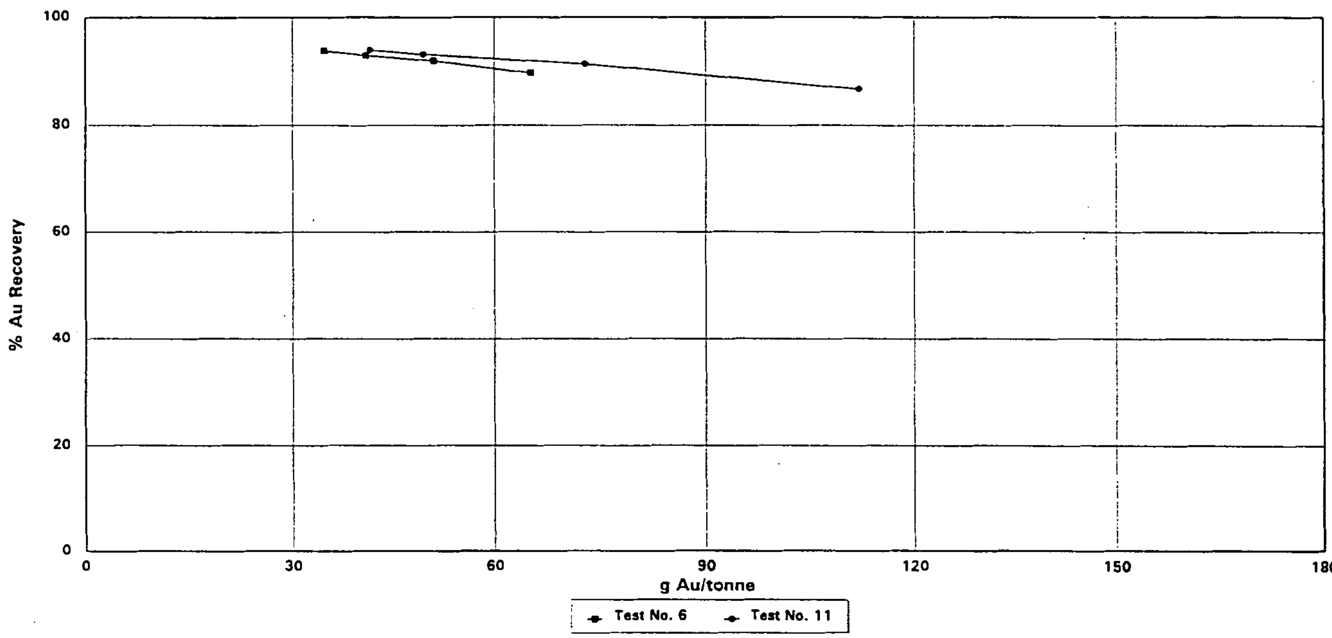

FIGURE F-2

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
ROUGHER FLOTATION TESTS NO. 6 AND 11 vs TESTS NO. 1, 17, AND 21
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

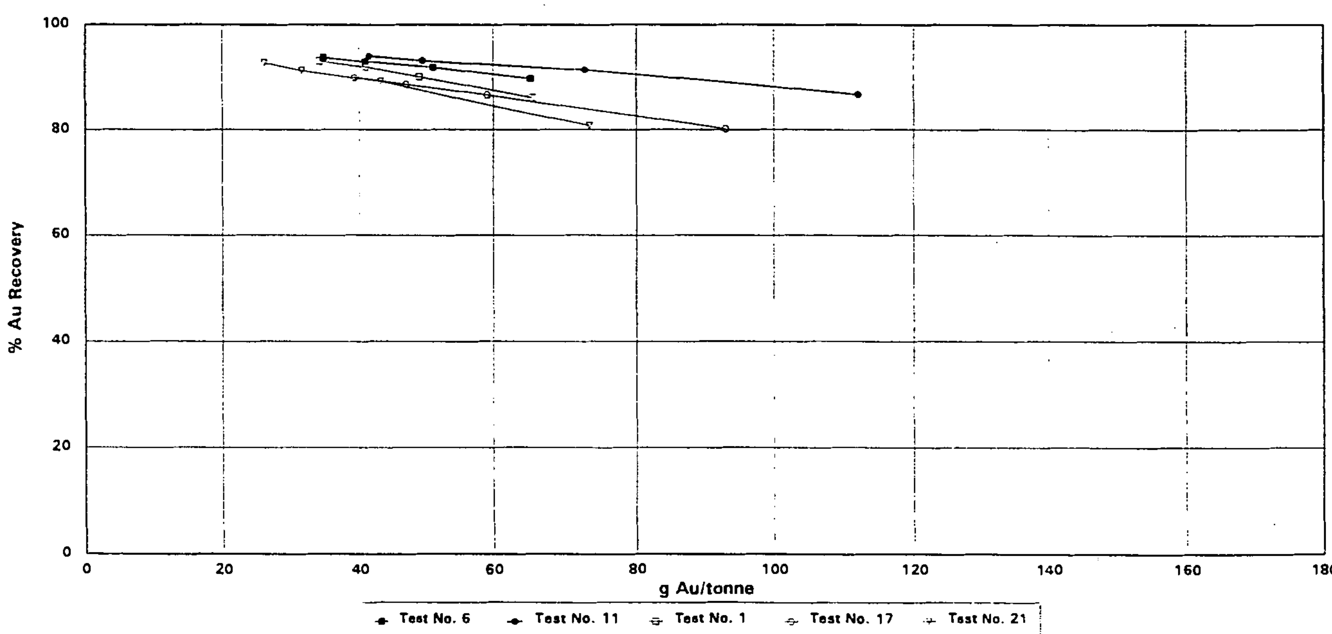

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FIGURE F-3

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
ROUGHER FLOTATION TESTS NO. 6 AND 11 vs TESTS NO. 18, 19, 20, AND 22
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

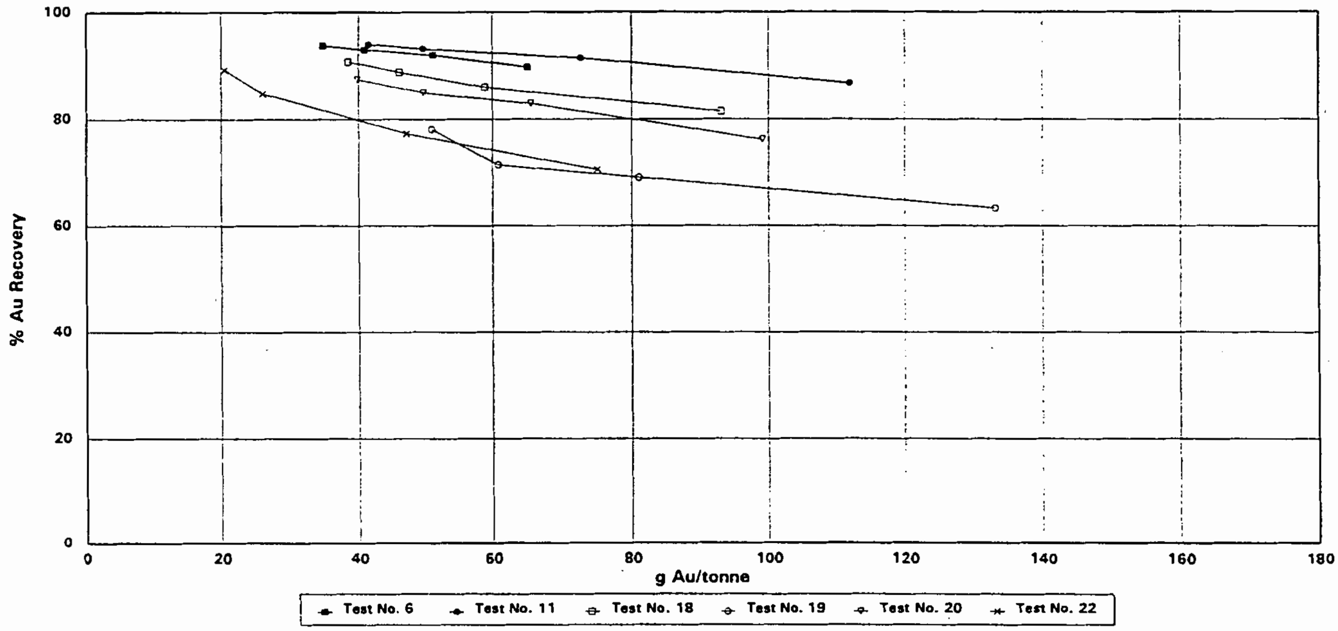

FIGURE F-4

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
ROUGHER FLOTATION TESTS NO. 6 AND 11 vs TESTS NO. 2, AND 8
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

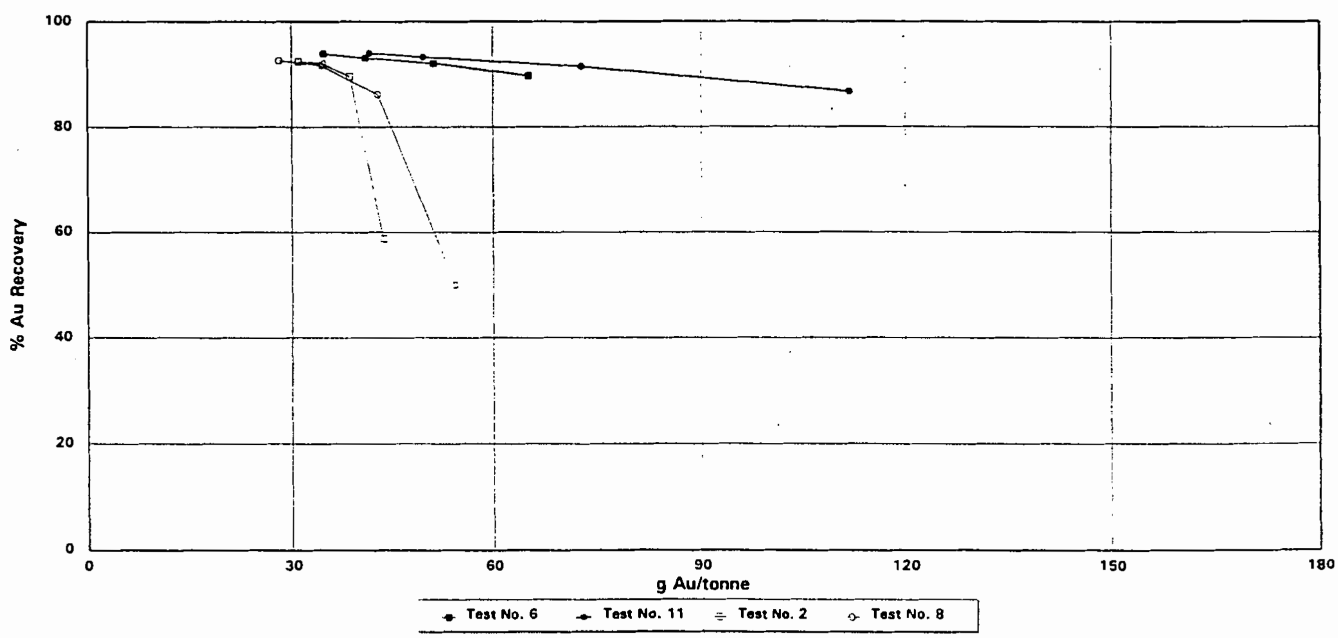

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FIGURE F-5

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
ROUGHER FLOTATION TESTS NO. 6 AND 11 vs TESTS NO. 3, 4, 5, AND 7
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

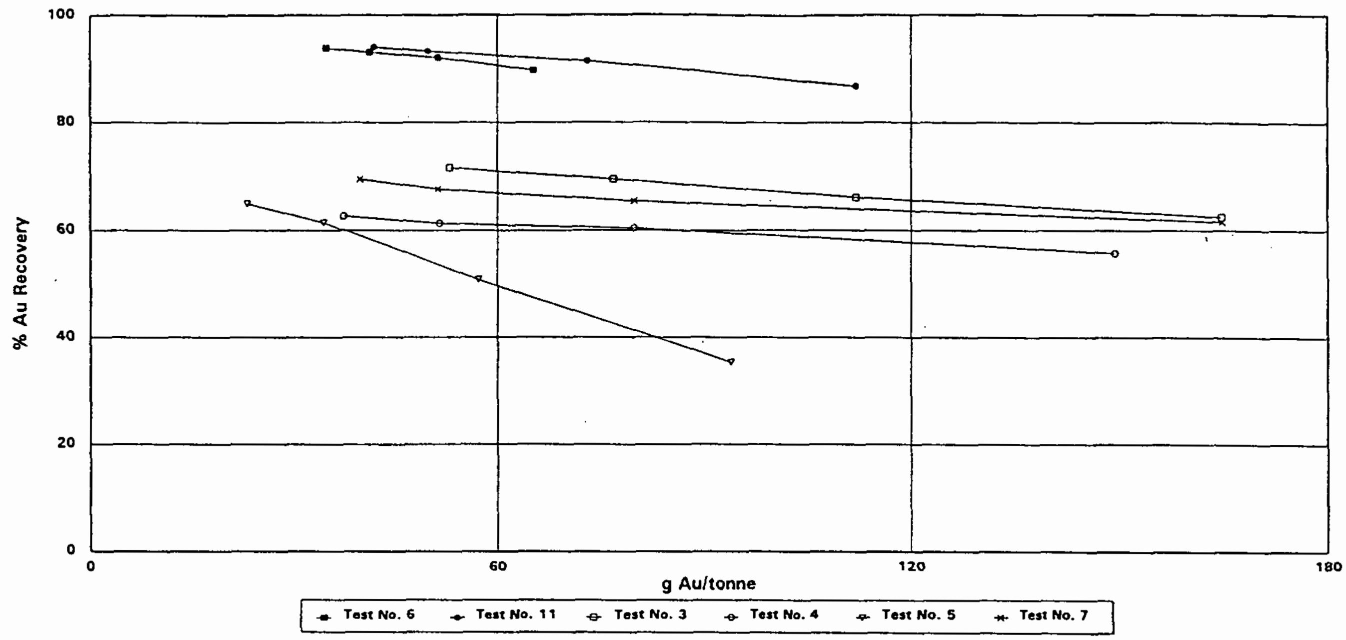
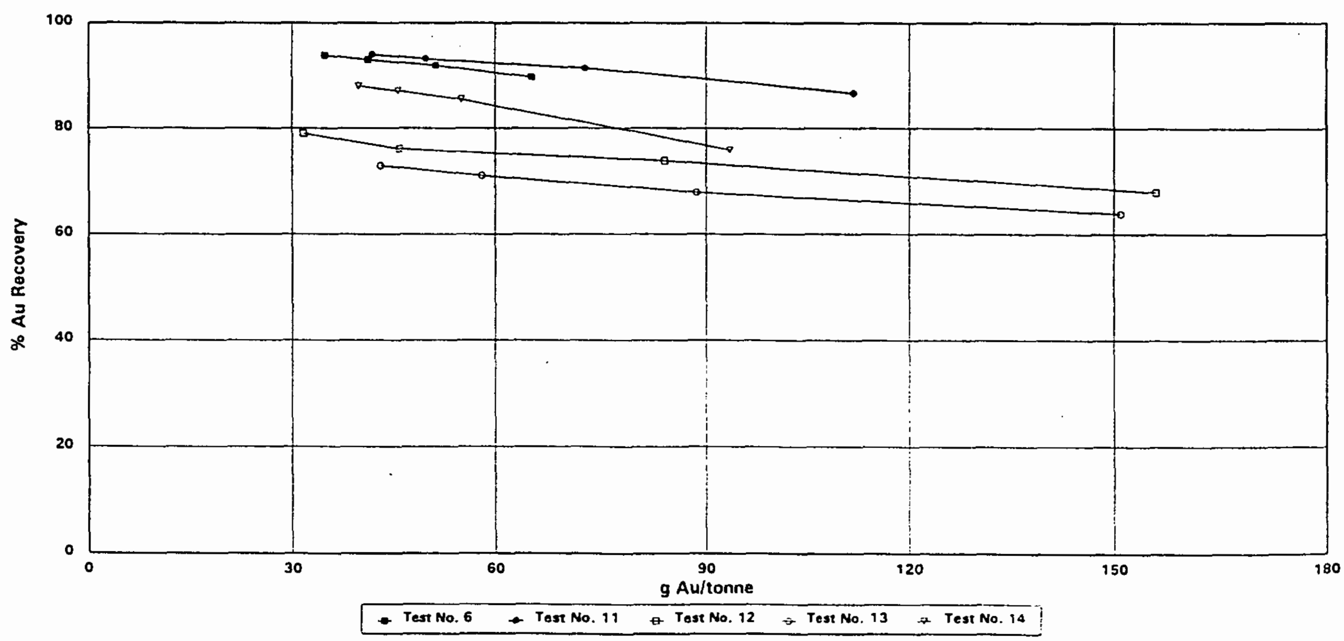


FIGURE F-6

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
ROUGHER FLOTATION TESTS NO. 6 AND 11 vs TESTS NO. 12, 13, AND 14
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE



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December 8, 1995

FIGURE F-7

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
ROUGHER FLOTATION TESTS NO. 6 AND 11 vs TEST NO. 16
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

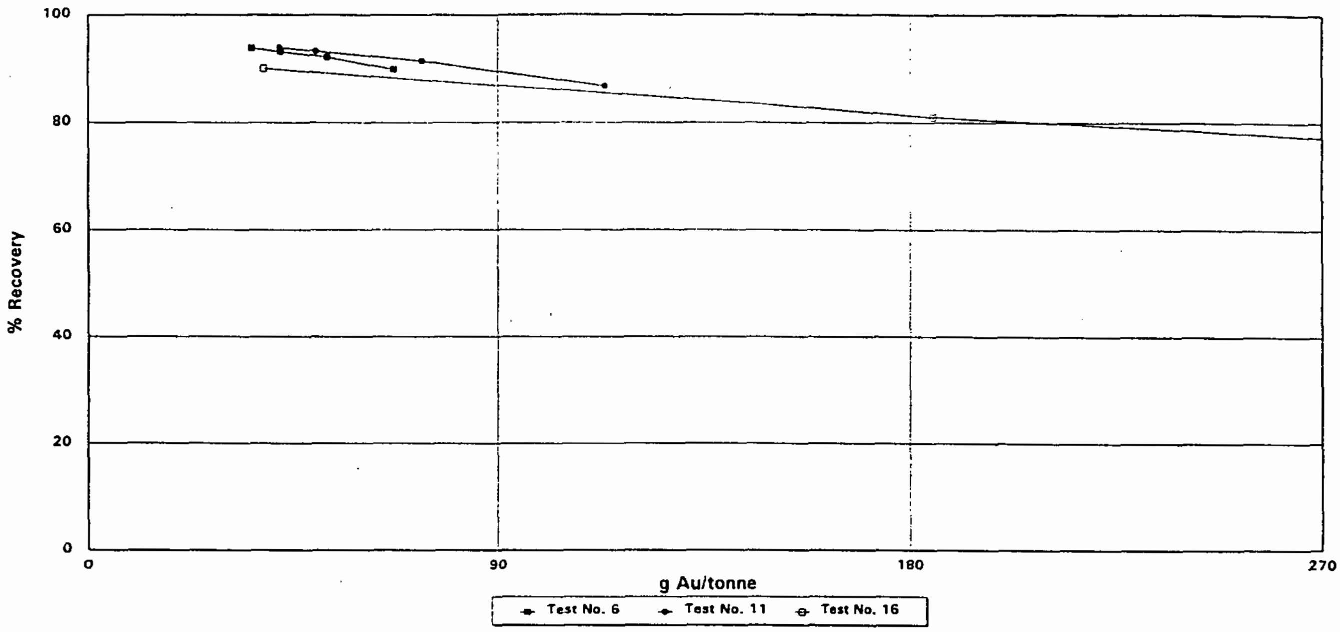

FIGURE F-8

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
ROUGHER FLOTATION TESTS NO. 6 AND 11 vs TEST NOS. 23, 24, 25, AND 26
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

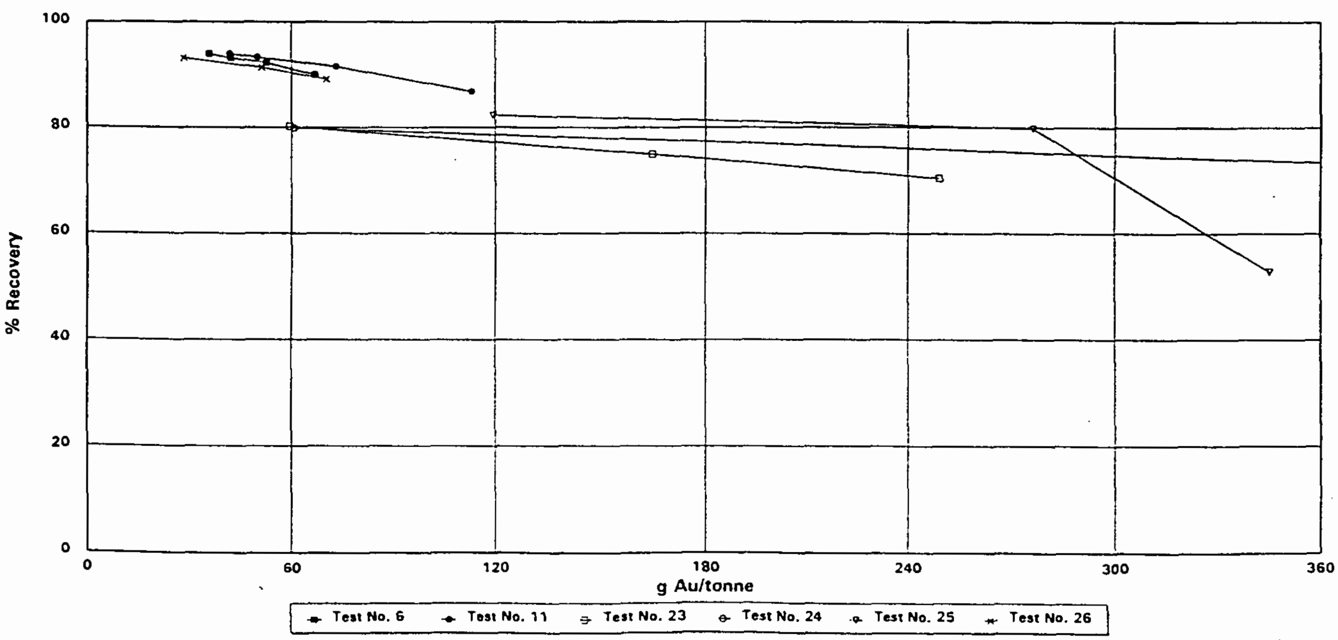

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FIGURE T-1

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
TEST NO. 6 BULK ROUGHER TAILS SIZE DISTRIBUTION
CUMULATIVE PERCENT PASSING vs PARTICLE SIZE

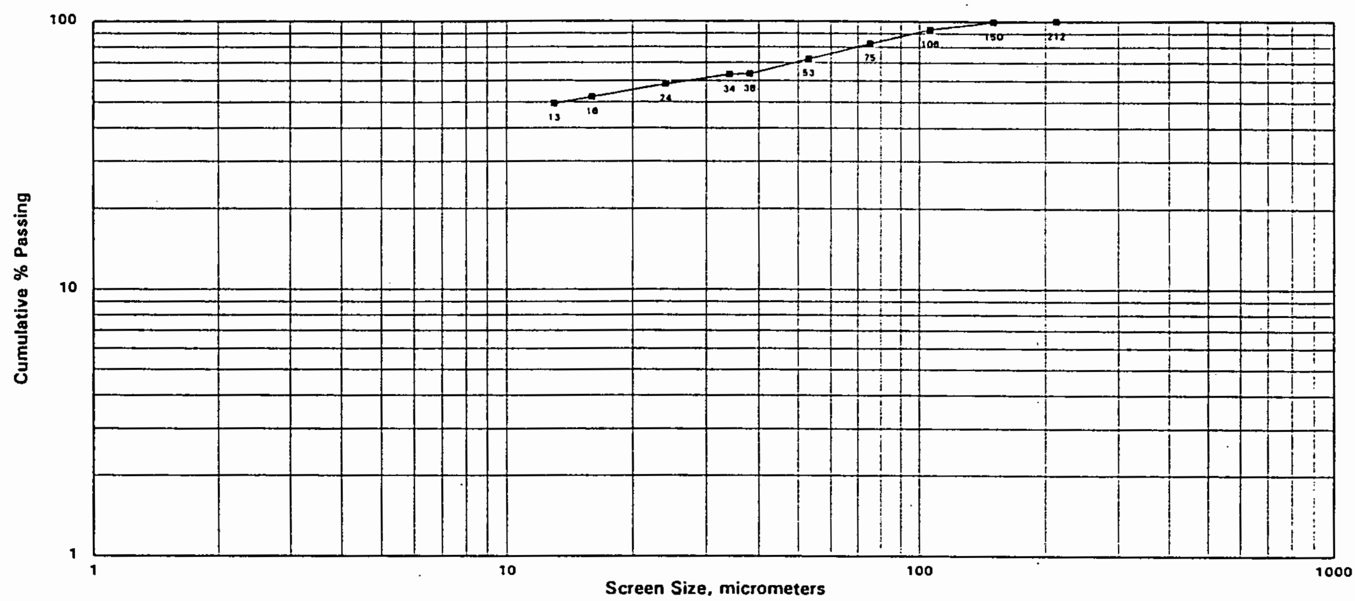
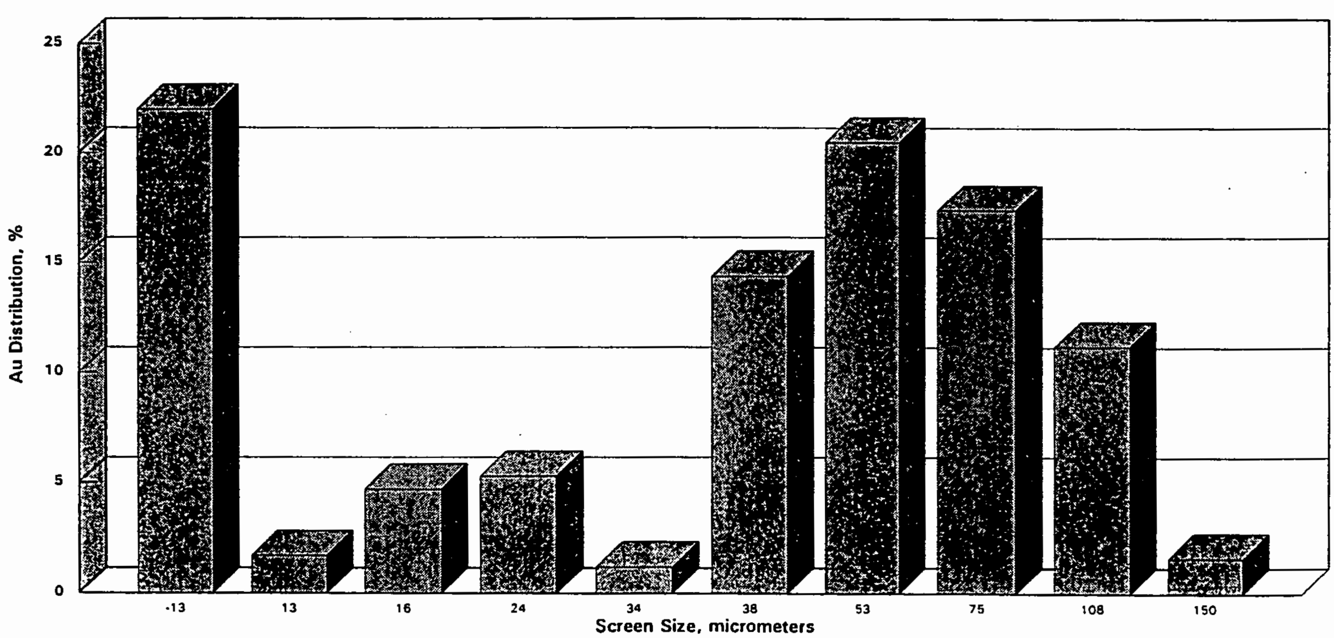


FIGURE T-2

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
GOLD DISTRIBUTION IN TEST NO. 6 BULK ROUGHER TAILS



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January 5, 1996

MELIS Project No. 319

Athabaska Gold Resources Ltd.
1185 West Georgia St. Suite 1200
Vancouver BC V6E 4E6

By Fax (604) 684-4601

Attention: Mr. Plen Dickson

RE: **Ladner Creek Gold Mine - Metallurgical Test Program**
Status Report December 9, 1995 to January 4, 1996

INTRODUCTION

Metallurgical testwork continued at Lakefield Research with the second phase of the testwork including:

- batch cleaner flotation tests,
- rougher concentrate cyanidation tests,
- whole ore cyanidation tests, and
- whole ore and flotation concentrate carbon-in-leach cyanidation tests.

Assays from the whole ore cyanidation tests conducted in the initial phase of testwork were received and are presented in this report.

SUMMARY

Flotation

Additional flotation testwork has shown that two flotation schemes are applicable to the Ladner Creek mineralization:

- flotation of separate high grade and low grade concentrates, and
- flotation of a single concentrate.

From the results obtained to date for flotation of two separate concentrates, a 64.5% recovery of gold to a high grade concentrate (the cleaner concentrate grade in Tests No. 16 and 35 averaged 534 g Au/tonne (15.58 oz Au/ton) and 0.62% As) appears achievable combined with a 21% recovery to a scavenger cleaner concentrate (the average scavenger cleaner concentrate grade of

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Tests No. 16 and 35 was 47 g Au/tonne (1.37 oz Au/ton) and 3.07% As). This represents an overall mine site target flotation recovery of 85.5%. Further processing of concentrate either by sale to a smelter or by cyanidation, would result in a lower net gold recovery.

Flotation of a single concentrate could achieve up to 85% gold recovery into a high grade concentrate (Test No. 40 achieved a 249 g Au/tonne (7.26 oz Au/ton) and 2.17% As). As above, further processing of concentrate would result in a lower net gold recovery.

Gravity Recovery of Gold from Flotation Concentrate

The average of four gravity recovery tests indicates that a 25% recovery of gold from flotation concentrate to a gravity concentrate may be achievable. This would provide the potential to produce bullion on site if sale of flotation concentrate is chosen as the best approach for the Ladner Creek mine. Actual plant operating conditions may lead to lower gravity recoveries than those achieved in testwork.

Cyanidation

Whole ore cyanidation using a carbon-in-leach process improved extractions to 90% from the 70% to 80% achieved in standard cyanidation tests.

Flotation/Cyanidation

Cyanidation of flotation concentrate using the carbon-in-leach process yielded an extraction of 92.8%. Combined with a 90% to 93% bulk flotation recovery, a flotation/cyanidation process using carbon-in-leach would represent a target overall gold recovery of 84%.

On-Going Work

Lock-cycle flotation testing of the two possible flotation schemes will be completed to quantify achievable recoveries and grades under conditions approaching steady state. Additional batch flotation tests will be done to see if any improvements can be made to results achieved to date. Cyanidation testing will continue to better define process conditions. Water treatment testwork will be initiated to identify process requirements for this component of the processing options.

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Prediction of Target Recoveries

An initial estimate of target recoveries was submitted in the MELIS fax dated December 22, 1995. Anticipated recoveries for the different processing options will be re-assessed upon completion of the testwork. The most economic option providing the best gold revenue will be quantified in combination with order of magnitude.

CYANIDATION TESTWORK

Initial cyanidation tests were completed on the overall composite to ascertain cyanidation conditions for Ladner Creek mineralization. A single cyanidation test was also completed on flotation concentrate.

A description of the conditions of the whole ore cyanidation tests is given in Table 1. The main purpose of these initial tests was to assess leach extraction under different leach processes. Results of the cyanidation tests are summarized in Tables 2 and 3. Gold extraction kinetic curves are compared in Figures CY-1 to CY-4.

The highest gold extraction from whole ore after 72 hours cyanidation time was obtained in Test No. C-5. A gold extraction of 78.5% was achieved from a calculated head of 4.23 g Au/tonne (0.123 oz Au/ton) leaving a leach residue of 0.91 g Au/tonne (0.027 oz Au/ton). Test No. C-5 combined pre-aeration with a two stage leach. The highest gold extraction from whole ore after 72 hours cyanidation time in a single stage leach was obtained in Test No. C-4. A gold extraction of 72.0% was achieved from a calculated head of 4.00 g Au/tonne (0.117 oz Au/ton) leaving a leach residue of 1.12 g Au/tonne (0.033 oz Au/ton). Test No. 4 evaluated pre-aeration with a single stage leach. The final gold extraction was higher in the two stage leach, Test No. C-5, than in the single stage leach, Test No. C-4 (78.5% Au extraction vs 72.0% Au extraction), as shown in Figure CY-1 where the gold extraction kinetic curves for both tests are plotted.

Single Stage Cyanidation Tests

The results of differing single stage cyanidation leach tests are compared in Figure CY-2. Test No. C-1 was a single stage leach with no pre-aeration. Tests No. C-2 and C-4 were single stage leach tests with pre-aeration. Test No. C-6 was a single stage leach with no pre-aeration conducted on the tails of a magnetic separator test on a sample of Ladner Creek overall composite. Results are summarized below:

Summary of Results - Tests No. C-1, C-2, C-4 and C-6 (Figure CY-2)											
			Leach Conditions								
Test No.	Pre-Aeration (hours)	Leach Time (hours)	$Pb(NO_3)_2$ (kg/t)	NaCN (kg/t)	CaO (kg/t)	Reducing Power (mL $KMnO_4$/L)	DO_2 (ppm)	Calculated Head (g Au/t)	% Au Extraction	Leach Residue (g Au/t)
C-1	0	72	0.375	0.42	0.60	80	8.9	4.53	69.5	1.38
C-2	2	72	0.375	0.23	1.40	55	9.2	3.95	70.9	1.15
C-4	2	72	0.375	0.27	1.10	45	9.2	4.00	72.0	1.12
C-6	0	72	0.375	0.20	0.46	40	9.2	3.95	80.5	0.77

Comparing Test No. C-6 with the three remaining tests plotted on Figure CY-2, cyanidation of the tails of a magnetic separator test on whole ore showed higher gold extractions than the cyanidation of the whole ore itself, 80.5% extraction vs an average of 70.8% for the other three tests. The magnetics removed through magnetic separation were primarily pyrite, arsenopyrite and pyrrhotite.

Tests No. C-1, C-2 and C-4, all conducted on whole ore, showed tightly bunched gold extraction kinetic curves. Tests No. C-2 and C-4, tests with pre-aeration, proved to have the highest gold extraction of the single stage leach tests on whole ore with respective residues of 1.15 g Au/tonne (0.034 oz Au/ton) and 1.12 g Au/tonne (0.033 oz Au/ton) being achieved, representing gold extractions of 72.0% and 70.9% being achieved respectively.

Two Stage Cyanidation Leach Tests

The results of differing two stage cyanidation leach tests are compared in Figure CY-3. Test No. C-3 was a two stage leach with no pre-aeration. Test No. C-5 was a two stage leach with pre-aeration. Results are summarized as follows:

Summary of Results - Tests No. C-3 and C-5 (Figure CY-3)													
		Leach Time (hours)		$Pb(NO_3)_2$ (kg/t)				Reducing Power (mL $KMnO_4$/L)		DO_2 (ppm)				
Test No.	Pre-Aeration (hours)	1st Stage	2nd Stage	1st Stage	2nd Stage	NaCN (kg/t)	CaO (kg/t)	1st Stage	2nd Stage	1st Stage	2nd Stage	Calculated Head (g Au/t)	% Au Extraction	Leach Residue (g Au/t)
C-3	-	24	48	0.375	0.190	0.30	0.64	80	60	9.8	9.2	4.60	76.6	1.08
C-5	2	24	48	0.375	0.190	0.20	1.29	-	20	9.3	9.2	4.23	78.5	0.91

There is some benefit in pre-aerating the slurry with lead nitrate ahead of cyanidation as observed in the gold extraction kinetic curves shown in Figure CY-3.

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Single Stage Cyanidation Leach Tests with Recycled Barren Solution

The results of whole ore single stage cyanidation leach tests with different amounts of recycled barren solution are reported in Tables 2 and 3 and compared in Figure CY-4. Test No. C-8 was a single stage leach with 75% barren solution recycle. Test No. C-9 was a single stage leach with 50% barren solution recycle. Test No. C-10 was a single stage leach with 25% barren solution recycle.

Barren solution was prepared by zinc powder precipitation of the pregnant solution prepared in Tests No. C-1 and C-3. This process of precipitation was labelled Test No. C-7. The barren solution prepared assayed 0.17 mg Au/L. Results of the three tests are summarized below:

Summary of Results - Tests No. C-8, C-9 and C-10 (Figure CY-4)										
			Leach Conditions							
Test No.	Pre-Aeration (hours)	Leach Time (hours)	$Pb(NO_3)_2$ (kg/t)	NaCN (kg/t)	CaO (kg/t)	Reducing Power (ml $KMnO_4$/L)	DO_2 (ppm)	Calculated Head (g Au/t)	% Au Extraction	Leach Residue (g Au/t)
C-8	0	72	*	*	*	*	*	5.17	72.5	1.35
C-9	0	72	*	*	*	*	*	4.98	69.9	1.30
C-10	0	72	*	*	*	*	*	5.01	70.6	1.30

* Assays not yet available

Tests No. C-8, C-9 and C-10 showed tightly bunched gold extraction kinetic curves. Although there appears to be a tendency for the tests with the higher percent barren solution recycle to have a higher final extraction, comparing leach residue grades there was no significant difference in leach extraction efficiency.

Carbon-In-Leach Cyanidation Leach Tests

The results of carbon-in-leach cyanidation leach tests are listed in Tables 4, 5 and 6 and compared in Figure CY-5. Tests No. C-11 (no pre-aeration) and C-12 (pre-aeration) were conducted on the whole ore composite sample. Test No. C-13 was conducted on flotation concentrate obtained from Flotation Test No. 32. The results are summarized as follows:

Summary of Results - Tests No. C-11, C-12 and C-13 (Figure CY-5)														
Test No.	Pre-Aeration (hours)	Leach Time		$Pb(NO_2)_3$ (kg/t)		NaCN (kg/t)		Reducing Power (mL $KMnO_4$/L)		DO_2 (ppm)		Calculated Head (g Au/t)	% Au Extraction	Leach Residue (g Au/t)
		1st Stage	2nd Stage	1st Stage	2nd Stage	1st Stage	2nd Stage	1st Stage	2nd Stage	1st Stage	2nd Stage			
C-11	-	24	24	0.375	0.190	0.56	0.72	60	30	8.0	8.4	5.17	89.0	0.57
C-12	4	24	24	0.375	0.190	0.36	0.60	40	25	6.4	8.0	5.98	90.4	0.57
C-13(1)	-	24	24	0.600	0.300	5.18	8.72	122	122	9.2	9.0	68.7	92.8	5.36
C-13(2)	-	-	-	0.30	0.015	0.26	0.43	-	-	-	-	-	78.0	-

NOTES:

1. Reagent consumptions are reported as kg/t of concentrate and the leach extraction refers to concentrate.
2. Reagent consumptions are reported as kg/t of whole ore and the leach extraction includes the flotation rougher recovery for the batch test.

The extraction curve for carbon-in-leach cyanidation of flotation concentrate (Test No. C-13) was higher than either extraction curve for carbon-in-leach cyanidation of whole ore (Tests No. C-11 and C-12). The final leach extraction for Test No. C-13 was 92.8%, higher than the leach extractions for Tests No. C-11 and C-12 which were 89.0% and 90.4% respectively. This can be expected since flotation concentrate is much higher in gold feed grade compared to whole ore. When comparing residue assays there appeared to be no benefit in using pre-aeration ahead of carbon-in-leach cyanidation of whole ore.

Cyanidation and Carbon-In-Leach Cyanidation Test Comparison

The results of the best straight cyanidation and carbon-in-leach cyanidation tests conducted on whole ore and concentrate are presented in Figure CY-6. Tests No. C-12 and C-13 were carbon-in-leach cyanidation tests, with Test No. C-12 conducted on whole ore and Test No. C-13 conducted on concentrate. Tests No. C-5 and C-6 were straight cyanidation tests, with Test No. C-5 conducted on whole ore and Test No. C-6 conducted on the tails of magnetic separation of whole ore. The results of these particular tests are summarized below.

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Athabaska Gold Resources Ltd.
Mr. Plen Dickson
January 5 1996

Summary of Results - Tests No. C-5, C-6, C-12 and C-13 (Figure CY-6)														
Test No.	Pre-Aeration (hours)	Leach Time		$Pb(NO_3)_2$ (kg/t)		NaCN (kg/t)		Reducing Power (mL $KMnO_4$/L)		DO_2 (ppm)		Calculated Head (g Au/t)	% Au Extraction	Leach Residue (g Au/t)
		1st Stage	2nd Stage	1st Stage	2nd Stage	1st Stage	2nd Stage	1st Stage	2nd Stage	1st Stage	2nd Stage			
C-5	2	24	48	0.375	0.190	0.20		-	20	9.3	9.2	4.23	78.5	0.91
C-6	0	72	-	0.375	-	0.20	-	40	-	9.2	-	3.95	80.5	0.77
C-12	4	24	24	0.375	0.190	0.36	0.60	40	25	6.4	8.0	5.98	90.4	0.57
C-13	4	24	24	0.600	0.300	5.18	8.72	122	122	9.2	9.0	68.7	92.8	5.36
C-13(1)	-	-	-	0.030	0.015	0.26	0.43	-	-	-	-	-	78.0	-

NOTES:

1. Reagent consumptions reported as kg/t of whole ore and the leach extraction includes the rougher recovery.

Carbon-in-leach cyanidation of whole ore proved superior to straight cyanidation of either whole ore or magnetic separation tails, with leach extractions of 90.4% being achieved vs 78.5% and 80.5% respectively.

The highest leach extraction was obtained in the carbon-in-leach cyanidation of flotation concentrate, Test No. 32, which achieved a leach extraction of 92.8%. The feed for Test No. C-13 was the rougher concentrate from batch flotation Test No. 32, which had a gold recovery of 84.1%. The overall extraction for this batch test, combining rougher recovery and leach extraction, was 78.0%.

GRAVITY CONCENTRATION OF ARSENOPYRITE

Test No. 24 consisted of a tabling test to collect as pure a sample of arsenopyrite from the whole ore as was reasonably possible. The purpose of the test was to identify the grade of gold associated with the arsenopyrite and thus determine whether the arsenic could be collected separately from the bulk of the gold. The results can be summarized as follows:

Summary of Results - Test No. 24			
Gravity Concentrate Grade			Calculated Distribution of Gold Associated with Arsenopyrite (%)
% As	% FeAsS	g Au/t	
33.0	71.7	483	29

It has been estimated that gold associated with arsenopyrite in the Ladner Creek mineralization is, on average, 29% of the gold available in the ore.

FLOTATION TESTWORK

Rougher Float Test of Flex 31 Collector

The collector Flex 31, supplied by Pro Spec Chemical Ltd. (a division of Charles Tennant & Co. (Canada) Ltd.), was tested in Test No. 33, and graphed against Tests No. 6 and 11 (which were described in detail in the status report dated December 8, 1995) in Figure F-9. The test results are summarized below:

Summary of Results - Tests No.6, 11 and 33 (Figure F-9)									
Test No.	Reagent Addition (g/tonne)					pH	Rougher Concentrate		Rougher Tails
	SIBX	CMC/WW82	208	Flex 31	MIBC		Grade (g Au/t)	Recovery (%)	Grade (g Au/t)
6	47.5		30		17.5	8.4	34.7	93.8	0.40
11	47.5	250	30		17.5	8.4	41.5	94.0	0.39
33				78	15	8.1	55.7	91.0	0.53

The higher bulk rougher concentrate grade achieved in Test No. 33 as compared to Tests No. 6 and 11 (55.7 g Au/tonne (1.62 oz Au/ton) vs 41.8 g Au/tonne (1.22 oz Au/ton) and 34.7 g Au/tonne (1.01 oz Au/ton) indicates that the Flex 31 collector warranted further testing.

Cleaner Flotation Tests

Batch cleaner flotation tests were continued on the Ladner Creek overall composite to ascertain flotation conditions for the Ladner Creek mineralization.

A description of the conditions of the batch flotation tests completed in the period covered by this status report is given in Table 7 and a full description of the reagents used in the flotation tests is listed in Table 8. The primary purpose of these batch flotation tests was to assess cleaner/scavenger recoveries under different reagent schemes and processes. Results of the rougher flotation tests are summarized in Table 9. Results of the cleaner flotation tests are summarized in Table 10.

Investigation of Aerofloat 242

Four cleaner flotation tests were done to investigate the properties of Aerofloat 242 as combined with Na_2CO_3 and $CuSO_4$. Results are listed in Tables 9 and 10 and depicted graphically in Figure F-10. Tests of the performance of Aerofloat 242 are summarized as follows:

Summary of Flotation Results - Tests No. 26, 36, 37, 38 and 40 (Figure F-10)									
		Float Time (min)				Ro Cln + Cln Scav Con			
							Grade		
Test No.	Reagents	Ro	Cl	Scav	Regrind	% Au Recovery	g Au/t	% As	Bulk Tails (g Au/t)
26	Na_2CO_3, $CuSO_4$, 242, MIBC	8	1.3	1.7	No	91.3	51.1	3.57	0.41
36	$CuSO_4$, 242, MIBC	8	1.5	2	Ro Conc	83.3	55.1	3.37	0.50
37	PAX, Na_2CO_3, $CuSO_4$, 242, MIBC	6	1.5	6	Ro Conc	74.8	69.7	3.81	0.38
38	242, MIBC	8	1.5	2	Ro Conc	72.3	75.1	0.57	1.27
40	Flex 31, MIBC	8	2	5.5	Ro Conc	80.7	249	2.17	0.51

Though giving reasonable recoveries (the lowest rougher cleaner/scavenger cleaner recovery was 72.3% for Test No. 38), the concentrate grade was low for all tests using Aerofloat 242. The highest concentrate grade achieved was 75.1 g Au/tonne (2.19 oz Au/ton) in Test No. 38. In comparison, Test No. 40 using Flex 31 resulted in a rougher cleaner and cleaner scavenger recovery of 80.7% at a concentrate grade of 249 g Au/tonne (7.26 oz Au/ton). As evident from the grade/recovery curves, the use of Aerofloat 242(Tests No. 36, 37 and 38) resulted in lower recoveries than that achievable with Flex 31 (Test No. 40) at equivalent concentrate grades.

Flotation of Separate High Grade and Low Grade Concentrates

Three cleaner flotation tests were performed to investigate the characteristics of a two concentrate (high grade and low grade) flotation circuit. Results are listed in Tables 9 and 10, depicted graphically in Figure F-11 and summarized below:

Summary of Results - Tests No. 16, 28, 35 and 40 (Figure F-11)									
		Float Time (min)				Ro Cln + Cln Scav Con			
							Grade		
Test No.	Reagents	Ro	Cl	Scav	Regrind	% Au Recovery	g Au/t	% As	Bulk Tails (g Au/t)
16	208, MIBC, PAX (Scav only)	4	-	4	Scav Con	81.0	185	1.92	0.54
28	SIBX, 208, MIBC	4	7.5	5.5	Scav Con	76.0	251	2.50	0.67
35	PAX, 208, MIBC	4	6	5.5	Scav Con	85.8	127	3.15	0.38
40	Flex 31, MIBC	8	2	5.5	Ro Con	80.7	249	2.17	0.51

Tests No. 16, 28 and 35 each resulted in the production of a separate high grade concentrate and low grade concentrate. A single concentrate was produced in Test No. 40. The comparison of these tests is conducted between combined concentrates. Test No. 16, which was reported in the December 8, 1995 status report, was the precursor to both Tests No.28 and 35.

As shown by the grade/recovery curves in Figure F-11, of Tests No. 16, 28 and 35, Test No. 35 which used a finer primary grind, had the best combination of recovery (85.8%) and concentrate grade [127 g Au/tonne (3.70 oz Au/ton)]. Test No. 40, which is presented in Figure F-11 for comparison purposes, also yielded excellent results showing a similar grade/recovery curve.

Flotation With Two Untried Collectors

Test No. 34 was a cleaner flotation test using AC829, Test No. 40 was a cleaner flotation test using Flex 31. Results are listed in Tables 9 and 10, depicted graphically in Figure F-12, and summarized below:

Summary of Flotation Results - Tests No. 39 and 40 (Figure F-12)									
						Ro Cln + Cln Scav Con			
		Float Time (min)					Grade		
Test No.	Reagents	Ro	Cl	Scav	Regrind	% Au Recovery	g Au/t	% As	Bulk Tails (g Au/t)
39	AC829, MIBC	6	2	4	Ro Con	76.2	154	4.53	0.64
40	Flex 31, MIBC	8	2	5.5	Ro Con	80.7	249	2.17	0.51

Test No. 40 with Flex 31 shows obvious superiority over Test No. 39 with AC829, with 4.5% higher recovery and a higher grade in the concentrate (249 g Au/tonne (7.26 oz Au/ton) versus 154 g Au/tonne (4.42 oz Au/ton)), and better selectivity against arsenic (2.17% As in concentrate versus 4.53% As). Repeating Test No. 40 with a finer primary grind was shown to improve recoveries (results will be reported in the next status report).

Tests Using Xanthate/ 208 - First Series

Tests No. 23, 24, 25 (all detailed in the status report dated December 8, 1995) and Test No. 34 investigated the performance of Aerofloat 208. Results are listed in Tables 9 and 10, depicted graphically in Figure F-13, and summarized below:

Summary of Flotation Results - Tests No. 23, 24, 25, 34 and 40 (Figure F-13)									
Test No.	Reagents	Float Time (min)			Regrind	Ro Cln + Cln Scav Con			Bulk Tails (g Au/t)
		Ro	Cl	Scav		% Au Recovery	Grade g Au/t	Grade % As	
23	SIPX, CMC/WW82, 208, MIBC	4	1.7	1.7	Ro Con	75.3	165	0.90	0.96
24	SIPX, CMC/WW82, 208, MIBC	4	1.7	-	Ro Con	67.6[1]	633	-	0.85
25	SIPX, CMC/WW82, 208, MIBC	4	1.3	1.3	Ro Con	80.1	276	-	0.85
34	SIPX, CMC/WW82, 208, MIBC	6	2	2	No	90.0	105	5.48	0.49
40	Flex 31, MIBC	8	2	5.5	Ro Con	80.7	249	2.17	0.51

NOTES:

1. Rougher cleaner concentrate only.

In a direct comparison between Test No. 34 the best xanthate/208 test, and Test No. 40, the Flex 31 test, Test No. 34 achieved a 9.3% higher recovery, though at a lower concentrate gold grade (105 g Au/tonne (3.06 oz Au/ton) compared to 249 g Au/tonne (7.26 oz Au/ton)) and a significantly higher arsenic grade (5.48% As versus 2.17% As). Grade/recovery curves were similar in both tests. Regrinding of rougher concentrate in Test No. 34 would be expected to yield some improvement in concentrate grade.

Tests Using Xanthate/208 - Second Series

Tests No. 27, 28 and 31 incorporated gravity separation of the first cleaner concentrate on the Mozley gravity separation table. Test No. 30 was a further investigation of the reagents used in Test No. 11, and Test No. 32 used the same procedure as Test No. 31 on a 10 kg charge to provide rougher concentrate for Cyanidation Test No. C-13. Results are tabulated in Tables 9 and 10, depicted graphically in Figures F-14 and F-16, and summarized below:

Summary of Flotation Results - Tests No. 27, 28, 30, 31, 32 and 40 (Figures F-14 and F-16)									
Test No.	Reagents	Float Time (min)			Regrind	Ro Cln + Cln Scav Con			Bulk Tails (g Au/t)
		Ro	Cl	Scav		% Au Recovery	Grade		
							g Au/t	% As	
27	SIBX, 208, CMC/WW82, MIBC	6	1.7	-	Ro Con	61.0	268	2.25	0.62(1)
28	SIBX, 208, CMC/WW82, MIBC	4	7.5	5.5	Scav Con	76.0(2)	251(2)	2.50(2)	0.67
30	SIBX, 208, CMC/WW82, MIBC	6	3.7	3	Ro Con	60.0	179	2.88	0.54
31	SIBX, 208, CMC/WW82, MIBC	6	1.7	2	Ro Con	60.2(1)	216(1)	2.78	0.58
32	SIBX, 208, CMC/WW82, MIBC	6	-	2	Ro Con	84.1(3)	74.0(3)	-	0.63(1)
40	Flex 31, MIBC	8	2	5.5	Ro Con	80.7	249	2.17	0.51

NOTES:

1. Rougher first cleaner only.
2. Combined high grade and low grade concentrate from a two-stage float.
3. Bulk rougher recovery and grade.

The grade/recovery curves for Tests No. 27, 28, 30 and 31 cluster together in Figures F-14 and F-16. The grade/recovery curve for Test No. 32, though a rougher flotation curve, is included on Figures F-14 and F-16 for comparison purposes. It is readily apparent that the grade/recovery curve for Test No. 40 using Flex 31 is superior to those for Tests No. 27, 28, 30, 31 and 32.

Summary of Best Results

The results of the best tests, Tests No. 16, 26, 34, 35 and 40, detailed in Table 11, and depicted graphically in Figure F-15 are summarized below:

Summary of Flotation Results - Tests No. 16, 26, 34, 35 and 40 (Figure F-15)						
Test No.	Reagents	Regrind	Ro Cln + Cln Scav Con			Bulk Tails (g Au/t)
			% Au Recovery	Grade		
				g Au/t	% As	
16	PAX, 208, MIBC	Scav Con	81.0	185	1.92	0.54
26	$CuSO_4$, Na_2CO_3, 242, MIBC	No	91.3	51.1	3.57	0.41
34	SIPX, CMC/WW82, 208, MIBC	No	90.0	105	5.48	0.49
35	PAX, 208, MIBC	Scav Con	85.8	127	3.15	0.38
40	Flex 31, MIBC	Ro Con	80.7	249	2.17	0.51

.../13

The grade/recovery curves for these tests all fall close together as shown in Figure F-15. Of these tests, Test No. 35, with a finer primary grind compared to Test No.16, was chosen as the best of the flotation tests where a separate high grade and low grade concentrate is produced.

For production of a single concentrate Test No.40 using Flex 31 collector was chosen as the better test because of the much lower arsenic content in the concentrate (2.17% As compared to 5.48 % As in Test No. 34).

GRAVITY SEPARATION OF GOLD FROM FLOTATION CONCENTRATE

Flotation concentrates produced in Tests No. 27, 28 and 31 were processed over a Mozley Table Concentrator to check on the potential of on-site smelting of gold bullion from gravity concentrate. Results are summarized in Table 12. Figure F-16, an expansion of Figure F-14, expresses the Mozley table concentrate grades and recoveries graphically. The range of gravity recovery was 12.1% to 37.4% of the gold in the feed for an average of 25%. The gravity concentrate grade ranged from 0.36% Au to 12.79% Au, for an average of 4.19% Au. Further upgrading may be necessary under plant operating conditions to further increase the gravity concentrate grade prior to refining.

ACID GENERATION TEST

As summarized in Table 13, the overall composite prepared from the Ladner Creek mine samples has been shown to be non-acid generating, having a high natural paste pH (pH 9.2).

ON-GOING TESTWORK

On-going testwork has been described in our fax of January 3, 1996. In summary, current and planned work includes:

- lock-cycle flotation tests,
- additional batch flotation tests including variability tests,
- flotation concentrate cyanidation tests including variability tests,
- whole ore variability cyanidation tests,
- flotation testing of a composite sample of existing tailings,
- flocculant/settling tests, and
- waste treatment testwork.

Environmental data will also be generated as part of the test program. Requirements for this are to be advised by Athabaska's environmental consultant.

Yours truly,

MELIS ENGINEERING LTD.

L.A. Melis, P.Eng.
President

B.C. Fielder
Senior Process Engineer

LAM/BCF:mlb/cls

cc: Tom Adamson
Jim Kermeen

(LR0196a5.319 Status Rep.2)

MELIS ENGINEERING LTD.
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January 5, 1996

TABLE 1

LADNER CREEK MINE
INITIAL CYANIDATION LEACH TESTS ON LADNER CREEK OVERALL COMPOSITE
SUMMARY OF TEST CONDITIONS

Test No.	Pre-Aeration (hours)	Leach Time (hours)		Leach Reagents							
				$Pb(NO_3)_2$ (kg/t)		NaCN (kg/t)	CaO (kg/t)	Reducing Power (mL $KMnO_4$/L)		DO_2 (ppm)	
		1st Stage	2nd Stage	1st Stage	2nd Stage			1st Stage	2nd Stage	1st Stage	2nd Stage
C-1	-	72	-	0.375	-	0.42	0.60	80	-	8.9	-
C-2	2	72	-	0.375	-	0.23	1.40	55	-	9.2	-
C-3	-	24	48	0.375	0.190	0.30	0.64	80	60	9.8	9.2
C-4	2	72	-	0.375	-	0.27	1.10	45	-	9.2	-
C-5	2	24	48	0.375	0.190	0.20	1.29	-	20	9.3	9.2
C-6 (1)	-	72	-	0.375	-	0.20	0.46	40	-	9.2	-
C-8 (2)	-	72	-	-	-	-	-	-	-	-	-
C-9 (3)	-	72	-	-	-	-	-	-	-	-	-
C-10 (4)	-	72	-	-	-	-	-	-	-	-	-

NOTES:

1. Single stage leaching of magnetic separation tanks.
2. Single stage leaching with 75% barren solution recycle.
3. Single stage leaching with 50% barren solution recycle.
4. Single stage leaching with 25% barren solution recycle.

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TABLE 2

LADNER CREEK MINE
INITIAL CYANIDATION LEACH TESTS ON LADNER CREEK OVERALL COMPOSITE
SUMMARY OF RESULTS

Test No.	Calculated Head (g Au/t)	Pregnant Solution						Leach Residue Grade (g Au/t)
		Grade (mg Au/L)			Gold Extraction, %			
		24 h	48 h	72 h	24 h	48 h	72 h	
C-1	4.53	1.54	1.52	1.49	70.2	70.0	69.5	1.38
C-2	3.95	1.37	1.37	1.34	70.6	71.7	70.9	1.15
C-3	4.60	1.46	0.26 [1]	0.25	65.2	76.6	76.6	1.08
C-4	4.00	1.38	1.46	1.38	70.2	75.3	72.0	1.12
C-5	4.23	1.28	0.17 [1]	0.16	69.6	78.6	78.5	0.91
C-6	3.95	1.56	1.56	1.52	80.9	81.7	80.5	0.77
C-8	5.17	1.91	1.89	1.79	74.2	74.2	72.5	1.35
C-9	4.98	1.86	1.85	1.76	73.4	73.8	69.9	1.30
C-10	5.01	1.84	1.84	1.77	72.6	73.6	70.6	1.30

NOTES:

1. Tests No. C-3 and C-5 comprised two-stage leaching. The leach slurry in Tests No. C-3 and C-5 was filtered and the pregnant solution replaced with water after 24 hours of leach time.

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TABLE 3

LADNER CREEK MINE
INITIAL CYANIDATION LEACH TESTS ON LADNER CREEK OVERALL COMPOSITE
SUMMARY OF SOLUTION ASSAYS

Test No.	24 Hour Pregnant Solution (mg/L)					48 Hour Pregnant Solution (mg Au/L)	72 Hour Pregnant Solution (mg/L)				
	Au	Cu	Fe	CNO	CNS		Au	Cu	Fe	CNO	CNS
C-1	1.54					1.52	1.49	7.58	12.5	<50	57.7
C-2	1.37					1.37	1.34	7.44	3.79	<50	38.9
C-3	1.46	4.23	2.96	<10	52.0	0.26	0.25	1.70	2.54	<50	10.8
C-4	1.38					1.46	1.38	7.71	3.76	<50	42.3
C-5	1.28	3.73	1.05	10	30.0	0.17	0.16	1.85	1.61	<50	8.58
C-6	1.56					1.56	1.52	8.79	0.83	<50	19.6
C-7	Results given below										
C-8	1.91					1.89	1.79	9.04	10.7	-	73.0
C-9	1.86					1.85	1.76	9.86	7.93	-	77.0
C-10	1.84					1.84	1.77	8.11	6.14	-	64.0

Test No.	Barren Solution (mg/L)					
	Au	Cu	Fe	CNO	CNS	Zn
C-7	0.17	4.52	3.95	<50	34.9	23.1

Test No. C-7 was the preparation of barren solution by zinc precipitation of the pregnant solutions obtained in Tests No. C-1 and C-3.

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TABLE 4

LADNER CREEK MINE
INITIAL CARBON-IN-LEACH CYANIDATION TESTS ON LADNER CREEK OVERALL COMPOSITE
SUMMARY OF TEST RESULTS

				First Stage						Second Stage					
Test No.	Pre-Aeration (hours)	NaCN (g/L)	pH	Leach Time (hours)	$Pb(NO_3)_2$ (kg/t)	NaCN (kg/t)	CaO (kg/t)	Reducing Power (mL $KMnO_4$/L)	DO_2 (ppm)	Leach time (hours)	$Pb(NO_3)_2$ (kg/t)	NaCN (kg/t)	CaO (kg/t)	Reducing Power (mL $KMnO_4$/L)	DO_2 (ppm)
C-11	0	0.5	10 to 10.5	24	0.375	0.56	0.56	60	8.0	24	0.190	0.72	0.98	30	8.4
C-12	4	0.5	10 to 10.5	24	0.375	0.36	0.64	40	6.4	24	0.190	0.60	1.00	25	8.0
C-13(1)	4	2.0	11 to 11.5	24	0.600	5.18	2.18	122	9.2	24	0.300	8.72	3.14	122	9.0
C-13(2)	-			-	0.030	0.26	0.11	-	-	-	0.015	0.43	0.16	-	-

NOTES:

1. Consumptions of $Pb(NO_3)_2$, NaCN and CaO reported per tonne of concentrate.

2. Consumptions of $Pb(NO_3)_2$, NaCN and CaO reported per tonne of ore.

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TABLE 5

LADNER CREEK MINE
INITIAL CARBON-IN-LEACH CYANIDATION TESTS ON LADNER CREEK OVERALL COMPOSITE
SUMMARY OF CYANIDATION TEST SOLUTION ASSAYS

Test No.	24 Hour Solution (mg/L)						48 Hour Solution (mg/L)					
	Au	Cu	Fe	CNO	CNS	As	Au	Cu	Fe	CNO	CNS	As
C-11	0.010	4.49	7.70	35.5	49.3	<1	-	1.80	2.38	55.3	10.4	<1
C-12	0.010	5.55	0.76	37.4	43.4	<1	-	2.65	0.78	11.3	6.58	<1
C-13	0.11	507	191	42.7	905	5.00	-	206	129	33.0	811	5

TABLE 6

LADNER CREEK MINE
SUMMARY OF INITIAL CARBON-IN-LEACH CYANIDATION TESTS ON LADNER CREEK OVERALL COMPOSITE

Test No.	Calculated Head	Gold Loading on Carbon						Leach Residue	
		24 Hour		48 Hour		Combined			
	g Au/t	g Au/t	% Distribution	g Au/t	% Distribution	g Au/t	% Distribution	g Au/t	% Distribution
C-11	5.17	192	87.8	2.82	1.2	100	89.0	0.57	11.0
C-12	5.98	218	89.5	1.98	0.9	102	90.4	0.57	9.6
C-13[1]	68.7	1,795	91.0	29.2	1.8	845	92.8	5.36	7.2

NOTES:

1. Test No. C-13 performed on flotation concentrate obtained in Flotation Test No. 32.

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TABLE 7

LADNER CREEK MINE
FLOTATION TESTS ON LADNER CREEK OVERALL COMPOSITE
SUMMARY OF FLOTATION CONDITIONS

Test No.	Figure No.	Reagent Addition (g/tonne)											pH	Float Time (min)			Flotation Conditions
		SIBX	SIPX	PAX	CMC/ WW82	Na_2CO_3	$CuSO_4$	208	242	AC829	Flex 31	MIBC		Ro	Cl	Scav	
27	F-13	45			275			25				17.5	8.1	6	1.7		Test No. 24 with SIBX and 3 flotation stages
28	F-10 F-13 F-14	45			125			62.5				32.5		4	7.5	5.5	Test No. 16 with CMC/WW82 and SIBX
30	F-13 F-14	55			275			35				22.5	8.1	6	3.7	3	Test No. 11 regrinding the Ro. Conc.
31	F-13 F-14	52.5			275			32.5				20	8.1	6	1.7	2	Test No. 30 but Mozley Table the 1st Cl. Conc.
32	F-13 F-14	47.5			250			30				17.5		6		2	Test No 31 on 10 kg charge to produce Ro. Conc. for cyanidation
33	F-15										78	15	8.1	6.3			Ro. Test of Flex 31 collector
34	F-12 F-16		52.5		275			30				22.5	8.1	6	2	2	Test No. 25 with 6 minute Ro. float
35	F-10 F-16			42.5				60				32.5	8.1	4	6	5.5	Test No. 16 with 40 minute primary grind
36	F-9						400		175.5			12.5	8.1	8	1.5	2	Test No. 26 with no Na_2CO_3 and regrind Ro. Conc.
37	F-9			10		900	400		102			20	8.8	6	1.5	6	Test No. 26 with PAX and regrind Ro. Conc.
38	F-9								119.5			10	8.1	8	1.5	2	Test No. 26 omitting Na_2CO_3 and $CuSO_4$, regrind Ro. Conc.
39	F-11									110		22.5	8.1	6	2	4	Test No. 14 with regrind and cleaning of Ro. Conc.
40	F-11 F-16										130	32.5	8.1	8	2	5.5	Test No. 39 with Flex 31 and 8 minute Ro. Float

TABLE 8

LADNER CREEK FLOTATION TESTWORK
SUMMARY OF FLOTATION REAGENTS

Abbreviation	Full Name	Description	Purpose
SIBX		Sodium isobutyl xanthate	Sulphide collector
SIPX		Sodium isopropyl xanthate	Sulphide collector
PAX		Potassium amyl xanthate	Sulphide collector
CMC	Metso CMC 7LT	Carboxyl methyl cellulose	Gangue depressant/dispersant
WW82	Quebracho WW82	Silicate	Gangue depressant/dispersant
CMC/WW82		50:50 mixture of CMC and WW82 with a solution strength totalling 1%	Gangue depressant/dispersant
Na_2CO_3		Sodium carbonate/Soda ash	pH adjustment
$CuSO_4$	$CuSO_4 \cdot 5H_2O$	Copper sulphate pentahydrate	Sulphidizer/activator
208	Aerofloat 208	Dithiophosphate	Collector/promoter
242	Aerofloat 242		Collector/promoter
5415	Cytec 5415	Modified thiocarbamate in isobutanol	Collector
S5688	Cytec S5688	Monothiophosphate salt in water	Collector
AC829	Procol AC829 (Allied Colloids)	Sodium mercaptobenothiazole	Sulphide collector
Flex 31	Pro Spec Chemical Ltd. (Charles Tennant & Co. (Canada) Ltd.) Flex 31	Sodium isopropyl xanthate (chemically enhanced)	Sulphide collector
MIBC		Methyl isobutyl carbonyl	Frother
Pine Oil			Frother

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TABLE 9

LADNER CREEK MINE
FLOTATION TESTS ON LADNER CREEK OVERALL COMPOSITE
SUMMARY OF ROUGHER FLOTATION RESULTS

Test No.	Calculated Head			Total Rougher Concentrate						Total Bulk Tails		
				Grade			% Recovery			Grade		
	g Au/t	% S	% As	g Au/t	% S	% As	Au	S	As	g Au/t	% S	% As
27	3.02	-	0.32	39.4	-	3.40	79.9	-	64.9	0.65	-	0.12
28[1]	4.52	-	0.33	55.3	-	2.56	86.2	-	-	0.67	-	0.16
30	3.30	-	0.30	45.7	-	3.50	82.4[2]	-	69.3	0.52	-	0.052
31	3.07	-	0.32	41.3	-	3.45	79.4[3]	-	64.5	0.58	-	0.076
32	4.39	-	-	74.0	-	-	84.1	-	-	0.63	-	-
33	5.37	2.37	0.33	55.7	24.0	3.22	91.0	88.9	85.6	0.53	0.29	0.052
34	5.05	2.23	0.30	84.3	30.4	4.60	90.8	74.2	83.6	0.49	0.61	0.052
35[1]	4.60	2.25	0.31	37.0	18.6	2.52	92.7	95.3	94.5	0.38	0.12	0.019
36	4.00	2.28	0.31	29.5	18.1	2.49	89.0	96.1	96.9	0.50	0.10	0.011
37	4.20	2.36	0.29	35.1	15.8	2.89	78.7[4]	62.9	95.1	0.38	0.12	0.007
38	4.69	2.31	0.31	17.2	5.93	0.40	78.7	55.1	27.6	1.27	1.32	0.29
39	4.16	2.33	0.32	52.3	22.5	3.61	82.9[5]	63.5	75.4	0.64	0.66	0.050
40	4.62	2.23	0.31	49.8	22.8	3.10	88.8[6]	84.0	82.7	0.51	0.25	0.036

NOTES:

1. Combined rougher and scavenger recovery of two stage float.
2. Scavenger float increased bulk recovery to 85.6%.
3. Scavenger float increased bulk recovery to 82.5%.
4. Xanthate scavenger float increased bulk recovery to 92.2%.
5. Scavenger float increased bulk recovery to 85.8%.
6. Scavenger float increased bulk recovery to 90.0%.

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TABLE 10

LADNER CREEK MINE
FLOTATION TESTS ON LADNER CREEK OVERALL COMPOSITE
SUMMARY OF CLEANER FLOTATION RESULTS

			Grade				% Distribution					
	Calculated Head		Ro 1st Cln Con		Ro 2nd Cln Con		Ro 1st Cln Con		Ro 2nd Cln Con		1st Cln Scav Con	
Test No.	g Au/t	% As	g Au/t	% As	g Au/t	% As	Au	As	Au	As	Au	As
28[1]	4.52	0.33	251	-	-	-	76.0	-	-	-	0.9	2.0
30	3.30	0.30	244	2.72	552	1.77	60.0	7.3	52.2	1.8	6.4	4.4
31	3.07	0.32	216	-	-	-	60.2	-	-	-	-	-
34	5.05	0.30	132	4.74	-	-	85.8	51.9	-	-	4.2	27.4
35[1]	4.60	0.31	127	3.15	-	-	85.8	31.9	-	-	1.1	13.4
36	4.00	0.31	79.5	4.16	-	-	74.5	50.3	-	-	8.8	15.4
37	4.20	0.29	107	2.38	-	-	70.0	22.8	-	-	4.8	37.1
38	4.69	0.31	110	0.59	-	-	64.4	5.2	-	-	7.8	3.0
39	4.16	0.32	225	4.59	-	-	71.2	19.2	-	-	5.0	10.3
40	4.62	0.31	320	2.10	-		79.2	7.8	-	-	1.5	2.7

NOTES:

1. Includes combined rougher concentrate and scavenger cleaner concentrate.

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TABLE 11

LADNER CREEK MINE
SUMMARY OF BEST FLOTATION RESULTS TO DATE

	Calculated Head		% Au Recovery				Grade							
							Ro 1st Clnr		Scav 1st Clnr		Ro 1st Clnr + Scav 1st Clnr		Bulk Tails	
Test No.	g Au/t	% As	Ro	Ro + Scav	Ro 1st Clnr	Ro 1st Clnr + Scav 1st Clnr	g Au/t	% As	g Au/t	% As	g Au/t	% As	g Au/t	% As
16(1)	4.86	0.39	64.8	90.1	62.3	81.0	481	0.58	60.5	2.48	185	1.92	0.54	0.17
26	4.92	0.32	93.1	-	89.1	91.3[3]	70.5	4.95	-	-	51.1[3]	3.57[3]	0.41	0.007
34	5.05	0.30	90.8	-	85.8	90.0[3]	132	4.74	-	-	105[3]	5.48[3]	0.49	0.052
35(1)	4.60	0.31	69.6	92.7	66.6	85.8	587	0.65	34.3	3.66	127	3.15	0.38	0.019
40	4.62	0.31	88.8	90.0	79.2	80.7[3]	320	2.10	-	-	249[3]	2.17[3]	0.51	0.036

NOTES:

1. The flotation scheme in Tests No. 16 and 35 included flotation of separate highgrade concentrate (Ro 1st Clnr Con) and low grade concentrate (Scav/1st Clnr Con).

2. The flotation scheme in Tests No. 26, 34 and 40 was flotation of a single concentrate (Ro 1st Clnr and Ro 1st Clnr Scav).

3. Ro 1st Clnr Con + Ro 1st Clnr Scav Con represents recovery and grade to a combined rougher first cleaner concentrate (Ro 1st Clnr Con) and rougher first cleaner scavenger concentrate (Ro 1st Clnr Scav).

TABLE 12

LADNER CREEK MINE
MOZLEY TABLE GRAVITY SEPARATION OF FLOTATION CONCENTRATE
SUMMARY OF RESULTS

Test No.	Mozley Table Feed		Mozley Table Conc.			Mozley Table Tails	
	% Au Distribution(1)	g Au/t	Weight %	% Au Distribution(1)	g Au/t	% Au Distribution(1)	g Au/t
24	67.6	633	0.001	37.4	127,878	30.1	283
27	61.0	268	0.024	29.0	3,613	32.0	146
28	51.1	1,796	0.018	21.0	5,310	30.1	1,229
31	60.2	216	0.001	12.1	30,917	48.1	173

NOTES:
1. % of gold in feed.

TABLE 13

LADNER CREEK MINE
RESULTS OF ACID GENERATION TEST ON ORE COMPOSITE

Trial	S (%)	S^{2-} (%)	Acid Producing Potential ($kg/H_2SO_4/t$)	Acid Consuming Ability ($kg/H_2SO_4/t$)	Net Acid Consuming Ability ($kg/H_2SO_4/t$)	Paste pH (units)
a	2.42	2.14	74.00	115.00	41.00	9.18
b	2.42	2.14	74.00	115.00	41.00	

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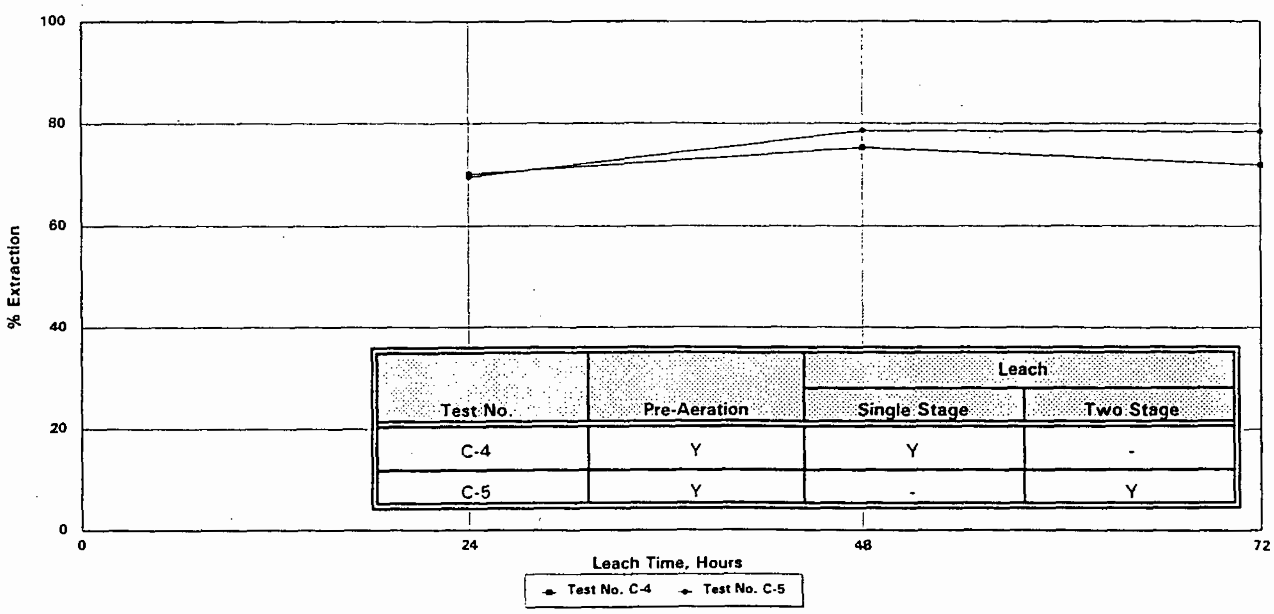
FIGURE CY-1

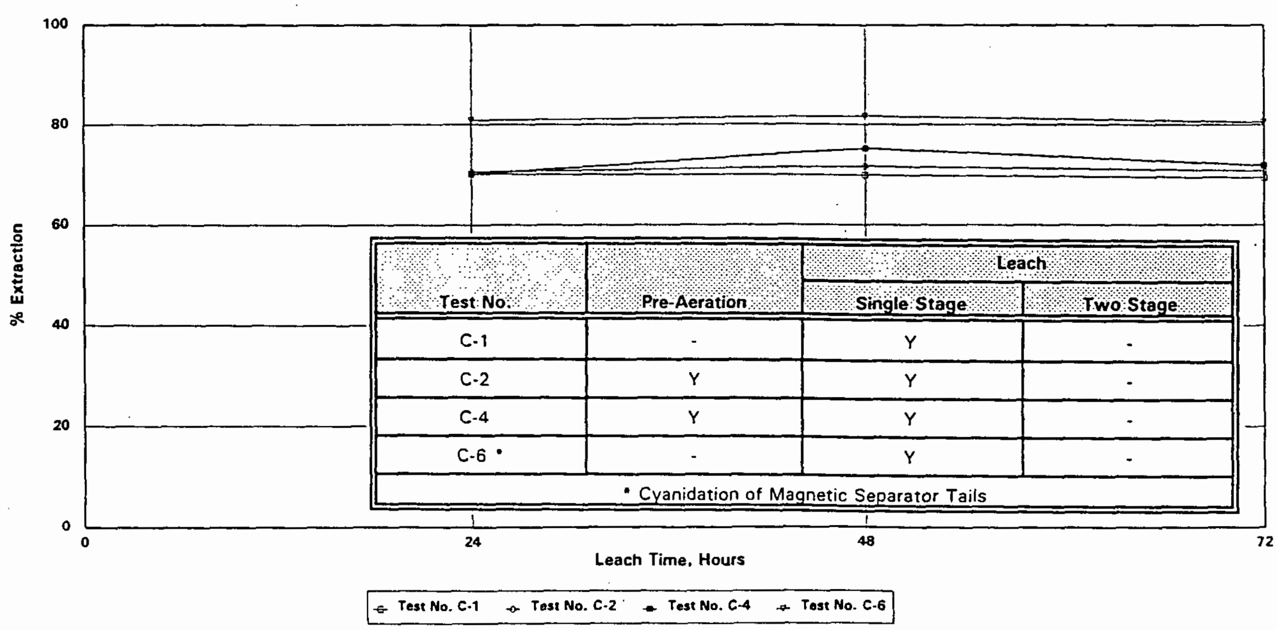
ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
SINGLE STAGE AND TWO STAGE CYANIDATION LEACH TESTS
GOLD EXTRACTION vs LEACH TIME



Test No.	Pre-Aeration	Leach Single Stage	Leach Two Stage
C-4	Y	Y	-
C-5	Y	-	Y

FIGURE CY-2

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
SINGLE STAGE CYANIDATION LEACH TESTS
GOLD EXTRACTION vs LEACH TIME



Test No.	Pre-Aeration	Leach Single Stage	Leach Two Stage
C-1	-	Y	-
C-2	Y	Y	-
C-4	Y	Y	-
C-6 *	-	Y	-

* Cyanidation of Magnetic Separator Tails

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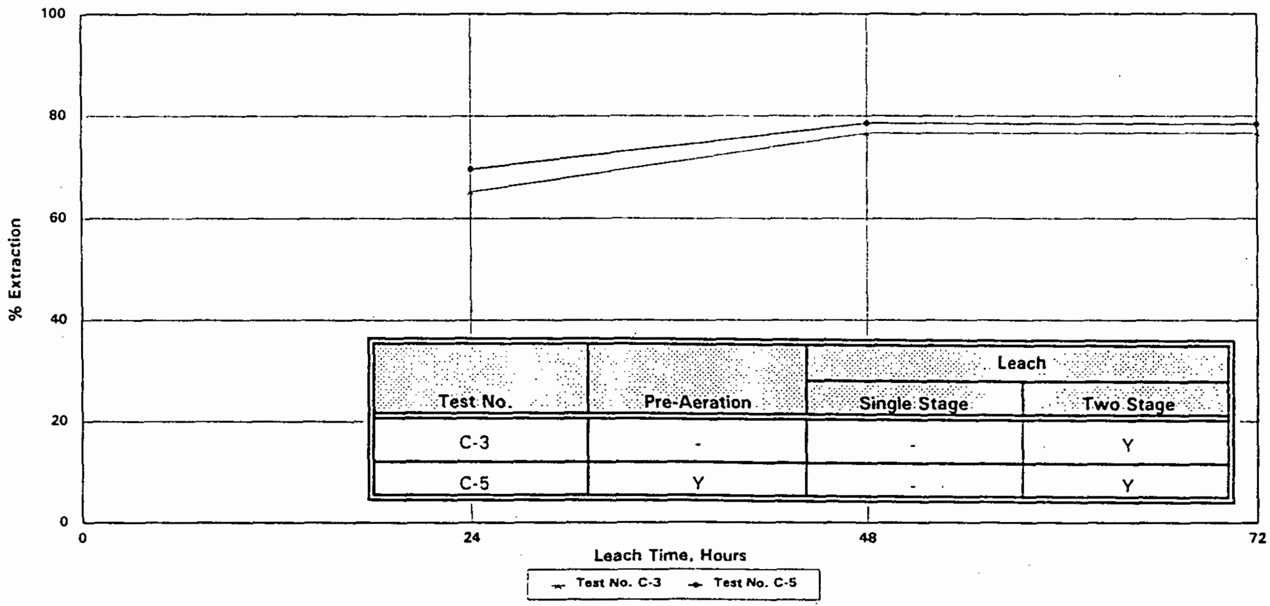
FIGURE CY-3

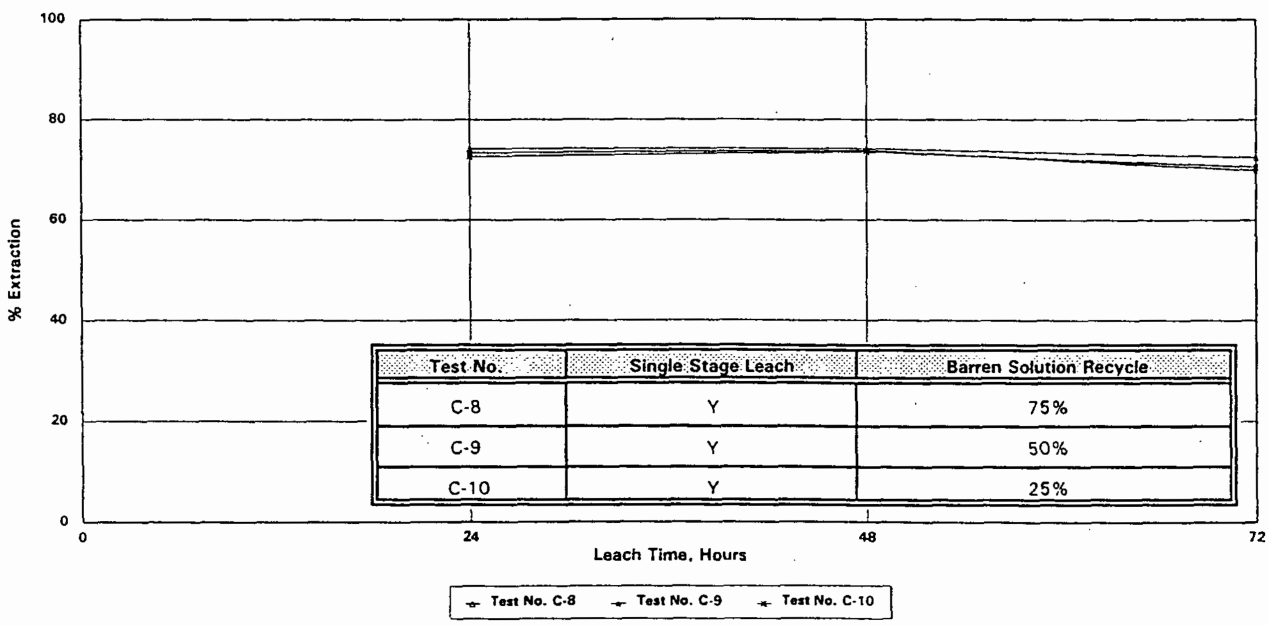
ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
TWO STAGE CYANIDATION LEACH TESTS
GOLD EXTRACTION vs LEACH TIME



Test No.	Pre-Aeration	Leach	
		Single Stage	Two Stage
C-3	-	-	Y
C-5	Y	-	Y

FIGURE CY-4

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
SINGLE STAGE CYANIDATION LEACH TESTS WITH RECYCLED BARREN SOLUTION
GOLD EXTRACTION vs LEACH TIME



Test No.	Single Stage Leach	Barren Solution Recycle
C-8	Y	75%
C-9	Y	50%
C-10	Y	25%

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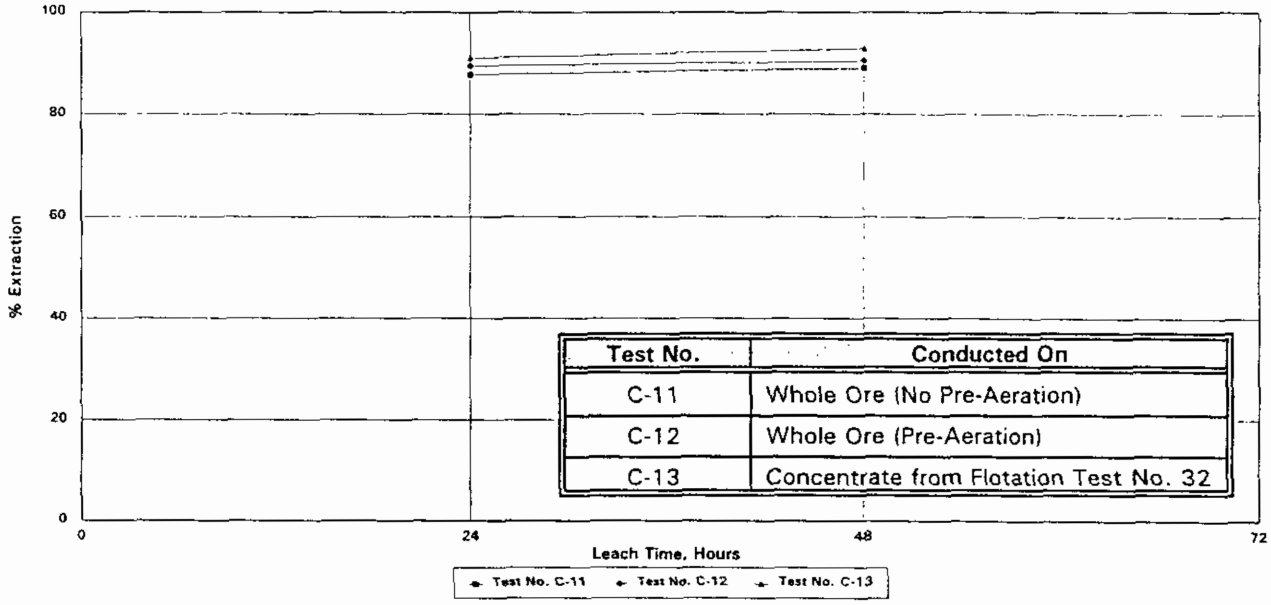
FIGURE CY-5

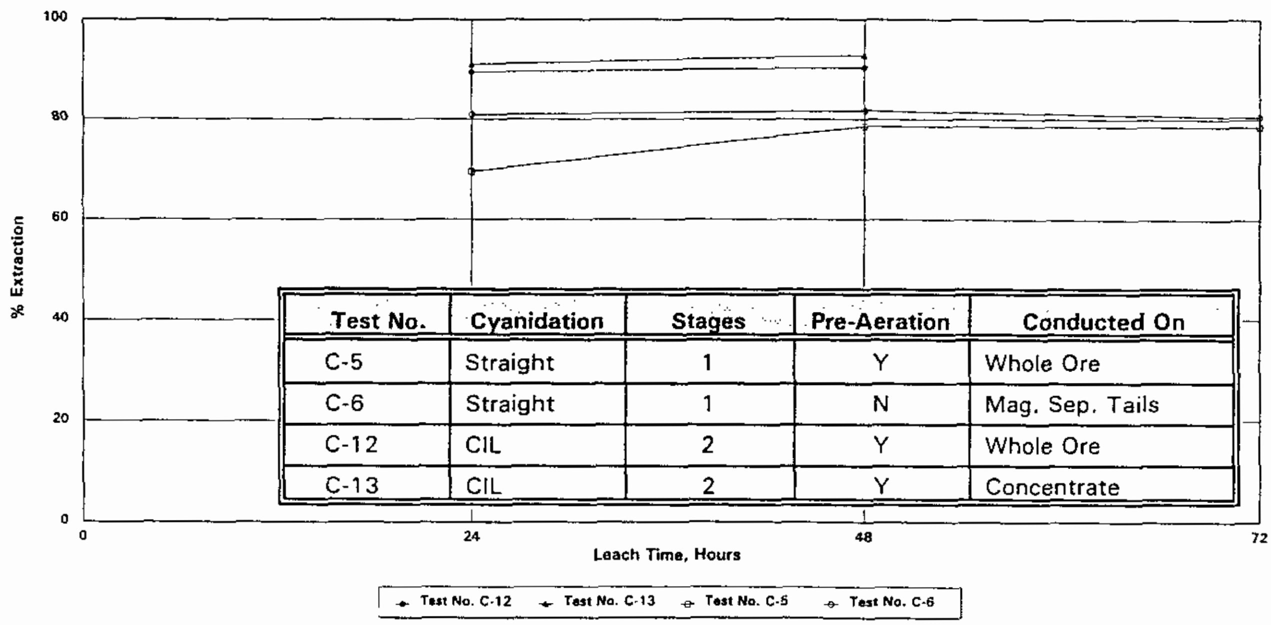
ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
CARBON-IN-LEACH CYANIDATION LEACH TESTS
GOLD EXTRACTION vs LEACH TIME



Test No.	Conducted On
C-11	Whole Ore (No Pre-Aeration)
C-12	Whole Ore (Pre-Aeration)
C-13	Concentrate from Flotation Test No. 32

FIGURE CY-6

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
CARBON-IN-LEACH CYANIDATION vs STRAIGHT CYANIDATION LEACH
GOLD EXTRACTION vs LEACH TIME



Test No.	Cyanidation	Stages	Pre-Aeration	Conducted On
C-5	Straight	1	Y	Whole Ore
C-6	Straight	1	N	Mag. Sep. Tails
C-12	CIL	2	Y	Whole Ore
C-13	CIL	2	Y	Concentrate

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FIGURE CY-1

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
SINGLE STAGE AND TWO STAGE CYANIDATION LEACH TESTS
GOLD EXTRACTION vs LEACH TIME

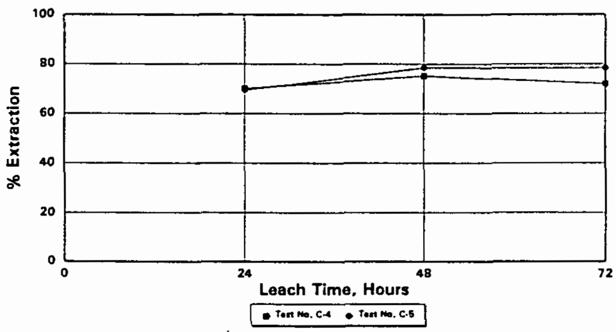

FIGURE CY-2

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
SINGLE STAGE CYANIDATION LEACH TESTS
GOLD EXTRACTION vs LEACH TIME

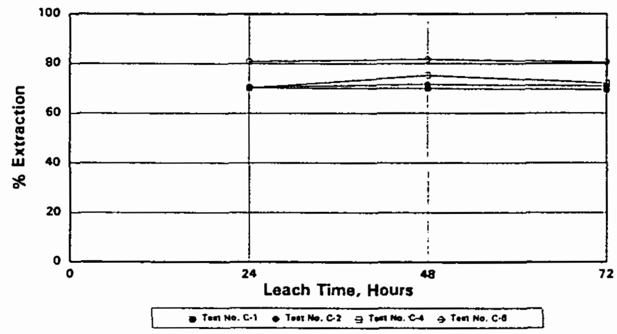

FIGURE CY-3

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
TWO STAGE CYANIDATION LEACH TESTS
GOLD EXTRACTION vs LEACH TIME

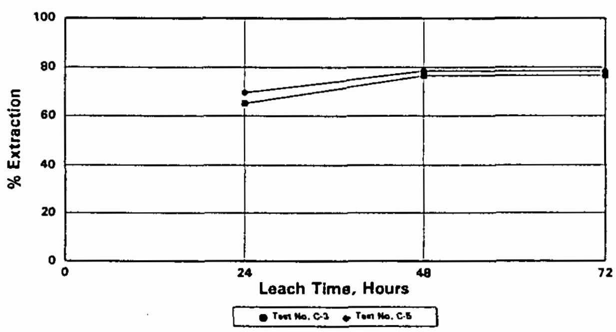

FIGURE CY-4

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
SINGLE STAGE CYANIDATION LEACH TESTS WITH RECYCLED BARREN SOLUTION
GOLD EXTRACTION vs LEACH TIME

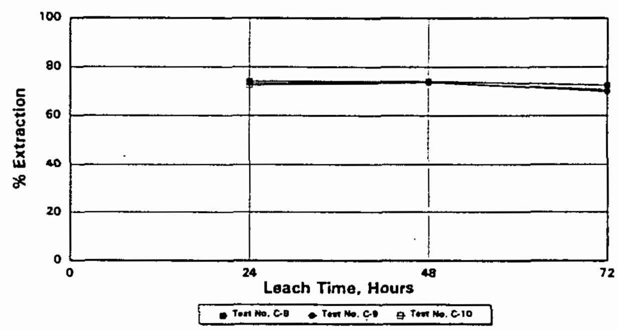

FIGURE CY-5

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
CARBON-IN-LEACH CYANIDATION LEACH TESTS
GOLD EXTRACTION vs LEACH TIME

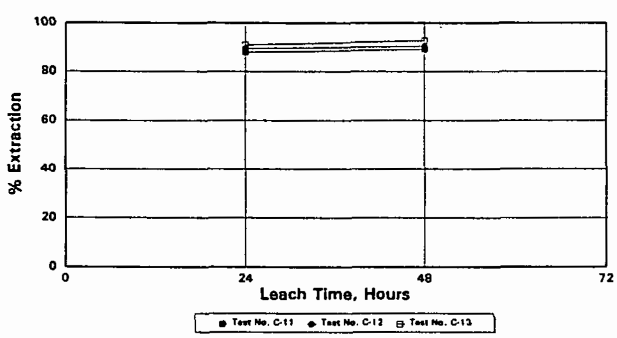

FIGURE CY-6

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
CARBON-IN-LEACH CYANIDATION vs STRAIGHT CYANIDATION LEACH
GOLD EXTRACTION vs LEACH TIME

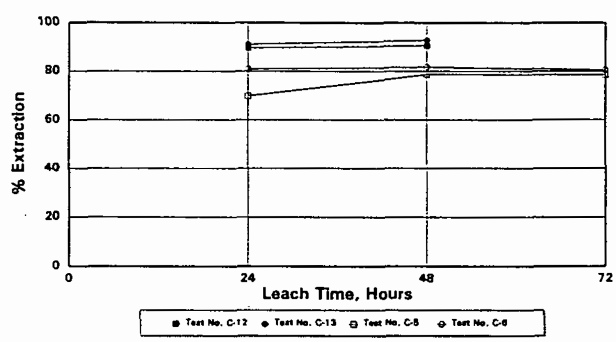

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FIGURE F-9

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
CLEANER FLOTATION TEST NO. 40 vs TESTS NO. 26, 36, 37, AND 38
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

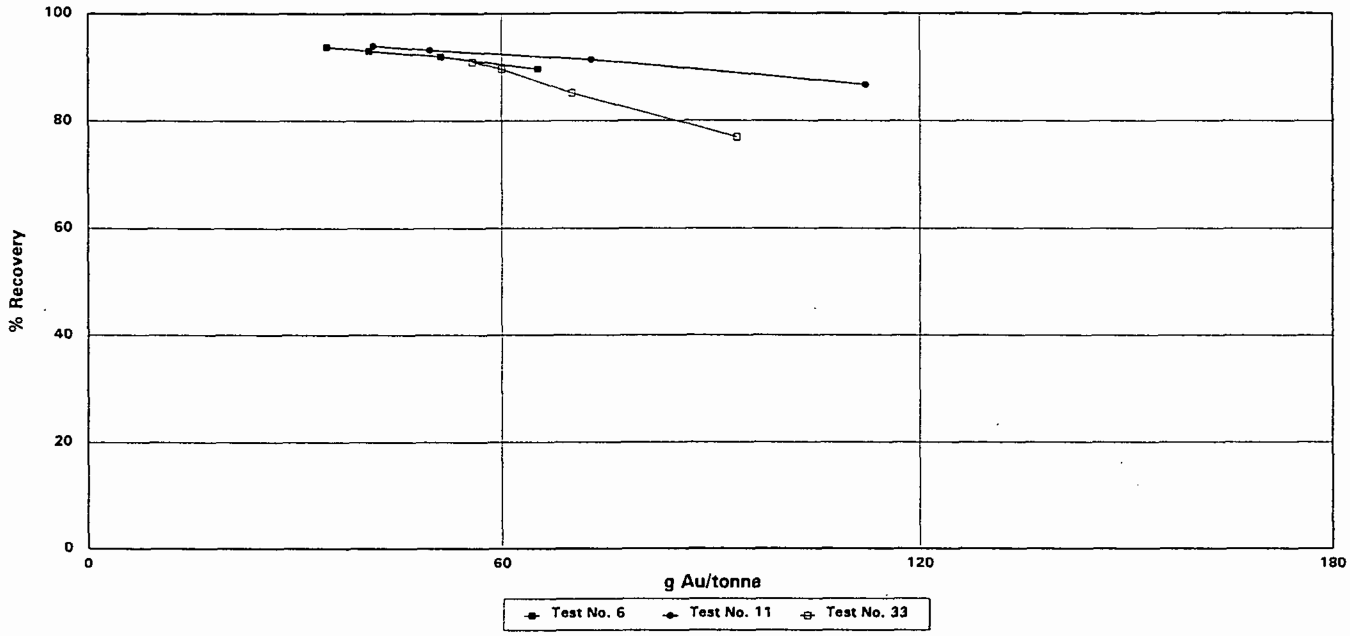

FIGURE F-10

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
CLEANER FLOTATION TEST NO. 40 vs TESTS NO. 16, 28, AND 35
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

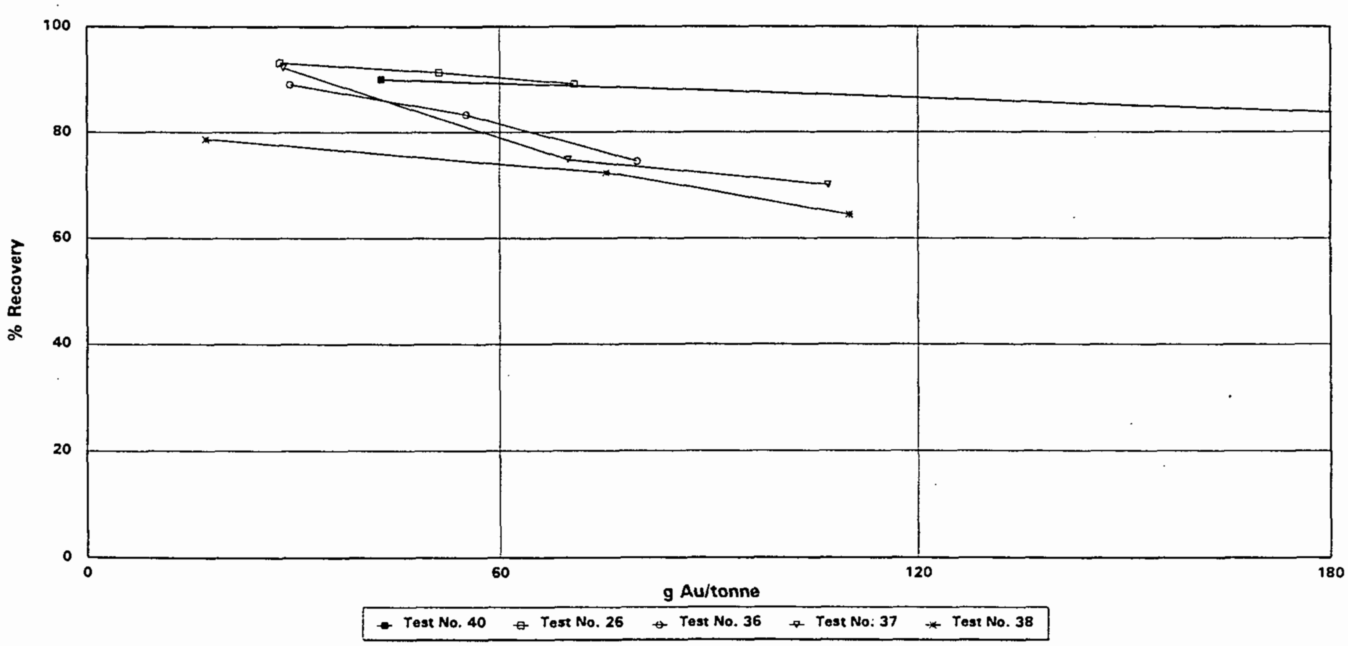

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FIGURE F-11

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
CLEANER FLOTATION TESTS NO. 39 AND 40
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

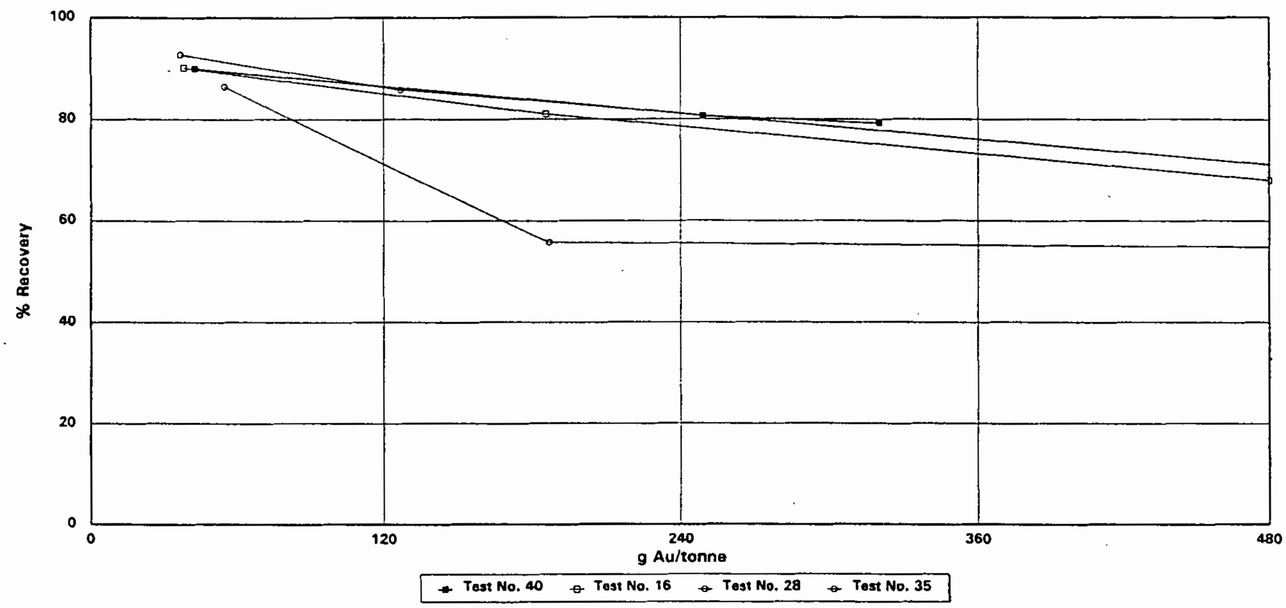

FIGURE F-12

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
CLEANER FLOTATION TEST NO. 40 vs TESTS NO. 23, 24, 25, AND 34
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

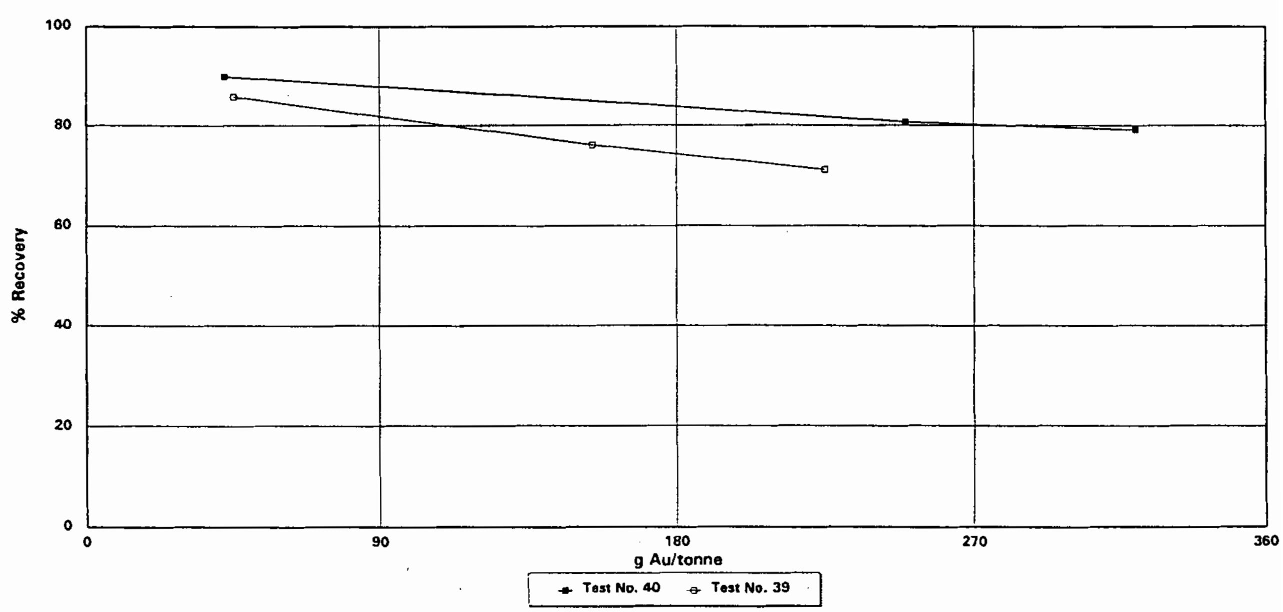

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FIGURE F-13

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
CLEANER FLOTATION TEST NO. 40 vs TESTS NO. 27, 28, 30, 31, AND 32
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

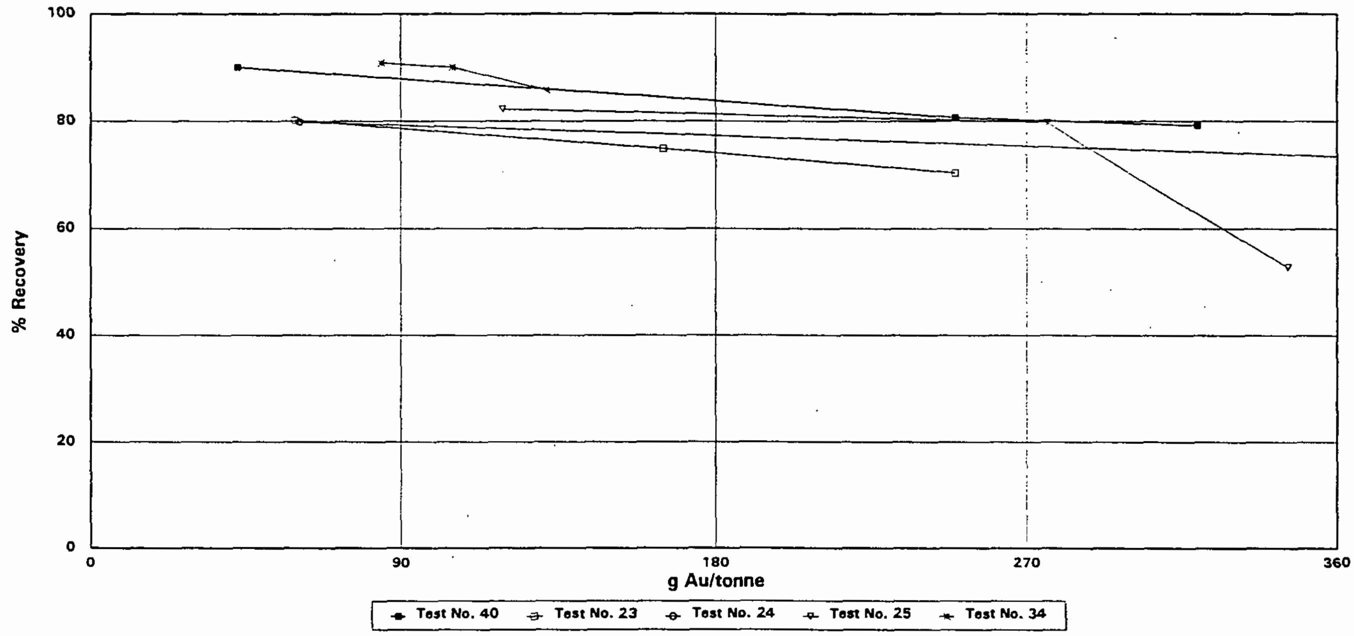
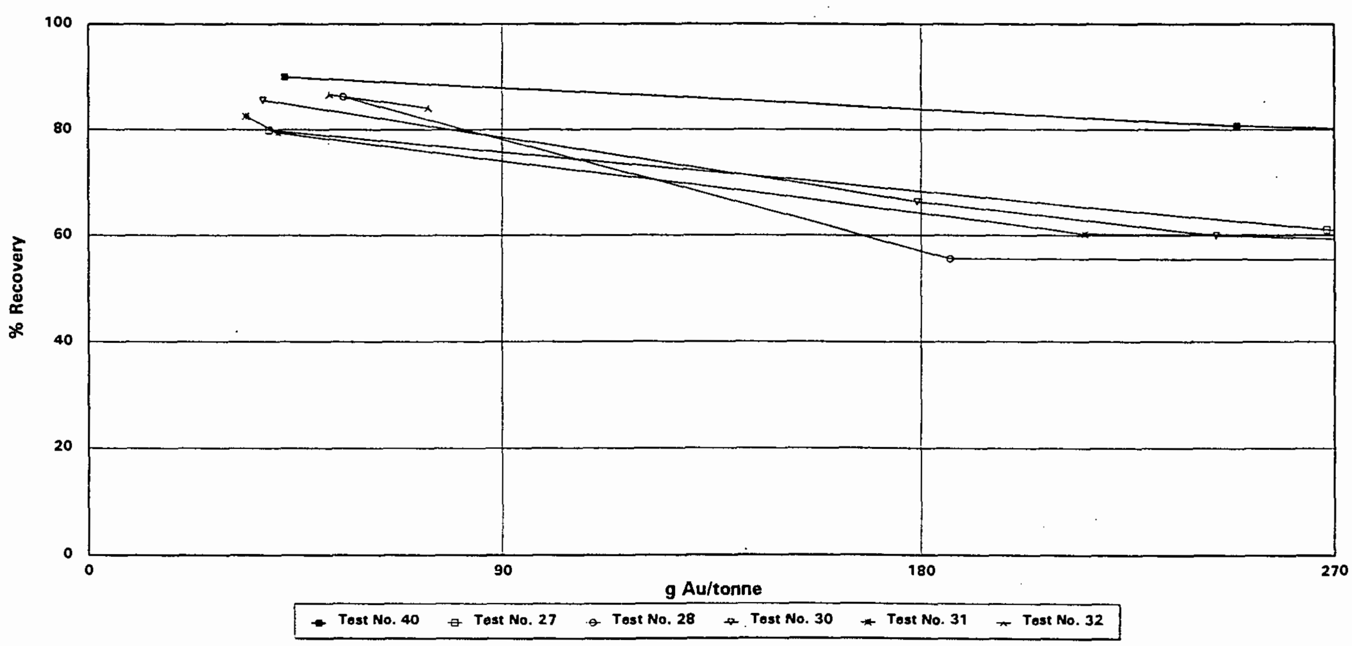


FIGURE F-14

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
CLEANER FLOTATION TEST NO. 40 vs TESTS NO. 27, 28, 30, 31, AND 32
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE



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January 5, 1996

FIGURE F-15

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
FLOTATION TESTS NO. 6 AND 11 vs TEST NO. 33
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

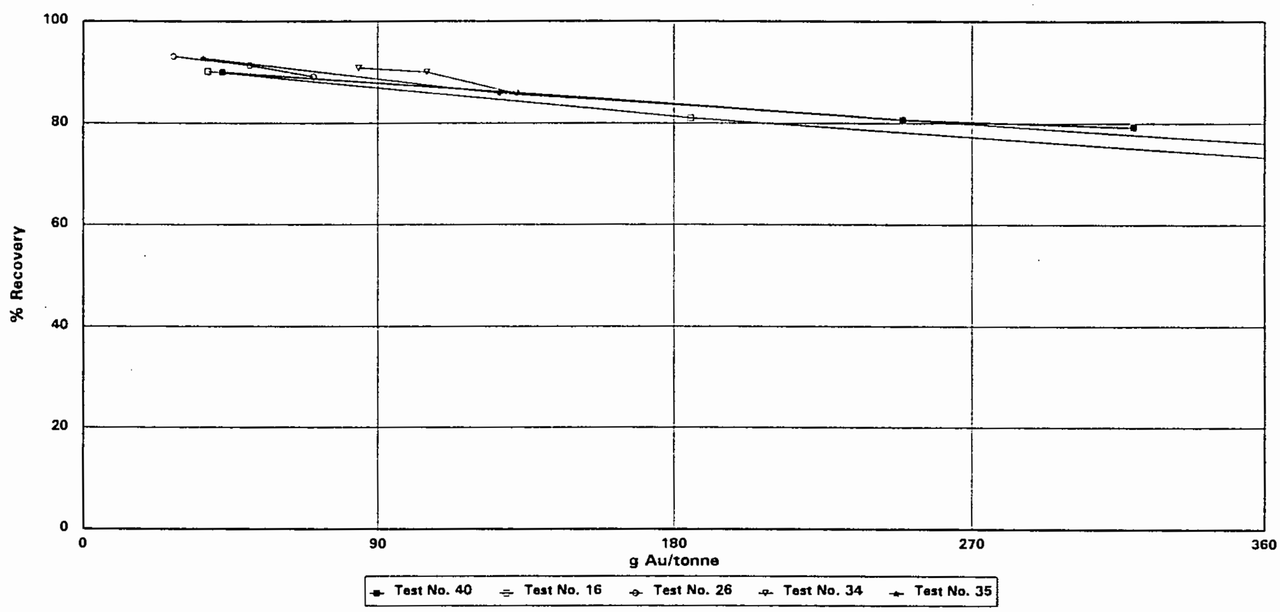
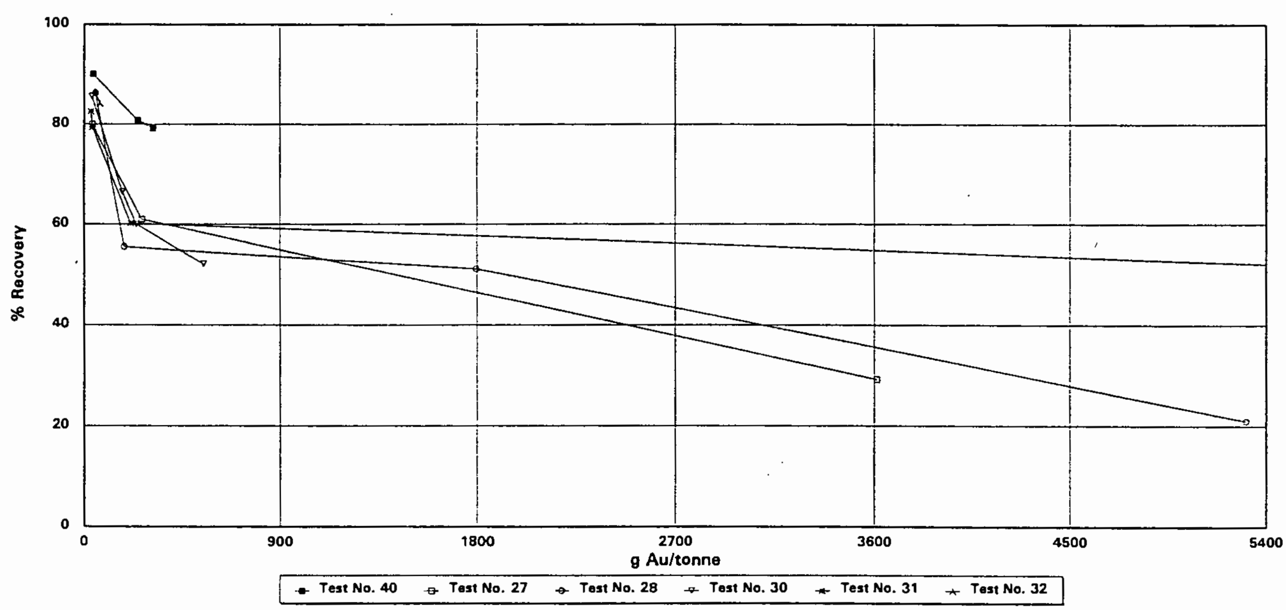


FIGURE F-16

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
CLEANER FLOTATION TESTS NO. 16, 26, 34, 35, AND 40
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE



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January 5, 1996

FIGURE F-1

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
ROUGHER FLOTATION TESTS NO. 6 AND 11
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

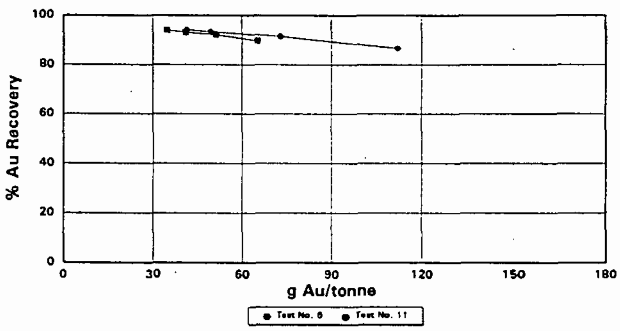

FIGURE F-2

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
ROUGHER FLOTATION TESTS NO. 6 AND 11 vs TESTS NO. 1, 17, AND 21
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

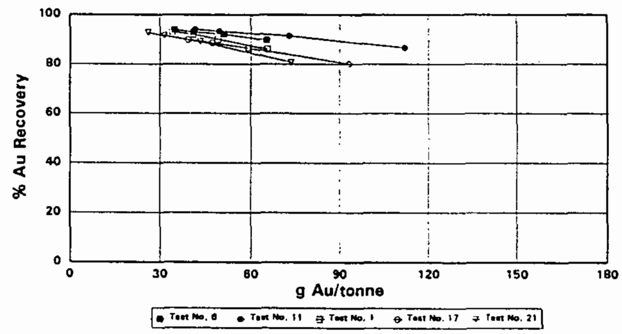

FIGURE F-3

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
ROUGHER FLOTATION TESTS NO. 6 AND 11 vs TESTS NO. 18, 19, 20, AND 22
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

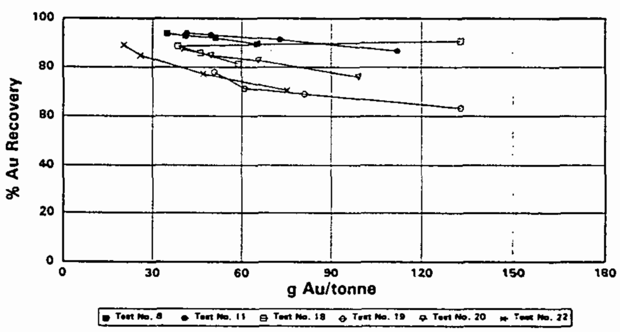

FIGURE F-4

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
ROUGHER FLOTATION TESTS NO. 6 AND 11 vs TESTS NO. 2, AND 8
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

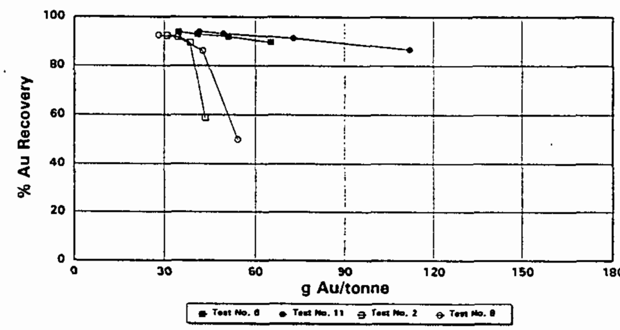

FIGURE F-5

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
ROUGHER FLOTATION TESTS NO. 6 AND 11 vs TESTS NO. 3, 4, 5, AND 7
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

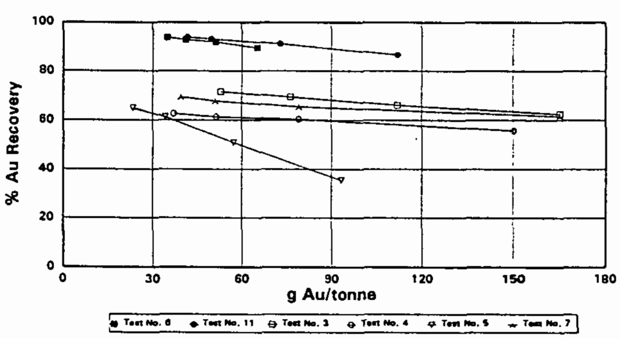

FIGURE F-6

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
ROUGHER FLOTATION TESTS NO. 6 AND 11 vs TESTS NO. 12, 13, AND 14
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

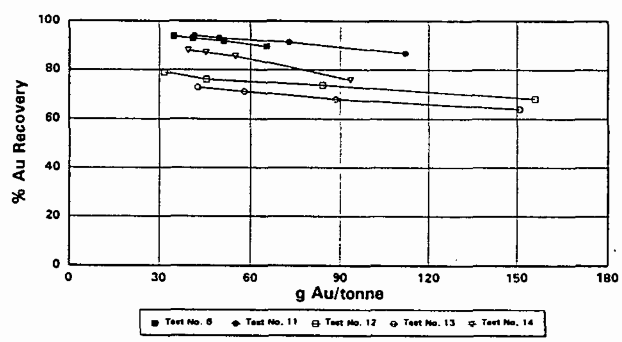

FIGURE F-7

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
ROUGHER FLOTATION TESTS NO. 6 AND 11 vs TEST NO. 16
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

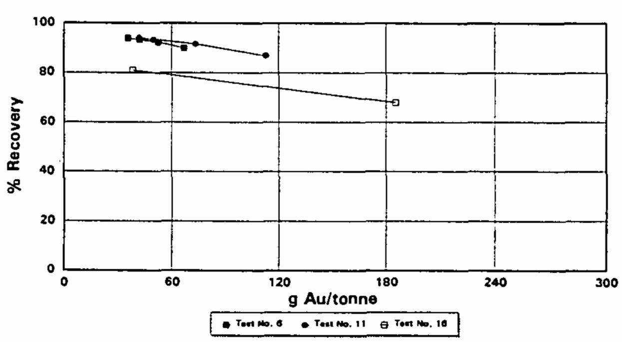

FIGURE F-8

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
ROUGHER FLOTATION TESTS NO. 6 AND 11 vs TEST NOS. 23, 24, 25, AND 26
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

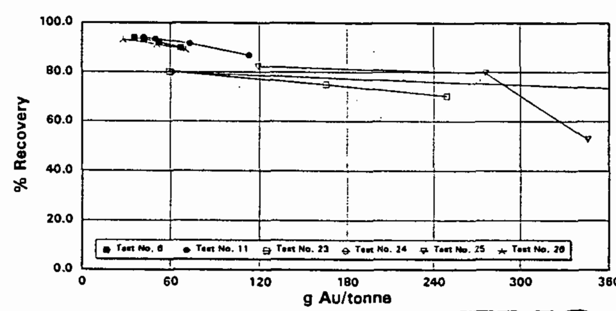

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FIGURE F-9

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
CLEANER FLOTATION TEST NO. 40 vs TESTS NO. 26, 36, 37, AND 38
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

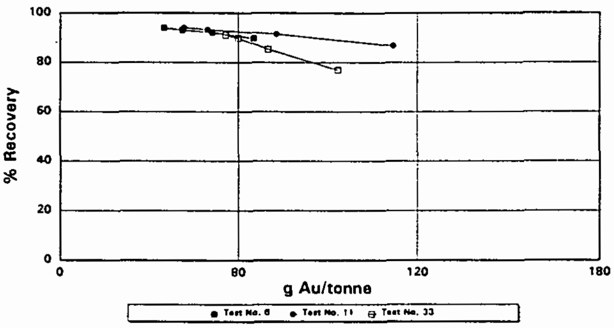


FIGURE F-10

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
CLEANER FLOTATION TEST NO. 40 vs TESTS NO. 16, 28, AND 35
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

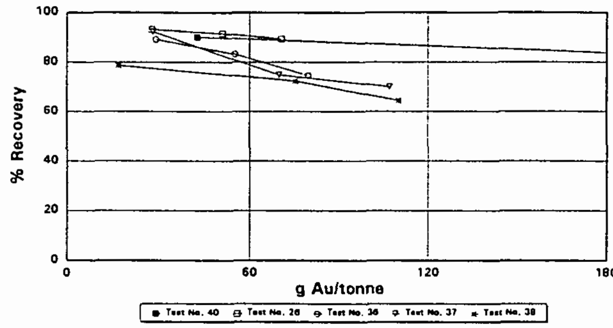


FIGURE F-11

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
CLEANER FLOTATION TESTS NO. 39 AND 40
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

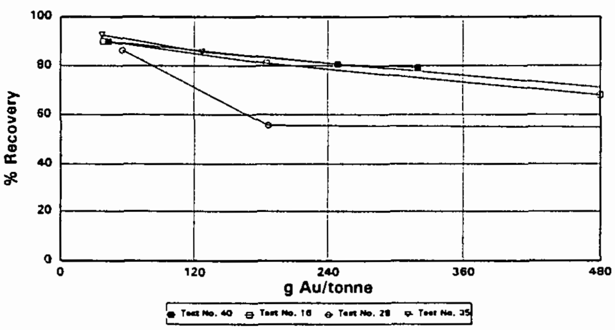


FIGURE F-12

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
CLEANER FLOTATION TEST NO. 40 vs TESTS NO. 23, 24, 25, AND 34
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

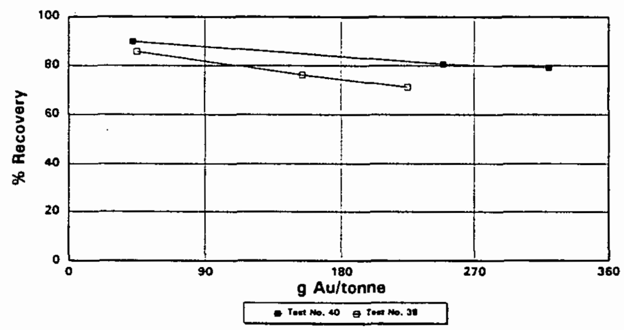


FIGURE F-13

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
CLEANER FLOTATION TEST NO. 40 vs TESTS NO. 27, 28, 30, 31, AND 32
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

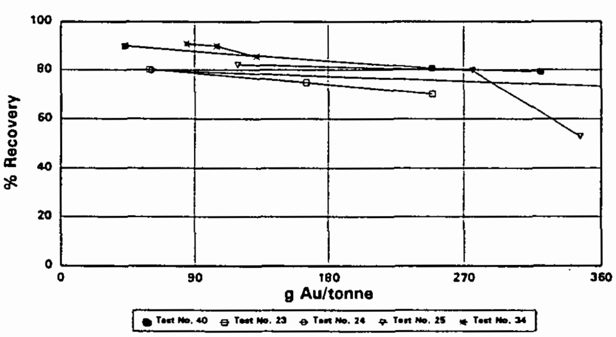


FIGURE F-14

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
CLEANER FLOTATION TEST NO. 40 vs TESTS NO. 27, 28, 30, 31, AND 32
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

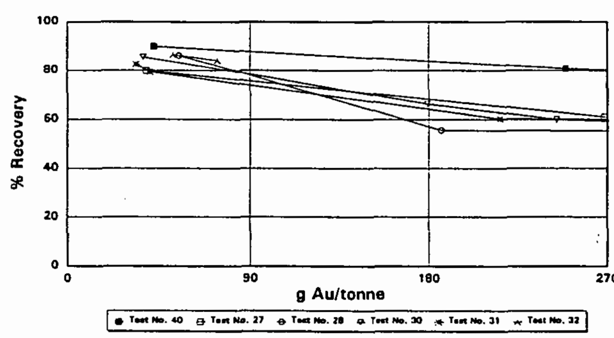


FIGURE F-15

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
FLOTATION TESTS NO. 6 AND 11 vs TEST NO. 33
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

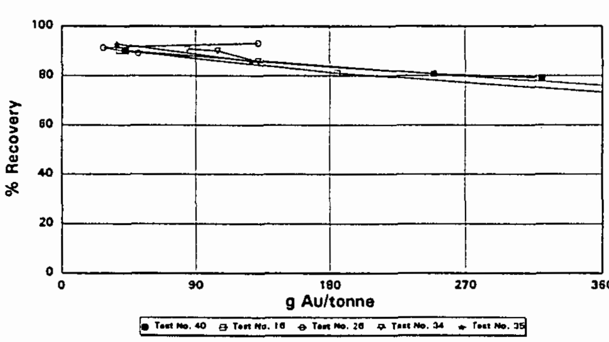
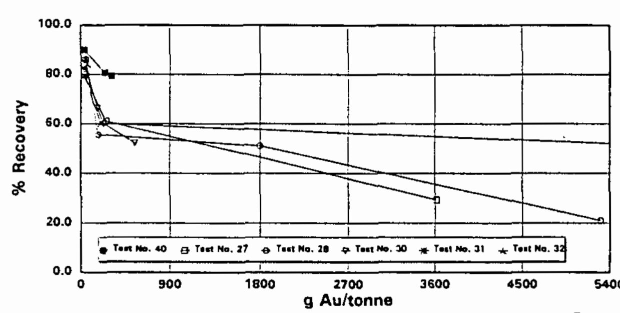


FIGURE F-16

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
CLEANER FLOTATION TESTS NO. 16, 26, 34, 35, AND 40
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE



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February 27, 1996

MELIS Project No. 319

Athabaska Gold Resources Ltd.
1185 West Georgia St. Suite 1200
Vancouver BC V6E 4E6

By Fax (604) 684-4601

Attention: Mr. Plen Dickson

RE: **Ladner Creek Gold Mine - Metallurgical Test Program**
Status Report January 5, 1996 to February 23, 1996

INTRODUCTION

Metallurgical and enviromental testwork has progressed quite well in the past period with the following work being completed:

- further batch flotation tests on the overall composite,
- lock-cycle flotation tests on the overall composite,
- batch flotation tests on head grade variability composites,
- cyanidation testing of flotation concentrate,
- lock-cycle cyanidation test on flotation concentrate,
- initiation of cyanide destruction testwork,
- batch flotation testing of the existing tailings composite,
- settling tests on flotation concentrate and the existing tailings composite, and
- initiation of environmental analyses.

Other activities included contacting nine potential smelter companies to identify concentrate terms for Ladner Creek flotation concentrate, and preparing recovery estimates and metallurgy summaries for a meeting with Athabaska Gold Resources Ltd. (Athabaska). Flowsheets of different processing options were also put together in preparation for order-of-magnitude cost estimating.

SUMMARY

Flotation - Ladner Creek Composites

Batch flotation tests and lock-cycle testing have provided two flotation options for Ladner Creek, single stage flotation for the production of a single concentrate and two stage flotation for the production of separate high grade and low grade concentrates.

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519 45TH STREET WEST, SASKATOON, SASKATCHEWAN, CANADA S7L 5Z9 (306) 652-4084 FAX: (306) 653-3779

Single Stage Flotation

A single stage flotation lock-cycle test completed on the overall composite ground to 87% minus 200 mesh (K_{80} of 64 micrometers) included rougher flotation with Flex 31 collector and MIBC frother at natural pH, regrinding of the rougher concentrate ahead of two stage cleaner flotation, and scavenger flotation of first cleaner tails.

An 85.1% gold recovery was obtained into a concentrate assaying 341 g Au/tonne (9.95 oz Au/ton) and 3.37% As from a calculated head grade of 5.54 g Au/tonne (0.162 oz Au/ton) and 0.34% As.

Flotation of composites with different head grades showed that recoveries and concentrate grades could be maintained on mineralization with a calculated head grade of 3.75 g Au/tonne (0.109 oz Au/ton) relative to a composite with a head grade of 5.59 g Au/tonne (0.163 oz Au/ton). A drop in composite grade to 3.50 g Au/tonne (0.102 oz Au/ton) appeared to also maintain recovery but a high weight reported to the rougher concentrate due to a high level of graphitic carbon (0.15% C) in this composite. This caused a decrease in concentrate grade for this composite.

Two Stage Flotation

Two stage flotation lock-cycle testing of the overall composite ground to 95% minus 200 mesh (K_{80} of 50 micrometers) included rougher flotation with Aerofloat 208 promoter and MIBC frother and two stage cleaning of rougher concentrate to produce a high grade concentrate. This was followed by scavenger flotation of rougher tails using xanthate collector, Aerofloat 208 promoter and MIBC frother, regrinding of scavenger tails to a K_{80} of 17 micrometers, two stage cleaning of scavenger concentrate with further additions of xanthate collector, and scavenger flotation of scavenger first cleaner tails using additional xanthate collector.

A gold recovery of 70.8% was achieved in the high grade concentrate which assayed 834 g Au/tonne (24.33 oz Au/ton) and 0.91% As. Scavenger recovery to a low grade concentrate was 19.7% into a concentrate assaying 45.6 g Au/tonne (1.33 oz Au/ton) and 3.35% As. The two stage float represented a combined recovery of 90.5% into a blended single concentrate assaying 175 g Au/tonne (5.10 oz Au/ton) and 2.95% As.

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Two stage flotation of a composite with a slightly lower head grade (calculated head grade of 4.37 g Au/tonne (0.128 oz Au/ton) yielded the same grade/recovery curve as the test on the overall composite with a calculated head grade of 4.60 g Au/tonne (0.134 oz Au/ton). A test on a composite with an expected head grade of 3.50 g Au/tonne (0.102 oz Au/ton) yielded substantially lower recoveries and grades due to a high graphitic carbon content (0.15% C) in the composite and due to a low calculated head for the test [2.49 g Au/tonne (0.073 oz Au/ton)].

Cyanidation of Flotation Concentrate

Merrill-Crowe Circuit

Cyanidation tests on bulk flotation concentrates showed that a target leach residue for standard (Merrill-Crowe) cyanidation of bulk flotation concentrate assaying 50 g Au/tonne (1.46 oz Au/ton) is 7.3 to 7.7 g Au/tonne which represents an 85% extraction. Leaching of a scavenger cleaner concentrate from a two stage float assaying 50 g Au/tonne (1.46 oz Au/ton) would yield an 87.5% extraction (leach residue grade of 5.8 g Au/tonne). Soluble losses would further reduce the net gold recovery to 83% to 84% in a Merrill-Crowe circuit. The improved extraction observed for scavenger concentrate (87.5% versus 85%) is a result of preg-robbing carbon being removed from the flotation concentrate in rougher flotation ahead of scavenger flotation in a two stage float.

Lock-cycle cyanidation tests demonstrated the negative impact of excessive barren solution recycle in a Merrill-Crowe circuit. Residue grade, cyanide consumption, reducing power and thiocyanate and heavy metal content in pregnant solution all increased with extended leach cycles. For design purposes, if a cyanidation circuit is used in the Ladner Creek mill, barren recycle may need to be limited to, say, 25%. The cyanide destruction circuit will need to be designed to accommodate 100% of the barren flow for occasional purges of fouled solution.

Carbon-in-Leach Circuit

Carbon-in-leach cyanidation of flotation concentrate yielded an average leach residue grade of 4.1 g Au/tonne, representing a 90% gold extraction from a concentrate with an average head grade of 41.4 g Au/tonne (1.21 oz Au/ton). The use of carbon in cyanidation improved gold extraction by 5% over that achieved by standard (Merrill-Crowe) cyanidation.

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Reagent Consumptions

Although the need for pre-aeration of slurry ahead of cyanidation was not definitive, the use of lead nitrate reduced cyanide consumption from 3.6 kg NaCN/tonne of concentrate to 2.3 kg NaCN/tonne of concentrate for carbon-in-leach cyanidation.

Cyanide consumptions for standard (Merrill-Crowe) cyanidation were approximately 2.0 kg NaCN/tonne of concentrate.

Lime consumptions were approximately 3.3 kg CaO/tonne of concentrate for carbon-in-leach cyanidation and 4.3 kg CaO/tonne of concentrate for standard (Merrill-Crowe) cyanidation.

Lead nitrate additions used in the testwork were approximately 0.4 kg $Pb(NO_3)_2$/tonne of concentrate in pre-aeration and 0.3 kg $Pb(NO_3)_2$/tonne of concentrate in cyanidation.

<u>Flotation - Existing Tailings Composite</u>

A blended composite of the existing Ladner Creek tailings prepared for testing assayed 1.86 g Au/tonne (0.054 oz Au/ton), <0.5 g Ag/tonne, 0.25% As and 0.10% C(graphitic). The composite as-received was relatively coarse [42.3% minus 200 mesh (K_{80} of 188 micrometers)]. Regrinding to approximately 80% minus 200 mesh (K_{80} of 80 micrometers) was found to be required prior to flotation.

Batch flotation testing showed there was no advantage in using a two stage flotation approach over a single stage float in terms of gold recovery and concentrate gold grade. A blended concentrate from a two stage float would, however, have lower arsenic content relative to a single concentrate from single stage flotation (2.18% As versus 4.80% As).

Single stage flotation batch testing yielded a rougher recovery of 76.6% and a first cleaner recovery of 72.1% from a calculated head of 1.95 g Au/tonne (0.057 oz Au/ton). Three cleaning stages yielded a concentrate grade of 73.8 g Au/tonne (2.15 oz Au/ton) and 5.42% As.

<u>Flotation Concentrate Smelter Analysis</u>

Detailed concentrate analyses were forwarded to nine potential smelter companies to obtain smelter terms and to identify the potential smelter acceptability of Ladner Creek flotation concentrates. A sample of the single concentrate from single stage flotation assayed 346 g Au/tonne (10.09 oz Au/ton), 61.9 g Ag/tonne (1.81 oz Ag/ton) and 3.71% As.

A sample of the high grade concentrate from two stage flotation assayed 988 g Au/tonne (28.82 oz Au/ton), 190 g Ag/tonne (5.54 oz Ag/ton) and 0.91% As. The sample of low grade concentrate from the two stage float assayed 43.9 g Au/tonne (1.28 oz Au/ton), 8.7 g Ag/tonne (0.25 oz Ag/ton) and 3.52% As. A weighted average blend of these two concentrates would assay 197 g Au/tonne (5.75 oz Au/ton), 38.2 g Ag/tonne (1.11 oz Ag/ton) and 3.10% As.

In addition to gold there will be a minor payable contribution from silver and copper for some of the concentrates. Arsenic is the major penalty element.

Settling Tests

Settling tests indicated a thickener unit area of 0.05 m^2/tonne/day for flotation concentrate and 0.03 m^2/tonne/day for reclaimed tailings.

Grinding Index

The Ladner Creek mineralization has an average rod mill Bond work index of 15.6 (metric) and an average ball mill Bond work index of 14.4 (metric).

Environmental

Inco is currently completing SO_2/air cyanide destruction testwork on cyanide tailings generated from cyanidation of flotation concentrate. The treated cyanidation tailings will be submitted for detailed environmental analyses along with flotation tails to generate environmental data for regulatory approval of operating permits.

Remaining Work

Remaining testwork at Lakefield Research includes a lock-cycle test on the existing tailings composite, a cyanidation test on concentrate from flotation of the existing tailings composite, a single stage and two stage float on a 0.100 oz Au/ton composite with 0.05% C (graphitic) and 0.25% As, cyanidation of bulk flotation concentrate at three different cyanide levels to more closely quantify cyanide consumption, and a repeat two stage flotation test on the 0.100 oz Au/ton composite with high graphitic carbon content (0.15% C).

Concentrates and tailings samples from a two stage float have been forwarded to Vancouver Petrographics Ltd. for mineralogical examination.

Order-of-magnitude cost estimates will be completed for the different processing options identified for Ladner Creek and compared against the net gold recoveries for each option in order to arrive at the most economical process for reactivation of the Ladner Creek mine. This will be followed by detailed capital cost and operating cost estimates which will form part of the feasibility study.

BATCH FLOTATION TESTS - LADNER CREEK COMPOSITES

Further batch flotation testwork was completed on the overall composite to quantify recoveries and grades under different flotation conditions using single stage flotation (flotation of a single concentrate) and two stage flotation (flotation of separate high grade and low grade concentrates).

Single Stage Flotation

Single stage flotation test conditions are summarized in Table 1 and results are presented in summary form in Tables 2 and 3. The results of the six additional tests are compared to the previous test, Test No. 40, in Table 4. Results achieved were as follows:

Summary of Results - Single Stage Flotation - Tests No. 40, 41, 44, 45, 60, 62, 64*														
Test No.	Primary Grind K_{80}(µm)	Reagents (g/t)			Calc. Head		% Gold Recovery			Grade (g Au/tonne)				
		$CuSO_4$	Flex 31	MIBC	g Au/t	% As	Ro	Ro 1st Clnr	Ro 2nd Clnr	Ro	Ro 1st Clnr	Ro 2nd Clnr	Total Tails	Scav Tails
40	81	-	130	32.5	4.62	0.31	90.0	79.2	-	42.8	320	-	0.57	0.51
41	50	-	130	32.5	3.73	0.23	93.3	81.7	-	12.5	99.5	-	0.31	0.29
44	64	-	110	32.5	5.59	0.41	93.3	82.0	78.7	41.6	203	387	0.75	0.43
45	100	-	110	32.5	5.94	0.42	90.2	76.5	70.9	52.0	266	636	1.07	0.65
60	~64	500	85	27.5	5.16	0.43	94.3	84.9	80.8	30.8	97.8	121	0.57	0.35
62	~64	-	110	22.5	3.75	0.32	92.6	83.6	79.5	21.2	150	305	0.50	0.33
64	~64	-	195	52.5	3.50	-	91.6	83.6	76.6	11.1	27.9	83.0	0.53	0.41

* Tests No. 40, 41, 44, 45 and 60 completed on the overall composite. Test No. 62 completed on Zone 1 Composite. Test No. 64 completed on a 65%/35% mixture of Drum 6 and Drum 7 samples.

Effect of Primary Grind

Tests No. 40, 41, 44, and 45 were completed using different primary grind times to determine the mesh-of-grind required for Ladner Creek mineralization. Results are presented graphically in Figures F-17, F-18 and F-19.

Fine grinding (40 minutes grinding time for a K_{80} of 50 micrometers in Test No. 41) yielded the lowest tail grade (0.29 g Au/tonne) but there was an very high weight collected in the rougher concentrate (27.5%) reflected by the low grade of the concentrates (12.5 g Au/tonne in the rougher concentrate). A target grind for the Ladner Creek mineralization appears to be 87% minus 200 mesh (K_{80} of 64 micrometers). Coarser grinding (66.8% minus 200 mesh or a K_{80} of 100 micrometers) leads to a drop in recovery as shown in Figures F-17 and F-18.

Effect of $CuSO_4$ Activator

Copper sulphate activator was added in Test No. 60 to see if this would lead to an improvement in recovery. A high weight was collected in the rougher concentrate (15.8%) which caused a decrease in the concentrate gold grade (30.7 g Au/tonne in the rougher concentrate and only 121 g Au/tonne in the second cleaner concentrate). As seen from the grade/recovery curve in Figure F-19, copper sulphate offers no advantage in a single stage float.

Flotation of Head Grade Variability Composites

Test No. 62 on the Zone 1 composite, and Test No. 64 on a 65%/35% composite mixture of Drum 6 and Drum 7 samples, were completed to see what recoveries are achievable using a single stage float on lower grade feed. Grade/recovery curves for these two tests are compared against the grade/recovery curve of Test No. 44 in Figure F-20.

Zone 1 Composite, with an expected head grade of 4.17 g Au/tonne (0.122 oz Au/ton), 0.32%As and 0.06% C(graphitic), appeared to maintain recovery in spite of the lower head grade, when comparing the results of Test No. 62 with a calculated head grade of 3.75 g Au/tonne (0.109 oz Au/ton), to Test No. 44 (completed on the overall composite) which had a calculated head grade of 5.59 g Au/tonne (0.163 oz Au/ton).

Test No. 64, done on a 65%/35% mixture of Drum 6 and Drum7 samples with an expected head grade of 3.50 g Au/tonne (0.102 oz Au/ton), 0.47% As and 0.15% C(graphitic), also appeared to maintain recovery but the grade to concentrate was much lower (rougher second cleaner grade of 83 g Au/tonne versus 387 g Au/tonne in Test No. 44), which is exemplified by the lower grade/recovery curve for this test in Figure F-20. This was caused by the abnormally high graphitic carbon in the feed [0.15% C (graphitic)] which necessitated high collector dosages which in turn led to a high weight collected in the rougher concentrate (28.8%). This test exemplifies the problem expected with swings of high levels of graphitic carbon in mill feed. High weights collected in rougher flotation can be expected to cause downstream problems in cleaner flotation and cyanidation (if cyanidation becomes part of the Ladner Creek mill circuit).

Two-Stage Flotation

Two stage flotation, to produce separate high grade rougher cleaner concentrate and low grade scavenger cleaner concentrate, was evaluated further in additional batch flotation tests. Test conditions are presented in Table 1 and results are summarized in Tables 2 and 3. The results of those additional tests are compared to the previous results of Test No. 35 in Table 5. Grade/recovery curves are depicted in Figure F-21. Results obtained were as follows:

Summary of Results - Two Stage Flotation - Tests No. 35, 47, 48, 49, 58, 59, 61, 63 and 69(1,2)																
	Reagents (g/t)					Calc. Head		% Gold Recovery				Grade (g Au/tonne)				
Test No.	208	PAX	$CuSO_4$	Flex 31	MIBC	g Au/t	% As	Ro	Scav	Ro 2nd Clnr	Scav 2nd Clnr	Ro 1st Clnr	Ro 2nd Clnr	Scav 2nd Clnr	Total Tails	Scav Tails
35	60	42.5	-	-	32.5	4.60	0.31	69.6	23.1	66.6(3)	19.2(3)	587	-	34.3(3)	0.50	0.38
47	77.5	25	-	-	32.5	4.78	0.30	72.3	20.8	68.6(3)	16.1(3)	340	-	35.2(3)	0.55	0.39
48	77.5	25	-	-	32.5	4.14	0.32	70.0	23.7	63.7(3)	16.1(3)	410	-	57.9(3)	0.57	0.31
49	77.5	25	-	-	32.5	5.49	0.37	73.2	21.5	70.2(3)	14.9(3)	537	-	63.1(3)	0.64	0.33
58	85	25	-	-	40	4.19	-	71.0	23.5	68.0	15.7	278	739	46.6	0.46	0.27
59	57.5	-	100	45	37.5	5.82	0.40	76.7	15.9	73.1	11.3	469	1,346	20.2	0.62	0.52
61	57.5	-	-	45	37.5	4.37	0.32	75.3	16.2	68.1	6.9	448	1,320	52.0	0.75	0.44
63	62.5	-	-	72.5	60	2.49	-	40.4	39.0	30.2	20.6	47.1	334	32.0	0.88	0.73
69	65	47.5	-	-	40	4.39	-	66.2	27.2	59.3	19.6	81.7	373	59.4	0.48	0.38

NOTES

1. Tests No. 35, 47, 48, 49, 58, 59 and 69 completed on the overall composite. Test No. 61 completed on Zone 1 Composite. Test No. 63 completed on a 65%/35% mixture of Drum 6 and Drum 7 samples.
2. Except for Test No. 49, which was a stage grind, a 40 minute primary grind was used in all tests (equivalent to a K_{80} of approximately 50 micrometers).
3. First cleaner recoveries and grades shown for Tests No. 35, 47, 48 and 49.

Use of Only 208 in Scavenger Cleaner

Test No. 47 was completed under the same conditions as Test No. 35 except only Aerofloat 208 promoter (no xanthate) was used in the scavenger cleaner. Results were similar to Test No. 35 with no improvement in gold grade observed in the scavenger cleaner concentrate (35.2 g Au/tonne versus 34.3 g Au/tonne in Test No. 35). There was however a decrease in arsenic content in the scavenger cleaner concentrate (2.70 % As versus 3.76% As in Test No. 35).

Evaluation of Concentrate Regrinding

Test No. 48 evaluated regrinding of rougher concentrate ahead of cleaning and extending the scavenger concentrate regrind time to 10 minutes (K_{80} of 14 micrometers). Compared to Test No. 35 there was essentially no difference in recovery and no improvement in rougher cleaner concentrate grade. There was however an improvement in scavenger concentrate grade (57.9 g Au/tonne from 34.3 g Au/tonne).

Evaluation of Primary Stage Grinding

Test No. 49 evaluated stage grinding ahead of flotation by screening at 200 mesh and grinding the oversize. The apparent improvement in rougher recovery is simply due to the high calculated head for this test. A comparison of tails grades indicates no reduction in gold content in the total flotation tails.

Two-Stage Cleaning Tests

Two-stage cleaning of both rougher and scavenger concentrates was tested in Tests No. 58 and 59.

Test No. 58 was a 4 kg float to prepare scavenger cleaner concentrate for cyanidation (see below). Recoveries were similar to those achieved in the previous two-stage float tests. Two-stage cleaning yielded a high rougher cleaner concentrate grade [739 g Au/tonne (21.55 oz Au/tonne) and 0.68% As] but no improvement in scavenger cleaner concentrate grade [46.6 g Au/tonne (1.36 oz Au/ton)].

Test No. 59 evaluate the use of Flex 31 collector instead of xanthate, and the addition of copper sulphate. Calculated recoveries to rougher concentrate appear high because of a high calculated head grade. The gold grade in the flotation tails was slightly higher than the test using xanthate. Two-stage cleaning yielded a very high rougher cleaner concentrate grade [1,346 g Au/tonne (39.26 oz Au/ton) and 1.17% As].

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Flotation of Head Grade Variability Composites

Two tests were completed on lower grade composites using the two-stage float approach. A two-stage float on Zone 1 Composite [expected head grade of 4.17 g Au/tonne (0.122 oz Au/ton), 0.32% As and 0.06% C(graphitic)] maintained or exceeded first stage rougher gold recovery [75.3% to the rougher concentrate in Test No. 61 with a calculated head grade of 4.37 g Au/tonne (0.128 oz Au/ton) versus 69.6% in Test No.35 with a calculated head grade of 4.60 g Au/tonne (0.134 oz Au/ton)] but there was a drop in second stage scavenger gold recovery (16.2% to the scavenger concentrate in Test No. 61 versus 23.1% in Test No. 35). The total flotation tails grade was higher (0.75 g Au/tonne in Test No. 61 versus 0.50 g Au/tonne in Test No. 35) which may have been partially due to the use of Flex 31 instead of xanthate in the float. The high rougher cleaner concentrate grade achieved with two-stage cleaning in this test [1,320 g Au/tonne (38.50 oz Au/ton) and 1.61% As] is noteworthy. As seen in Figure F-22, the grade/recovery curve for Test No. 61 [actual test calculated head was 4.37 g Au/tonne (0.127 oz Au/ton)] is the same as the grade/recovery curve for Test No. 35 with a calculated head of 4.60 g Au/tonne (0.134 oz Au/ton).

Test No. 63 was completed on the 65%/35% mixture of Drum 6 and Drum7 samples [expected head grade of 3.50 g Au/tonne (0.102 oz Au/ton), 0.47% As and 0.15% C(graphitic)]. As seen in Figure F-22, recoveries and grades were substantially lower in this test which had an actual calculated head grade of 2.49 g Au/tonne (0.073 oz Au/ton). The high graphitic carbon content (0.15% C) led to a high weight reporting to the rougher (8.6%) and scavenger (21.0%) concentrate which resulted in low concentrate grades. The flotation tails were also substantially high in Test No. 63 compared to Test No. 35. This test will be repeated to confirm the results.

Flotation of Samples for Mineralogical Examination

A two-stage float was completed on the overall composite (Test No. 69) to generate samples for mineralogical examination. Samples of rougher second cleaner concentrate, scavenger second cleaner concentrate, scavenger 1st cleaner scavenger tails, and scavenger tails have been forwarded to Vancouver Petrographics Ltd. to identify the mode of occurence of gold and to establish the relationship of gold to pyrrhotite, pyrite and arsenopyrite.

Recoveries and concentrate grades in this test were somewhat lower than expected (66.2% to rougher

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concentrate versus 69.0% in Test No. 35) as evident from the grade/recovery curve shown in Figure F-21, but the total tails grade (0.48 g Au/tonne) was the same as the total tails assay of Test No. 35 (0.50 g Au/tonne).

LOCK-CYCLE FLOTATION TESTS - OVERALL COMPOSITE

Two separate lock-cycle tests were completed on the overall composite to quantify recoveries and grades achievable under conditions approaching steady state using single stage flotation and two stage flotation. Test results, listed in Table 6, were as follows:

Ladner Creek Overall Composite - Lock-Cycle Tests						
		Calculated Head		Concentrate Grade		
Float	Concentrate	g Au/t	% As	g Au/t	% As	% Gold Recovery
Single Stage Flotation	Single	5.54	0.34	341	3.77	85.1
Two-Stage Flotation	High Grade	-	-	834	0.91	70.8
	Low Grade	-	-	45.6	3.35	19.7
	Total	5.53	0.34	175	2.95	90.5

Single stage flotation yielded a gold recovery of 85.1% into a concentrate assaying 341 g Au/tonne (9.95 oz Au/ton) and 3.77% As from a calculated head grade of 5.54 g Au/tonne (0.162 oz Au/ton) and 0.34% As.

Two stage flotation of a sample with a calculated head grade of 5.53 g Au/tonne (0.161 oz Au/ton) and 0.34% As yielded a gold recovery of 70.8% to a high grade concentrate assaying 834 g Au/tonne (24.33 oz Au/ton) and 0.91% As. Scavenger recovery to a low grade concentrate was 19.7% into a concentrate assaying 45.6 g Au/tonne (1.33 oz Au/ton) and 3.35% As. The two stage float represented a combined recovery of 90.5% into a blended single concentrate assaying 175 g Au/tonne (5.10 oz Au/ton) and 2.95% As.

A plot of concentrate grade versus gold recovery for the two lock-cycle tests is shown in Figure F-23. From this graph it is apparent that the grade/recovery points fall on the same line for both flotation options. In other words, gold recovery in the single stage flotation scheme would also increase to

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90%, the recovery of the combined high grade (rougher) and low grade (scavenger) concentrate in the two stage flotation scheme, with a drop in concentrate grade.

FLOTATION CONCENTRATE CYANIDATION TESTS

Standard (Merrill-Crowe) Cyanidation

Test conditions and results of bottle roll cyanidation tests on flotation concentrate are listed in Tables 7,8 and 9. The following results were obtained on flotation concentrates from Tests No. 42, 50 and 58:

Ladner Creek Flotation Concentrate Cyanidation Tests						
Test No.	Calc. Head of Concentrate (g Au/tonne)	Number of Stages	% Gold Extraction (48h)	Leach Residue (g Au/tonne)	Reagent Consumption	
					NaCN (kg/t con)	CaO (kg/t con)
42	70.3	2	91.5	5.96	1.75	2.65
50	14.0	1	74.0	5.18	1.83	3.21
58	46.6	1	87.6	5.79	1.96	4.46

Bulk Concentrate

Test No. 42 was completed on a bulk flotation concentrate with a calculated head grade of 70.3 g Au/tonne (2.05 oz Au/ton). Leaching was done as a two stage leach in the presence of lead nitrate. The first stage (24 hour) extraction was 78.3% and the second stage extraction, after a solution change, was 13.2% for a total extraction of 91.5% after 48 hours of leaching leaving a leach residue of 5.96 g Au/tonne. Cyanide consumption was 1.75 kg NaCN/tonne of concentrate.

Scavenger Concentrate

Test No. 50 was completed on a low grade scavenger concentrate (14 g Au/tonne) produced from a two stage float (Flotation Test No. 50). Pre-aeration in the presence of lead nitrate was done prior to cyanidation. Total extraction after a 48-hour leach was only 74.0%, leaving a leach residue grade of 5.18 g Au/tonne. Cyanide consumption was 1.83 kg NaCN/tonne of concentrate.

Test No. 58 was a 48-hour leach of pre-aerated scavenger cleaner concentrate produced from a two-stage float (calculated head grade of 46.6 g Au/tonne). Gold extraction was 87.6% leaving a leach residue grade of 5.79 g Au/tonne. Cyanide consumption was 1.96 kg NaCN/tonne of concentrate.

Leaching of scavenger cleaner concentrate from a two stage float yields a slightly better extraction compared to leaching of bulk concentrate. The 87.6% extraction obtained in Test No. 59 (leach residue grade of 5.79 g Au/tonne) can be compared to the average results of Test No. 51 and Test No. 52D (see below) which show that an extraction of 85% (leach residue of 7.5 g Au/tonne) can be achieved by standard (Merrill-Crowe) cyanidation from a bulk concentrate assaying 50 g Au/tonne. The improved extraction observed for scavenger concentrate is a result of preg-robbing carbon being removed from the flotation concentrate in the rougher flotation step ahead of scavenger flotation in a two stage float.

<u>Lock-Cycle Merrill-Crowe Cyanidation Test - Bulk Concentrate</u>

A five cycle lock-cycle cyanidation test (Test No. 51) was completed on bulk concentrate produced from single stage flotation. Test conditions and results are summarized in Table 10 and depicted graphically in Figures CY-7 and CY-8. Results obtained are summarized as follows:

Barren Recycle Lock-Cycle Cyanidation Test on Flotation Concentrate (Test No. 51)						
Cycle	Calc. Head Concentrate (g Au/tonne)	% Gold Extraction	Leach Residue (g Au/tonne)	Reagent Composites		Reducing Power (mL $KMnO_4$/L)
				kg NaCN/t	kg CaO/t	
1	54.0	86.0	7.58	2.99	4.51	725
2	48.5	84.7	7.44	1.86	4.73	900
3	49.9	84.6	7.70	1.95	3.79	1,480
4	52.7	84.2	8.34	2.70	5.47	1,250
5	49.8	85.5	7.23	4.00	5.64	1,450

Barren solution, produced from zinc precipitation of pregnant solution, was recycled in the leach at a rate of 75% which represented 58% to 68% of the solution in the leach.

An increase in residue gold grade was apparent with extended leach cycles (see Figure CY-7), even though the lowest residue grade was obtained in the last cycle, which was anomalous compared to the other four cycles. Gold extraction ranged from 84.2% to 86.0% in the five cycles. Except for the anomalous extraction achieved in the last cycle, there was a slight drop in extraction with extended cycles. The average gold extraction for the five cycles was 85.0% from an average calculated concentrate grade of 51.0 g Au/tonne (1.49 oz Au/ton), leaving an average residue grade of 7.66 g Au/tonne.

As shown in Figure CY-8, there was a definite relationship of cyanide consumption and reducing power with extended cycles, with both increasing from Cycles 1 to 5.

Recycling of barren solution to the cyanide leach also causes a build-up in total cyanide and thiocyanate, as well as heavy metals, as noted from the analysis of Cycle 3 (Cycle C) pregnant solution presented in Table 10.

This cyanidation lock-cycle test exemplifies the concern of recycling barren to the cyanide leach. For design purposes, if a cyanidation circuit is used in the Ladner Creek mill, barren recycle may need to be limited to, say, 25%. The cyanide destruction treatment circuit will need to be designed to accomodate 100% of the barren flow for occasional purges of fouled solution.

Carbon-in-Leach Cyanidation Tests - Bulk Concentrate

Tests No. 52A, 52B, 52C, 52D and 52E were completed on bulk flotation concentrate to optimize cyanidation conditions. Test conditions and results are summarized in Table 11. Tests No. 52A, 52B, 52C and 52E were completed as carbon-in-leach tests and Test No. 52D was completed without carbon added to the leach for comparison purposes. Results were as follows:

Cyanidation Optimization Tests on Flotation Concentrate (Test No. 52)								
Test No.	Pre-Aeration	$Pb(NO_3)_2$	Carbon	Calc. Head of Concentrate (g Au/tonne)	% Gold Extraction	Leach Residue (g Au/tonne)	Reagent Consumption	
							kg NaCN/t	kg CaO/t
52A	yes	yes	yes	42.7	91.0	3.85	2.43	2.65
52B	yes	yes	yes	38.5	88.2	4.52	1.70	1.64
52C	no	no	yes	40.5	90.9	3.70	3.63	3.63
52D	yes	no	no	47.0	84.5	7.28	2.61	5.11
52E	yes	yes	yes	43.0	91.1	3.85	2.81	5.11

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These tests led to the following conclusions:

- an achievable leach residue grade for carbon-in-leach cyanidation appears to be 4.1 g Au/tonne, representing a 90% extraction from a 41.4 g Au/tonne concentrate (average concentrate head grade of Tests No. 52A, 52B and 52E),

- the use of carbon in the cyanide leach improves gold extraction from 84.5% to 90% (comparison of Test No. 52D with the average of Tests No. 52A, 52B and 52E),

- a target leach residue grade for standard (Merrill-Crowe) cyanidation of bulk concentrate assaying 50 g Au/tonne appears to be 7.3 to 7.7 g Au/tonne (Test No. 52D and the average of the five leach cycles in Test No. 51 as dicussed above) which represents an 85% gold extraction,

- the use of lead nitrate reduces cyanide consumption (average of 2.31 kg NaCN/tonne for Tests No. 52A, 52B and 52E versus 3.63 kg NaCN/tonne for Test No. 52C), and

- the need for pre-aeration is not definitive based on the results obtained.

Reagent Consumptions

Cyanide consumptions for carbon-in-leach cyanidation are, as noted above, approximately 2.3 kg NaCN/tonne when using lead nitrate. Cyanide consumptions for a standard (Merrill-Crowe) cyanidation circuit are approximately 2.1 kg NaCN/tonne of concentrate (average of Tests No. 42, 50, 58 and 51A). These values are net consumptions of cyanide in the leach, additional cyanide will be required to maintain adequate free cyanide levels in the leach.

Lime consumptions were approximately 3.3 kg CaO/tonne of concentrate for carbon-in-leach cyanidation (average of Tests No. 52A, 52B, 52C and 52E) and 4.3 kg CaO/tonne of concentrate for standard (Merrill-Crowe) cyanidation (average of Tests No. 42, 50, 58, 51A, 51B, 51C, 51D and 51E).

Lead nitrate additions used in the testwork were approximately 0.4 kg $Pb(NO_3)_2$/tonne of concentrate for pre-aeration and 0.3 kg $Pb(NO_3)_2$/tonne of concentrate for cyanidation.

TESTWORK ON EXISTING TAILINGS COMPOSITE

Composite Analysis

Approximately 250 samples of the existing Ladner Creek tailings were received from Athabaska for preparation of a test composite.

The samples were drilled from the existing tailings pond by Ace Drilling of Vancouver, B. C. using a Vibra-Core drill, under the supervision of Ash & Associates of Vancouver.

The samples were combined and repulped to 50% solids(w/w) with water. The slurry was screened at 10 mesh and the oversize (approximately 6 kg from a total tailings weight of approximately 1,000 kg) was discarded. Approximately fifty 4 kg samples of the blended composite were taken for analysis and testing by pumping appropriate quantities of agitated slurry from the mix tank.

The head analysis of the tailings composite is listed in Table 12 along with a partial analysis of the slurry liquid. The blended tailings composite assayed 1.86 g Au/tonne (0.054 oz Au/ton) (average of four separate assays: 1.45, 1.98, 1.79 and 2.20 g Au/tonne), <0.5 g Ag/tonne, 0.25% As and 0.10% C (graphitic). The average gold assay head agreed very well with the average calculated head of 1.87 g Au/tonne (0.055 oz Au/ton) from eight flotation tests. The liquid component of the tailings slurry contained no cyanide and very low metal values.

Additional samples of the tailings composite will also be analysed for carbon and arsenic, as well as particle size distribution.

<u>Batch Flotation Tests</u>

Eight batch flotation tests were completed on the existing tailings composite to ascertain achievable recoveries and grades. Test conditions are listed in Table 13. Results are summarized in Tables 14 and 15 and depicted graphically in Figures FT-1 to FT-4.

Single Stage Flotation

A single stage float was evaluated in Tests No. 53, 54, 55, 57, 65 and 66. Results are discussed below under separate headings.

Effect of Grinding

The effect of grinding the tailings prior to flotation can be ascertained from the following results:

Flotation of Existing Tailings Composite - Effect of Grinding					
Test No.	Grinding Time (min.)	Feed K_{80} (μm)	Calc. Head (g Au/tonne)	% Ro Recovery	Tails Grade (g Au/tonne)
53	10	66	1.61	81.6	0.38
65	6.5	91	1.95	77.1	0.46
54	0	188	1.92	68.0	0.69
57	0	188	1.73	67.8	0.64

As seen from the results of Tests No. 53 and 54 (Figures FT-1 and FT-2) and Test No. 57 (Figure FT-3), grinding of the tailings will be required prior to flotation. Grinding of the tailings to 86.4% minus 200 mesh (K_{80} of 66 micrometers) (Test No. 53) yielded a much higher rougher gold recovery (81.6%) compared to no grinding (68.0% in Test No. 54) where the tailings feed particle size distribution was only 42.3% minus 200 mesh (K_{80} of 188 micrometers). The flotation tails grade was 0.38 g Au/tonne with grinding compared to 0.64 g Au/tonne (Test No. 57) and 0.69 g Au/tonne (Test No. 54) without grinding.

A coarser grind (71.1% minus 200 mesh equivalent to a flotation feed K_{80} of 91 micrometers) was evaluated in Test No. 65. Rougher gold recovery dropped somewhat to 77.1% and the flotation tails grade increased to 0.46 g Au/tonne.

From these tests it appears that the target grind for reprocessing of tailings will be approximately 80% minus 200 mesh, or a flotation feed K_{80} of approximately 80 micrometers.

Cleaner Flotation

Cleaner flotation was evaluated in Test No. 55 (two stage cleaner), Test No. 57 (two stage cleaner with no grinding of flotation feed) and Test No.65 (three stage cleaner). Results of these tests can be summarized as follows:

Flotation of Existing Tailings Composite - Cleaner Flotation												
Test No.	Feed K_{80} (μm)	Reagents (g/t)			Calc. Head (g Au/t)	% Gold Recovery				Grade (g Au/t)		
		$CuSO_4$	Flex 31	MIBC		Ro	1st Clnr	2nd Clnr	3rd Clnr	Ro 2nd Clnr	Ro 3rd Clnr	Total Tails
55	66	625	135	50	1.81	80.5	71.7	66.7	-	36.0	-	0.48
57	188	625	135	45	1.73	67.8	62.4	58.5	-	26.4	-	0.64
65	91	625	122.5	45	1.79	77.1	71.3	67.9	64.8	30.9	37.4	0.51

Three stage cleaning under the flotation conditions listed above only led to a slight increase in cleaner concentrate grade (37.4 g Au/tonne) as evident from the grade/recovery curves shown in Figure FT-3.

Effect of $CuSO_4$

Test No. 66 was carried out under the same conditions as Test No. 65 but copper sulphate was eliminated from the float. The following results were obtained:

Flotation of Existing Tailings Composite - Effect of $CuSO_4$												
Test No.	Feed K_{80} (μm)	Reagents (g/t)			Calc. Head (g Au/t)	% Gold Recovery				Grade (g Au/t)		
		$CuSO_4$	Flex 31	MIBC		Ro	1st Clnr	2nd Clnr	3rd Clnr	Ro 2nd Clnr	Ro 3rd Clnr	Total Tails
65	91	625	122.5	45	1.79	77.1	71.3	67.9	64.8	30.9	37.4	0.51
66	91	0	122.5	45	1.95	76.6	68.8	65.6	63.9	59.3	73.8	0.58

As seen from the above results, and from the grade/recovery curve shown in Figure FT-3, there was a significant increase in cleaner concentrate grades with virtually no effect on gold recovery.

Two Stage Flotation

Two stage flotation of the existing tailings composite was evaluated in Tests No. 56 and 67. Results obtained were as follows:

Flotation of Existing Tailings Composite - Two Stage Flotation														
Test No.	Feed K_{80} (μm)	Reagents (g/t)				Calc. Head (g Au/t)	% Gold Recovery				Grade (g Au/t)			
		208	PAX	Flex 31	MIBC		Ro	Scav	Ro 2nd Clnr	Scav 2nd Clnr	Ro 1st Clnr	Ro 2nd Clnr	Scav 2nd Clnr	Total Tails
56	66	47.5	37.5	-	32.7	2.25	79.7	4.9	-	-	-	-	-	0.40
67	91	57.5	-	45	37.5	1.92	60.8	12.5	51.9	8.4	52.8	69.9	56.5	0.58

The high calculated recoveries in Test No. 56 are due to the high calculated head in this test (2.25 g Au/tonne). As seen in Figure FT-4, and by comparing the grade/recovery curve of Test No.66 for a single stage float (Figure FT-3) to the curve for the two stage float (Test No. 67, Figure FT-4), there is no benefit in using a two-stage float in terms of gold recovery and concentrate gold grade. Results of Tests No. 66 and 67, listed in Table 16, were as follows:

Flotation of Existing Tailings Composite - Comparison of Single Stage and Two Stage Flotation										
			% Gold Recovery			Grade				
						(Ro + Scav) 1st Clnr		(Ro + Scav) 2nd Clnr		
Test No.	Float	Calc. Head (g Au/t)	Ro	Ro + Scav	(Ro + Scav) 1st Clnr	g Au/t	% As	g Au/t	% As	Total Tails (g Au/t)
66	Single Stage	1.95	76.6	-	72.1	36.4	3.71	59.3	4.80	0.58
67	Two Stage	1.92	60.8	73.3	67.7	46.5	2.59	67.7	2.18	0.58

FLOTATION CONCENTRATE SMELTER ANALYSIS

Samples of concentrate from the two lock-cycle tests (Tests No. 43 and 46) were submitted for detailed smelter analysis to identify concentrate quality in relation to the potential sale of concentrate to smelters. The concentrate analyses are listed in Table 17.

Key concentrate analysis can be summarized as follows:

Ladner Creek Flotation Concentrate Analyses			
	Test No. 43	Test No. 46	
Element	Single Concentrate	High Grade Concentrate	Low Grade Concentrate
Au - g/tonne	346	988	43.9
- oz/ton	10.09	28.82	1.28
Ag - g/tonne	61.9	190	8.7
- oz/ton	1.81	5.54	0.25
As, %	3.71	0.91	3.52
Cu, %	1.13	4.84	0.14
Pb, %	0.11	0.30	0.014
Al_2O_3, %	2.84	8.86	2.60

The concentrate analysis listed in Table 17 were forwarded to potential smelter companies to obtain smelter terms and to identify the potential smelter acceptability of the following concentrates:

- single concentrate from single stage float,
- high grade (rougher) concentrate from two stage float,
- low grade (scavenger) concentrate from two stage float, and
- blended high grade and low grade concentrate from two stage float.

The following smelter companies were contacted:

- Asarco Inc.
- Boliden Mineral AB
- Cominco Ltd.
- Dowa Mining Co.
- Hudson Bay Mining and Smelting Co., Limited
- Mitsubishi Canada Limited
- Noranda Metallurgy Inc.
- Sumitomo Canada Limited
- Union Miniere - BU

In addition to gold there will be a minor payable contribution from silver and copper for some of the Ladner Creek concentrates. Arsenic will be the major penalty element and, depending on the smelter, lead and aluminum may lead to additonal penalty charges.

A separate letter report will be issued once information is received from the smelter companies listed above. To date only Asarco Inc. has replied. (See MELIS fax dated February 15, 1996).

SETTLING TESTS

Flotation Concentrate

Settling tests were completed on rougher flotation concentrate from Test No. 51. The following results were observed:

Test No. 51 Flotation Concentrate Settling Tests				
Feed Density [% Solids(w/w)]	Percol 351 (g/t)	Rise Rate (m^3/m^2/day)	Thickener Unit Area (m^2/t/day)	Final Density [% Solids(w/w)]
24.9	9.6	61.9	0.28	61.0
14.0	10.0	257.3	0.05	64.0

Existing Tailings

The existing tailings composite was submitted to settling tests with increasing flocculant addition. The following results were obtained:

Settling Tests on Existing Tailings Composite				
Feed Density [% Solids(w/w)]	Percol 351 (g/t)	Rise Rate ($m^3/m^2/day$)	Thickener Unit Area ($m^2/t/day$)	Final Density [% Solids(w/w)]
19.2	0	12.8	0.36	66.4
19.9	5.3	153.1	0.05	72.8
18.7	10.8	391.1	0.03	73.0

GRINDABILITY TESTS

Standard Bond ball mill grindability tests were completed on the Zone 1 and Zone 2 composites. The ball mill Bond work indices (BWI) are reported below along with the previously reported rod mill Bond work indices (BWI).

Bond Work Index Measurements								
	Rod Mill				Ball Mill			
Composite	Mesh	Feed K_{80} (μm)	Product K_{80} (μm)	BWI (Metric)	Mesh	Feed K_{80} (μm)	Product K_{80} (μm)	BWI (Metric)
Zone 1	14	8,262	892	15.9	150	2,025	79	14.3
Zone 2	14	8,317	893	15.3	150	2,146	79	14.4

As noted from these measurements there is essentially no difference in grinding work index between the two zone composites.

CYANIDE DESTRUCTION TESTWORK

Cyanide destruction testwork using the Inco SO_2/air process is currently being completed at Inco's Sheridan Park research laboratory on the following cyanide tailings samples:

- Barren Solution from Tests No. 50 and 51, and
- Carbon-in-Leach Cyanide Tailings Slurry from Test No. 52.

Because of limited amounts of samples, initial tests were completed on synthetic solutions made up on the basis of Ladner Creek barren solution analysis. This is to be followed by testing of the actual solutions.

The proposed treatment approach for a Merrill-Crowe circuit would be to first treat the barren solution bleed stream (expected to be 75% or more of the total barren solution flow) and then combine the treated barren solution with the washed leach residue for final (second stage) treatment of the total cyanide tailings.

For a carbon-in-leach circuit the total cyanide tailings slurry would be treated, likely in a two stage treatment circuit.

Results of this testwork should be available next week. Inco is to provide the following information:

- $Na_2S_2O_5$ and CaO consumption,
- number of stages and retention time per stage,
- pH conditions,
- tank air requirements,
- mixing and aeration conditions,
- pertinent analysis of feed and treated solutions (Au, Ag, Cu, Fe, Ni, Zn, As, CNO, CNS, CN_T, CN_{WAD}), and
- effect of aging by re-analysis of treated solutions after 24 hours or 48 hours.

The treated samples will be returned to Lakefield Research for environmental analysis.

ENVIRONMENTAL DATA

The following tailings analyses are planned to provide environmental data for reactivation of the Ladner Creek mine:

- **Flotation Tails - Overall Composite (combined rougher tails and 1st cleaner scavenger tails)**

  Solids
  - acid-base accounting measurement
  - low level analysis
  - SWEP test (leach at pH 3.5 with acetic acid) with low level analysis of leachate
  - simulated rainfall test (leach at pH 5.5 with carbonic acid) with low level analysis of leachate

  Liquid
  - low level analysis
  - 96-hour LC_{50} bio-assay

- **Treated Concentrate Cyanidation Tails (from Inco testwork)**

  Solids
  - acid-base accounting measurement
  - low level analysis
  - SWEP test (leach at pH 3.5 with acetic acid) with low level analysis of leachate
  - simulated rainfall test (leach at pH 5.5 with carbonic acid) with low level analysis of leachate

  Liquid
  - low level analysis

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- Simulated Final Discharge [mixture of flotation tails liquid, treated cyanidation tails liquid and water (to simulate rainfall and runoff dilution)]

  Liquid Only - low level analysis
  - 96-hour LC_{50} bio-assay

- Flotation Tails - Existing Tailings Composite (combined rougher tails and 1st cleaner scavenger tails)

  Solids - acid-base accounting measurement
  - low level analysis

  Liquid - low level analysis

Analysis of the flotation tails from the overall composite has been initiated. Environmental work on the treated concentrate cyanidation tails and the simulated final discharge will be initiated during the first week of March. Results will be submitted as they become available.

REMAINING WORK

Testwork

Remaining work at Lakefield Research includes:

- repeat of Test No. 63 on Drum 6/Drum 7 composite with an expected head assay of 3.46 g Au/tonne (0.101 oz Au/ton), 0.47% As and 0.15% C(g),
- single stage and two stage float test on a composite made up from all the drum samples to assay 0.100 oz Au/ton (3.43 g Au/tonne) and approximately 0.05% C(g) and 0.25% As,
- cyanidation of bulk flotation concentrate from the overall composite at 0.5, 1.0 and 2.0 g NaCN/L free cyanide level,
- cyanidation of bulk concentrate from flotation of the existing tailings composite,
- lock-cycle test on the existing tailings composite using single stage flotation including smelter analysis of the concentrate, and
- assimilation of environmental data as listed above.

Processing Options

As noted in our meeting of January 30, 1996 in Athabaska's Vancouver office, the following process options are being considered for reactivation of the Ladner Creek mine:

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Ladner Creek Mine Reactivation - Process Options	
Option	**Description**
1	Whole Ore Carbon-in-Leach Cyanidation
2	Flotation/Carbon-in-Leach of Bulk Concentrate
3	Flotation/Cyanidation (Merrill-Crowe) of Bulk Concentrate
4	Flotation/Sale of High Grade Concentrate/Cyandiation (Merrill-Crowe) of Low Grade Concentrate
5	Flotation/Sale of High Grade Concentrate/Sale of Low Grade Concentrate
6	Flotation/Sale of Single Concentrate

The different process options are depicted in the flowsheets shown in Figure 1 for ore processing and in Figure 2 for tailings reprocessing.

Order-of-magnitude capital and operating cost estimates of the different processing options will be initiated next week. The order-of-magnitude cost estimates will be considered against the target gold recoveries for each option in order to arrive at the most economical process for reactivation of the Ladner Creek mine.

Economic evaluation of tailings re-processing will be completed in the same manner.

Once the optimum process has been selected, a detailed capital cost estimate will be completed which will require a detailed assessment of the existing Ladner Creek mill and related facilities to identify rehabilitation requirements for the selected process. Operating cost estimates and supporting documentation such as flowsheets and general arrangement drawings for the selected process will also form part of the feasibility study for reactivation of the Ladner Creek Mine.

Respectfully submitted,
MELIS ENGINEERING LTD.

L.A. Melis, P.Eng.
President

B.C. Fielder
Senior Process Engineer

LAM/BCF:mdl
cc: Tom Adamson
Jim Kermeen

(lr0296c1.319)

MELIS ENGINEERING LTD.
Project No. 319
February 27, 1996

TABLE 1

LADNER CREEK MINE
FLOTATION TESTS ON LADNER CREEK COMPOSITES
SUMMARY OF FLOTATION CONDITIONS[1]

Test No.	Figure No.	Reagent Addition (g/tonne)								pH	Float Time (min)			Flotation Conditions
		SIBX	SIPX	PAX	CMC/ WW82	$CuSO_4$	208	Flex 31	MIBC		Ro	Total Cl	Scav	
41								130	32.5	8.6	8	3.5	8	Test No. 40 but with 40 minute grind instead of 30 minutes
42					250			102.5	22.5	8.3	10	-	-	Test No. 41 conditions on 10 kg float to produce bulk concentrate for cyanidation
43								110	31	8.5	8	3	1.5	Single stage lock-cycle float under Test No. 40 conditions using a 35 minute grind
44								110	32.5	8.5	8	3	2	Batch test of Lock-Cycle Test No. 43 (K_{80} = 64 μm)
45								110	32.5	8.5	8	3	2	Test No. 44 conditions but 25 minute grind (K_{80} = 101 μm)
46				47.5			65		40	8.2	4	5.5/5.3	4.5	Two stage lock-cycle float using Test No. 35 conditions with a 40 minute grind (Regrind K_{80} = 17 μm)
47				25			77.5		32.5	-	4	2/4	4	Test No. 35 but using only 208 in scavenger cleaner
48				25			77.5		32.5	-	4	2/4	4	Test No. 47 but regrinding of rougher concentrate and increased scavenger concentrate regrind time prior to cleaning (K_{80} = 14 μm)
49				25			77.5		32.5	-	4	2/4	4	Test No. 47 but using stage grinding for primary grind (Regrind K_{80} = 18 μm)
50				25			47.5		15	-	4	-	4	To produce low grade scavenger concentrate from two stage float for cyanidation
51								102.5	22.5	8.3	10	-	-	Test No. 44 conditions to produce bulk concentrate for lock-cycle cyanidation test (Primary Grind K_{80} = 63 μm)
52								102.5	22.5	8.3	10	-	-	Test No. 44 conditions to produce concentrate for cyanidation optimization tests
58				25			85		40	8.2	4	3.5/5.5	4	Similar to Test No. 50 but scavenger concentrate cleaned twice for producing upgraded scavenger concentrate for cyanidation
59						100	57.5	45	37.5	8.2	4	3.5/5.5	4	Test No. 35 but $CuSO_4$ addition and PAX replaced with Flex 31
60						500		85	27.5	7.7	6	3	2	Test No. 44 with $CuSO_4$ addition in grind
61							57.5	45	37.5	8.1	4	3/5.5	4	Test No. 35 with Flex 31 instead of PAX on Zone 1 Composite
62								110	32.5	8.1	8	3.5	1.5	Test No. 44 conditions on Zone 1 Composite
63							62.5	72.5	60	8.5	4	3.5/5.3	8	Test No. 35 conditions with Flex 31 instead of PAX on a 65%/35% mixture of Drum 6 and Drum 7 samples.
64								195	52.5	8.5	10	4.3	2	Test No. 44 conditions on a 65%/35% mixture of Drum 6 and Drum 7 samples.
69				47.5			65		40	8.2	4	5.5/5.3	4.5	Test No. 46 conditions to generate samples for mineralogical examination

NOTES:

1. Tests No. 41 to 52, Tests No. 58 to 60 and Test No. 69 were completed on overall composite; Tests No. 61 and 62 were completed on Zone 1 Composite [expected head assay of 4.17 g Au/tonne (0.122 oz Au/ton), 0.32% As and 0.06% C(g)]. Tests No. 63 and 64 completed on a composite made up as a 65%/35% mixture of Drum 6 and Drum 7 samples [expected head assay of 3.46 g Au/tonne (0.101 oz Au/ton), 0.47% As and 0.15% C (g)].

TABLE 2

LADNER CREEK MINE
FLOTATION TESTS ON LADNER CREEK COMPOSITES
SUMMARY OF ROUGHER FLOTATION RESULTS

Test No.	Calculated Head			Total Rougher Concentrate						Total Bulk Tails[1]		
				Grade			% Recovery			Grade		
	g Au/t	% S	% As	g Au/t	% S	% As	Au	S	As	g Au/t	% S	% As
41[2]	3.73	2.24	0.23	12.8	7.74	0.80	94.4	94.8	95.6	0.31	0.32	0.019
42	4.77	2.47	0.37	70.3	-	4.20	85.6	-	66.7	0.73	1.51	0.13
44	5.59	2.47	0.41	41.6	16.9	2.92	93.3	85.9	90.3	0.75	1.70	0.30
45	5.94	2.29	0.42	52.0	19.0	3.44	90.2	85.5	84.0	1.07	1.88	0.35
47[2]	4.78	2.26	0.30	28.6	13.7	1.76	93.1	94.0	91.8	0.55	1.43	0.21
48[2]	4.14	2.21	0.32	25.1	13.5	1.94	93.7	94.2	93.4	0.57	1.77	0.26
49[2]	5.49	2.48	0.37	47.1	21.4	3.18	94.7	95.3	94.3	0.64	1.77	0.30
50[2]	4.70	-	-	59.6	-	-	92.7	-	-	0.38[3]	-	-
51	3.77	-	-	51.0	-	-	89.1	-	-	0.44	-	-
52	4.17	-	-	41.9	-	-	92.6	-	-	0.34	-	-
58[2]	4.19	-	-	28.0	-	-	94.5	-	-	0.46	-	-
59[2]	5.82	-	0.40	30.3	-	2.17	92.7	-	96.5	0.62	-	0.11
60	5.16	2.48	0.43	30.8	15.4	2.61	94.3	98.3	96.8	0.57	0.66	0.14
61[2]	4.37	-	0.32	26.4	-	1.45	91.5	-	68.3	0.75	-	0.24
62	3.75	-	0.32	21.2	-	1.82	92.6	-	93.9	0.50	-	0.20
63[2]	2.49	-	-	6.7	-	-	79.4	-	-	0.88	-	-
64	3.50	-	-	11.1	-	-	91.6	-	-	0.53	-	-
69[2]	4.39	-	-	16.9	-	-	93.4	-	-	0.48	-	-

NOTES:

1. Total Bulk Tails includes bulk flotation tails and first cleaner scavenger tails.
2. Combined rougher and scavenger recovery.
3. Scavenger tail only.

TABLE 3

LADNER CREEK MINE
FLOTATION TESTS ON LADNER CREEK COMPOSITES
SUMMARY OF CLEANER FLOTATION RESULTS

Test No.	Calculated Head		Grade				% Distribution					
			Ro 1st Clnr Con		Ro 2nd Clnr Con		Ro 1st Clnr Con		Ro 2nd Clnr Con		1st Clnr Scav Con	
	g Au/t	% As	g Au/t	% As	g Au/t	% As	Au	As	Au	As	Au	As
41	3.73	0.23	99.5	1.72	-	-	81.7	22.9	-	-	4.7	11.8
44	5.59	0.41	203	3.22	387	3.34	82.0	18.0	78.7	9.4	5.1	10.2
45	5.94	0.42	266	3.04	636	2.40	76.5	12.3	70.9	3.8	5.9	7.5
47[1]	4.78	0.30	128	2.00	-	-	84.7	21.1	-	-	1.2	9.9
48[1]	4.14	0.32	184	2.43	-	-	79.8	13.6	-	-	1.3	6.8
49[1]	5.49	0.37	232	3.01	-	-	85.1	16.3	-	-	0.8	4.7
58[1]	4.19	-	85.3	-	197	-	87.8	-	83.7	-	0.8	-
59[1]	5.82	0.40	75.4	4.14	137	6.03	88.0	70.7	84.4	54.0	0.7	2.0
60	5.16	0.43	97.4	5.38	121	6.02	84.9	56.6	80.7	48.8	4.7	12.5
61[1]	4.37	0.32	114	2.27	409	2.85	78.4	21.3	75.0	7.1	0.7	6.4
62	3.75	0.32	150	4.27	305	6.88	83.6	28.1	79.5	21.1	3.6	10.5
63[1]	2.49	-	19.6	-	69.2	-	61.8	-	50.8	-	2.6	-
64	3.50	-	27.9	-	83.0	-	83.6	-	76.6	-	3.4	-
69[1]	4.39	-	46.3	-	161	-	87.2	-	78.9	-	1.3	-

NOTES:

1. Includes combined rougher cleaner concentrate and scavenger cleaner concentrate for a two-stage float.

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TABLE 4

LADNER CREEK MINE
COMPARISON OF SINGLE STAGE FLOTATION RESULTS
(Tests No. 40, 41, 44, 45, 60, 62 and 64)

Test No.	Primary Grind K_{80} (μm)	Calculated Head		% Gold Recovery				Grade									
								Ro 1st Clnr		1st Clnr Scav		Ro 1st Clnr + 1st Clnr Scav[1]		Total Bulk Tails[3]		Scav Tails
		g Au/t	% As	Ro	Ro + Scav	Ro 1st Clnr	Ro 1st Clnr + 1st Clnr Scav[1]	g Au/t	% As	g Au/t	% As	g Au/t	% As	g Au/t	% As	g Au/t
40	81	4.62	0.31	88.8	90.0	79.2	80.7	320	2.10	19.8	2.41	249	2.17	0.57	0.06	0.51
41	50	3.73	0.23	93.3	94.4	81.7	86.4	99.5	1.72	11.9	1.85	71.1	1.76	0.31	0.019	0.29
44	64	5.59	0.41	93.3	-	82.0	87.1	203[2]	3.22[2]	24.4	3.54	142	3.33	0.75	0.30	0.43
45	100	5.94	0.42	90.2	-	76.5	82.4	266[2]	3.04[2]	35.6	3.19	182	3.09	1.07	0.35	0.65
60	~64	5.16	0.43	94.3	-	84.9	89.6	97.4[2]	5.38[2]	12.8	2.81	72.3	4.61	0.57	0.14	0.35
62[4]	~64	3.75	0.32	92.6	-	83.6	87.3	150[2]	4.27[2]	7.7	1.89	84.8	3.18	0.50	0.20	0.33
64[5]	~64	3.50	-	91.6	-	83.6	87.0	27.9[2]	-	2.5	-	20.0	-	0.53	-	0.41

NOTES:

1. Represents recovery and grade to a combined rougher first cleaner concentrate (Ro 1st Clnr Con) and rougher first cleaner scavenger concentrate (1st Clnr Scav).

2. Rougher second cleaner (Ro 2nd Clnr) assayed 387 g Au/tonne and 3.34% As in Test No. 44; 636 g Au/tonne and 2.40% As in Test No. 45; 121 g Au/tonne and 6.02% As in Test No. 60, 83.0 g Au/tonne in Test No. 64; and 305 g Au/tonne and 6.88% As in Test No. 62.

3. Total bulk tails includes rougher or scavenger tails and first cleaner scavenger tails.

4. Test No. 62 completed on Zone 1 Composite [expected head assay of 4.17 g Au/tonne (0.122 oz Au/ton), 0.32% As and 0.06% C (g)].

5. Test No. 64 completed on a 65%/35% mixture of Drum 6 and Drum 7 [expected head assay of 3.46 g Au/tonne (0.101 oz Au/ton), 0.47% As and 0.15% C (g)].

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TABLE 5

LADNER CREEK MINE
COMPARISON OF TWO STAGE FLOTATION RESULTS
(Tests No. 35, 47, 48, 49, 58, 59, 61, 63 and 69)

Test No.[7]	Calculated Head		% Gold Recovery				Grade								
							Ro 1st Clnr		Scav 1st Clnr		Ro 1st Clnr + Scav 1st Clnr		Total Bulk Tails[4]		Scav Tails
	g Au/t	% As	Ro	Ro + Scav	Ro 1st Clnr	Ro 1st Clnr + Scav 1st Clnr[1]	g Au/t	% As	g Au/t	% As	g Au/t	% As	g Au/t	% As	g Au/t
35	4.60	0.31	69.6	92.7	66.6	85.8	587	0.65	34.3	3.66	127	3.15	0.50	0.17	0.38
47	4.78	0.30	72.3	93.1	68.6	84.7	340	0.42	35.2	2.70	128	2.00	0.55	0.21	0.39
48	4.14	0.32	70.0	93.7	63.7	79.8	410	0.39	57.9	3.57	184	2.43	0.57	0.26	0.31
49	5.49	0.37	73.2	94.7	70.2	85.1	537	1.11	63.1	4.06	232	3.01	0.64	0.30	0.33
58	4.19	-	71.0	93.0	69.5	87.8	278[2]	-	23.4	-	85.3	-	0.46	-	0.27
59	5.82	0.40	76.7	92.7	74.7	88.0	469[2]	0.66[2]	13.1[3]	4.70[3]	75.4	4.14	0.62	0.11	0.52
61[5]	4.37	0.32	75.3	91.5	69.8	78.4	448[2]	0.87[2]	16.2[3]	2.68[3]	114	2.27	0.75	0.24	0.44
63[6]	2.49	-	40.4	79.4	34.2	61.8	47.1	-	11.4	-	19.6	-	0.88	-	0.73
69	4.39	-	66.2	93.4	63.7	87.2	81.7[2]	-	21.3[3]	-	46.3	-	0.48	-	0.38

NOTES:

1. Represents recovery and grade to a combined rougher first cleaner concentrate (Ro 1st Clnr Con) and scavenger first cleaner concentrate (Scav 1st Clnr).
2. Rougher second cleaner concentrate (Ro 2nd Clnr Con) assayed 739 g Au/tonne and 0.68% As in Test No. 58; 1,346 g Au/tonne and 1.17% As in Test No. 59; 1,320 g Au/tonne and 1.61% As in Test No. 61; 334 g Au/tonne in Test No. 63; and 373 g Au/tonne in Test No. 69.
3. Scavenger second cleaner concentrate (Scav 2nd Clnr Con) assayed 20.2 g Au/tonne and 6.50% As in Test No. 59; 52.0 g Au/tonne and 3.34% As in Test No. 61; 32.0 g Au/tonne in Test No. 63; and 59.4 g Au/tonne in Test No.69.
4. Total bulk tails includes scavenger tails and first cleaner scavenger tails.
5. Test No. 61 completed on Zone 1 Composite [expected head assay of 4.17 g Au/tonne (0.122 oz Au/ton), 0.32% As and 0.06% C (g)].
6. Test No. 63 completed on a 65%/35% mixture of Drum 6 and Drum 7 [expected head assay of 3.46 g Au/tonne (0.101 oz Au/ton), 0.47% As and 0.15% C (g)].
7. All tests completed with a 40 minute primary grind (approximate K_{80} of 50 micrometers), except for Test No. 49 which was a stage grind (20, 7 and 3 minutes).

TABLE 6

LADNER CREEK MINE
SUMMARY OF LOCK-CYCLE FLOTATION TEST RESULTS ON OVERALL COMPOSITE

Test No.	Flotation	Calculated Head		Concentrate									% Gold Recovery			Total Tails
				High Grade (HG)			Low Grade (LG)			Single						
		g Au/t	% As	Wt %	g Au/t	% As	Wt %	g Au/t	% As	Wt %	g Au/t	% As	HG	LG	Single	g Au/t
43	Single Stage (Test No. 44 conditions)	5.54	0.34	-	-	-	-	-	-	1.38	341	3.77	-	-	85.1	0.84
46	Two Stage (Test No. 35 conditions)	5.53	0.34	0.47	834	0.91	2.39	45.6	3.35	2.86	175 (1)	2.95 (1)	70.8	19.7	90.5 (1)	0.53

NOTES:

1. Calculated grade and recovery for combined high grade and low grade concentrate.

TABLE 7

LADNER CREEK MINE
CYANIDATION TESTS ON FLOTATION CONCENTRATE
SUMMARY OF TEST CONDITIONS

Test No.	Pre-Aeration		Cyanidation		First Stage				Second Stage				Reagent Consumption			
													NaCN		CaO	
	Time (h)	$Pb(NO_3)_2$ (kg/t con)	NaCN (g/L)	pH	Leach Time (h)	$Pb(NO_3)_2$ (kg/t con)	Reducing Power (mL $KMnO_4$/L)	DO_2 (ppm)	Leach Time (h)	$Pb(NO_3)_2$ (kg/t con)	Reducing Power (mL $KMnO_4$/L)	DO_2 (ppm)	kg/t con	kg/t ore	kg/t con	kg/t ore
42(1)	4	-	2	11 to 11.5	24	0.6	300	-	24	0.3	120	10.0	1.75	0.11	2.65	0.16
50(2)	4	0.40	2	11 to 11.5	48	0.3	500	-	-	-	-	-	1.83	0.13	3.21	0.23
58(3)	4	0.54	2	11 to 11.5	48	0.4	-	-	-	-	-	-	1.96	0.03	4.46	0.06

NOTES:

1. Test No. 42 performed on rougher concentrate (70.3 g Au/tonne) from Flotation Test No. 42.
2. Test No. 50 performed on low grade (14 g Au/tonne) scavenger concentrate from two stage float (Flotation Test No. 50).
3. Test No. 58 performed on scavenger cleaner concentrate from two-stage float (46.6 g Au/tonne) (Flotation Test No. 58).

TABLE 8

LADNER CREEK MINE
CYANIDATION TESTS ON FLOTATION CONCENTRATE
SUMMARY OF SOLUTION ASSAYS

Test No.	24 Hour Solution (mg/L)						48 Hour Solution (mg/L)							
	Au	Cu	Fe	CNO	CNS	As	Au	Cu	Fe	CNO	CNS	As	Ni	Zn
42	24.7	109	25.2	<10	283	11.0	3.68	30.6	31.7	<10	98	12.0	-	-
50	-	-	-	-	-	-	7.12	143	15.3	<10	482	12.0	4.3	7.5
58	-	-	-	-	-	-	12.7	-	-	-	-	-	-	-

TABLE 9

LADNER CREEK MINE
CYANIDATION TESTS ON FLOTATION CONCENTRATE
SUMMARY OF RESULTS

Test No.	Calculated Head (g Au/t)	% Gold Extraction		Leach Residue g Au/t
		24 Hour	48 Hour	
42	70.3	78.3	91.5	5.96
50	14.0	-	74.0	5.18
58	46.6	-	87.6	5.79

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TABLE 10

LADNER CREEK MINE
LOCK-CYCLE CYANIDATION TEST ON FLOTATION CONCENTRATE
SUMMARY OF RESULTS (1)

Test No.	Pre-Aeration			Cyanidation						Barren Recycle		Reagent Consumption		Results		
	Time (h)	$Pb(NO_3)_2$ (kg/t con)	pH	NaCN (g/L)	pH	Leach Time (h)	$Pb(NO_3)_2$ (kg/t con)	Reducing Power (mL $KMnO_4$/L)	DO_2 (ppm)	% of Barren	% of Leach Liquid	NaCN (kg/t con)	CaO (kg/t con)	Calc. Head (g Au/t)	% Gold Extraction	Leach Residue (g Au/t)
51A(1)	4	0.41	8.0	2	11.0	48	0.31	725	6.9	0	0	2.99	4.51	54.0	86.0	7.58
51B	4	0.43	9.8	2	11.0	48	0.32	900	6.9	75	61	1.86	4.73	48.5	84.7	7.44
51C	4	0.40	9.8	2	10.5 to 11.0	48	0.30	1,480	-	75	63	1.95	3.79	49.9	84.6	7.70
51D	4	0.43	9.5	2	10.5 to 11.5	48	0.31	1,250	9.3	75	58	2.70	5.47	52.7	84.2	8.34
51E	4	0.44	-	2	10.0 to 11.5	48	0.32	1,450	6.5	75	68	4.00	5.64	49.8	85.5	7.23

NOTES:

1. Silver extraction in Cycle A was 82.0% from a flotation concentrate grade of 10.7 g Ag/tonne, leaving a leach residue grade of 1.92 g Ag/tonne.

Cycle C Pregnant Solution Analysis	
Element	mg/L
As	36
Cu	375
Fe	205
Ni	5.6
Zn	118
Cyanide	mg/L
CN_T	3,276
CN_{WAD}	1,012
CNS	1,163
CNO	23.3

TABLE 11

LADNER CREEK MINE
CARBON-IN-LEACH CYANIDATION TESTS ON FLOTATION CONCENTRATE
SUMMARY OF RESULTS

Test No.	Pre-Aeration[1] Time (h)	Pre-Aeration[1] $Pb(NO_3)_2$ (kg/t con)	Pre-Aeration[1] pH	Cyanidation NaCN (g/L)	Cyanidation pH	Cyanidation Carbon (g/L)	Cyanidation Leach Time (h)	Cyanidation $Pb(NO_3)_2$ (kg/t con)	Cyanidation Reducing Power (mL $KMnO_4$/L)	Cyanidation DO_2 (ppm)	Reagent Consumption NaCN (kg/t con)	Reagent Consumption CaO (kg/t con)	Results Calc. Head (g Au/t)	Results % Gold Extraction	Results Leach Residue (g Au/t)
52A	4(B)	0.49	9.5 to 10.5	2	11.0	18	48	0.37	460	5.0	2.43	2.65	42.7	91.0	3.85
52B	4(C)	0.31	8.2	2	11.0	21	48	0.23	625	5.5	1.70	1.64	38.5	88.2	4.52
52C	-	-	-	2	11.0	19	48	-	660	5.9	3.63	3.63	40.5	90.9	3.70
52D	4(C)	-	8.0	2	11.0	-	48	-	580	5.4	2.61	5.11	47.0	84.5	7.28
52E	4(C)	0.48	7.9	2	11.0	18	48	0.36	420	5.5	2.81	5.11	43.0	91.1	3.85

NOTES:

1. (C) Pre-Aeration done in a column. (B) Pre-Aeration done in bottle roll.

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TABLE 12

LADNER CREEK MINE
EXISTING TAILINGS COMPOSITE ANALYSIS

Solids			
Element	Assay	Element	Assay
Au, g/t	1.86*	Be, %	<0.05
Au, oz/ton	0.054	Cd, %	<0.002
Ag, g/t	<0.5	Co, %	<0.01
Cu, %	0.019	Cr_2O_3, %	0.020
Pb, %	0.002	K_2O, %	0.49
Zn, %	0.011	La, %	<0.05
Ni, %	0.002	Mn, %	0.11
As, %	0.25	Mo, %	<0.001
Hg, ppm	<0.3	P_2O_5, %	0.11
Fe, %	7.56	Sb, %	<0.001
S_T, %	1.66	Se, %	<0.0003
S^{2-}, %	1.59	SiO_2, %	51.1
CaO, %	5.68	Sn, %	0.002
MgO, %	2.78	Te, %	<0.0003
Al_2O_3, %	13.7	TiO_2 , %	1.07
Na_2O, %	5.67	Y, %	<0.05
C (graphitic), %	0.10	LOI, %	4.41
Ba, %	<0.05		

* average of four separate assays: 1.45, 1.98, 1.79 and 2.20 g Au/tonne. In agreement with average calculated head of 1.87 g Au/tonne from eight flotation tests.

Slurry Liquid	
Element	Assay (mg/L)
Au	<0.01
Cu	<0.05
Zn	0.030
Ni	<0.10
As	<1.0
Fe	0.29
CN_T	<0.05

TABLE 13

LADNER CREEK MINE
FLOTATION TESTS ON EXISTING TAILINGS COMPOSITE
SUMMARY OF FLOTATION CONDITIONS

Test No.	Figure No.	Reagent Addition (g/tonne)											pH	Float Time (min)			Flotation Conditions
		SIBX	SIPX	PAX	CMC/ WW82	Na_2CO_3	$CuSO_4$	208	242	AC829	Flex 31	MIBC		Ro	Total Cl	Scav	
53							500				105	35	7.8	11	-	-	Kinetic test using Test No. 44 conditions (single stage float)plus addition of $CuSO_4$ and grinding of tailings prior to flotation (Grind K_{80} = 66 μm)
54							500				105	30	6.8	11	-	-	Kinetic test using Test No. 53 conditions but no grinding of tailings ahead of flotation (Feed K_{80} = 188 μm)
55							625				135	50	7.5	11	4	1.7	Test No. 53 conditions with two stage cleaner and first cleaner scavenger float
56				37.5				47.5				32.7	7.4	4	-	4	Test No. 35 (two stage float) conditions with grinding of tailings ahead of flotation and no cleaning
57							625				135	45	6.7	11	3.5	1.7	Test No. 54 conditions [single stage float (no grinding)] with two stage cleaning and cleaner scavenger float
65							625				122.5	45	-	9	5.5	1.5	Test No. 55 with coarser grind (6.5 minutes instead of 10 minutes) and three stage cleaning (Grind K_{80} = 91 μm)
66											122.5	45	7.5	9	5.5	1.5	Test No. 65 condition but no $CuSO_4$ (Grind K_{80} = 91 μm)
67								57.5			45	37.5	-	4	3/5	4	Test No. 56 (two stage float) but replacing PAX with Flex 31 and two stage cleaning of rougher and scavenger concentrate (Grind K_{80} = 91 μm)

TABLE 14

LADNER CREEK MINE
FLOTATION TESTS ON EXISTING TAILINGS COMPOSITE
SUMMARY OF ROUGHER FLOTATION RESULTS[1]

Test No.	Calculated Head (g Au/tonne)	Total Rougher Concentrate			Total Bulk Tails (g Au/tonne)[4]
		Weight %	g Au/tonne	% Gold Recovery	
53	1.61	21.9	6.0	81.6	0.38
54	1.92	10.8	12.1	68.0	0.69
55	1.81	14.0	10.4	80.5	0.41
56[2]	2.25	12.8	14.9	84.5[3]	0.40
57	1.73	10.2	11.5	67.8	0.62
65	1.79	10.9	12.6	77.1	0.46
66	1.95	10.2	14.7	76.6	0.51
67[2]	1.92	6.9	20.4	73.3	0.55

NOTES:

1. Tests No. 53, 55 and 56 were done with grinding of the tailings composite prior to flotation [mesh-of-grind was 86.4% minus 200 mesh (K_{80} of 66 micrometers)]. Tests No. 54 and 57 were done without grinding ahead of flotation with mesh-of-grind being only 42.3% minus 200 mesh (K_{80} of 188 micrometers). Tests No. 65, 66 and 67 regrind K_{80} was 91 micrometers (71% minus 200 mesh).

2. Tests No. 56 and 67 results are combined rougher and scavenger recovery of two stage float.

3. High calculated recovery due to high calculated head grade.

4. Total bulk tails includes rougher or scavenger tails and 1st cleaner scavenger tails.

TABLE 15

LADNER CREEK MINE
FLOTATION TESTS ON LADNER CREEK EXISTING TAILINGS COMPOSITE
SUMMARY OF CLEANER FLOTATION RESULTS[1]

	Calculated Head		Ro 1st Cln Con			Ro 2nd Cln Con			% Distribution					
									Ro 1st Cln Con		Ro 2nd Cln Con		1st Cln Scav Con	
Test No.	g Au/t	% As	Weight %	g Au/t	% As	Weight %	g Au/t	% As	Au	As	Au	As	Au	As
55	1.81	-	4.85	26.7	-	3.35	36.0	-	71.7	-	66.7	-	3.4	-
57	1.73	-	5.23	20.6	-	3.83	26.4	-	62.4	-	58.5	-	2.7	-
65	1.79	0.26	6.84	19.2	3.03	3.93	30.9	3.92	71.3	71.6	67.9	59.4	2.3	8.4
66	1.95	0.27	3.69	36.4	3.71	2.16	59.3	4.80	68.8	50.1	65.6	38.1	3.4	14.0
67[2]	1.92	0.18	-	-	-	6.89	67.7	2.18	-	-	60.3	20.5	0.5	5.8

NOTES:

1. Test No. 55 was done with grinding of tailings composite prior to flotation [mesh-of-grind was 86.4% minus 200 mesh (K_{80} of 66 micrometers)]. Test No. 57 was done without grinding ahead of flotation with mesh-of-grind being only 42.3% minus 200 mesh (K_{80} of 188 micrometers). Tests No. 65, 66, 67 regrind K_{80} was 91 micrometers (71% minus 200 mesh).

2. Rougher second cleaner concentrate (Ro 2nd Cln Con) includes combined rougher second cleaner concentrate (Ro 2nd Cln Con) and scavenger second cleaner concentrate (Scav 2nd Cln Con) of two stage float.

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TABLE 16

LADNER CREEK MINE
SUMMARY OF SINGLE STAGE AND TWO STAGE FLOTATION RESULTS ON EXISTING TAILINGS COMPOSITE

Test No.	Calculated Head		% Gold Recovery				Grade							
							Ro 1st Clnr		Scav 1st Clnr		Ro 1st Clnr + Scav 1st Clnr		Total Bulk Tails[7]	
	g Au/t	% As	Ro	Ro + Scav	Ro 1st Clnr	Ro 1st Clnr + Scav 1st Clnr	g Au/t	% As	g Au/t	% As	g Au/t	% As	g Au/t	% As
66[1]	1.95	0.27	76.6	-	68.8	72.1[3]	36.4[4]	3.71[4]	-	-	26.1[3]	3.23[3]	0.58	0.10
67[2]	1.92	0.18	60.8	73.3	56.9	67.7	52.8[5]	0.80[5]	27.2[5]	7.68[5]	46.5[6]	2.59[6]	0.58	0.09

NOTES:

1. The flotation scheme in Test No. 66 was flotation of a single concentrate (Ro 1st Clnr and Ro 1st Clnr Scav).
2. The flotation scheme in Test No. 67 included flotation of separate high grade concentrate (Ro 1st Clnr Con) and low grade concentrate (Scav 1st Clnr Con).
3. Represents recovery and grade to a combined rougher first cleaner concentrate (Ro 1st Clnr Con) and rougher first cleaner scavenger concentrate (Ro 1st Clnr Scav).
4. Rougher second cleaner concentrate assayed 59.3 g Au/tonne and 4.80% As and rougher third cleaner concentrate assayed 73.8 g Au/tonne and 5.42% As.
5. Rougher second cleaner concentrate assayed 69.9 g Au/tonne and 0.82% As; scavenger second cleaner concentrate assayed 56.5 g Au/tonne and 8.99% As.
6. Combined rougher second cleaner concentrate and scavenger second cleaner concentrate assay is 67.7 g Au/tonne and 2.18% As.
7. Total bulk tails includes rougher or scavenger tails and 1st cleaner scavenger tails.

TABLE 17

LADNER CREEK GOLD MINE
LOCK-CYCLE FLOTATION CONCENTRATE ANALYSES

Element	Single Stage Float (Test No. 43)	Two Stage Float (Test No. 46)		
	Single Con	High Grade Con	Low Grade Con	Hg/LG Blended Con[1]
Au, g/t	346	988	43.9	197
Pd, g/t	0.050	0.20	0.070	0.09
Pt, g/t	0.050	0.20	0.050	0.07
Ag, g/t	61.9	190	8.70	38.2
Sb, %	0.011	0.006	0.008	0.008
As, %	3.71	0.91	3.52	3.10
Bi, %	<0.002	<0.002	<0.002	<0.002
Co, %	0.037	0.030	0.031	0.031
Cu, %	1.13	4.84	0.14	0.90
Fe, %	39.0	21.1	41.3	38.0
Pb, %	0.11	0.30	0.014	0.061
Hg, ppm	0.70	1.70	<0.3	0.53
Ni, %	0.026	0.040	0.050	0.048
S, %	39.4	14.9	39.7	N/A
Zn, %	0.25	0.29	0.10	0.13
Al_2O_3, %	2.84	9.09[2]	3.06[3]	4.04
MgO, %	0.45	1.84	0.53	0.74
SiO_2, %	8.38	27.7	8.97	12.0

NOTES:

1. Weighted average grade if high grade and low grade concentrate from a two stage float were blended for sale as a single concentrate.
2. Re-assay was 8.86% Al_2O_3.
3. Re-assay was 2.60% Al_2O_3.

FIGURE F-17

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
FLOTATION TESTS NO. 40, 41, 44, AND 45
EFFECT OF PRIMARY GRIND TIME

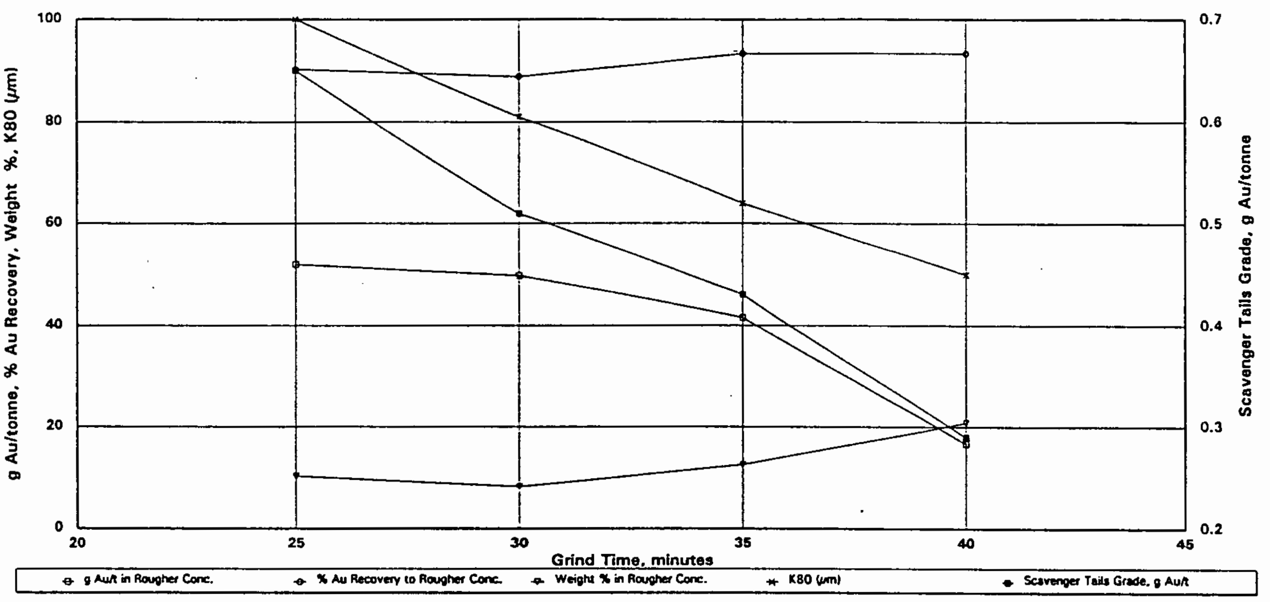

FIGURE F-18

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
FLOTATION TESTS NO. 40, 41, 44, AND 45
SIZE DISTRIBUTION WITH DIFFERING PRIMARY GRIND TIMES

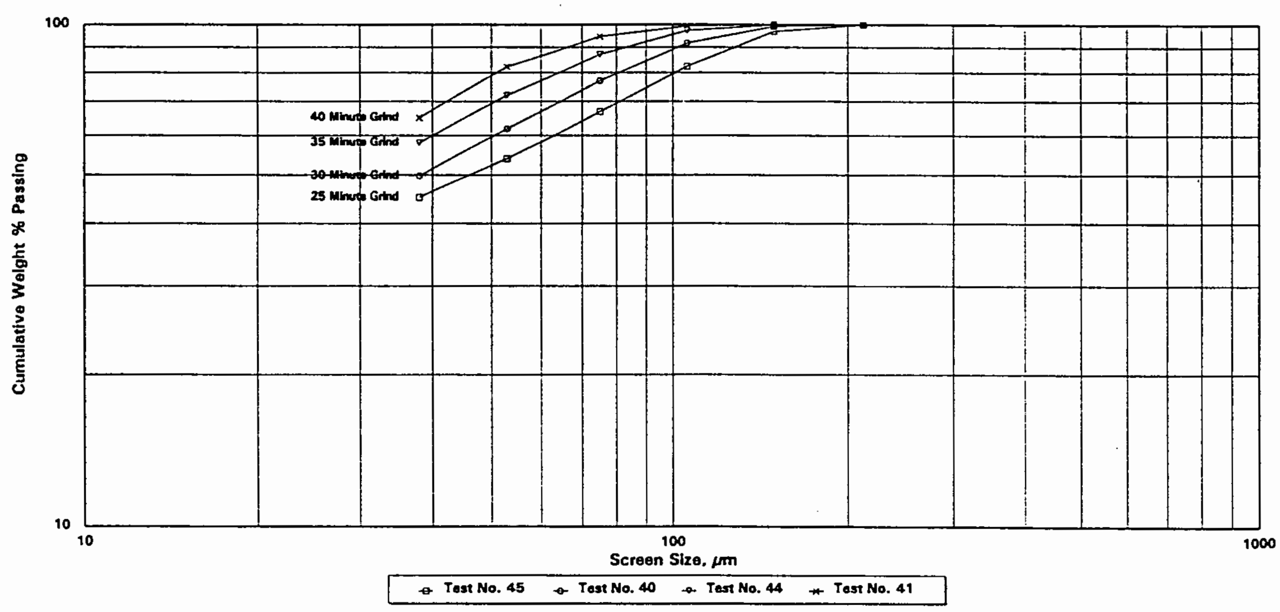

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FIGURE F-19

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
FLOTATION TESTS NO. 40, 41, 44, 45, AND 60
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

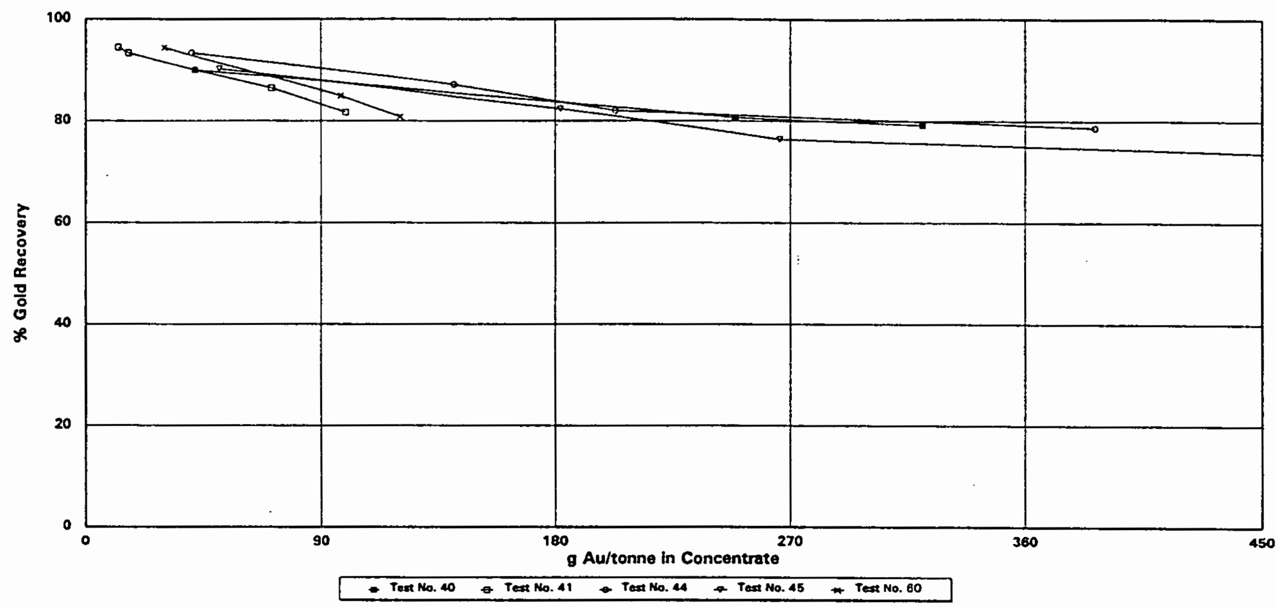

FIGURE F-20

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK HEAD GRADE VARIABILITY TESTS
FLOTATION TESTS NO. 44, 62, AND 64
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

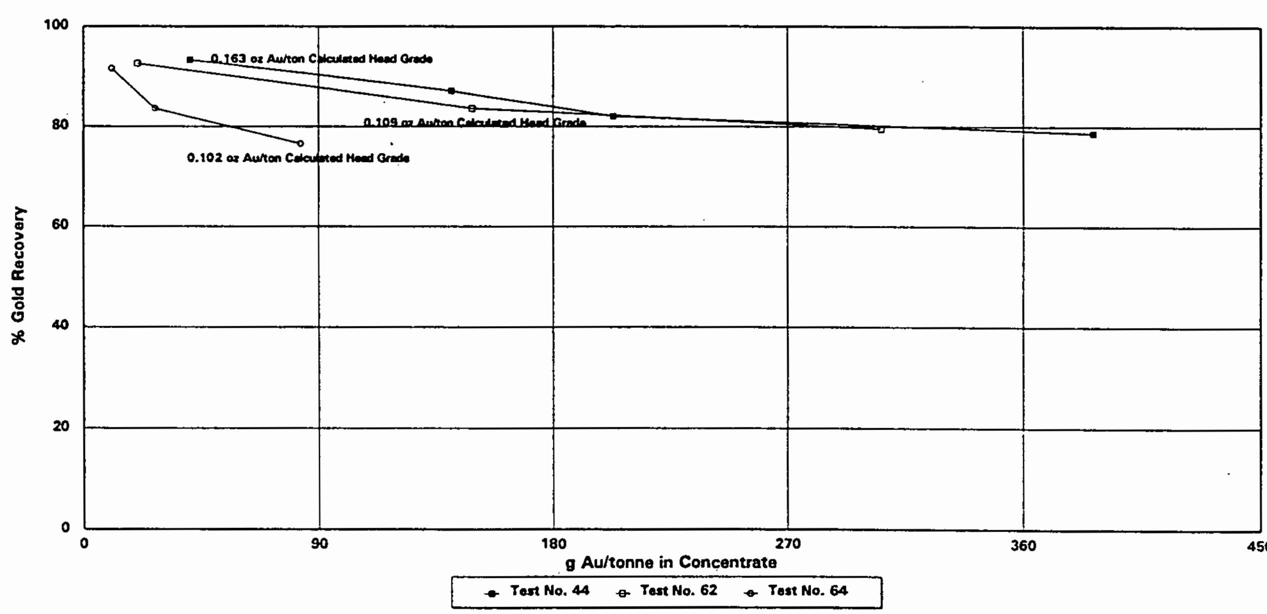

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FIGURE F-21

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
CLEANER FLOTATION TESTS NO. 35, 47, 48, 49, 59, AND 69
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

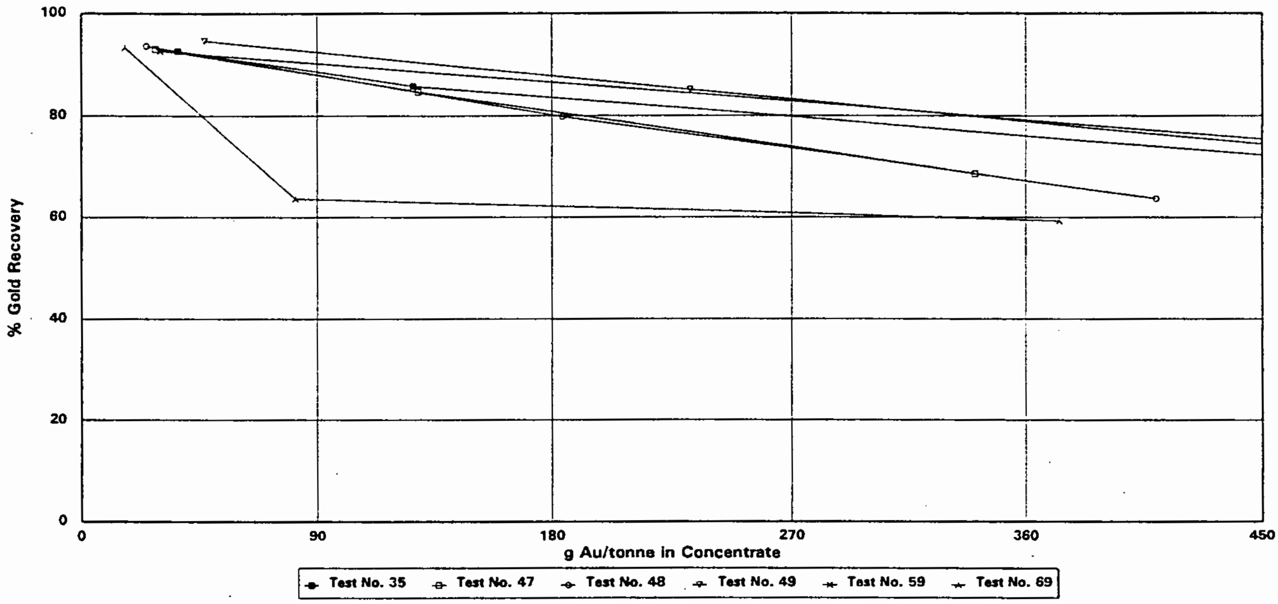
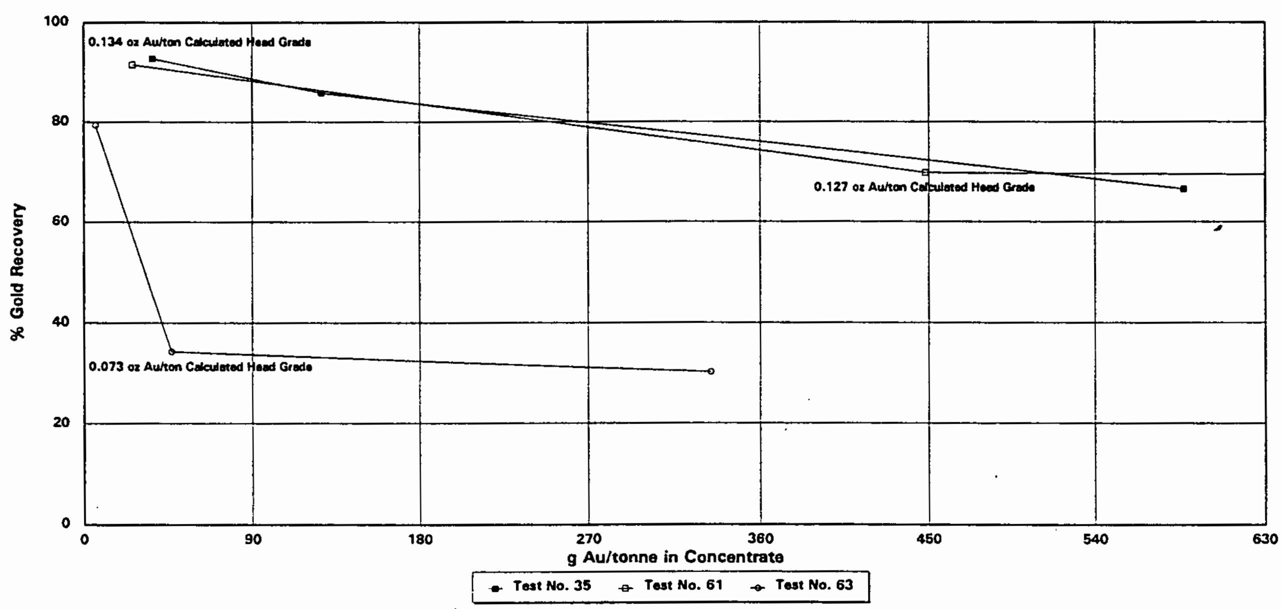


FIGURE F-22

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK HEAD GRADE VARIABILITY TESTS
FLOTATION TESTS NO. 35, 61, AND 63
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE



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February 29, 1996

FIGURE F-23

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
LOCK CYCLE TESTS NO. 43 AND 46
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

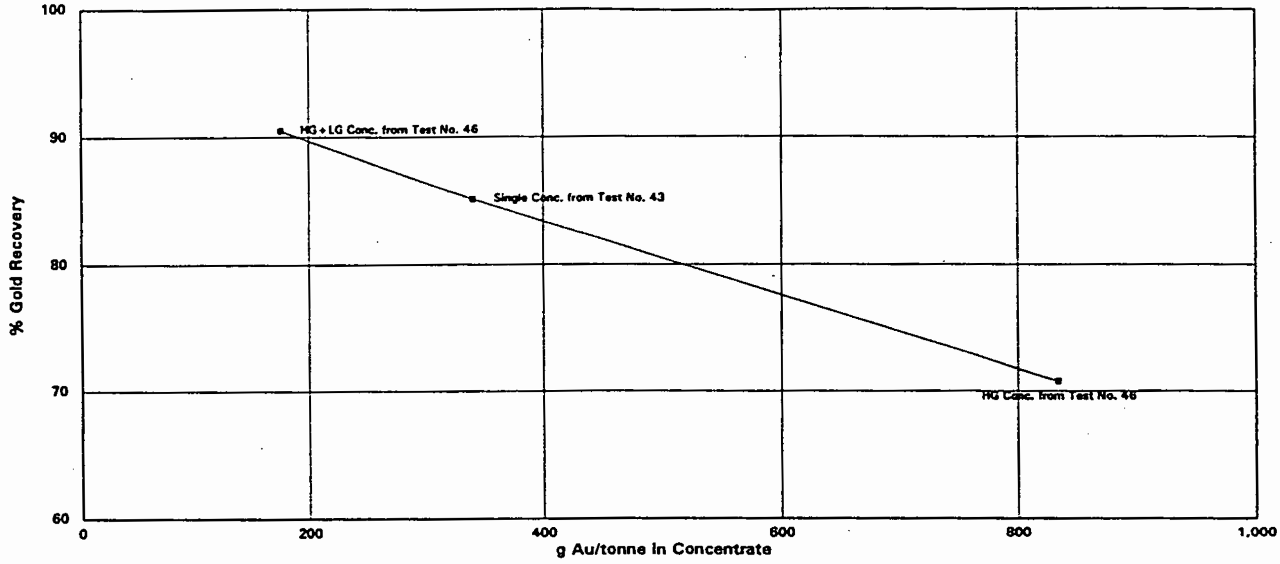

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FIGURE CY-7

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
LOCK CYCLE CYANIDATION TEST NO. 51 ON FLOTATION CONCENTRATE
CYCLE NO. vs LEACH RESIDUE GRADE AND GOLD EXTRACTION

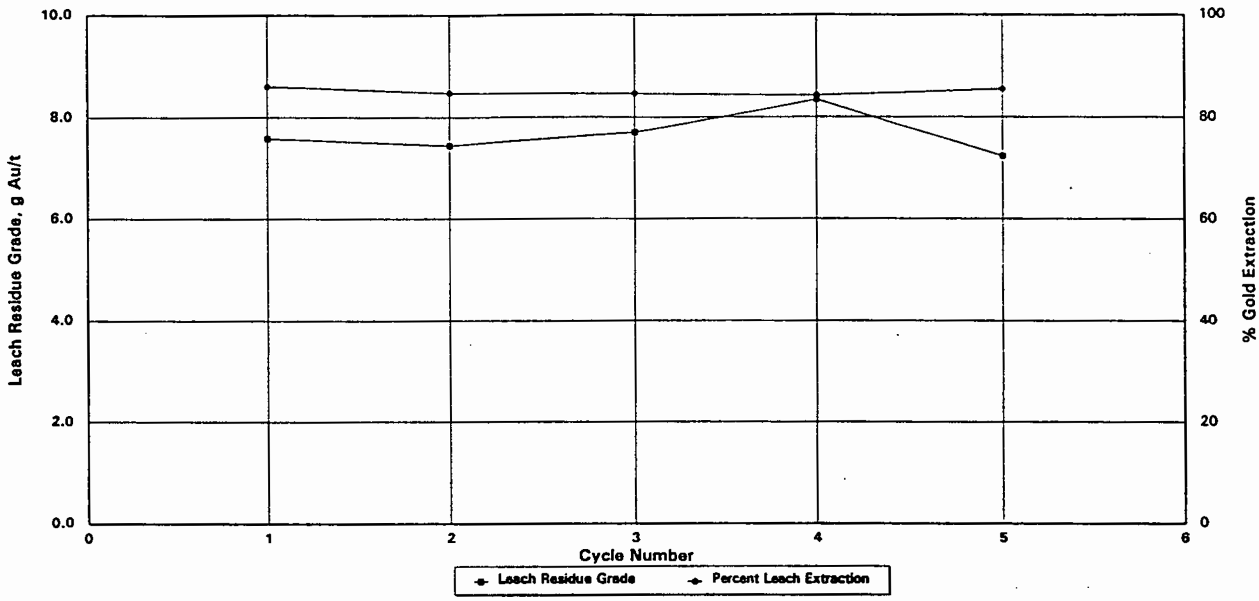

FIGURE CY-8

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
LOCK CYCLE CYANIDATION TEST NO. 51 ON FLOTATION CONCENTRATE
CYCLE NUMBER vs REDUCING POWER AND CYANIDE CONSUMPTION

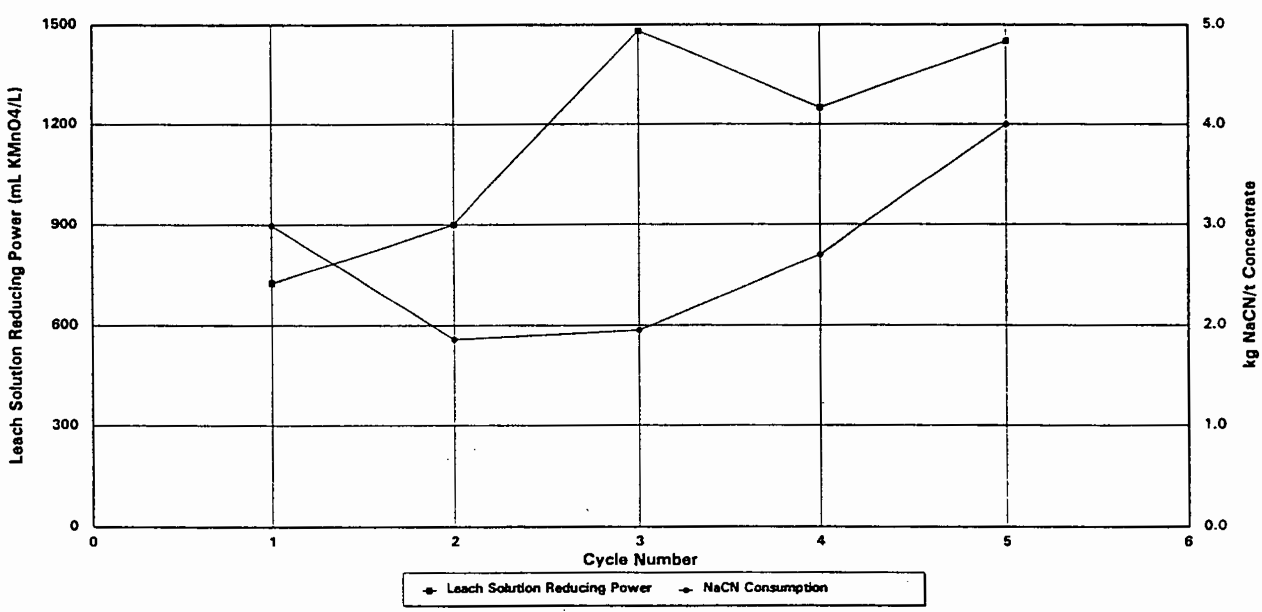

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FIGURE FT-1

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK EXISTING TAILINGS COMPOSITE
ROUGHER FLOTATION TESTS NO. 53 AND 54
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

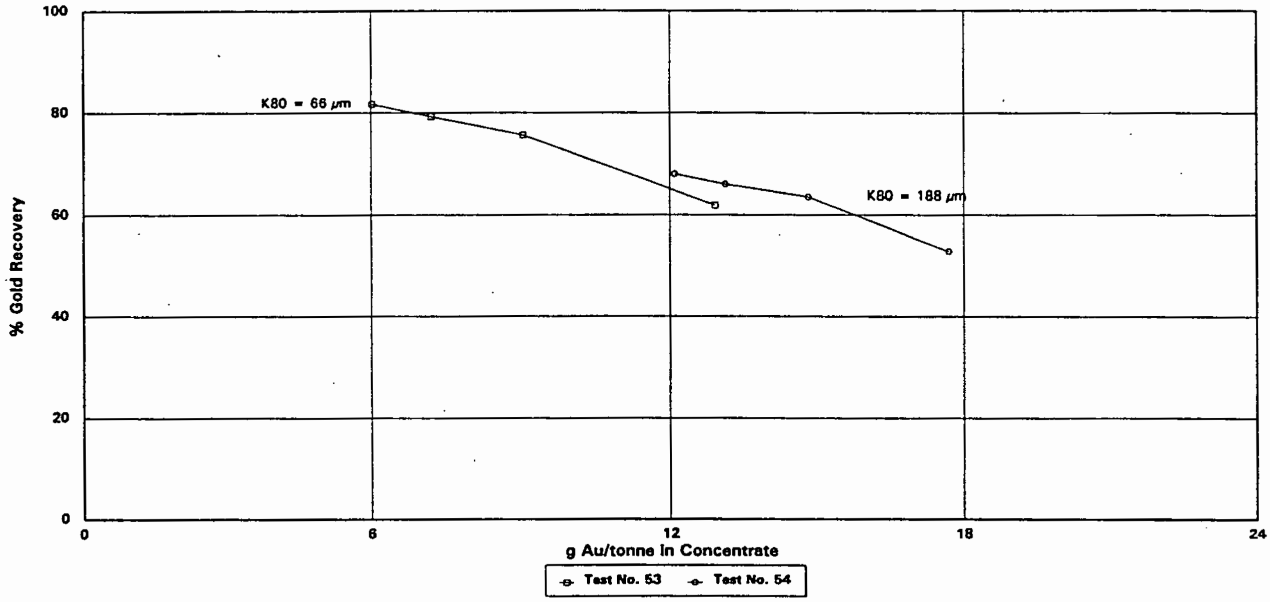

FIGURE FT-2

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK EXISTING TAILINGS COMPOSITE
FLOTATION TESTS NO. 53 AND 54
ROUGHER RECOVERY KINETICS

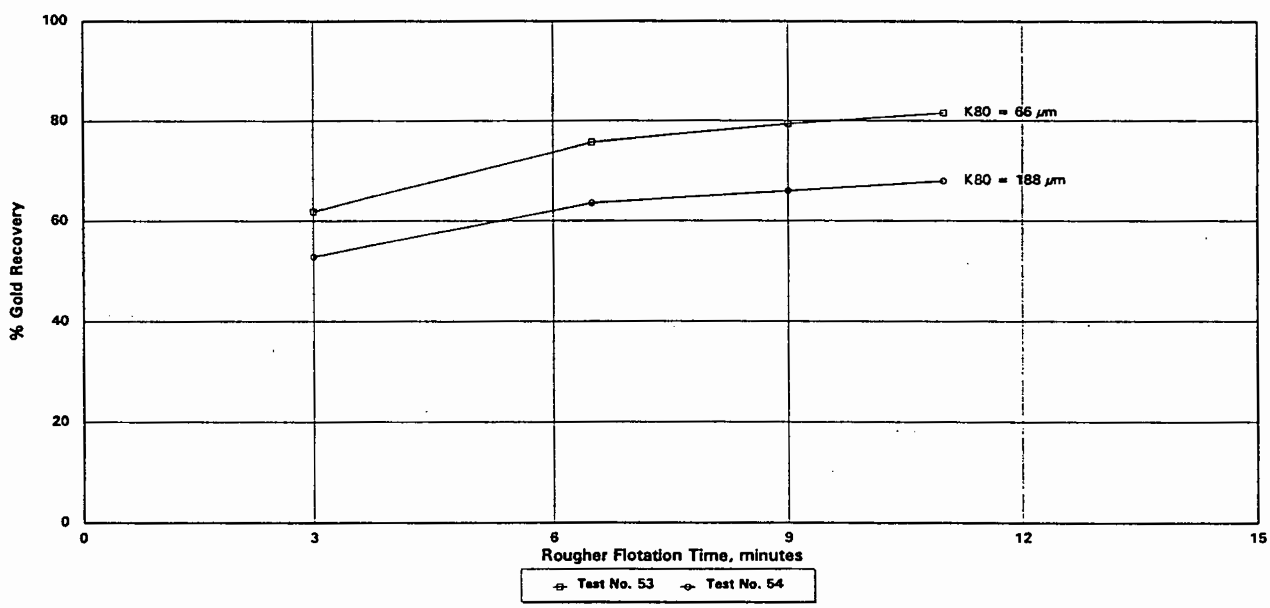

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FIGURE FT-3

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK EXISTING TAILINGS COMPOSITE
FLOTATION TESTS NO. 55, 57, 65 AND 66
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

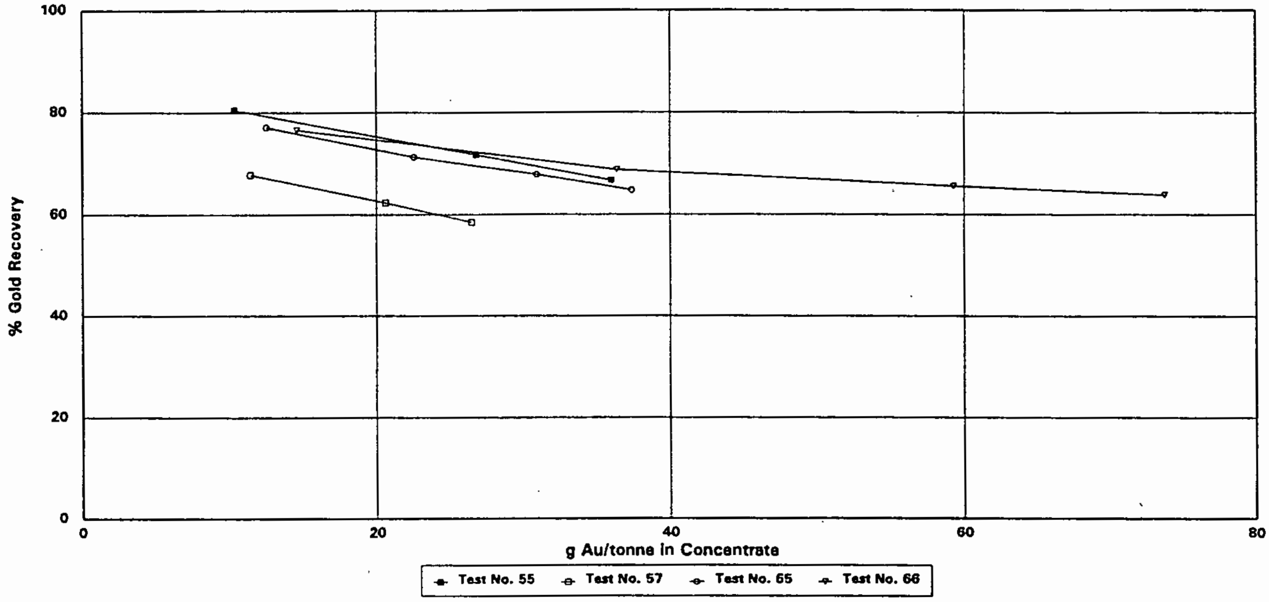
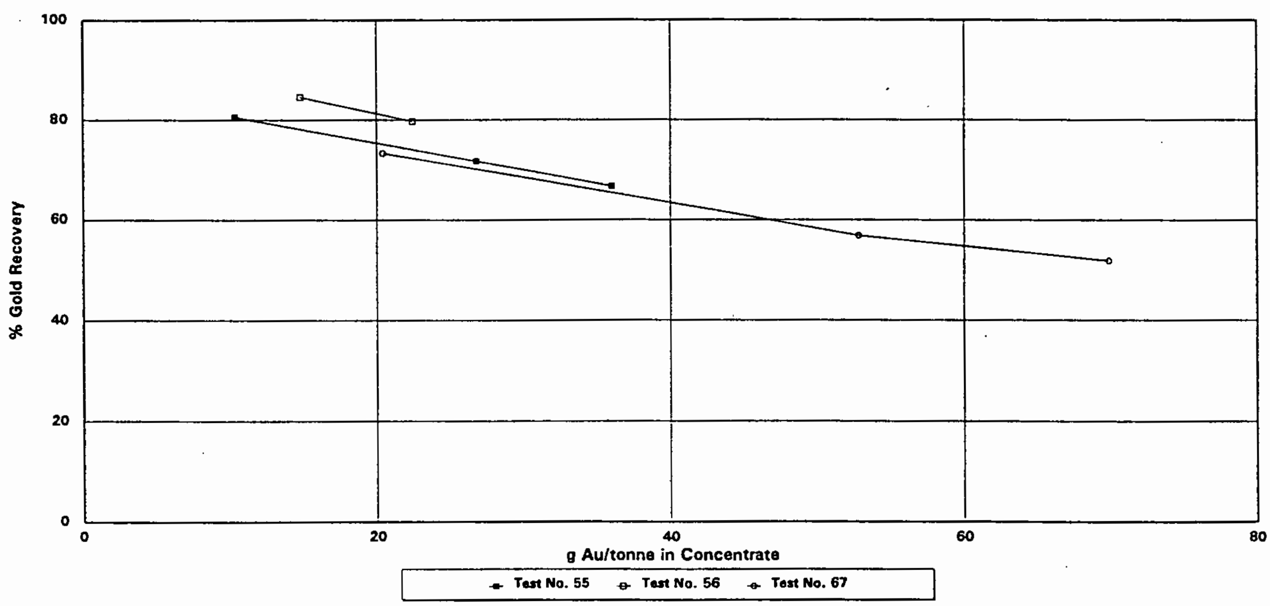


FIGURE FT-4

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK EXISTING TAILINGS COMPOSITE
FLOTATION TESTS NO. 55, 56, AND 67
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE



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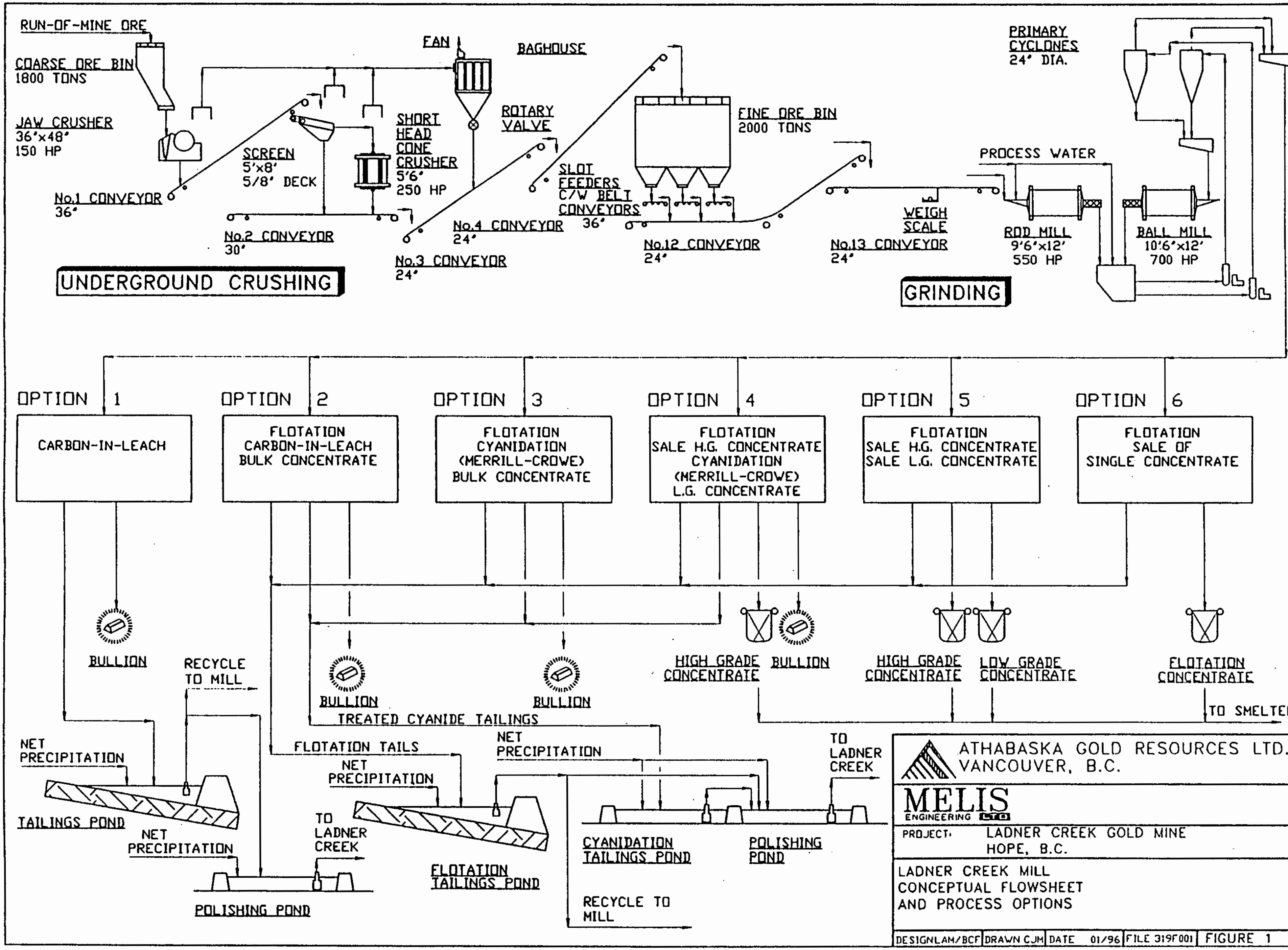
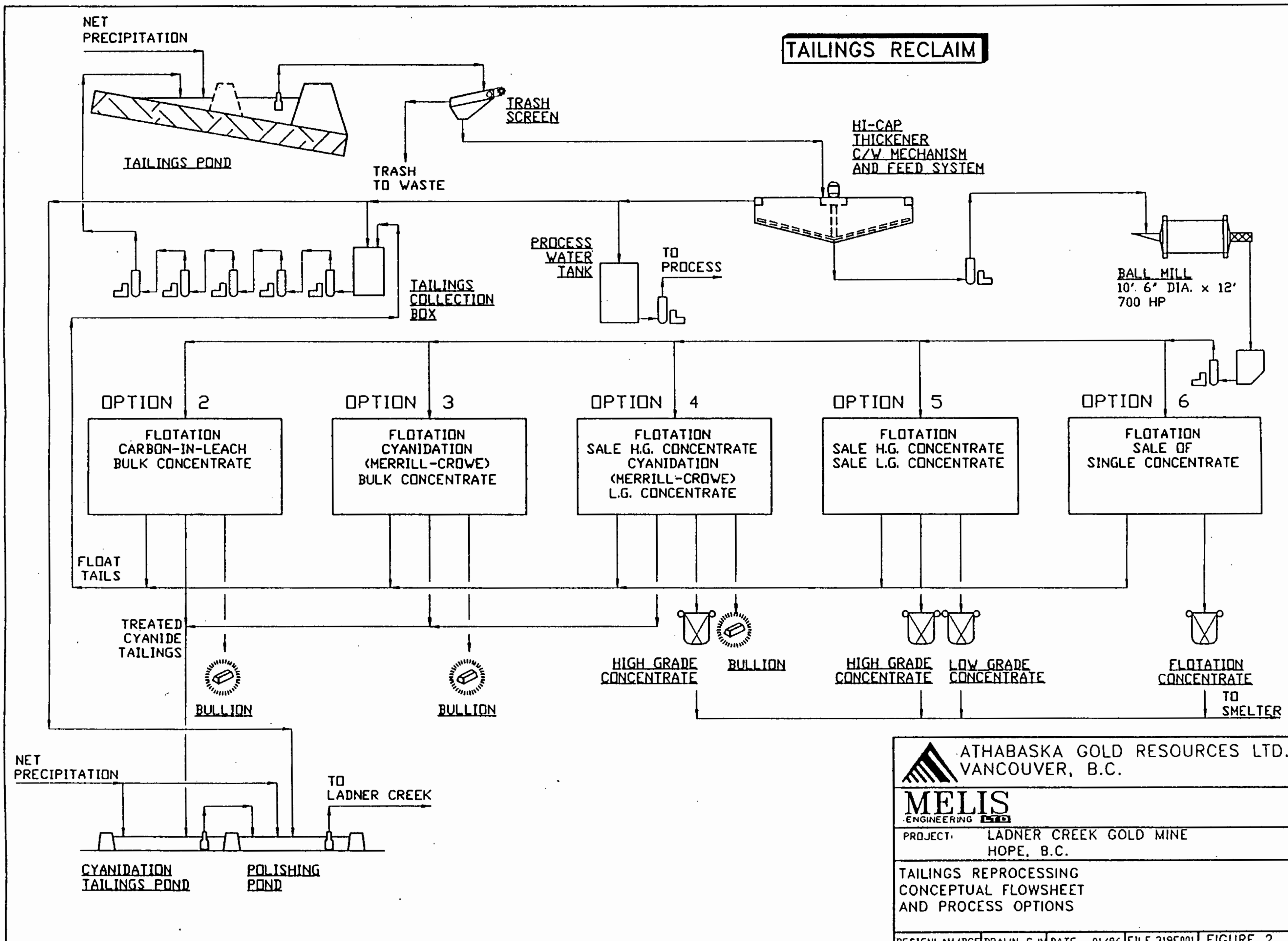

RUN-OF-MINE ORE
COARSE ORE BIN
1800 TONS
JAW CRUSHER
36"x48"
150 HP
No.1 CONVEYOR
36"
SCREEN
5'x8'
5/8" DECK
No.2 CONVEYOR
30"
FAN
BAGHOUSE
SHORT HEAD CONE CRUSHER
5'6"
250 HP
ROTARY VALVE
No.3 CONVEYOR
24"
No.4 CONVEYOR
24"
SLOT FEEDERS
C/W BELT CONVEYORS
36"
FINE ORE BIN
2000 TONS
No.12 CONVEYOR
24"
No.13 CONVEYOR
24"
WEIGH SCALE
PROCESS WATER
PRIMARY CYCLONES
24" DIA.
ROD MILL
9'6"x12'
550 HP
BALL MILL
10'6"x12'
700 HP
UNDERGROUND CRUSHING
GRINDING
OPTION 1
CARBON-IN-LEACH
OPTION 2
FLOTATION
CARBON-IN-LEACH
BULK CONCENTRATE
OPTION 3
FLOTATION
CYANIDATION
(MERRILL-CROWE)
BULK CONCENTRATE
OPTION 4
FLOTATION
SALE H.G. CONCENTRATE
CYANIDATION
(MERRILL-CROWE)
L.G. CONCENTRATE
OPTION 5
FLOTATION
SALE H.G. CONCENTRATE
SALE L.G. CONCENTRATE
OPTION 6
FLOTATION
SALE OF
SINGLE CONCENTRATE
BULLION
RECYCLE TO MILL
BULLION
BULLION
HIGH GRADE CONCENTRATE
BULLION
HIGH GRADE CONCENTRATE
LOW GRADE CONCENTRATE
FLOTATION CONCENTRATE
TO SMELTER
TREATED CYANIDE TAILINGS
NET PRECIPITATION
FLOTATION TAILS
NET PRECIPITATION
NET PRECIPITATION
TO LADNER CREEK
TAILINGS POND
NET PRECIPITATION
TO LADNER CREEK
POLISHING POND
FLOTATION TAILINGS POND
CYANIDATION TAILINGS POND
POLISHING POND
RECYCLE TO MILL
ATHABASKA GOLD RESOURCES LTD.
VANCOUVER, B.C.
MELIS ENGINEERING LTD
PROJECT: LADNER CREEK GOLD MINE
HOPE, B.C.
LADNER CREEK MILL
CONCEPTUAL FLOWSHEET
AND PROCESS OPTIONS
DESIGN LAM/BCF
DRAWN CJM
DATE 01/96
FILE 319F001
FIGURE 1


TAILINGS RECLAIM
NET PRECIPITATION
TAILINGS POND
TRASH SCREEN
TRASH TO WASTE
HI-CAP THICKENER C/W MECHANISM AND FEED SYSTEM
TAILINGS COLLECTION BOX
PROCESS WATER TANK
TO PROCESS
BALL MILL 10'. 6' DIA. x 12' 700 HP
OPTION 2
FLOTATION CARBON-IN-LEACH BULK CONCENTRATE
OPTION 3
FLOTATION CYANIDATION (MERRILL-CROWE) BULK CONCENTRATE
OPTION 4
FLOTATION SALE H.G. CONCENTRATE CYANIDATION (MERRILL-CROWE) L.G. CONCENTRATE
OPTION 5
FLOTATION SALE H.G. CONCENTRATE SALE L.G. CONCENTRATE
OPTION 6
FLOTATION SALE OF SINGLE CONCENTRATE
FLOAT TAILS
TREATED CYANIDE TAILINGS
BULLION
BULLION
HIGH GRADE CONCENTRATE
BULLION
HIGH GRADE CONCENTRATE
LOW GRADE CONCENTRATE
FLOTATION CONCENTRATE
TO SMELTER
NET PRECIPITATION
TO LADNER CREEK
CYANIDATION TAILINGS POND
POLISHING POND
ATHABASKA GOLD RESOURCES LTD. VANCOUVER, B.C.
MELIS ENGINEERING LTD
PROJECT: LADNER CREEK GOLD MINE HOPE, B.C.
TAILINGS REPROCESSING CONCEPTUAL FLOWSHEET AND PROCESS OPTIONS
DESIGN LAM/BCF
DRAWN CJM
DATE 01/96
FILE 319F001
FIGURE 2

MAR 18 1996

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March 8, 1996

MELIS Project No. 319

Athabaska Gold Resources Ltd.
1185 West Georgia St. Suite 1200
Vancouver BC V6E 4E6

By Fax (604) 684-4601

Attention: Mr. Jim Kermeen

RE: **Ladner Creek Gold Mine**
Sale of Flotation Concentrate to Smelters - Estimated Net Gold Recoveries

Information on Ladner Creek flotation concentrates was forwarded to various smelters to obtain smelter terms for the flotation concentrates. To date Dowa, Asarco, Noranda and Cominco have replied, replies from Sumitomo and Union Miniere are pending, Mitsubishi cannot accept the concentrates because of the arsenic content and Hudson Bay Mining and Smelting Co., Ltd. have yet to reply. The potential sale of concentrate to Westmin's Premier Mine in Stewart, B.C. and to Echo Bay's Kettle River Mine in Republic, Washington is also being investigated.

Smelter Terms

Indicative smelter terms from Dowa, Asarco, Noranda and Cominco are summarized in Table 1. Dowa has the highest payment terms and the lowest treatment charge while Cominco has the lowest payment terms, the highest treatment charge and the highest penalty charge.

Transportation and Handling

Preliminary estimates of transportation costs have been used as shown in Table 2. Shipment to Dowa is based on trucking of one-way concentrate bulk bags to the Vancouver Wharf for shipment to Japan as overstow on bulk concentrate ships. Shipment to Asarco and Noranda would be by truck to the Hope rail siding and by rail from Hope. Shipment to Cominco's Trail smelter would be by truck. Arrow Transportation Systems Inc. of Richmond, B.C. have been contacted to obtain budget transportation estimates for cost estimating. Transport costs will need to be quantified more closely for final feasibility purposes.

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Net Gold Recoveries

The net equivalent gold recovery was calculated by subtracting all charges from the concentrate payment as shown in Table 2 and equating the net payment [inclusive of silver and copper (for Cominco only) values] to a gold grade based on CDN$550/oz gold price. Comparing this calculated grade to the original grade in concentrate yields the gold recovery from concentrate. Multiplying this by the flotation gold recovery gives the net overall gold recovery.

The concentrate analyses used for the calculations are listed in Table 3.

The net overall gold recoveries are summarized below:

Ladner Creek Flotation Concentrate Sale to Smelters - Calculated Net Overall Gold Recoveries				
Smelter	Flotation Circuit	Concentrate	Grade (g Au/t)	% Overall Gold Recovery
Dowa	Single Stage	Single	346	75.8
Asarco	Single Stage	Single	346	75.5
Noranda	Single Stage	Single	346	73.0
Dowa	Two Stage	High Grade Low Grade Total	834 45.6 175	66.3 8.8 75.1
Cominco	Two Stage	High Grade	834	63.6
Dowa	Single Stage	Single	200	76.3

From the above table it is apparent that, for single concentrate, Dowa and Asarco are the preferred smelters for Ladner Creek concentrates, with Dowa being slightly better. Comparing the net Dowa overall recovery for a single concentrate [75.8% for 346 g Au/tonne (10.092 oz Au/ton) concentrate and 76.3% for 200 g Au/tonne (5.833 oz Au/ton) concentrate] against the total recovery from a high grade and low grade concentrate from two stage flotation (75.1%), the lower cost single stage flotation for production of a single concentrate is the preferred flotation approach.

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Dowa would also be the preferred smelter for high grade concentrate with a net gold recovery from high grade concentrate of 93.7% representing a net overall gold recovery of 66.3%. Cominco can only accept concentrate containing less than 1% As and the net overall gold recovery is only 63.6%.

Decreasing the concentrate grade to 200 g Au/tonne from 346 g Au/tonne to increase flotation recovery in single stage flotation, results in a slightly higher net overall recovery (76.3% versus 75.8%).

The above provides you with some initial information regarding smelter terms. Further reporting will be provided when smelter terms are received from Sumitomo and Union Miniere, as well as Westmin and Echo regarding potential custom milling of concentrate. Also, potential revenues for concentrate from reprocessing of existing tailings will be calculated once lock-cycle results are received.

Yours truly,
MELIS ENGINEERING LTD.

L.A. Melis, P.Eng.
President

cc: P. Dickson

LAM:mb

(LR0396A5.319)

MELIS ENGINEERING LTD.
Project No. 319
March 8, 1996

TABLE 1

LADNER CREEK GOLD MINE
INDICATIVE SMELTER TERMS FOR SALE OF CONCENTRATE[1]

ITEM	DOWA	ASARCO	NORANDA	COMINCO	SUMITOMO	UNION MINIERE
PAYMENT						
Gold	96.5% < 100 g Au/t 97.0% 101 to 300 g Au/t 97.5% > 300 g Au/t	96% less 0.7 g Au/t (Single Con) 96.5% less 0.7 g Au/t (H.G. Con) 95% less 0.7 g Au/t (L.G. Con)	95% less 1 g Au/t - -	93% less 1 g Au/t (H.G. Only) - -		
Silver	90% > 30 g Ag/t	95% less 34.3 g Ag/t	90% less 31 g Ag/t	93% less 1 g Ag/t		
Copper	-	-		40% less 0.5% Cu		
TREATMENT CHARGE						
Rate	US$100/tonne	US$132.28/tonne	US$150/tonne	CDN$260/tonne		
REFINING CHARGE						
Gold	US$8/oz	US$6/oz	US$6/oz	N/A		
Silver	US$0.50/oz	US$0.30/oz	US$0.50/oz	N/A		
PENALTIES						
As	US$3/t/0.1% > 0.1%	US$27.56/t/1% > 0.5%	US$3/t/0.1% > 0.3%	CDN$29.55/t/0.1% < 1%[2]		
Sb	Included with As	US$27.56/t/1% > 0.5%	Not specified	CDN$29.55/t/0.1%		
Bi	Not specified	US$100/t/1% > 0.1%	Not specified	Not specified		
Hg	US$1/t/10ppm > 10ppm	US$7.50/t/10ppm	Not specified	CDN$3.00/100ppm > 50ppm		
Pb + Zn	US$3/t/1% > 4%	Not specified	Not specified	N/A		
Al_2O_3	US$3/t/1% > 3%	Not specified	Not specified	Not specified		
MgO	included with Al_2O_3	Not specified	Not specified	Not specified		
H_2O	Not specified	Not specified	US$1.10/wet t/1% > 10% US$1.60/wet t/1% < 6%	CDN$0.40/t/1% > 8% to10% CDN$1.00/t/1% > 10%		
PRICE						
Gold	London I/F Mean	LDF	London PM Fix	98% of London Final		
Silver	London Spot	H & H	H & H	96% of H & H		

NOTES:

1. Indicative terms from Sumitomo (Japan) and Union Miniere (Belgium) not received as of March 7, 1996. Mitsubishi cannot accept due to high arsenic content. No reply from HBM&S as of March 6, 1996.

2. Cominco do not accept concentrates with arsenic greater than 1% As (or 1.25% As if gold content is greater than 1,000 g Au/tonne).

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Project No. 319
March 8, 1996

TABLE 2

LADNER CREEK GOLD MINE
NET SMELTER RETURN CALCULATIONS

ITEM	DOWA	ASARCO	NORANDA	DOWA		COMINCO	DOWA
	Single Con (346 g Au/t)	Single Con (346 g Au/t)	Single Con (346 g Au/t)	H.G. Con (834 g Au/t)	L.G. Con (45.6 g Au/t)	H.G. Con (834 g Au/t)	Single Con (200 g Au/t)
PAYMENT (CDN$/tonne)[1]	5,977.71	5,867.21	5,802.93	14,422.05	778.11	13,799.78	3,439.12
CHARGES (CDN$/tonne)							
- Refining	123.27	87.94	92.79	298.04	16.07	-	71.32
- Treatment	137.00	181.22	205.50	137.00	137.00	260.00	137.00
- Penalties	149.97	121.20	140.15	57.19	146.44	271.86	104.36
- Total	410.24	390.36	438.44	492.23	299.51	531.86	312.68
TRANSPORT AND HANDLING (CDN$/tonne)	118.00	50.00	118.00	118.00	118.00	25.00	118.00
NET PAYMENT (CDN$/tonne)	5,449.47	5,426.85	5,246.49	13,811.82	360.6	13,242.92	3,008.44
Equivalent g Au/tonne[2]	308.1	306.9	296.7	781.0	20.4	748.8	170.1
% NET RECOVERY (FROM CONCENTRATE)[3]	89.1	88.7	85.7	93.7	44.7	89.8	85.1
% FLOTATION RECOVERY	85.1	85.1	85.1	70.8	19.7	70.8	89.7[4]
% OVERALL RECOVERY	75.8	75.5	73.0	66.3	8.8	63.6	76.3

NOTES:

1. Based on CDN$550/oz Au, CDN$7.50/oz Ag and CDN$1.64/lb Cu (Cominco only).
2. Includes silver and copper (Cominco only) values.
3. Calculated from 346 g Au/tonne (or 200 g Au/tonne), head grade for single concentrate (Single Con), 834 g Au/tonne head grade for high grade concentrate (H.G. Con) and 45.6 g Au/tonne head grade from low grade concentrate (L.G. Con).
4. Recovery for 200 g Au/tonne concentrate estimated from grade/recovery curve (Figure F-23, February 27, 1996 status report).

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Project No. 319
March 8, 1996

TABLE 3

LADNER CREEK GOLD MINE
CONCENTRATE GRADES USED FOR SMELTER CALCULATIONS

Element	Single Con		High Grade Con	Low Grade Con
Au, g/t	346	200	834	45.6
Ag, g/t	61.9	38	190	8.7
As, %	3.71	3.50	0.91	3.52
Cu, %	1.13	-	4.84	0.14
Pb, %	0.11	-	0.30	0.11
Al_2O_3, %	2.84	3.0	9.09	3.06
MgO, %	0.45	0.5	1.84	0.53
Hg, ppm	0.7	-	1.70	<0.3
Sb, %	0.01	-	0.006	0.008
Zn, %	0.25	-	0.29	0.10

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FAX MEMORANDUM

TO:	Athabaska Gold Resources Ltd. Vancouver BC	DATE:	April 4, 1996
		PROJECT NO.:	319
		FAX NO.:	(604) 684-4601
ATTN:	Mr. Jim Kermeen/Mr. Plen Dickson	FROM:	L.A. Melis, P.Eng.

This transmission consists of 7 page(s) including this one.

RE: LADNER CREEK GOLD MINE PROJECT - TAILINGS REPROCESSING

Order-of-Magnitude Capital Cost Estimate

Attached is an estimate of capital costs to rehabilitate the Ladner Creek mill for tailings reprocessing based on flotation and sale of a single concentrate as depicted on the attached flowsheet. This estimate includes the cost of setting up a tailings reclaim pumping arrangement to transfer the tailings from the tailings pond down to the mill.

A large portion of the estimated capital costs to be incurred for tailings reprocessing are costs that will eventually need to be incurred for milling ore once the Ladner Creek underground workings are reactivated. An approximate capital cost split is as follows:

Ladner Creek Tailings Reprocessing Capital Cost Estimate	
Item	$
Costs Required for Tailings Reprocessing	700,000
In-Mill Costs Associated with Ore Processing	2,680,000
Total Estimated Capital Costs	3,380,000

Order-of-Magnitude Operating Costs

The estimated mill operating costs for tailings reprocessing are summarized in Table T-1 (previously submitted in our fax of April 2, 1996). The mill operating costs have been estimated at $5.56/tonne based on 662,110 metric tonnes per year. This cost includes tailings reclaim costs of approximately $0.75/tonne based on two operators per shift and reclaiming tailings by pumping from a floating barge.

Gold Recovery

Lock-cycle testing of a tailings composite assaying 1.97 g Au/tonne (0.058 oz Au/ton) yielded a 60.6% recovery into a concentrate assaying 135 g Au/tonne (3.94 oz Au/ton) and 7.45% As.

Net smelter return calculations for sale to the Dowa smelter in Japan (see separate correspondence for smelter terms) infer a net recovery from concentrate of 71.7%. The net overall recovery expected from tailings reprocessing if the concentrate is sold to Dowa is therefore 43.5% (60.6% x 0.717). A simililar calculation for sale of concentrate to Asarco implies a net overall recovery of 44.5%, 1% better than the overall recovery for Dowa. Calculations are presented in Table T-2.

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If the concentrate from the existing tailings can be processed in the Premier mill (there is a real concern of solution fouling in the Premier carbon-in-leach circuit based on observations of the carbon-in-leach test on a concentrate produced from the existing tailings), with a 92% recovery being achieved from a 135 g Au/tonne concentrate, then the net recovery from concentrate would be 77.8% and the overall recovery would be 47.1%. If a 94% recovery is achieved in the Premier mill circuit then the net recovery from concentrate would be 79.7% and the overall recovery would be 48.3%. Calculations for processing concentrate in the Premier mill are also presented in Table T-2.

Revenue Estimates
Revenue estimates have been calculated for processing the existing tailings through the rehabilitated Ladner Creek mill circuit for the production of a flotation cleaner concentrate. Option A1 is based on selling the concentrate to the Dowa smelter which would represent a net overall recovery of 43.5% as discussed above. Option A2 implies a 44.5% net overall recovery if the concentrate is sold to Asarco. Option B, based on custom milling the concentrate in the Premier mill and achieving an in-mill circuit recovery of 94%, represents an overall recovery of 48.3%. Similarly, Option C, which assumes an in-mill recovery of 92%, represents a 47.1% overall recovery.

As seen in Table T-3, the net value expected from tailings reprocessing is $3,906,400 if the concentrate is sold to Dowa; $4,111,703 if the concentrate is sold to Asarco; $4,886,400 (or $4,641,400) if the concentrate is custom milled at Premier, depending on the in-mill recovery achievable in the Premier mill.

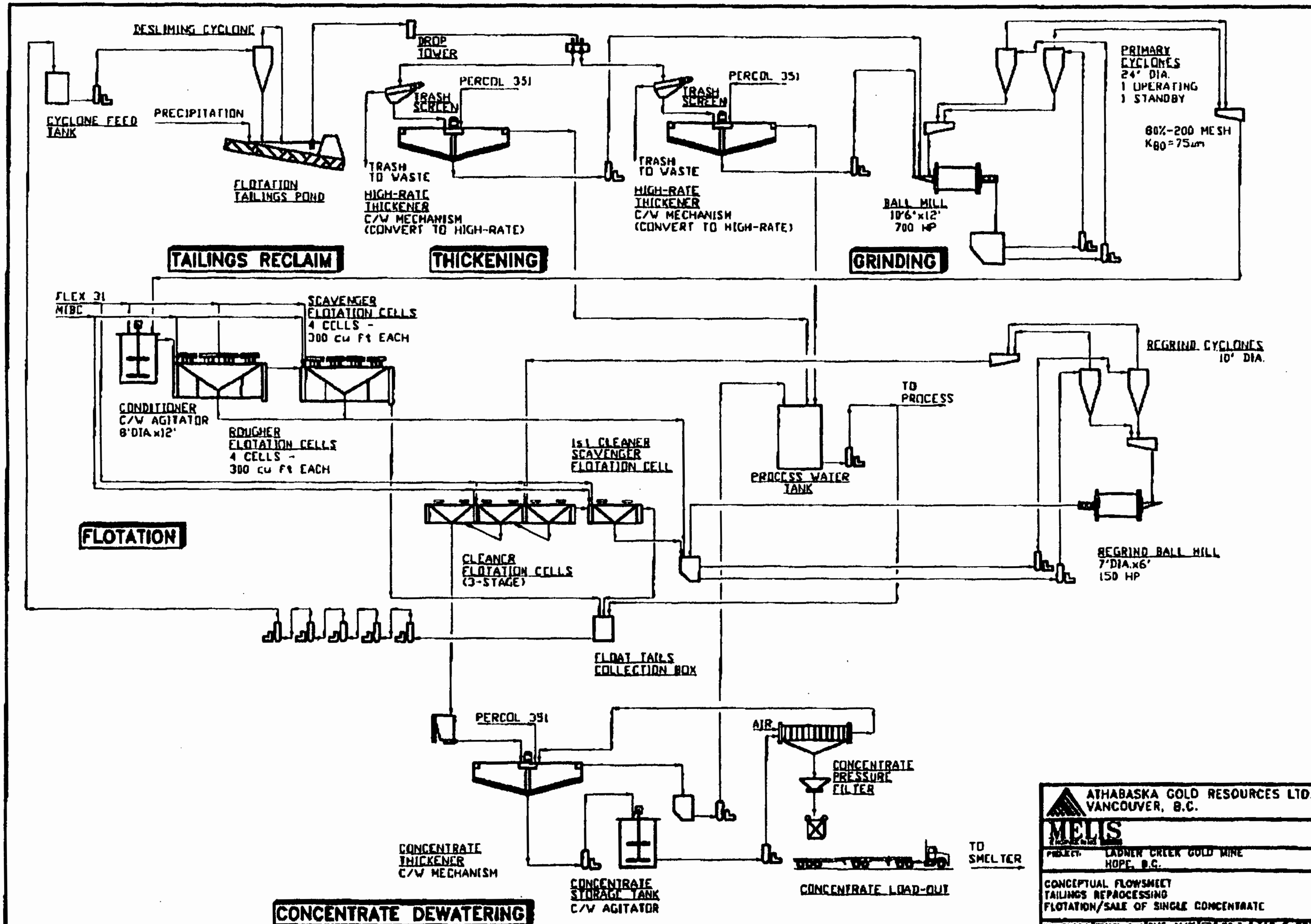
In all four cases the revenue from tailings reprocessing would essentially pay for all the capital costs associated with the mill rehabilitation and would easily recover the cost expenditures required for tailings reprocessing ($700,000) within the first few months of operation.

Also, an important advantage of tailings reprocessing would be the opportunity to use less valuable material (tailings assaying 1.75 g Au/tonne) to run-in and optimize a retrofitted Ladner Creek mill circuit. This would be of great assistance towards achieving optimum gold recoveries once underground material is processed.

Best regards,
MELIS ENGINEERING LTD.

L.A. Melis, P.Eng.
President

(F0498A5.jkp)


DESLIMING CYCLONE
DROP TOWER
CYCLONE FEED TANK
PRECIPITATION
FLOTATION TAILINGS POND
PERCOL 351
TRASH SCREEN
TRASH TO WASTE
HIGH-RATE THICKENER C/W MECHANISM (CONVERT TO HIGH-RATE)
PERCOL 351
TRASH SCREEN
TRASH TO WASTE
HIGH-RATE THICKENER C/W MECHANISM (CONVERT TO HIGH-RATE)
PRIMARY CYCLONES 24" DIA. 1 OPERATING 1 STANDBY
80%-200 MESH
K_{80}=75µm
BALL MILL 10'6"x12' 700 HP
TAILINGS RECLAIM
THICKENING
GRINDING
FLEX 31
MIBC
SCAVENGER FLOTATION CELLS 4 CELLS - 300 cu ft EACH
CONDITIONER C/W AGITATOR 8'DIA x12'
ROUGHER FLOTATION CELLS 4 CELLS - 300 cu ft EACH
REGRIND CYCLONES 10" DIA.
TO PROCESS
1st CLEANER SCAVENGER FLOTATION CELL
PROCESS WATER TANK
FLOTATION
CLEANER FLOTATION CELLS (3-STAGE)
REGRIND BALL MILL 7'DIA.x6' 150 HP
FLOAT TAILS COLLECTION BOX
PERCOL 351
AIR
CONCENTRATE PRESSURE FILTER
CONCENTRATE THICKENER C/W MECHANISM
CONCENTRATE STORAGE TANK C/W AGITATOR
CONCENTRATE LOAD-OUT
TO SMELTER
CONCENTRATE DEWATERING
ATHABASKA GOLD RESOURCES LTD. VANCOUVER, B.C.
MELIS
PROJECT: LADNER CREEK GOLD MINE HOPE, B.C.
CONCEPTUAL FLOWSHEET
TAILINGS REPROCESSING
FLOTATION/SALE OF SINGLE CONCENTRATE

MELIS ENGINEERING LTD.
Project No. 319
April 3, 1996

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK MINE
ORDER OF MAGNITUDE MILL CAPITAL COST ESTIMATE SUMMARY
TAILINGS REPROCESSING - FLOTATION/SALE OF SINGLE CONCENTRATE

AREA	MAN HOURS	LABOUR ($)	MATERIALS ($)	TOTAL ($)
DIRECT COSTS				
Tailings Reclaim	920	44,160	150,068	194,228
Thickening	1,085	52,080	219,512	271,592
Grinding	730	35,040	156,131	191,171
Flotation	1,380	66,240	132,770	199,010
Bulk Concentrate Regrinding	330	15,840	82,685	98,525
Concentrate Thickening	525	25,200	101,225	126,425
Concentrate Filtration and Load-out	720	34,560	318,967	353,527
Flotation Tailings	810	38,880	453,263	492,143
Reagents	296	14,208	29,900	44,108
Services	655	31,440	97,927	129,367
Buildings	1,070	51,360	32,249	83,609
Laboratory	1,795	86,160	156,541	242,701
Power Supply	550	26,400	20,598	46,998
Freight				10,000
Sub-Total Direct Costs	**10,866**	**521,568**	**1,951,836**	**2,483,404**
INDIRECT COSTS				
Engineering and Procurement				175,000
Construction Management and Supervision				100,000
Contractor Overheads				75,000
Mobilization and Demobilization				10,000
Construction Equipment and Small Tools				50,000
Start-up Costs				50,000
Sub-Total Indirect Costs				**460,000**
TOTAL DIRECT AND INDIRECT COSTS				**2,943,404**
Contingency				441,511
TOTAL ESTIMATED ORDER-OF-MAGNITUDE CAPITAL COSTS				**3,384,915**
			say,	**3,380,000**

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TABLE T-1

LADNER CREEK GOLD MINE PROJECT - TAILINGS REPROCESSING ORDER-OF-MAGNITUDE ESTIMATE OF MILL OPERATING COSTS (1,2)

Item	$/year	$/tonne
Manpower	1,605,975	2.43
Reagents and Steel Media	576,036	0.87
Power	450,392	0.68
Maintenance Supplies	650,000	0.98
Operating Supplies	150,000	0.23
Laboratory Supplies	75,000	0.11
Sub-Total	3,507,403	5.30
Contingency (5%)	175,370	0.26
Total Estimated Mill Operating Costs	3,682,773	5.56

NOTES:

1. Based on an hourly mill throughput rate of 81 metric tonnes per hour (89.3 short tons per hour), equivalent to 1,944 metric tonnes per day (2,143 short tons per day), and an operating availability of 93.4% for an annual tonnage of 682,110 metric tonnes (729,839 short tons).

2. Mill operating costs include operating and maintenance of tailings reclaim, milling, and flotation tailings disposal.

MELIS ENGINEERING LTD.
Project No. 319
April 4, 1996

TABLE T-2

LADNER CREEK GOLD MINE PROJECT - TAILINGS REPROCESSING NET SMELTER RETURN CALCULATIONS[1]

ITEM	DOWA	ASARCO	PREMIER	
	Single Con (135 g Au/t)	Single Con (135 g Au/t)	Single Con (135 g Au/t)	Single Con (135 g Au/t)
PAYMENT (CDN$/tonne)[2]	2,317.01	2,281.48	2,245.35	2,197.58
CHARGES (CDN$/tonne)				
- Refining	46.17	34.10	33.56	32.84
- Treatment	137.00	181.22	213.72[5]	213.72[5]
- Penalties	302.09	262.41	-	-
- Total	485.26	477.73	247.28	362.90
TRANSPORT AND HANDLING (CDN$/tonne)	120.00	50.00	95.00	95.00
NET PAYMENT (CDN$/tonne)	1,711.75	1,753.75	1,903.07	1,856.02
Equivalent g Au/tonne[3]	96.8	99.2	107.6	105.0
% NET RECOVERY (FROM CONCENTRATE)	71.7	73.5	79.7[6]	77.8[7]
% FLOTATION RECOVERY[4]	60.6	60.6	60.6	60.6
% OVERALL RECOVERY	43.5	44.5	48.3	47.1

NOTES:

1. Calculated from 135 g Au/tonne head grade for single concentrate (Single Con) based on results achieved in lock-cycle flotation testing of a 1.97 g Au/tonne (0.058 oz Au/ton) composite of existing tailings.

2. Based on CDN$550/oz Au and smelter payment terms.

3. No silver value since concentrate from existing tailings expected to contain less than 30 g Ag/tonne.

4. Flotation recovery achieved in lock-cycle flotation testing of a 1.97 g Au/tonne (0.058 oz Au/ton) composite of existing tailings.

5. Additional $US50.00/tonne (CDN$68.50/tonne) treatment charge [over and above the quoted treatment charge of US$106/tonne (CDN$145.22/tonne)] assumed applicable due to high cyanide consumption for leaching concentrate produced from existing tailings and due to fouling characteristics of leach solution.

6. Net recovery assumes 94% gold recovery from leaching tailings concentrate in Premier mill circuit.

7. Net recovery assumes 92% gold recovery from leaching tailings concentrate in Premier mill circuit.

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Project No. 319
April 4, 1996

TABLE T-3

LADNER CREEK GOLD MINE PROJECT - TAILINGS REPROCESSING
COMPARISON OF POTENTIAL REVENUES FOR FLOTATION AND SALE OF SINGLE CONCENTRATE

Buyer	Option	% Gold Recovery[1]	Gold Recovered[3] g Au/t	Gold Recovered[4] $/t	Operating Cost[5] $/t	Net Value $/t	Net Value[6] $/year	Net Value[7] $	Capital Costs $[8]		
									Required Costs for Tailings Reprocessing	In-Mill Costs Associated with Ore Processing	Total
Dowa	A1	43.5	0.761	13.46	7.56	5.90	3,906,400	3,906,400	700,000	3,680,000	4,380,000
Asarco	A2	44.5	0.779	13.77	7.56	6.21	4,111,703	4,111,703	700,000	3,680,000	4,380,000
Premier	B[2]	48.3	0.845	14.94	7.56	7.38	4,886,400	4,886,400	700,000	4,180,000	4,880,000
Premier	C[2]	47.1	0.824	14.57	7.56	7.01	4,641,400	4,641,400	700,000	4,180,000	4,880,000

NOTES:

1. Net target recoveries based on recently completed metallurgical testwork on a composite of existing tailings. Target recoveries for Options A1, A2, B and C are net of concentrate transportation costs and smelter charges.

2. The target recoveries of 48.3% for Option B and 47.1% for Option C are based on achieving a 94% and 92% gold recovery respectively from custom milling of a single concentrate in the Premier carbon-in-leach mill circuit, assuming that the concentrate from the existing tailings has no deleterious effect on the Premier mill carbon-in-leach process (solution fouling caused by the oxidized nature of the tailings was quite evident in the leach test).

3. The recovered gold in g Au/tonne is based on a mill feed head grade of 1.75 g Au/tonne (0.051 oz Au/ton).

4. Recovered value as $/tonne is based on a CDN$550/oz gold price.

5. The operating costs include tailings reclaim and milling costs estimated by Melis Engineering Ltd. (see fax dated April 2, 1996) and a G&A cost of $2.00/tonne as provided by Athabaska Gold Resources Ltd.

6. The net recovered value as $/year is based on an annual tonnage of 662,110 tonnes, the approximate quantity of tailings that would be reclaimed.

7. The net recovered value is based on one year of operation only which would be sufficient to reprocess all the reclaimable tailings.

8. The capital costs for the Ladner Creek mine rehabilitation include order-of-magnitude estimates for tailings reclaim and mill-related capital costs as well as $1,000,000 for the capital costs associated with other site requirements as provided by Athabaska Gold Resources Ltd. For Options B and C, a $500,000 allowance has been included for possible modifications/additions at the Premier mill to process Ladner Creek concentrates.

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FAX MEMORANDUM

TO:	Athabaska Gold Resources Ltd.	DATE:	April 8, 1996
	Vancouver BC	PROJECT NO.:	319
		FAX NO.:	(604) 684-4601
ATTN:	Mr. Jim Kermeen/Mr. Plen Dickson	FROM:	L.A. Melis, P.Eng.

This transmission consists of 9 page(s) including this one.

RE: LADNER CREEK GOLD MINE PROJECT
TERMS FOR SALE OF CONCENTRATE - FINAL UPDATE

Contacts

Terms for sale of Ladner Creek flotation concentrates were received from the following seven smelters from a total of nine smelters contacted:

1. Dowa Mining Co., Ltd. (Aomori, Japan)
   Vancouver Contact: Mr. Kenich Kagiyama (604-688-8228)

2. Asarco Incorporated (East Helena, Montana, USA)
   New York Contact: Mr. Glendon F. Archer (212-510-2215)

3. Noranda Metallurgy Inc. (Rouyn-Noranda, Quebec)
   Toronto Contact: Mr. Michael G. Hauck (416-982-7056)

4. Cominco Ltd. (Trail, B.C.)
   Trail Contact: Mr. Gordon Mattson (604-364-4222)

5. Sumitomo Canada Limited (Niihama, Japan)
   Vancouver Contact: Mr. Hoshi Lee (604-691-6024)

6. Mitsubishi Materials Corporation (Naoshima or Onhama, Japan)
   Vancouver Contact: Mr. H. Okazaki (604-654-8051)

7. Union Miniere (Hoboken, Belgium)
   New York Contact: Sogem Afrimet Inc., Mr. Tom Mulhere (612-341-9822)

Boliden Mineral AB(Skellestehamn, Sweden) replied that they cannot accept Ladner Creek concentrates due to the high arsenic content. Hudson Bay Mining and Smelting Co., Limited (Flin Flon, Manitoba) only provided a verbal reply indicating a possible payment of 90% and a treatment charge of US$100/tonne.

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519 45TH STREET WEST, SASKATOON, SASKATCHEWAN, CANADA S7L 5Z9 (306) 652-4084 FAX: (306) 653-3779

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Two mining companies were also contacted regarding the possibility of custom milling Ladner Creek concentrate. No reply was received from Echo Bay Mines Inc. (Englewood, Colorado) regarding the possibility of custom milling concentrate at their Kettle River mill in Republic, Washington. Westmin Resources Limited of Vancouver, B.C. expressed an interest and provided terms for custom milling Ladner Creek concentrate at the Premier mill in Stewart, B.C. (Vancouver Contact, Mr. Ed LeBlanc: 604-681-2253 and Premier Minesite Contact, Mr. Denis Gregoire: 604-636-2206 ext. 204).

Terms

Terms for sale of Ladner Creek concentrate are summarized in Table 1.

Some key points regarding the terms are as follows:

- the Japanese smelters have the best payment terms,
- Cominco has the lowest gold payment terms,
- Dowa has the lowest treatment charge and Mitsubishi has the highest,
- refinery charges are similar for all smelters,
- Asarco and Mitsubishi have the lowest penalty charge while Union Miniere has the highest,
- Cominco cannot accept concentrates with arsenic greater than 1% As, or 1.25% As if the gold content is greater than 1,000 g Au/tonne,
- Sumitomo cannot accept concentrates with an arsenic content greater than 2% As,
- Mitsubishi can only accept 3,000 tonnes of concentrate per year because of the high arsenic content, and
- payment of gold for custom milling of concentrate at the Premier gold mill in Stewart, B.C. will be based on the percent gold recovery achieved in the plant. The percent payment values indicated are approximate recoveries expected for Ladner Creek concentrates using a carbon-in-leach circuit. Testing will be required to quantify achievable recoveries in the Premier mill. The terms provided assume that the Ladner Creek concentrate would have no deleterious effect on the Premier mill process and no negative environmental impact on the Premier tailings pond.

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Net Smelter Return Calculations and Recovery Estimates

A comparison of net smelter returns and net recovery estimates are presented in Table 2 based on the concentrate analyses listed in Table 3 and on the terms summarized in Table 1. Estimates of transport charges are presented in Table 4 for North American and offshore destinations.

The net overall recovery calculated for each smelter and for Premier can be summarized as follows:

Ladner Creek Concentrate Sale - Recovery Estimates					
			% Recovery		
Concentrate	Grade (g Au/t)	Buyer	from Buyer	Flotation	Overall
Single	346	Dowa	89.1	85.1	75.8
Single	346	Asarco	88.7	85.1	75.5
Single	346	Noranda	85.7	85.1	73.0
Single	346	Mitsubishi	85.7	85.1	73.0
Single	346	Union Miniere	82.7	85.1	70.4
Single	346	Premier[1]	92.3	85.1	78.5
Single	200	Dowa	84.0	89.7	75.3
High Grade	834	Dowa	93.7	70.8	66.3
High Grade	834	Sumitomo	93.4	70.8	66.1
High Grade	834	Cominco	89.7	70.8	63.5
High Grade	834	Premier[2]	95.2	70.8	67.4
Low Grade	45.6	Dowa	44.5	19.7	8.8
Low Grade	45.6	Premier[3]	56.8	19.7	11.1

NOTES:

1. Net recovery assumes 97.5% gold recovery from leaching single concentrate in Premier mill circuit.
2. Net recovery assumes 98% gold recovery from leaching high grade concentrate in Premier mill circuit.
3. Net recovery assumes 88% gold recovery from leaching low grade concentrate in Premier mill circuit.

Single Stage Flotation

From the above table it is apparent that Dowa and Asarco are the preferred smelters for Ladner Creek concentrates, with Dowa realizing a slightly better net recovery from concentrate.

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Decreasing the concentrate grade to, say, 200 g Au/tonne from 346 g Au/tonne, with the intent of increasing flotation recovery in single stage flotation, results in a slightly lower net overall recovery (75.3% versus 75.8%). Calculations of overall recovery at various concentrate grades, based on Dowa smelter terms, indicate that the optimum grade of a single concentrate will be 300 g Au/tonne to 325 g Au/tonne (8.75 oz Au/ton to 9.48 oz Au/ton), representing an estimated overall recovery of 76% to 77%.

Payment for custom milling of concentrate in the Premier mill would be based on the actual gold (and silver) recovery achieved in the Premier carbon-in-leach circuit. Assuming a 97.5% gold recovery from a single concentrate assaying approximately 350 g Au/tonne, the net overall recovery for custom milling at Premier would be 78.5%. If the recovery of gold drops to 95%, which could happen with such problems as solution fouling and circuit inefficiencies, the net overall recovery for custom milling at Premier would drop to 76.4%. In both cases the net overall recovery would be better than the recovery from sale of concentrate to Dowa. It is noted, however, that leach tests on concentrates will be required to establish anticipated gold recoveries in the Premier mill circuit.

Two Stage Flotation
Comparing the net Dowa overall recovery of 75.8% for a single concentrate assaying 346 g Au/tonne (10.092 oz Au/ton) against the total recovery of 75.1% from a high grade and low grade concentrate produced from two stage flotation, single stage flotation for production of a single concentrate is the preferred flotation approach.

Dowa would be the preferred smelter for high grade concentrate (66.3% overall recovery). Sumitomo is a close second but they have an upper limit on arsenic content (2% As). Cominco, which can only accept concentrate containing less than 1% As, has the lowest overall recovery for high grade concentrate (63.5%).

Custom milling of high grade concentrate at Premier, assuming a 98% in-mill recovery, would yield a 67.4% overall recovery from high grade concentrate. This is 1.1% better than the net overall recovery expected from Dowa for high grade concentrate.

Smelter payment drops markedly for low grade concentrate (44.5% net payment from Dowa representing an overall recovery from low grade concentrate of 8.8%). Processing the low grade concentrate at Premier, assuming an 88% in-mill recovery representing an estimated net payment of 56.8%, would increase the overall recovery to 11.1%.

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Combining the overall recovery from custom milling of high grade concentrate (67.4%) and low grade concentrate (11.1%) at Premier represents a total overall recovery of 78.5%. This is exactly the same net overall recovery expected from custom milling of a single concentrate at Premier as noted above.

Conclusions

The following can be concluded from a review of concentrate sales to a smelter, or to Premier for custom milling:

- single stage flotation with production and sale of a single concentrate is the preferred approach for Ladner Creek,
- Dowa and Asarco are the preferred smelters,
- there is the potential to increase recoveries by 2% to 3% by custom milling concentrate at the Premier mill.

Consequently, more detailed negotiations should be initiated with Dowa and Asarco to finalize smelter terms as part of the feasibility for the Ladner Creek Gold Mine Project. The required testwork (flotation for production of concentrates and concentrate leach tests both at Lakefield Research and at the Premier mine) needs to be started to quantify arsenic variability in concentrates, to establish achievable gold recoveries in the Premier mill circuit, and to provide concentrate samples to both Dowa and Asarco. Arrangements and negotiations with Westmin should also be undertaken to determine the acceptability of Ladner Creek concentrates in terms of environmental (arsenic) and process aspects.

Also of importance will be to obtain more accurate quotes for transportation of concentrates from the Ladner Creek mine to Dowa, Asarco and Westmin's Premier mine and to quantify concentrate handling requirements.

The above is a summary of concentrate sale information. It will form part of our formal report on cost comparisons of the different process options considered for Ladner Creek.

Yours truly,
MELIS ENGINEERING LTD.

Lawrence A. Melis, P.Eng.
President

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MELIS ENGINEERING LTD.
Project No. 319
April 4, 1996

TABLE 3

LADNER CREEK GOLD MINE PROJCET
CONCENTRATE GRADES USED FOR NET SMELTER RETURN CALCULATIONS

Element	Single Con		High Grade Con	Low Grade Con
Au, g/t	346	200	834	45.6
Ag, g/t	61.9	38	190	8.7
As, %	3.71	3.50	0.91	3.52
Cu, %	1.13	-	4.84	0.14
Pb, %	0.11	-	0.30	0.11
Al_2O_3, %	2.84	3.0	9.09	3.06
MgO, %	0.45	0.5	1.84	0.53
Hg, ppm	0.7	-	1.70	<0.3
Sb, %	0.01	-	0.006	0.008
Zn, %	0.25	-	0.29	0.10

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MELIS ENGINEERING LTD.
Project No. 319
April 8, 1996

TABLE 4

LADNER CREEK GOLD MINE PROJCET
ESTIMATE OF CONCENTRATE TRANSPORTATION COSTS

Ladner Creek Concentrate Transportation Costs - Initial Estimates (CDN$)		
Company	Rate	$/tonne
Dowa/Mitsubishi/Sumitomo (bags)		
Truck	130 km @ $0.10/t/km	13.00
Port Handling		10.00
Sea Freight		85.00
Bags	$25/bag @ 2 t/bag	12.50
Total		120.50, say 120.00
Asarco (bulk)		
Truck	20km @ $0.40/t/km	8.00
Rail	1,400 km @ $0.03/t/km	42.00
Total		50.00
Noranda (bulk)		
Truck	20 km @ $0.40/t/km	8.00
Rail	$90.00/swt (Noranda Estimate) ($0.032/t/km)	110.00
Total		118.00
Union Miniere (bags)		
Truck	130 km @ $0.10/t/km	13.00
Port Handling		10.00
Ocean Freight		75.00
Bags	$25/bag @ 2 t/bay	12.50
Total		110.50, say 110.00
Cominco (bulk)		
Truck	520 km @ $0.075/t/km	39.00, say $40.00
Premier (bags)		
Truck	130 km @ 0.10/t/km	13.00
Port Handling		10.00
Barge		55.00
Bags	$25/bag @ 2 t/bag	12.50
Concentrate Storage		5.00
Total		95.50, say 95.00

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Project No. 319
April 4, 1998

TABLE 1

LADNER CREEK GOLD MINE PROJECT
INDICATIVE TERMS FOR SALE OF CONCENTRATE[1]

ITEM	DOWA	ASARCO	NORANDA	COMINCO	SUMITOMO	MITSUBISHI[4]	UNION MINIERE	PREMIER[5]
PAYMENT								
Gold	96.5%<100 g Au/t 97.0% 101 to 300 g Au/t 97.5%>300 g Au/t	86% less 0.7 g Au/t (Single Con) 86.5% less 0.7 g Au/t (H.G. Con) 85% less 0.7 g Au/t (L.G. Con)	95% less 1 g Au/t	93% less 1 g Au/t (H.G. Only)	92.5% 1 to 10 g Au/t 93.5% 10 to 30 g Au/t 94.5% 30 to 60 g Au/t 95.5% 60 to 150 g Au/t 96.5% 150 to 250 g Au/t 97.5% > 250 g Au/t	94%	96%<500 g Au/t 96.5%>500 g Au/t	-98% for H.G. Con (>800 g Au/t) -88% for L.G. Con (40 to 50 g Au/t) -97.5% for Single Con (~350 g Au/t)
Silver	90%>30 g Ag/t	95% less 34.3 g Ag/t	80% less 31 g Ag/t	93% less 1 g Ag/t	90% > 3 g Ag/t	90%>30 g Ag/t	100%>50 g Ag/t	90% for concentrate > 30 g Ag/t
Copper	-	-	-	40% less 0.5% Cu	-	-	-	-
TREATMENT CHARGE								
Rate	US$100/tonne	US$132.28/tonne	US$160/tonne	CDN$280/tonne	US$202/tonne[3]	US$300/tonne	US$280/tonne + $1/$1 for Au>$400 oz	US$108/tonne
REFINING CHARGE								
Gold	US$8/payable oz	US$6/payable oz	US$6/accountable oz	N/A	US$6/payable oz + 5% for Au>$450/oz	US$7.50/payable oz	US$6.13/oz	US$6.00/payable oz
Silver	US$0.50/payable oz	US$0.30/payable oz	US$0.50/accountable oz	N/A	US$0.50/payable oz + 5% for Ag> $6.00/oz	US$0.50/payable oz	US$0.50/oz	US$0.25/payable oz
PENALTIES								
As	US$3/t/0.1%>0.1%	US$27.56/t/1%>0.5%	US$3/t/0.1%>0.3%	CDN$29.66/t/0.1%<1%[2]	US$3.00/t/0.1%>0.2%<1% US$4.50/t/0.1%>1%<2%[2]	US$2.50/t/0.1%>0.2%	US$8.00/t/0.1%>0.10%	N/A
Sb	Included with As	US$27.56/t/1%>0.5%	Not specified	CDN$29.66/t/0.1%	US$1.50/t/0.01%>0.1%	Not specified	Not specified	N/A
Bi	Not specified	US$100/t/1%>0.1%	Not specified	Not specified	Not specified	Not specified	Not specified	N/A
Hg	US$1/t/10ppm>10ppm	US$17.50/t/10ppm	Not specified	CDN$3.00/100ppm>50ppm	Not specified	Not specified	Not specified	N/A
Pb + Zn	US$3/t/1%>4%	Not specified	Not specified	N/A	Not specified	Not specified	Not specified	N/A
Al_2O_3	US$3/t/1%>3%	Not specified	Not specified	Not specified	Not specified	Not specified	Not specified	N/A
MgO	Included with Al_2O_3	Not specified	Not specified	Not specified	Not specified	Not specified	Not specified	N/A
H_2O	Not specified	Not specified	US$1.10/wet t/1%>10% US$1.60/wet t/1%<6%	CDN$0.40/t/1%>8% to10% CDN$1.00/t/1%>10%	Not specified	Not specified	Not specified	N/A
Ni	Not specified	Not specified	Not specified	Not specified	Not specified	Not specified	Ni→US$6.00/0.1%>0.1%	N/A
PRICE								
Gold	London UF Mean	LDF	London PM Fix	98% of London Final	Not specified	London UF Mean	London AM/PM Fix	Not specified
Silver	London Spot	H & H	H & H	98% of H & H	Not specified	London Spot	London Spot	Not specified

NOTES:

1. Boliden (Skelleftehamn, Sweden) cannot accept Ladner Creek concentrates due to high arsenic. HBM&S (Flin Flon, Manitoba) provided verbal reply only indicating 90% payment and US$100/tonne treatment charge.
2. Cominco do not accept concentrates with arsenic greater than 1% As (or 1.20% As if gold content is greater than 1,000 g Au/tonne). Sumitomo cannot accept concentrates with arsenic greater than 2% As.
3. Sumitomo treatment charge includes a US$15/wet metric tonne handling charge for concentrate bags shipped in containers.
4. Mitsubishi can only accept 3,000 tonnes per year because of high arsenic content. Payment term is based on sale of blended high grade and low grade concentrate. Similar payment expected for sale of single concentrate.
5. Payment of gold for custom milling of concentrate at the Premier gold mill in Stewart, B.C. will be based on the percent recovery achieved in the plant. The percent values indicated are approximate recoveries expected for Ladner Creek concentrates using a carbon-in-leach circuit. The terms provided assume that the Ladner Creek concentrate would have no deleterious effect on the Premier mill process and no negative environmental impact on the Premier tailings pond.

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MELIS ENGINEERING LTD.
Project No. 319
April 4, 1996

TABLE 2

LADNER CREEK GOLD MINE PROJECT
NET SMELTER RETURN CALCULATIONS AND RECOVERY ESTIMATES[1]

ITEM	DOWA	ASARCO	NORANDA	MITSUBISHI	UNION MINIERE	DOWA		SUMITOMO	COMINCO	DOWA	PREMIER		
	Single Con (346 g Au/t)	Single Con (346 g Au/t)	Single Con (346 g Au/t)	Single Con (346 g Au/t)	Single Con (346 g Au/t)	H.G. Con (834 g Au/t)	L.G. Con (46.6 g Au/t)	H.G. Con (834 g Au/t)	H.G. Con (834 g Au/t)	Single Con (200 g Au/t)	Single Con (346 g Au/t)	H.G. Con (834 g Au/t)	L.G. Con (46.6 g Au/t)
PAYMENT (CDN$/tonne)[2]	6,977.71	6,867.21	6,802.93	6008.30	6,887.46	14,492.05	778.11	14,422.05	13,799.78	3,430.12	6,978.22	14,491.30	709.57
CHARGES (CDN$/tonne)													
- Refining	120.08	67.94	92.78	113.22	79.40	280.28	16.61	224.15	-	69.13	89.69	217.68	10.60
- Treatment	137.00	181.22	205.60	411.00	342.60	137.00	137.00	276.74	260.00	137.00	145.22	145.22	145.22
- Penalties	149.97	121.20	140.16	120.56	297.56	67.19	146.44	24.30	271.66	142.21	-	-	-
- Total	407.05	380.36	438.44	644.78	719.46	484.47	299.95	525.19	531.66	348.34	234.91	362.90	155.82
TRANSPORT AND HANDLING (CDN$/tonne)	120.00	60.00	118.00	120.00	110.00	120.00	120.00	120.00	40.00	120.00	95.00	95.00	95.00
NET PAYMENT (CDN$/tonne)	6,450.66	6,426.85	6,246.49	6,243.52	6,057.96	13,617.58	358.4	13,776.86	13,227.92	2,910.78	6,648.31	14,033.40	458.75
Equivalent g Au/tonne[3]	308.2	306.9	298.7	298.5	286.0	781.4	20.3	779.1	748.0	169.0	319.3	793.8	25.9
% NET RECOVERY (FROM CONCENTRATE)	89.1	88.7	86.7	85.7	82.7	93.7	44.6	93.4	89.7	84.0	92.3[6]	95.2[7]	98.8[8]
% FLOTATION RECOVERY[4]	85.1	85.1	85.1	85.1	85.1	70.8	19.7	70.8	70.8	89.7[5]	85.1	70.8	19.7
% OVERALL RECOVERY	75.8	75.5	73.0	73.0	70.4	66.3	8.8	66.1	63.6	76.3	78.6	67.4	11.1

NOTES:

1. Calculated from 346 g Au/tonne (or 200 g Au/tonne) head grade for single concentrate (Single Con), 834 g Au/tonne head grade for high grade concentrate (H.G. Con) and 46.6 g Au/tonne head grade from low grade concentrate (L.G. Con); based on results achieved in lock-cycle flotation testing of a 5.5 g Au/tonne (0.160 oz Au/ton) Ladner Creek composite.
2. Based on CDN$550/oz Au, CDN$7.50/oz Ag and CDN$1.84/lb Cu (Cominco only) and smelter payment terms.
3. Includes silver and copper (Cominco only) values.
4. Flotation recoveries achieved in lock-cycle flotation testing of a 5.5 g Au/tonne (0.160 oz Au/ton) Ladner Creek composite.
5. Recovery for 200 g Au/tonne concentrate estimated from grade/recovery curve (Figure F-23, February 27, 1996 status report).
6. Net recovery assumes 97.5% gold recovery from leaching single concentrate in Premier mill circuit.
7. Net recovery assumes 96% gold recovery from leaching high grade concentrate in Premier mill circuit.
8. Net recovery assumes 88% gold recovery from leaching low grade concentrate in Premier mill circuit.

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MELIS
ENGINEERING LTD.

April 23, 1996

MELIS Project No. 319

Athabaska Gold Resources Ltd.
1185 West Georgia St. Suite 1200
Vancouver BC V6E 4E6

Attention: Mr. Plen Dickson

RE: **Ladner Creek Gold Mine Project - Metallurgical Test Program**
Status Report February 24, 1996 to April 22, 1996

INTRODUCTION

The first phase of metallurgical and environmental testwork aimed at selecting the most economic process for reactivation of the Ladner Creek mine has been completed. Testwork completed since the issue of the last status report included:

- a batch flotation test to evaluate the possibility of arsenopyrite depression,
- batch flotation tests on a low grade composite,
- a second single stage flotation lock-cycle test on the overall mine composite,
- a lock-cycle test on the composite of existing tailings,
- additional screen analyses and assays of the existing tailings composite,
- further cyanidation tests on rougher flotation concentrate to evaluate free cyanide levels,
- a cyanidation test on flotation concentrate produced from the existing tailings,
- cyanide destruction testwork by Inco Limited,
- environmental analyses, and
- mineralogical examination of flotation products.

In addition, discussions were held with various smelters and with two potential custom milling facilities regarding the potential sale of flotation concentrates. Initial concentrate sale terms were obtained to arrive at net recovery estimates. Flowsheets of six different process options were prepared along with order-of-magnitude capital and operating cost estimates to arrive at a process selection for reactivation of the Ladner Creek mine. The economics of tailings reprocessing were also assessed. A formal report with cost estimating back-up was submitted on April 11, 1996.

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SUMMARY

Flotation

Repeat flotation tests on head grade variability composites suggest that two stage flotation recoveries can be maintained down to a head grade of 4.29 g Au/tonne (0.125 oz Au/ton) but a significant drop in recovery can be expected at head grades lower than this. With single stage flotation there is a slight drop in recovery (2% to 5%) from a head grade of 5.59 g Au/tonne (0.163 oz Au/ton) down to a head grade of 3.75 g Au/tonne (0.109 oz Au/ton).

A second single stage flotation lock-cycle test on the Ladner Creek overall composite using a longer cleaner flotation time led to a higher weight collected in the second cleaner concentrate which in turn decreased the concentrate grade down to 176 g Au/tonne (5.13 oz Au/ton) from the 341 g Au/tonne (9.95 oz Au/ton) grade achieved in the first lock-cycle test. A lower total tails grade was achieved [0.73 g Au/tonne (0.021 oz Au/ton) versus 0.84 g Au/tonne(0.025 oz Au/ton)] but the calculated gold recovery was essentially unchanged (84.2% versus 85.1%) due to the lower calculated head in this second lock-cycle test [4.53 g Au/tonne (0.132 oz Au/ton) versus 5.54 g Au/tonne (0.162 oz Au/ton)].

Further lock-cycle testing will need to be completed on Ladner Creek composites of appropriate head grades to quantify achievable recoveries and concentrate grades.

A single stage flotation lock-cycle test on the existing tailings composite with a calculated head of 1.97 g Au/tonne (0.058 oz Au/ton) yielded a 60.6% gold recovery into a third cleaner concentrate assaying 135 g Au/tonne (3.94 oz Au/ton) and 7.45% As. Additional lock-cycle testing of the existing tailings composite will be required to quantify achievable gold concentrate grades and recoveries, to determine the range of arsenic levels in concentrate, and to provide a detailed analysis of concentrate produced from the existing tailings.

Concentrate Cyanidation

Three concentrate leach tests at different cyanide levels suggest that cyanidation of concentrate at lower free cyanide levels (0.5 g NaCN/L) can be as effective as high cyanide levels (2.0 g NaCN/L). It was also observed that high cyanide levels result in higher cyanide consumptions and higher contaminant levels in pregnant solution.

Cyanide leaching of the concentrate from flotation of the existing tailings composite resulted in a high cyanide extraction (88.7%) but cyanide consumption was very high (15.81 kg NaCN/tonne of concentrate), solution fouling was quite evident, and the pregnant solution was very high in contaminants.

Cyanide Destruction Testwork

Barren solution can be effectively treated using the SO_2/air process. Cyanide levels were reduced to less than 1 mg/L (0.6 mg CN_T/L and 0.4 mg CN_{WAD}/L) and base metals were reduced to acceptable levels except for copper at 1.4 mg Cu/L. Residual arsenic was also present at 1.8 mg As/L.

Treatment of cyanide slurry tailings from carbon-in-leach cyanidation also reduced cyanide levels to less than 1 mg/L (0.8 mg CN_T/L and 0.4 mg CN_{WAD}/L) and copper to marginally less than 1 mg/L (0.9 mg Cu/L). Arsenic levels however were very high (53 mg As/L).

Further treatment of pond solution would be needed to reduce copper and arsenic to acceptable levels.

Environmental Data

Extensive environmental data were generated as part of the metallurgical test program. Acid-base accounting measurements demonstrated that the Ladner Creek mineralization and flotation tailings are net acid consumers. Sulphide-bearing treated cyanide tailings (from leaching of flotation concentrate) were, as expected, acid generating.

Flotation tailings water from the Ladner Creek overall composite was found to be low in all contaminants. Flotation tailings water generated from flotation of the existing tailings was also low in contaminants except for arsenic which was slightly elevated at 0.43 mg As/L.

The liquid component of the treated cyanide tailings was high in arsenic (6.54 mg As/L), and slightly elevated in copper (0.17 mg Cu/L) and total cyanide (0.27 mg CN_T/L) relative to the previous Carolin mine operating licence.

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Mineralogy

Flotation products from two stage flotation were submitted to mineralogical examination. The high grade concentrate contained approximately 20% total sulphides consisting principally of pyrite plus major accessory proportions of arsenopyrite, chalcopyrite and pyrrhotite. Native gold mostly occurred as grains locked in pyrite, arsenopyrite and pyrrhotite. Only 17% of the observed gold was present as liberated grains. The low grade concentrate on the other hand was mostly sulphides with pyrite being dominant followed by arsenopyrite and pyrrhotite. Of the five gold grains observed, four were locked with pyrite and/or pyrrhotite and one was present as a liberated grain.

No gold was observed in the two tailings products. The sulphides in the scavenger first cleaner scavenger tails were mostly pyrrhotite with rare specks of arsenopyrite. No pyrite was identified. The scavenger flotation tails were made up mostly of gangue constituents (quartz, feldspar, carbonates, chlorite, iron oxides and rutile). The only sulphide present was pyrrhotite.

From this assessment it can reasonably be assumed that gold losses in Ladner Creek mineralization are associated as locked particles within pyrrhotite, or possibly within silicates and carbonates.

BATCH FLOTATION TESTS - LADNER CREEK COMPOSITES

Arsenopyrite Separation Float Test

Test No. 68 was completed in an attempt to keep arsenopyrite out of the gold flotation concentrate. Test conditions are summarized in Table 1 and results are presented in Tables 2, 3 and 5. A graphical representation, comparing Test No. 68 to Test No. 35, is shown in Figure F-24.

This float test was completed with an ultra-fine primary grind (K_{80} of 40 micrometers), conditioning by aggressive aeration and high pH (pH 12) cleaning. The results of Test No. 68 appear to be slightly better than Test No. 35, based on the grade/recovery curves shown in Figure F-24, but this is mainly due to the higher calculated head grade for Test No. 68 (5.17 g Au/tonne) compared to Test No. 35 (4.60 g Au/tonne). Both tests achieved essentially the same total tails grade (0.50 g Au/tonne for Test No. 35 and 0.51 g Au/tonne for Test No. 68). Recovery to the two concentrates in Test No. 68 (76.1% in total to the first cleaner concentrate No. 1 plus the first

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cleaner concentrate No. 2) was in fact lower than the recovery to the two concentrates in Test No. 35 (85.8% in total to the rougher first cleaner concentrate plus the scavenger first cleaner concentrate).

The results of this test are therefore no better than the results of the earlier two stage float tests.

Flotation of Head Grade Variability Composites

Two Stage Float

Results of two repeat float tests, Tests No. 72 and 76, using two stage flotation are presented in Tables 2, 3 and 5. These tests can be summarized as follows:

Summary of Results - Two Stage Flotation - Tests No. 35, 61, 63, 72 and 76[1,2]

Test No.	Reagents (g/t)					Calc. Head		% Gold Recovery				Grade (g Au/tonne)				
	208	PAX	$CuSO_4$	Flex 31	MIBC	g Au/t	% As	Ro	Scav	Ro 2nd Clnr	Scav 2nd Clnr	Ro 1st Clnr	Ro 2nd Clnr	Scav 2nd Clnr	Total Tails	Scav Tails
35	60	42.5	-	-	32.5	4.60	0.31	69.6	23.1	66.6[3]	19.2[3]	587	-	34.3[3]	0.50	0.38
61	57.5	-	-	45	37.5	4.37	0.32	75.3	16.2	68.1	6.9	448	1,320	52.0	0.75	0.44
63	62.5	-	-	72.5	60	2.49	-	40.4	39.0	30.2	20.6	47.1	334	32.0	0.88	0.73
72	72.5	-	-	92.5	45	3.90	0.46	57.6	30.6	54.7	15.4	282	789	84.8	0.87	0.57
76	57.5	-	-	37.5	45	3.39	0.26	59.5	24.9	55.3[3]	16.9[3]	354	-	69.5[3]	0.77	0.60

NOTES

1. Test No. 35 completed on the overall composite. Tests No. 61 and 76 completed on Zone 1 Composite. Tests No. 63 and 72 completed on a 65%/35% mixture of Drum 6 and Drum 7 samples.
2. A 40 minute primary grind was used in all tests (equivalent to a K_{80} of approximately 50 micrometers).
3. First cleaner recoveries and grades shown for Tests No. 35 and 76.

Test No. 72 was completed on the 65%/35% mixture of Drum 6 and Drum 7 samples [calculated head grade for this repeat test was 3.90 g Au/tonne (0.114 oz Au/ton)] as a repeat of Test No. 63 [calculated head grade of only 2.49 g Au/tonne (0.073 oz Au/ton)] using a two stage float approach. The grade/recovery curve for this test is compared against the grade/recovery curve of Test No. 35 and Test No. 63 in Figure F-25.

The results of this test appear better than those achieved in Test No. 63. However, the total tails grade was essentially the same in both tests (0.87 g Au/tonne in Test No. 72 and 0.88 g Au/tonne in Test No. 63. It should be noted that the high graphitic content of this composite (0.15% C) leads to a high weight reporting to the rougher/scavenger concentrates which results in relatively

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low concentrate grades. Although recoveries in Test No. 72 were improved over those achieved in Test No. 63 they were still lower than those achieved in Test No. 35 on the higher grade overall composite [calculated head grade of 4.60 g Au/tonne (0.134 oz Au/ton)].

Test No. 76 was completed on the Zone 1 Composite as a repeat of Test No. 61. A grade/recovery curve comparison is shown in Figure F-25. The total tails grade (0.77 g Au/tonne) was essentially the same as the tails grade achieved in the earlier test, Test No. 61 (0.75 g Au/tonne). As seen from Figure F-26, recoveries achieved in Test No. 76, with a calculated head grade of 3.39 g Au/tonne (0.099 oz Au/ton), were lower than the recoveries achieved in Test No. 61, with a calculated head grade of 4.37 g Au/tonne (0.127 oz Au/ton), or in Test No. 35 with a calculated head grade of 4.60 g Au/tonne (0.134 oz Au/ton).

The results of the head grade variability batch tests suggest that two stage flotation recoveries can be maintained down to a head grade of 0.125 oz Au/ton (4.29 g Au/tonne) but a significant drop in recovery can be expected at head grades lower than this (see Figure F-25). Lock-cycle testing of appropriate composites, with head grades of, say, 0.100, 0.125 and 0.150 oz Au/ton, made up from all the drum samples, will need to be done to quantify achievable recoveries and concentrate grades for different head grades.

Single Stage Float

Test No. 75 was done on the Zone 1 Composite as a repeat of Test No. 62. Test conditions are summarized in Table 1 and results are presented in Tables 2, 3 and 4. Grade/recovery curves are compared in Figure F-26. Results obtained can be summarized as follows:

Summary of Results - Single Stage Flotation - Tests No. 44, 62, 64 and 75(1)

Test No.	Primary Grind K_{80} (μm)	Reagents (g/t)			Calc. Head		% Gold Recovery			Grade (g Au/tonne)				
		$CuSO_4$	Flex 31	MIBC	g Au/t	% As	Ro	Ro 1st Clnr	Ro 2nd Clnr	Ro	Ro 1st Clnr	Ro 2nd Clnr	Total Tails	Scav Tails
44	64	-	110	32.5	5.59	0.41	93.3	82.0	78.7	41.6	203	387	0.75	0.43
62	~64	-	110	22.5	3.75	0.32	92.6	83.6	79.5	21.2	150	305	0.50	0.33
64	~64	-	195	52.5	3.50	-	91.6	83.6	76.6	11.1	27.9	83.0	0.53	0.41
75	~64	-	110	37.5	3.72	0.25	90.7	80.1	75.1	28.9	176	407	0.66	0.39

NOTES:

1. Test No. 44 was completed on the overall composite. Tests No. 62 and 75 were completed on the Zone 1 Composite. Test No. 64 was completed on a 65%/35% mixture of Drum 6 and Drum 7 samples.

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The results of these tests suggest there would be a slight drop in recovery (2% to 5%) from a head grade of 5.59 g Au/tonne (0.163 oz Au/ton) (Test No. 44) down to a head grade of 3.75 g Au/tonne (0.109 oz Au/ton) (Tests No. 62 and 75).

Lock-cycle testing of single stage flotation will need to be completed on composites with appropriate head grades to quantify achievable recoveries and concentrate grades for different head grades.

LOCK-CYCLE FLOTATION TESTS

Overall Composite

A second single stage flotation lock-cycle test (Test No. 74) was completed on the Ladner Creek overall composite to see if gold recovery could be increased by decreasing the concentrate grade. Test conditions and results are presented in Table 6. Test results can be summarized as follows:

Ladner Creek Overall Composite - Single Stage Flotation - Lock-Cycle Tests							
	Calculated Head		Concentrate				
Test No.	g Au/t	% As	Weight %	g Au/t	% As	% Gold Recovery	Total Tails (g Au/t)
43	5.54	0.34	1.38	341	3.77	85.1	0.84
74	4.53	0.32	2.16	176	3.89	84.2	0.73

A longer cleaner flotation time led to a higher weight collected in the second cleaner concentrate (2.16% versus 1.38%) which in turn decreased the concentrate grade [341 g Au/tonne (9.95 oz Au/ton) to 176 g au/tonne (5.13 oz Au/ton)]. A lower total tails grade was achieved (0.73 g Au/tonne versus 0.84 g Au/tonne) but the calculated gold recovery was essentially unchanged (84.2% versus 85.1%) due to the lower calculated head in Test No. 74 [4.53 g Au/tonne (0.132 oz Au/ton)] compared to Test No. 43 [5.54 g Au/tonne (0.162 oz Au/ton)].

Further lock-cycle flotation testing of Ladner Creek composites will be required to confirm recoveries and concentrate grades for the expected mill feed head grade of 0.125 oz Au/ton (4.29 g Au/tonne).

Existing Tailings Composite

A lock-cycle flotation test (Test No. 73) was completed on the existing tailings composite using a single stage float with three cleaning stages. Test results, which are presented in Table 6, can be summarized as follows:

Ladner Creek Existing Tailings Composite - Lock-Cycle Test							
	Calculated Head		Concentrate				
Test No.	g Au/t	% As	Weight %	g Au/t	% As	% Gold Recovery	Total Tails (g Au/t)
73	1.97	0.28	0.88	135	7.45	60.6	0.78

Three stage cleaning yielded a reasonable recovery (60.6%) and concentrate gold grade [135 g Au/tonne (3.94 oz Au/ton)] but the arsenic content in the concentrate was high at 7.45% As. Additional lock-cycle testing of the existing tailings composite will be required to quantify achievable gold concentrate grades and recoveries, to determine the range of arsenic levels in concentrate, and to provide a detailed analysis of concentrate produced from the existing tailings.

CYANIDATION TESTS ON FLOTATION CONCENTRATE

Variation of Free Cyanide Levels

Three bottle roll cyanidation tests were carried out on flotation concentrate prepared from the Ladner Creek overall composite to check on the effect of free cyanide levels in the leach. The calculated grade of the rougher concentrate used for cyanidation averaged 47.3 g Au/tonne (1.38 oz Au/ton), representing a flotation recovery of 91.1% and 7.05% of the feed weight. Leaching was completed as a two stage leach (48 hours plus 24 hours) in the presence of lead nitrate, after a 4-hour pre-aeration step. Results, presented in Table 7, can be summarized as follows:

Ladner Creek Flotation Concentrate - Cyanidation Tests						
					Reagent Consumption	
Test No.	Calc. Head of Concentrate (g Au/tonne)	Free Cyanide (g NaCN/L)	% Gold Extraction (72h)	Leach Residue (g Au/tonne)	NaCN (kg/t con)	CaO (kg/t con)
70A	49.4	0.5	82.9	8.48	1.29	3.82
70B	47.3	1.0	82.9	8.09	2.43	3.67
70C	45.3	2.0	83.2	7.63	2.79	3.34

The results suggest that cyanidation at lower free cyanide levels (0.5 g NaCN/L) will be as effective as high free cyanide levels (2.0 g NaCN/L). However, a decrease in residue grade with increasing free cyanide concentration was observed which infers a more efficient leach may be possible at higher cyanide levels. The increase in sodium cyanide consumption with increasing free cyanide level was expected. Also, as expected, and as summarized below, pregnant solution contaminant levels increase with higher concentrations of cyanide in solution:

Ladner Creek Concentrate Cyanidation - Pregnant Solution Analysis (mg/L)						
Test No.	Free Cyanide (g NaCN/L)	Cu	Fe	Ni	Zn	CN_T
70A	0.5	139	2.92	1.70	6.44	374
70B	1.0	151	10.9	2.20	8.17	543
70C	2.0	171	27.9	2.30	8.91	969

Cyanide Leaching of Concentrate from Existing Tailings

A single bottle roll leach test was completed on flotation concentrate produced by flotation of the existing tailings composite. The calculated grade of the first cleaner concentrate used for cyanidation was 49.8 g Au/tonne (1.45 oz Au/ton), representing a flotation recovery of 62.0% and 10.42% of the feed weight. Results, presented in Table 7, can be summarized as follows:

Cyanidation Test on Flotation Concentrate from Existing Tailings						
Test No.	Free Cyanide (g NaCN/L)	Calc. Head of Concentrate (g Au/tonne)	% Gold Extraction (72h)	Leach Residue (g Au/tonne)	Reagent Consumption	
					NaCN (kg/t con)	CaO (kg/t con)
71	2.0	49.8	88.7	5.65	15.81	5.30

Although a high gold extraction was obtained (88.7%), the cyanide consumption was very high (15.81 kg NaCN/tonne of concentrate). Solution fouling was also quite evident with reducing powers of 2,160 and 2,830 being measured for the first stage and second stage leach respectively. The pregnant solution was also high in contaminants (613 mg Cu/L, 130 mg Fe/L, 6.40 mg Ni/L, 20.0 mg Zn/L, 1,087 mg CN_T/L, 906 mg CN_{WAD}/L, 3,744 mg CNS/L and 90.9 mg CNO/L). The fouled nature of the leach solution is due to the oxidized nature of the existing tailings. Consequently, leaching difficulties can likely be expected in a continuous concentrate leaching circuit.

MISCELLANEOUS ASSAYS

Overall Composite

The overall composite mercury content was measured at less than 0.3 ppm Hg.

Existing Tailings Composite

Three additional samples of the existing tailings composite were analysed with results obtained being as follows:

Ladner Creek - Existing Tailings Composite Analysis			
Item	Previous	Additional	Average
As, %	0.25	0.28, 0.26, 0.28	0.27
C, %	0.10	0.09, 0.05, 0.06	0.075
Particle Size K_{80}, μm	188	192, 191, 193	191

CYANIDE DESTRUCTION TESTWORK

Cyanide destruction testwork using the SO_2/air process was completed by Inco Limited at their J. Roy Gordon Research Laboratory in Sheridan Park, Mississauga, Ontario. The testwork was completed on barren solution and washed leached residue collected from Tests No. 50 and 51 (cyanidation tests on flotation concentrate, see Melis Engineering Ltd. status report dated February 27, 1996) and a carbon-in-leach cyanide tailings slurry from Test No. 52 (carbon-in-leach cyanidation test on flotation concentrate, see Melis Engineering Ltd. status report dated February 27, 1996). Test results are summarized in Table 8.

Merrill-Crowe Circuit

Barren solution and leach residue solids, typical of cyanide tailings generated from a gold leaching circuit using the Merrill-Crowe (zinc precipitation) process, were prepared by Lakefield Research (Tests No. 50 and 51).

The barren was effectively treated at pH 9 with the SO_2/air process using a single stage with a 120-minute retention time and an SO_2 dosage of 4.5 g SO_2/g CN_{WAD}. The treated solution had a residual cyanide of 0.6 mg CN_{WAD}/L. The treated barren was recombined with repulped washed leach residue to simulate a 75% barren bleed, yielding a 14% solids(w/w) slurry. This slurry was treated in a second stage with a 30-minute retention time and an SO_2 dosage of 6.0 g SO_2/g CN_{WAD}.

Cyanide levels in the liquid component of the treated tailings were reduced to less than 1 mg/L (0.6 mg CN_T/L and 0.4 mg CN_{WAD}/L). Base metals were reduced to acceptable levels except for copper which measured 1.4 mg Cu/L. Residual arsenic was also present at 1.8 mg As/L. Further treatment of pond solution would be needed to reduce copper and arsenic to acceptable levels.

Carbon-in-Leach Circuit

Cyanide slurry tailings, simulated cyanide-bearing tailings from a carbon-in-leach cyanidation circuit, were prepared by Lakefield Research (Test No. 52).

The slurry tailings were treated in a single stage using the SO_2/air process at pH 8.5 with an SO_2 dosage of 8.0 g SO_2/ g CN_{WAD} and a 120-minute retention time. The addition of copper sulphate, at 20 mg Cu^{2+}/L, was necessary to precipitate iron. The cyanide concentration was effectively reduced to less than 1 mg/L (0.8 mg CN_T/L and 0.4 mg CN_{WAD}/L). Copper was marginally less than 1 mg/L (0.9 mg Cu/L) but arsenic levels were very high (53 mg As/L). An additional treatment step using ferric sulphate for arsenic precipitation would be necessary.

ENVIRONMENTAL DATA

The following detailed environmental analyses were completed on tailings products from the Ladner Creek testwork:

- acid-base accounting measurements,
- low level analysis of tailings solids and tailings liquid,
- SWEP test (Special Waste Extraction Procedure, B.C. Reg 63/88) on tailings solids to determine if environmentally harmful components will leach from a waste due to exposure to acid rain. The test is done by leaching 50 g tailings solids in 800 mL water using acetic acid to control pH at pH 5.0 for 24 hours and analyzing the resulting leachate,
- rainfall leachate test (ASTM D3987) on tailings solids to determine the leaching characteristics of tailings using a dilute solution of carbonic acid to simulate acid rain. The test is done by leaching the solids for 18 hours using a 20% solids(w/w) mixture with pH 5.5 carbonic acid water and analyzing the leachate, and
- 96-hour LC_{50} bio-assay using rainbow trout.

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Acid-Base Accounting Measurements

Acid-base accounting measurements are listed in Table 9. The Ladner Creek mineralization (Overall Composite) and flotation tailings are not acid generating as evident from the net acid consuming ability of the test products. As expected, the sulphide-bearing treated cyanide tailings (from leaching of flotation from concentrate) have a net potential for acid generation. Results obtained can be summarized as follows:

Ladner Creek Acid-Base Accounting Measurements	
Sample	Net Acid Consuming Ability ($kg\ H_2SO_4/t$)
Overall Composite	41.0
Flotation Tails from Overall Composite	88.5
Flotation Tails from Existing Tailings	74.1
Treated Cyanide Tailings from Cyanidation of Flotation Concentrate	-337.3

Flotation Tailings from Overall Composite

Detailed environmental analyses of the flotation tailings from Lock-Cycle Test No. 43 on the Ladner Creek overall composite are presented in Table 10. As noted from this table, the flotation tailings water is low in all contaminants. Key analyses can be summarized as follows:

Analyses of Ladner Creek Overall Composite Flotation Tailings					
Element	Solids (%)	Liquid (mg/L)		SWEP Test Leachate (mg/L)	Rainfall Leachate (mg/L)
		Sample	Licence[1]		
As	0.18	0.15	-	0.042	0.040
Cu	0.003	0.044	0.05	<0.001	<0.001
Fe	7.99	<0.001	0.30	22.7	<0.001
Hg	<0.00003	<0.0001	-	<0.0001	<0.0001
Mo	<0.001	0.031	-	<0.002	<0.002
Ni	0.010	0.003	-	0.023	0.003
Pb	<0.001	<0.005	0.05	0.020	<0.005
Zn	0.009	0.006	0.50	0.053	<0.001
CN_T	-	<0.01	0.1	-	-
pH	-	-	6.5 to 8.5	5.43	7.74

NOTES:

1. Limits for tailings supernatant discharge to Ladner Creek specified in the previous pollution control permit for the Carolin mine (Permit No. PE-5692, August, 1980).

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Flotation Tailings from Existing Composite

Detailed environmental analyses of the flotation tailings from Batch Test No. 71 on the existing tailings composite are presented in Table 11. As noted from this table, the flotation tailings water generated from flotation of the existing tailings is low in all contaminants except for arsenic which is slightly elevated at 0.43 mg As/L. Key analyses can be summarized as follows:

Analyses of Flotation Tailings from Flotation of Existing Tailings					
Element	Solids (%)	Liquid (mg/L)		SWEP Test Leachate (mg/L)	Rainfall Leachate (mg/L)
		Test	Licence[1]		
As	0.13	0.43	-	0.13	0.073
Cu	0.007	0.003	0.05	<0.001	0.002
Fe	10.7	0.030	0.30	5.42	0.064
Hg	<0.00003	<0.001	-	<0.001	<0.001
Mo	<0.001	0.014	-	0.082	0.005
Ni	0.002	0.004	-	0.017	0.005
Pb	<0.001	0.002	0.05	0.01	-
Zn	0.084	<0.001	0.50	0.098	<0.001
CN_T	-	0.080	0.1	-	-
pH	-	8.0	6.5 to 8.5	5.53	7.76

NOTES:

1. Limits for tailings supernatant discharge to Ladner Creek specified in the previous pollution control permit for the Carolin mine (Permit No. PE-5692, August, 1980).

Treated Tailings from Cyanidation of Flotation Concentrate

Detailed environmental analyses of the treated cyanide tailings from cyanidation of flotation concentrate are listed in Table 12. Key analyses can be summarized as follows:

Analyses of Treated Tailings from Cyanidation of Flotation Concentrate					
Element	Solids (%)	Liquid (mg/L)		SWEP Test Leachate (mg/L)	Rainfall Leachate (mg/L)
		Test	Licence[1]		
As	1.10	6.54	-	2.79	2.04
Cu	0.18	0.17	0.05	0.40	0.016
Fe	29.4	0.045	0.30	3.46	0.005
Hg	<0.00003	<0.0001	-	<0.0001	<0.0001
Mo	<0.001	0.080	-	0.062	0.016
Ni	0.017	0.017	-	0.21	0.012
Pb	0.037	<0.005	0.05	0.056	-
Zn	0.052	<0.001	0.50	2.25	<0.001
CN_T	-	0.27	0.1	0.23	0.040
pH	-	8.65	6.5 to 8.5	5.16	8.14

NOTES:

1. Limits for tailings supernatant discharge to Ladner Creek specified in the previous pollution control permit for the Carolin mine (Permit No. PE-5692, August, 1980).

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As noted from the above analysis, the liquid component of the treated cyanide tailings is high in arsenic (6.54 mg As/L) and is slightly elevated in copper (0.17 mg Cu/L) and total cyanide (0.27 mg CN_T/L) relative to the limits of the existing licence (0.05 mg Cu/L and 0.1 mg CN_T/L).

Fish Toxicity Test

The results of the fish toxicity test (96-hour LC_{50}) completed on flotation tailings supernatant water from flotation of the Ladner Creek overall composite (Lock-Cycle Test No. 43) are presented in Table 13. There was zero fish mortality in the test.

MINERALOGICAL EXAMINATION OF FLOTATION PRODUCTS

A two stage flotation test (Test No. 69, see Melis Engineering Ltd. status report dated February 27, 1996) was completed on the Ladner Creek overall composite to generate flotation concentrate and tailings for mineralogical examination. The calculated head for the test was 4.39 g Au/tonne (0.128 oz Au/ton).

The samples were prepared as polished sections by Vancouver Petrographics Ltd. and the mineralogical examination was completed by Dr. J.F. Harris of Harris Exploration Services. Pertinent points from Dr. Harris' report are summarized below.

Rougher Second Cleaner Concentrate (High Grade Concentrate)

The grade of this concentrate [373 g Au/tonne (10.88 oz Au/ton)] was somewhat lower than previous high grade concentrates produced by two stage flotation. It represented 59.3% of the gold in the feed and 0.70% of the feed weight. The particle size was in the range of 1 to 80 micrometers with rare coarser grains to 150 micrometers.

This concentrate contained approximately 20% total sulphides, principally pyrite (8%), plus major accessory proportions of arsenopyrite (4%), chalcopyrite (4%) and pyrrhotite (3%). There was also minor amounts of sphalerite (0.2%) and galena (0.1%). Mutual liberation, estimated at 98%, was good. Native gold occured as grains in the 5 to 45 micrometer range, mainly locked with pyrite, arsenopyrite and pyrrhotite. The gold showed no apparent preferential association for any one sulphide species. Only 3 of the 18 observed gold occurrences were present as liberated grains.

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The dominant gangue components were silicates and carbonates. Also observed were minor proportions of a carbon constituent (graphite or pyrobitumen), occurring as liberated grains showing flaking or concoidal morphology.

Scavenger Second Cleaner Concentrate (Low Grade Concentrate)

The grade of this concentrate [59.4 g Au/tonne (1.73 oz Au/ton)] was as expected, representing 19.6% of the gold in the feed and 1.45% of the feed weight. The particle size range was 10 to 100 micrometers with occasional grains to 150 micrometers.

Unlike the high grade concentrate, this concentrate was composed predominantly of sulphides, (95%) with pyrite (77%), arsenopyrite (14%) and pyrrhotite (4.5%) being the dominant species. There was minor chalcopyrite (0.5%) and trace sphalerite. There was only a few percent of finely comminuted silicate and carbonate gangue. Liberation of the sulphides from one another was essentially complete.

Native gold was much less abundant with only five grains in the 3 to 15 micrometer size range being observed. Two grains were locked with pyrite, one with pyrrhotite and one with a pyrite/pyrrhotite composite. One 12 micrometer liberated grain was observed.

Scavenger First Cleaner Scavenger Tails

This tailings product, from scavenger flotation of the scavenger first cleaner tails, assayed 1.6 g Au/tonne (0.047 oz Au/ton), representing 2.4% of the gold in the flotation feed and 6.61% of the weight.

In order to improve the chances of observing gold particles, a sample of this tailings product was pre-concentrated by leaching with dilute acid (to destroy carbonates) and by heavy liquid separation using tetrabromethane (S.G. of 2.96). The sink fraction (heavies), representing a three-fold concentration, was examined as a polished thin section. Unfortunately, there was no detectable gold in the optical examination.

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This tailings product had a dominant particle size range of 8 to 50 micrometers with scattered grains to 80 micrometers. The ratio of total sulphides to non-sulphides was estimated at roughly 30%, the sulphides consisting of mostly pyrrhotite (29%) and rare specks of arsenopyrite (0.5%). Pyrite was not positively identified and chalcopyrite was essentially absent. The gangue was made up of silicates (35%), carbonates (25%) and biotite/chlorite (10%).

Scavenger Tails

The scavenger tails from the float, representing 75.7% of the feed weight and 6.6% of the gold in the feed, assayed 0.38 g Au/tonne (0.011 oz Au/ton). The particle size range was 5 to 120 micrometers. Pre-concentration by acid dissolution of carbonates and heavy liquid separation represented a 20-fold concentration but did not result in any gold grains being observed.

This tailings sample was made up almost entirely of gangue, consisting of quartz and/or feldspar (55%), carbonates (35%) and minor chlorite (5%), as well as iron oxides and possible rutile (2%). The only sulphide present was pyrrhotite (3%).

Interpretation of Gold Losses

Although no gold was observed in the two tailings products, it can be reasonably assumed that gold losses in Ladner Creek mineralization are associated as locked particles within pyrrhotite since this mode of occurrence for gold was noted from observation of the concentrates, and pyrrhotite is the major sulphide mineral in the tailings. Some gold could also be locked with silicates and/or carbonates.

Respectfully submitted,
MELIS ENGINEERING LTD.

L.A. Melis, P.Eng.
President

B.C. Fielder
Senior Process Engineer

LAM/BCF:mb

cc: Tom Adamson
Jim Kermeen

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FIGURE F-26

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK VARIABILITY TESTS
SINGLE STAGE FLOTATION TESTS NO. 44, 62, 64, AND 75
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

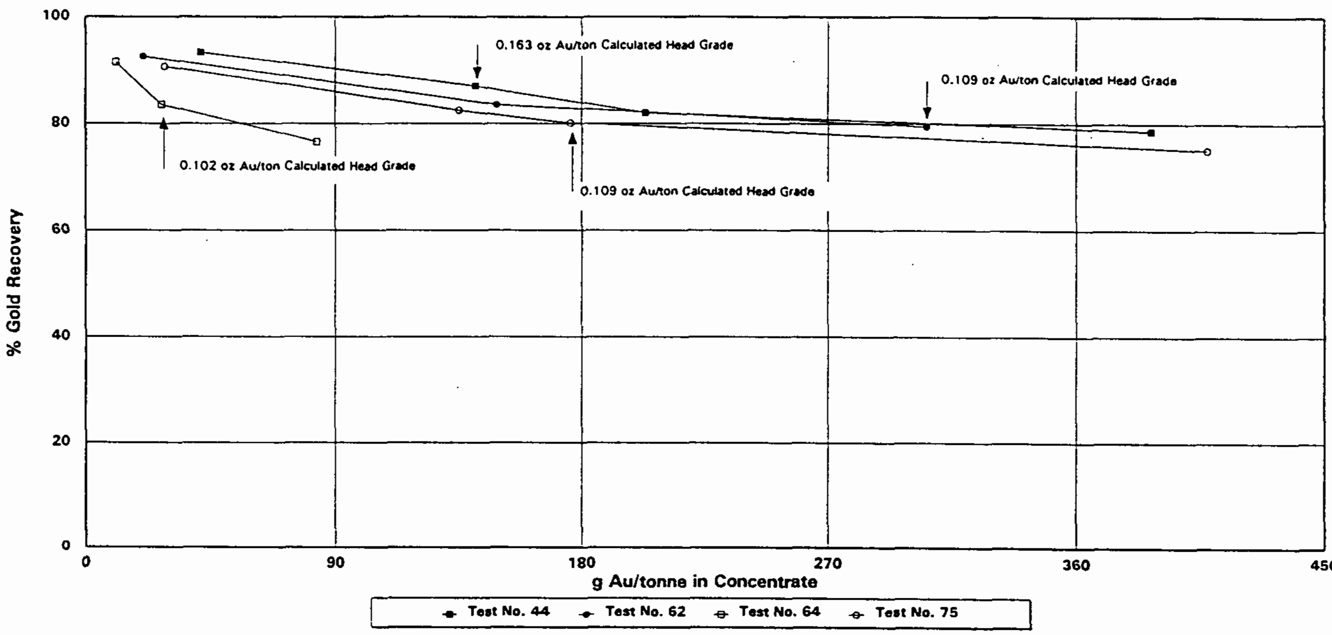

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FIGURE F-24

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK OVERALL COMPOSITE
CLEANER FLOTATION TESTS NO. 35 AND 68
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

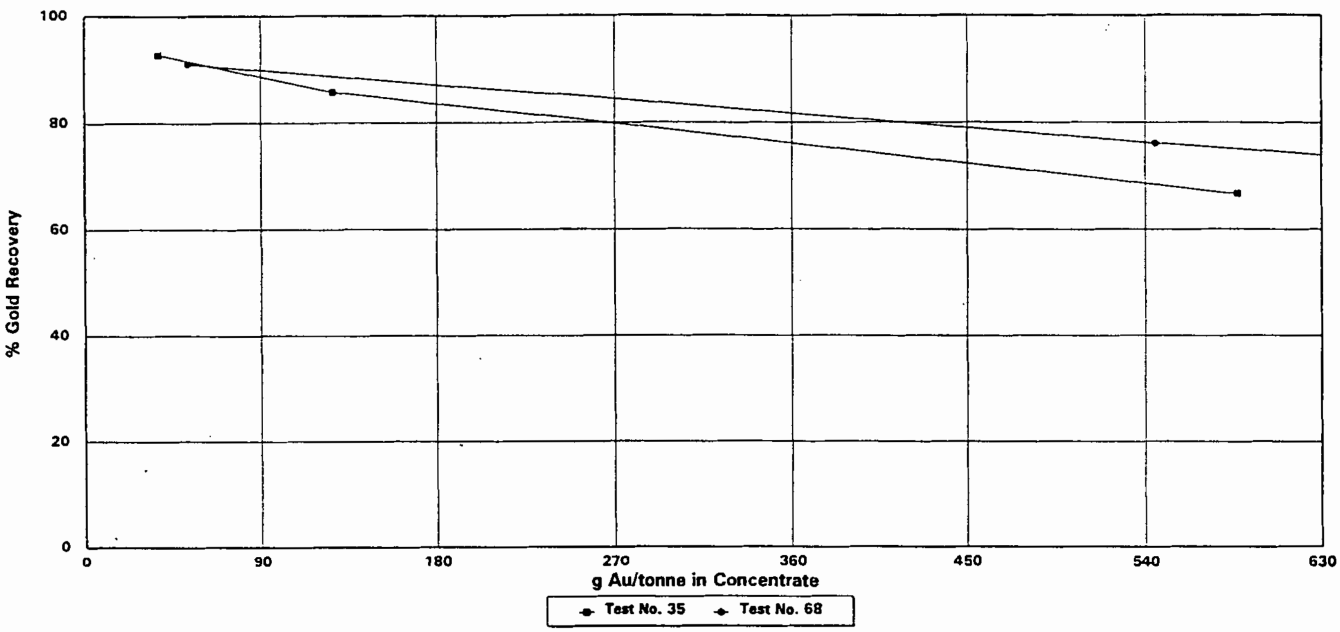

FIGURE F-25

ATHABASKA GOLD RESOURCES LTD.
LADNER CREEK VARIABILITY TESTS
TWO STAGE FLOTATION TESTS NO. 35, 61, 63, 72, AND 76
GOLD RECOVERY vs g Au/tonne IN CONCENTRATE

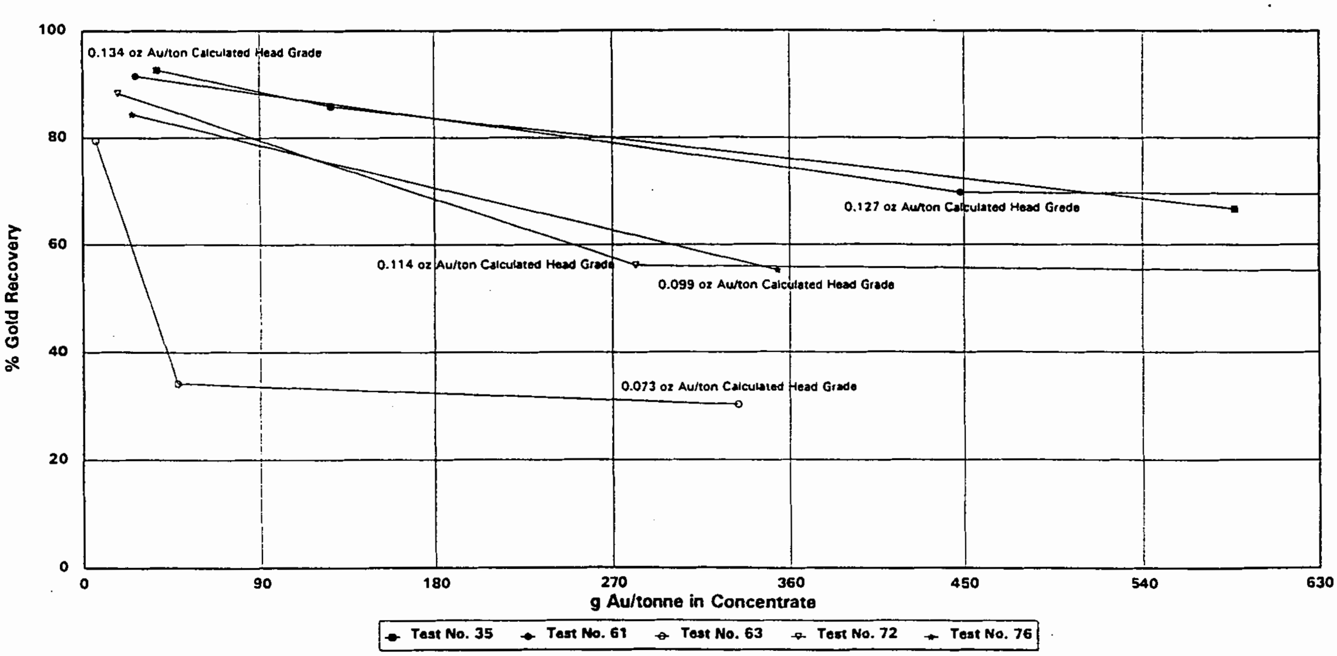

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TABLE 1

LADNER CREEK GOLD MINE PROJECT
FLOTATION TESTS ON LADNER CREEK COMPOSITES
SUMMARY OF FLOTATION CONDITIONS[1]

Test No.	Reagent Addition (g/tonne)								pH	Float Time (min)			Flotation Conditions
	SIBX	SIPX	PAX	CMC/ WW82	$CuSO_4$	208	Flex 31	MIBC		Ro	Total Cl	Scav	
41							130	32.5	8.6	8	3.5	8	Test No. 40 but with 40 minute grind instead of 30 minutes
42				250			102.5	22.5	8.3	10	-	-	Test No. 41 conditions on 10 kg float to produce bulk concentrate for cyanidation
43							110	31	8.5	8	3	1.5	Single stage lock-cycle float under Test No. 40 conditions using a 35 minute grind
44							110	32.5	8.5	8	3	2	Batch test of Lock-Cycle Test No. 43 (K_{80} = 64 μm)
45							110	32.5	8.5	8	3	2	Test No. 44 conditions but 25 minute grind (K_{80} = 101 μm)
46			47.5			65		40	8.2	4	5.5/5.3	4.5	Two stage lock-cycle float using Test No. 35 conditions with a 40 minute grind (Regrind K_{80} = 17 μm)
47			25			77.5		32.5	-	4	2/4	4	Test No. 35 but using only 208 in scavenger cleaner
48			25			77.5		32.5	-	4	2/4	4	Test No. 47 but regrinding of rougher concentrate and increased scavenger concentrate regrind time prior to cleaning (K_{80} = 14 μm)
49			25			77.5		32.5	-	4	2/4	4	Test No. 47 but using stage grinding for primary grind (Regrind K_{80} = 18 μm)
50			25			47.5		15	-	4	-	4	To produce low grade scavenger concentrate from two stage float for cyanidation
51							102.5	22.5	8.3	10	-	-	Test No. 44 conditions to produce bulk concentrate for lock-cycle cyanidation test (Primary Grind K_{80} = 63 μm)
52							102.5	22.5	8.3	10	-	-	Test No. 44 conditions to produce concentrate for cyanidation optimization tests
58			25			85		40	8.2	4	3.5/5.5	4	Similar to Test No. 50 but scavenger concentrate cleaned twice for producing upgraded scavenger concentrate for cyanidation
59					100	57.5	45	37.5	8.2	4	3.5/5.5	4	Test No. 35 but $CuSO_4$ addition and PAX replaced with Flex 31
60					500		85	27.5	7.7	6	3	2	Test No. 44 with $CuSO_4$ addition in grind
61						57.5	45	37.5	8.1	4	3/5.5	4	Test No. 35 with Flex 31 instead of PAX on Zone 1 Composite
62							110	32.5	8.1	8	3.5	1.5	Test No. 44 conditions on Zone 1 Composite
63						62.5	72.5	60	8.5	4	3.5/5.3	8	Test No. 35 conditions with Flex 31 instead of PAX on a 65%/35% mixture of Drum 6 and Drum 7 samples.
64							195	52.5	8.5	10	4.3	2	Test No. 44 conditions on a 65%/35% mixture of Drum 6 and Drum 7 samples.
68							102.5	22.5	-	10	3	-	Arsenopyrite separation float with fine grinding (K_{80} ~40 μm), aeration and high pH (pH 12) cleaning with lime (350 g/t) and M2030 (4.5 g/t)
69			47.5			65		40	8.2	4	5.5/5.3	4.5	Test No. 46 conditions to generate samples for mineralogical examination
72						72.5	92.5	45	8.5	4	3.5/6.3	8	Repeat of Test No. 63 on a 65%/35% mixture of Drum 6 and Drum 7 samples
75							110	37.5	-	8	3.5	1.5	Repeat of Test No. 62 on Zone 1 Composite
76						57.5	37.5	45	-	4	3/5.5	4	Repeat of Test No. 61 on Zone 1 Composite

NOTES:

1. Tests No. 41 to 52, Tests No. 58 to 60 and Tests No. 68 and 69 were completed on overall composite; Tests No. 61, 62, 75 and 76 were completed on Zone 1 Composite (expected head assay of 4.17 g Au/tonne (0.122 oz Au/ton), 0.32% As and 0.06% C(g)). Tests No. 63, 64 and 72 completed on a composite made up as a 65%/35% mixture of Drum 6 and Drum 7 samples (expected head assay of 3.46 g Au/tonne (0.101 oz Au/ton), 0.47% As and 0.15% C (g)).

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TABLE 2

LADNER CREEK GOLD MINE PROJECT
FLOTATION TESTS ON LADNER CREEK COMPOSITES
SUMMARY OF ROUGHER FLOTATION RESULTS

Test No.	Calculated Head			Total Rougher Concentrate						Total Bulk Tails[1]		
				Grade			% Recovery			Grade		
	g Au/t	% S	% As	g Au/t	% S	% As	Au	S	As	g Au/t	% S	% As
41[2]	3.73	2.24	0.23	12.8	7.74	0.80	94.4	94.8	95.6	0.31	0.32	0.019
42	4.77	2.47	0.37	70.3	-	4.20	85.6	-	66.7	0.73	1.51	0.13
44	5.59	2.47	0.41	41.6	16.9	2.92	93.3	85.9	90.3	0.75	1.70	0.30
45	5.94	2.29	0.42	52.0	19.0	3.44	90.2	85.5	84.0	1.07	1.88	0.35
47[2]	4.78	2.26	0.30	28.6	13.7	1.76	93.1	94.0	91.8	0.55	1.43	0.21
48[2]	4.14	2.21	0.32	25.1	13.5	1.94	93.7	94.2	93.4	0.57	1.77	0.26
49[2]	5.49	2.48	0.37	47.1	21.4	3.18	94.7	95.3	94.3	0.64	1.77	0.30
50[2]	4.70	-	-	59.6	-	-	92.7	-	-	0.38[3]	-	-
51	3.77	-	-	51.0	-	-	89.1	-	-	0.44	-	-
52	4.17	-	-	41.9	-	-	92.6	-	-	0.34	-	-
58[2]	4.19	-	-	28.0	-	-	94.5	-	-	0.46	-	-
59[2]	5.82	-	0.40	30.3	-	2.17	92.7	-	96.5	0.62	-	0.11
60	5.16	2.48	0.43	30.8	15.4	2.61	94.3	98.3	96.8	0.57	0.66	0.14
61[2]	4.37	-	0.32	26.4	-	1.45	91.5	-	68.3	0.75	-	0.24
62	3.75	-	0.32	21.2	-	1.82	92.6	-	93.9	0.50	-	0.20
63[2]	2.49	-	-	6.7	-	-	79.4	-	-	0.88	-	-
64	3.50	-	-	11.1	-	-	91.6	-	-	0.53	-	-
68	5.17	2.45	0.39	52.0	14.3	3.64	91.0	52.8	84.2	0.51	1.27	0.068
69[2]	4.39	-	-	16.9	-	-	93.4	-	-	0.48	-	-
72[2]	3.90	2.60	0.46	17.5	9.69	1.59	88.3	73.4	67.1	0.87	2.16	0.38
75	3.72	2.02	0.25	28.9	8.29	1.99	90.7	48.0	92.0	0.66	1.64	0.19
76[2]	3.39	2.01	0.26	24.3	4.81	0.76	84.4	28.2	34.8	0.77	1.90	0.25

NOTES:

1. Total Bulk Tails includes bulk flotation tails and first cleaner scavenger tails.
2. Combined rougher and scavenger recovery.
3. Scavenger tail only.

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TABLE 3

LADNER CREEK GOLD MINE PROJECT
FLOTATION TESTS ON LADNER CREEK COMPOSITES
SUMMARY OF CLEANER FLOTATION RESULTS

			Grade				% Distribution					
	Calculated Head		Ro 1st Clnr Con		Ro 2nd Clnr Con		Ro 1st Clnr Con		Ro 2nd Clnr Con		1st Clnr Scav Con	
Test No.	g Au/t	% As	g Au/t	% As	g Au/t	% As	Au	As	Au	As	Au	As
41	3.73	0.23	99.5	1.72	-	-	81.7	22.9	-	-	4.7	11.8
44	5.59	0.41	203	3.22	387	3.34	82.0	18.0	78.7	9.4	5.1	10.2
45	5.94	0.42	266	3.04	636	2.40	76.5	12.3	70.9	3.8	5.9	7.5
47(1)	4.78	0.30	128	2.00	-	-	84.7	21.1	-	-	1.2	9.9
48(1)	4.14	0.32	184	2.43	-	-	79.8	13.6	-	-	1.3	6.8
49(1)	5.49	0.37	232	3.01	-	-	85.1	16.3	-	-	0.8	4.7
58(1)	4.19	-	85.3	-	197	-	87.8	-	83.7	-	0.8	-
59(1)	5.82	0.40	75.4	4.14	137	6.03	88.0	70.7	84.4	54.0	0.7	2.0
60	5.16	0.43	97.4	5.38	121	6.02	84.9	56.6	80.7	48.8	4.7	12.5
61(1)	4.37	0.32	114	2.27	409	2.85	78.4	21.3	75.0	7.1	0.7	6.4
62	3.75	0.32	150	4.27	305	6.88	83.6	28.1	79.5	21.1	3.6	10.5
63(1)	2.49	-	19.6	-	69.2	-	61.8	-	50.8	-	2.6	-
64	3.50	-	27.9	-	83.0	-	83.6	-	76.6	-	3.4	-
68(2)	5.17	0.39	545	1.81	-	-	76.1	3.4	-	-	-	-
69(1)	4.39	-	46.3	-	161	-	87.2	-	78.9	-	1.3	-
72(1)	3.90	0.46	95.7	2.47	280	3.68	75.8	16.4	70.1	7.7	1.9	5.4
75	3.72	0.25	176	20.2	407	4.41	80.1	22.5	75.1	12.0	2.4	5.0
76(1)	3.39	0.26	181	0.97	-	-	72.2	5.1	-	-	2.4	2.1

NOTES:

1. Includes combined rougher cleaner concentrate and scavenger cleaner concentrate for a two-stage float.
2. Includes 1st Cleaner Con 1 and 1st Cleaner Con 2.

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TABLE 4

LADNER CREEK GOLD MINE PROJECT
COMPARISON OF SINGLE STAGE FLOTATION RESULTS
(Tests No. 40, 41, 44, 45, 60, 62, 64 and 75)

Test No.	Primary Grind K_{80} (µm)	Calculated Head		% Gold Recovery				Grade										
								Ro 1st Clnr		1st Clnr Scav		Ro 1st Clnr + 1st Clnr Scav[1]		Total Bulk Tails[3]		Scav Tails
		g Au/t	% As	Ro	Ro + Scav	Ro 1st Clnr	Ro 1st Clnr + 1st Clnr Scav[1]	g Au/t	% As	g Au/t	% As	g Au/t	% As	g Au/t	% As	g Au/t
40	81	4.62	0.31	88.8	90.0	79.2	80.7	320	2.10	19.8	2.41	249	2.17	0.57	0.06	0.51
41	50	3.73	0.23	93.3	94.4	81.7	86.4	99.5	1.72	11.9	1.85	71.1	1.76	0.31	0.019	0.29
44	64	5.59	0.41	93.3	-	82.0	87.1	203[2]	3.22[2]	24.4	3.54	142	3.33	0.75	0.30	0.43
45	100	5.94	0.42	90.2	-	76.5	82.4	266[2]	3.04[2]	35.6	3.19	182	3.09	1.07	0.35	0.65
60	~64	5.16	0.43	94.3	-	84.9	89.6	97.4[2]	5.38[2]	12.8	2.81	72.3	4.61	0.57	0.14	0.35
62[4]	~64	3.75	0.32	92.6	-	83.6	87.3	150[2]	4.27[2]	7.7	1.89	84.8	3.18	0.50	0.20	0.33
64[5]	~64	3.50	-	91.6	-	83.6	87.0	27.9[2]	-	2.5	-	20.0	-	0.53	-	0.41
75[4]	~64	3.72	0.25	90.7	-	80.1	82.5	176[2]	3.36[2]	15.9	2.25	136	3.08	0.66	0.19	0.39

NOTES:

1. Represents recovery and grade to a combined rougher first cleaner concentrate (Ro 1st Clnr Con) and rougher first cleaner scavenger concentrate (1st Clnr. Scav).
2. Rougher second cleaner (Ro 2nd Clnr) assayed 387 g Au/tonne and 3.34% As in Test No. 44; 636 g Au/tonne and 2.40% As in Test No. 45; 121 g Au/tonne and 6.02% As in Test No. 60; 305 g Au/tonne and 6.88% As in Test No. 62; 83.0 g Au/tonne in Test No. 64; and 407 g Au/tonne and 4.41% As in Test No. 75.
3. Total bulk tails includes rougher or scavenger tails and first cleaner scavenger tails.
4. Test No. 62 and No. 75 completed on Zone 1 Composite [expected head assay of 4.17 g Au/tonne (0.122 oz Au/ton), 0.32% As and 0.06% C (g)].
5. Test No. 64 completed on a 65%/35% mixture of Drum 6 and Drum 7 [expected head assay of 3.46 g Au/tonne (0.101 oz Au/ton), 0.47% As and 0.15% C (g)].

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TABLE 5

LADNER CREEK GOLD MINE PROJECT
COMPARISON OF TWO STAGE FLOTATION RESULTS
(Tests No. 35, 47, 48, 49, 58, 59, 61, 63, 68, 69, 72 and 76)

Test No.[7]	Calculated Head		% Gold Recovery				Grade								
							Ro 1st Clnr		Scav 1st Clnr		Ro 1st Clnr + Scav 1st Clnr		Total Bulk Tails[4]		Scav Tails
	g Au/t	% As	Ro	Ro + Scav	Ro 1st Clnr	Ro 1st Clnr + Scav 1st Clnr[1]	g Au/t	% As	g Au/t	% As	g Au/t	% As	g Au/t	% As	g Au/t
35	4.60	0.31	69.6	92.7	66.6	85.8	587	0.65	34.3	3.66	127	3.15	0.50	0.17	0.38
47	4.78	0.30	72.3	93.1	68.6	84.7	340	0.42	35.2	2.70	128	2.00	0.55	0.21	0.39
48	4.14	0.32	70.0	93.7	63.7	79.8	410	0.39	57.9	3.57	184	2.43	0.57	0.26	0.31
49	5.49	0.37	73.2	94.7	70.2	85.1	537	1.11	63.1	4.06	232	3.01	0.64	0.30	0.33
58	4.19	-	71.0	93.0	69.5	87.8	278[2]	-	23.4	-	85.3	-	0.46	-	0.27
59	5.82	0.40	76.7	92.7	74.7	88.0	469[2]	0.66[2]	13.1[3]	4.70[3]	75.4	4.14	0.62	0.11	0.52
61[5]	4.37	0.32	75.3	91.5	69.8	78.4	448[2]	0.87[2]	16.2[3]	2.68[3]	114	2.27	0.75	0.24	0.44
63[6]	2.49	-	40.4	79.4	34.2	61.8	47.1	-	11.4	-	19.6	-	0.88	-	0.73
68[8]	5.17	0.39	91.0	-	68.8	76.1	843	1.60	126	2.11	545	1.81	0.51	0.07	-
69	4.39	-	66.2	93.4	63.7	87.2	81.7[2]	-	21.3[3]	-	46.3	-	0.48	-	0.38
72	3.90	0.46	57.6	88.2	56.1	75.8	282	1.09	33.1	2.93	95.7	2.47	0.87	0.38	0.57
76	3.39	0.26	59.5	84.4	55.3	72.2	354	0.37	69.5	1.35	181	0.97	0.77	0.25	0.60

NOTES:

1. Represents recovery and grade to a combined rougher first cleaner concentrate (Ro 1st Clnr Con) and scavenger first cleaner concentrate (Scav 1st Clnr).
2. Rougher second cleaner concentrate (Ro 2nd Clnr Con) assayed 739 g Au/tonne and 0.68% As in Test No. 58; 1,346 g Au/tonne and 1.17% As in Test No. 59; 1,320 g Au/tonne and 1.61% As in Test No. 61; 334 g Au/tonne in Test No. 63; and 373 g Au/tonne in Test No. 69.
3. Scavenger second cleaner concentrate (Scav 2nd Clnr Con) assayed 20.2 g Au/tonne and 6.50% As in Test No. 59; 52.0 g Au/tonne and 3.34% As in Test No. 61; 32.0 g Au/tonne in Test No. 63; and 59.4 g Au/tonne in Test No.69.
4. Total bulk tails includes scavenger tails and first cleaner scavenger tails.
5. Test No. 61 completed on Zone 1 Composite [expected head assay of 4.17 g Au/tonne (0.122 oz Au/ton), 0.32% As and 0.06% C (g)].
6. Test No. 63 completed on a 65%/35% mixture of Drum 6 and Drum 7 [expected head assay of 3.46 g Au/tonne (0.101 oz Au/ton), 0.47% As and 0.15% C (g)].
7. All tests completed with a 40 minute primary grind (approximate K_{80} of 50 micrometers), except for Test No. 49 which was a stage grind (20, 7 and 3 minutes) and Test No. 68 which was done with an ultra fine primary grind (K_{80} ~40 micrometers).
8. Arsenopyrite separation test: Ro 1st Clnr represents 1st Clnr Con 1 and Scav 1st Clnr represents 1st Clnr Con 2.

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TABLE 6

LADNER CREEK GOLD MINE PROJECT
SUMMARY OF LOCK-CYCLE FLOTATION TEST RESULTS

LOCK-CYCLE FLOTATION TEST CONDITIONS				
Test No.	Composite	Primary Grind K_{80} µm	Stage	Conditions
43	Overall	~65	1	Rougher Float (8') at natural pH (pH 8.5) with regrind of concentrate (7') ahead of two cleaning stages (2'/1') and scavenger on first cleaner tails (2'): Flex 31 (110 g/t) and MIBC (31 g/t)
74	Overall	~65	1	Rougher float (8') at natural pH (pH 8.4) with regrind of concentrate (7') ahead of two cleaning stages (3.5'/1.5') and scavenger on first cleaner tails (2'): Flex 31 (116.2 g/t) and MIBC (32.5 g/t)
46	Overall	~50	2	Rougher float (4') with two stages of cleaning (4'/1.5'): A208 (57.5 g/t) and MIBC (15 g/t). Followed by scavenger float (4.5'), regrind scavenger concentrate (7'), two stages of cleaning (4'/1.3') and scavenger on first cleaner scavenger tails (1.5'): A208 (7.5 g/t), PAX (47.5 g/t) and MIBC (25 g/t). All at natural pH (pH 8.0 to 8.2).
73	Existing Tailings	~90	1	Rougher Float (9') at natural pH (7.9) with regrind of rougher concentrate (18', K_{80}=11 µm) ahead of three cleaning stages (2.5'/1.5'/1.5') and scavenger on first cleaner tails (1.5'): Flex 31 (125 g/t) and MIBC (45 g/t)

LOCK-CYCLE FLOTATION TEST RESULTS																		
			Calculated Head		Concentrate									% Gold Recovery			Total Tails
					High Grade (HG)			Low Grade (LG)			Single						
Test No.	Composite	Flotation	g Au/t	% As	Wt %	g Au/t	% As	Wt %	g Au/t	% As	Wt %	g Au/t	% As	HG	LG	Single	g Au/t
43	Overall	Single Stage (Test No. 44 Conditions)	5.54	0.34	-	-	-	-	-	-	1.38	341	3.77	-	-	85.1	0.84
74	Overall	Single Stage (Repeat Test No. 43)	4.53	0.32	-	-	-	-	-	-	2.16	176	3.89	-	-	84.2	0.73
46	Overall	Two Stage (Test No. 35 Conditions)	5.53	0.34	0.47	834	0.91	2.39	45.6	3.35	2.86	175(1)	2.95(1)	70.8	19.7	90.5(1)	0.53
73	Existing Tailings	Single Stage (Test No. 43 Conditions)	1.97	0.28	-	-	-	-	-	-	0.88	135	7.45	-	-	60.6	0.78

NOTES:

1. *Calculated grade and recovery for combined high grade and low grade concentrate.*

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TABLE 7

LADNER CREEK GOLD MINE PROJECT
CYANIDATION TESTS ON FLOTATION ROUGHER CONCENTRATE
SUMMARY OF RESULTS

	Pre-Aeration[3]			Cyanidation[4]								Reagent Consumption		Results		
Test No.	Time (h)	$Pb(NO_3)_2$ (kg/t con)	pH	NaCN (g/L)	pH	Leach Time (h)	$Pb(NO_3)_2$ (kg/t con)	Reducing Power (mL 0.1N $KMnO_4$/L)		DO_2 (ppm)		NaCN (kg/t con)	CaO (kg/t con)	Calculated Head (g Au/t)	% Gold Extraction (72 h)	Leach Residue (g Au/t)
								Stage 1	Stage 2	Stage 1	Stage 2					
70A[1]	4	0.43	8.0 to 9.7	0.5	10.3 to 11.5	48+24	0.32	580	230	5.7	6.6	1.29	3.82	49.4	82.9	8.48
70B[1]	4	0.43	8.4 to 9.9	1.0	10.3 to 11.5	48+24	0.32	700	280	6.3	6.6	2.43	3.67	47.3	82.9	8.09
70C[1]	4	0.43	8.4 to 9.5	2.0	10.6 to 11.7	48+24	0.32	750	350	5.3	6.6	2.79	3.34	45.3	83.2	7.63
71[2]	4	0.39	8.4 to 9.6	2.0	9.4 to 11.4	48+24	0.30	2160	2830	4.5	5.6	15.81	5.30	49.8	88.7	5.65

48-Hour Pregnant Solution Analysis (mg/L)								
Test No.	Cu	Fe	Ni	Zn	CN_T	CN_{WAD}	CNS	CNO
70A	139	2.92	1.70	6.44	374	350	333	74.7
70B	151	10.9	2.20	8.17	543	523	472	21.4
70C	171	27.9	2.30	8.91	969	969	563	35.6
71	613	130	6.40	20.0	1,087	906	3,744	90.9

NOTES:

1. Tests No. 70A, 70B and 70C were done on reground rougher concentrate (16'/100 g)prepared from the Ladner Creek overall composite with an average calculated head of 3.66 g Au/tonne (0.107 oz Au/ton). The rougher concentrate calculated gold grade was 47.3 g Au/tonne (1.381 oz Au/ton), representing a flotation gold recovery of 91.1% and 7.05% of the feed weight.

2. Test No. 71 was completed on reground first cleaner concentrate (K_{80} ~16 μm) prepared from the composite of existing tailings with a calculated head grade of 1.77 g Au/tonne (0.052 oz Au/ton). The first cleaner concentrate calculated gold grade was 49.8 g Au/tonne (1.45 oz Au/ton), representing a flotation recovery of 62.0% and 10.42% of the feed weight.

3. Pre-aeration done in bottle roll.

4. Cyanidation was completed in two stages (48 hours + 24 hours) with a filtration and repulp stage between the two stages.

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TABLE 8

LADNER CREEK GOLD MINE PROJECT
CYANIDE DESTRUCTION TESTWORK RESULTS[1]

Stream	Assay (mg/L)													
	CN_T[2]	CN_{WAD}	Cu	Fe	Ni	Zn	As	CNO	S_2O_3	SO_4	NH_3	CNS	Au	Ag
MERRILL CROWE CIRCUIT[3]														
Untreated Barren	1,301	1,105	200	70	4.8	77	2	74	<10	-	-	836	0.032	<0.1
Treated Barren	0.5	0.3	1.3	<0.1	0.14	0.5	0.2	1,460	127	5,660	23	575	0.27	0.072
Treated Slurry	0.6	0.4	1.4	<0.1	<0.1	<0.1	1.8	1,210	<10	5,020	30	477	0.3	<0.01
CARBON-IN-LEACH[4]														
Untreated Slurry	1,345	1,010	161	120	0.9	14.8	51[5]	183	44	720	7.3	532	0.016	<0.1
Treated Slurry	0.8	0.4	0.9	0.14	0.02	0.05	53[5]	1.88	174	10.5	-	761	0.83	0.014

NOTES:

1. Liquid analysis is dissolved analysis based on filtration at 0.22 micrometers.

2. CN_T assay calculated using $CN_T = [CN_{WAD} + (Fe \times 2.795)]$

3. Treatment of barren solution and washed leach residue from Tests No. 50 and 51 (see Melis Engineering Ltd. status report dated February 27, 1996). Reagent consumptions were 4.5 g SO_2/g CN_{WAD} and 0.6 g $Ca(OH)_2$/g SO_2 in the first stage treatment of barren, and 6.0 g SO_2/g CN_{WAD} and 0.6 g $Ca(OH)_2$/g SO_2 in the second stage treatment of residual cyanide in the combined treated barren and washed leach residue slurry.

4. Treatment of carbon-in-leach slurry tailings from Test No. 52 (See Melis Engineering Ltd. status report dated February 27, 1996). Reagent consumptions were 8.0 g SO_2/g CN_{WAD}, 0.2 g $Ca(OH)_2$/g SO_2 and 20 mg Cu^{2+}/L.

5. Arsenic level in sample of carbon-in-leach tailings as-received was 19 mg As/L. Level increased to 51 mg As/L by the time of testing. Treatment for arsenic removal (ferric sulphate addition) was not carried out.

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TABLE 9

LADNER CREEK GOLD MINE PROJECT
ACID BASE ACCOUNTING MEASUREMENTS

Sample	Measurement	Paste pH	% S (Total)	% S^{2-}	APP[5] ($kg/H_2SO_4/t$)	ACA[6] ($kg/H_2SO_4/t$)	NACA[7] ($kg/H_2SO_4/t$)	ACA/APP
Overall Composite[1]	A	9.2	2.42	2.14	74.0	115.0	41.0	9.8
	B	9.2	2.42	2.14	74.0	115.0	41.0	9.8
Flotation Tails from Flotation of Overall Composite[2]	A	8.6	1.04	0.85	32.0	120.5	89.0	3.8
	B	8.6	1.04	0.85	32.0	120.3	88.0	3.8
Flotation Tails from Flotation of Existing Tailings[3]	A	7.2	1.22	0.95	37.3	112.9	75.6	3.0
	B	7.2	1.22	0.95	37.3	109.8	72.5	2.9
Treated Cyanide Tailings from Cyanidation of Flotation Concentrate[4]	A	8.2	14.5	12.6	443.7	106.1	-337.6	0.20
	B	8.2	14.5	12.6	443.7	106.8	-336.9	0.20

NOTES:

1. Overall composite of Ladner Creek underground material made up from the nine drums of samples provided for metallurgical testwork (seeMelis Engineering Ltd. status report dated December 8, 1995).

2. Combined rougher tails solids and first cleaner scavenger tails solids (total flotation tails) from Lock-Cycle Test No. 43 on the Ladner Creek Overall Composite.

3. Combined rougher tails solids and first cleaner scavenger tails solids (total flotation tails) from Batch Test No. 71 on the existing tailings composite.

4. Solids from combined treated slurry from Test No. 50 (Merrill-Crowe cyanidation of flotation concentrate) and Test No. 51 (carbon-in-leach cyanidation of flotation concentrate). Treatment of cyanide slurry completed by Inco Limited using the SO_2/air process.

5. APP: Acid Production Potential = %S x 30.6.

6. ACA: Acid Consuming Ability = mL 1N H_2SO_4 consumed x 49/weight (g) of sample.

7. NACA: Net Acid Consuming Ability = ACA - APP.

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TABLE 10

LADNER CREEK GOLD MINE PROJECT
ENVIRONMENTAL ANALYSES
FLOTATION TAILINGS FROM OVERALL COMPOSITE[1]

Analyte	Tailings Solids %	Tailings Liquid (mg/L)[2]		SWEP Test Leachate (mg/L)[3]	Rainfall Test Leachate (mg/L)[4]
		Dissolved	Total		
pH, final	-	-	-	5.43	7.74
Conductivity, mho/cm	-	-	464	5,410	436
Total Dissolved Solids	-	-	296	7,040	300
Total Hardness as $CaCO_3$	-	-	149	4,220	232
Total Alkalinity as $CaCO_3$	-	-	111	2,300	116
Sulphate	-	-	103	15.7	118
N, Nitrate (NO_3)	-	-	0.51	0.13	0.021
N, Nitrite (NO_2)	-	-	0.051	<0.006	<0.006
N, Ammonia (NH_3 + NH_4)	-	-	0.30	0.60	0.40
Total Suspended Solids	-	-	7	-	-
Ag	0.50 g/t	<0.003	<0.003	<0.001	<0.001
Al	N/A	0.036	0.058	0.25	0.044
As	0.18	0.15	0.056	0.042	0.040
Au	0.59 g/t	-	-	-	-
B	<0.0005	0.030	<0.01	<0.01	<0.01
Ba	-	0.026	0.026	0.28	0.03
Be	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002
Bi	<0.002	<0.02	<0.02	<0.02	<0.02
Ca	4.67	47.8	40.9	1,640	75.4
Cd	<0.0005	0.023	<0.0005	0.001	<0.0005
Co	0.0019	<0.001	<0.001	0.007	<0.001
Cr	0.024	<0.001	<0.001	0.002	<0.001
Cu	0.0028	0.044	0.013	<0.001	<0.001
F	-	-	-	0.030	0.040
Fe	7.99	<0.001	0.071	22.7	<0.001
Ga	0.001	-	-	-	-
Hg	<0.00003	<0.0001	<0.0001	<0.0001	<0.0001
K	0.13	-	-	-	-
Li	<0.001	-	-	-	-
Mg	1.60	13.1	11.3	31.0	10.5
Mn	0.12	0.078	0.078	31.3	0.21
Mo	<0.001	0.031	0.023	<0.002	<0.002
Na	2.56	-	-	-	-
Ni	0.010	0.003	0.003	0.023	0.003
P	N/A	0.39	0.39	<0.0005	0.015
Pb	<0.001	<0.005	<0.005	0.020	<0.005
S (total)	1.05	-	-	-	-
S^{2-}	0.77	-	-	-	-
Sb	<0.001	0.004	0.005	<0.001	0.006
Se	-	<0.005	0.008	<0.005	<0.005
Si	25.2	1.77	1.79	1.77	1.86
Sr	-	0.49	0.38	5.47	0.42
Ti	0.34	-	-	-	-
U	-	<0.3	<0.3	<0.3	<0.3
V	<0.10	0.026	0.009	0.029	0.020
W	<0.01	-	-	-	-
Zn	0.009	0.006	0.021	0.053	<0.001
CN_T	-	-	<0.01	<0.01	<0.01
CN_{WAD}	-	-	<0.01	<0.01	<0.01
CN_F	-	-	-	<0.20	<0.20
CNS	-	-	<0.50	<0.50	<0.50
CNO	-	-	<10	<10	<10
LOI	5.49	-	-	-	-

NOTES:

1. Combined rougher tails and first cleaner scavenger tails (total flotation tails) from Lock-Cycle Test No. 43 completed on the Ladner Creek Overall Composite.
2. Tailings liquid collected by filtration of flotation tailings from Lock-Cycle Test No. 43. Dissolved analysis is based on 0.45 μm filtration.
3. SWEP test (Special Waste Extraction Procedure, B.C. Reg 63/88) completed by leaching 50 g of tailings solids in 800 mL water using acetic acid to control pH at pH 5.0 for 24 hours and analyzing the resulting leachate.
4. Rainfall leachate test (ASTM D3987) completed by leaching the tailings solids for 18 hours using a 20% solids(w/w) mixture with pH 5.5 carbonic and water and analyzing the resulting leachate.

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TABLE 11

LADNER CREEK GOLD MINE PROJECT
ENVIRONMENTAL ANALYSES
FLOTATION FROM EXISTING TAILINGS COMPOSITE[1]

Analyte	Tailings Solids %	Tailings Liquid Dissolved (mg/L)[2]	SWEP Test Leachate (mg/L)[3]	Rainfall Test Leachate (mg/L)[4]
pH	-	8.00	5.53	7.76
Conductivity, mho/cm	-	1,100	5,250	757
Total Dissolved Solids	-	862	6,900	560
Total Hardness as $CaCO_3$	-	533	4,300	418
Total Alkalinity as $CaCO_3$	-	96	2,326	73
Sulphate	-	463	67.5	304
N, Nitrate (NO_3)	-	0.090	0.021	0.037
N, Nitrite (NO_2)	-	0.100	<0.006	<0.006
N, Ammonia (NH_3 + NH_4)	-	1.50	0.80	0.50
Total Suspended Solids	-	-	-	-
Ag	0.50 g/t	0.001	0.003	0.001
Al	3.65	0.056	0.097	0.040
As	0.13	0.43	0.13	0.073
Au	0.68 g/t	-	-	-
B	<0.001	0.03	0.06	0.08
Ba	-	0.018	0.13	0.017
Be	<0.0001	<0.0002	<0.0002	<0.0002
Bi	0.005	<0.02	0.040	0.040
Ca	4.42	170	1,700	146
Cd	<0.001	0.0007	0.001	<0.0001
Co	0.002	0.002	0.018	<0.001
Cr	6.47	0.001	0.002	<0.001
Cu	0.007	0.003	<0.001	0.002
F	-	-	0.040	0.050
Fe	10.7	0.030	5.42	0.064
Ga	0.001	-	-	-
Hg	<0.00003	<0.0001	<0.0001	<0.0001
K	0.22	-	-	-
Li	<0.001	-	-	-
Mg	1.68	26.3	14.3	13.1
Mn	0.13	0.17	21.3	0.47
Mo	<0.001	0.014	0.082	0.005
Na	2.21	-	-	-
Ni	0.002	0.004	0.017	0.005
P	N/A	0.033	N/A	N/A
Pb	<0.001	0.002	0.01	N/A
S (total)	1.22	-	-	-
S^{2-}	0.95	-	-	-
Sb	<0.005	0.026	0.011	0.025
Se	-	<0.005	<0.005	<0.005
Si	23.0	1.10	2.14	1.94
Sr	-	0.59	3.45	0.32
Ti	0.47	-	-	-
U	-	<0.3	N/A	N/A
V	0.040	<0.008	<0.01	<0.01
W	<0.01	-	-	-
Zn	0.084	<0.001	0.098	<0.001
CN_T	-	0.080	<0.01	0.16
CN_{WAD}	-	<0.01	-	<0.01
CN_F	-	-	N/A	<0.2
CNS	-	<1	<0.5	<0.5
CNO	-	<1	<0.5	<0.5
LOI	4.99	-	-	-
S.G.	2.74	-	-	-

NOTES:

1. Combined rougher tails and first cleaner scavenger tails (total flotation tails) from Batch Test No. 71 completed on the composite of existing tailings.
2. Tailings liquid collected by filtration of flotation tailings from Batch Test No. 71. Dissolved analysis is based on 0.45 μm filtration.
3. SWEP test (Special Waste Extraction Procedure, B.C. Reg 63/88) completed by leaching 50 g of tailings solids in 800 mL water using acetic acid to control pH at pH 5.0 for 24 hours and analyzing the resulting leachate.
4. Rainfall leachate test (ASTM D3987) completed by leaching the tailings solids for 18 hours using a 20% solids(w/w) mixture with pH 5.5 carbonic and water and analyzing the resulting leachate.

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TABLE 12

LADNER CREEK GOLD MINE PROJECT
ENVIRONMENTAL ANALYSES
TREATED SLURRY TAILINGS FROM CYANIDATION OF FLOTATION CONCENTRATE[1]

Analyte	Tailings Solids %	Tailings Liquid (mg/L)		SWEP Test Leachate (mg/L)[4]	Rainfall Test Leachate (mg/L)[5]
		Dissolved[2]	Simulated Final Discharge (mg/L)[3]		
pH, final	-	8.54	8.65	5.16	8.14
Conductivity, mho/cm	-	11,800	9,890	5,070	3,210
Total Dissolved Solids	-	10,500	8,680	6,540	2,840
Total Hardness as CaO_3	-	1,300	963	3,820	1,470
Total Alkalinity as CaO_3	-	273	278	1,595	53.0
Sulphate	-	5,901	4,811	544	1,663
N, Nitrate (NO_3)	-	42.3	32.6	3.55	3.05
N, Nitrite (NO_2)	-	1.89	1.70	<0.006	0.13
N, Ammonia (NH_3 + NH_4)	-	269	219	4.70	16.1
Total Suspended Solids	-	-	-	-	-
Ag	2.30 g/t	0.015	0.008	0.009	0.003
Al	2.23	0.053	0.044	0.64	0.068
As	1.10	5.96	6.54	2.79	2.04
Au	4.99 g/t	-	-	-	-
B	<0.001	0.06	0.03	0.05	0.09
Ba	-	0.025	0.027	0.12	0.021
Be	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002
Bi	<0.002	<0.10	<0.02	0.04	0.02
Ca	3.57	504	370	1,490	580
Cd	0.001	0.0003	<0.0001	0.008	<0.0001
Co	0.015	0.20	0.20	0.034	0.020
Cr	5.22	<0.001	<0.001	0.002	<0.001
Cu	0.18	0.16	0.17	0.40	0.016
F	-	-	-	0.060	0.040
Fe	29.4	0.034	0.045	3.46	0.005
Ga	0.001	-	-	-	-
Hg	<0.00003	<0.0001	<0.0001	<0.0001	<0.0001
K	0.13	-	-	-	-
Li	<0.001	-	-	-	-
Mg	1.30	10.9	9.49	25.1	4.04
Mn	0.10	0.045	0.031	15.9	0.050
Mo	<0.001	0.080	0.080	0.062	0.016
Na	1.50	-	-	-	-
Ni	0.017	0.016	0.017	0.21	0.012
P	N/A	0.10	0.09	N/A	0.030
Pb	0.037	<0.002	<0.002	0.056	N/A
S (total)	14.5	-	-	-	-
S^{2-}	12.6	-	-	-	-
Sb	<0.005	0.036	0.027	0.020	0.065
Se	-	0.016	0.016	<0.005	0.005
Si	18.0	1.66	2.28	3.77	2.69
Sr	-	0.10	0.43	3.01	0.27
Ti	0.42	-	-	-	-
U	-	<0.30	<0.30	N/A	N/A
V	0.040	<0.008	<0.008	<0.01	<0.01
W	<0.01	-	-	-	-
Zn	0.052	<0.001	0.001	2.25	<0.001
CN_T	-	0.42	0.27	0.23	0.040
CN_{WAD}	-	0.080	0.26	-	<0.01
CN_F	-	-	-	<0.20	<0.20
CNS	-	520	399	9.49	47.5
CNO	-	862	569	<0.50	38.0
LOI	11.7	-	-	-	-
S.G.	2.91	-	-	-	-

NOTES:

1. Combined treated slurry from Tests No. 50 and 51 (Merrill-Crowe cyanidation of flotation concentrate) and Test No. 52 (carbon-in-leach cyanidation of flotation concentrate). Treatment completed by Inco Limited using SO_2/air process.
2. Tailings liquid collected by filtration (0.45 μm) of treated cyanidation tailings from SO_2/air treatment of leached concentrate cyanidation residue slurry.
3. Simulated final discharge prepared by adding 1.4 L of water to 1 kg of treated leach residue at 15% solids(w/w) and sampling supernatant after seven days.
4. SWEP test (Special Waste Extraction Procedure, B.C. Reg 63/88) completed by leaching 50 g of tailings solids in 800 mL water using acetic acid to control pH at pH 5.0 for 24 hours and analyzing the resulting leachate.
5. Rainfall leachate test (ASTM D3987) completed by leaching the tailings solids for 18 hours using a 20% solids(w/w) mixture with pH 5.5 carbonic and water and analyzing the resulting leachate.

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TABLE 13

LADNER CREEK GOLD MINE PROJECT

FISH TOXICITY TEST RESULTS[1]
FLOTATION TAILINGS WATER[2]

Item	Time (h)				
	0	24	48	72	96
Tailings Water (100%)					
pH	8.13	-	-	-	8.18
Dissolved Oxygen, mg/L	9.4	9.2	9.2	9.5	9.6
Conductivity, μmhos/cm	382	-	-	-	379
Temperature, °C	16.0	14.9	14.6	14.0	14.2
Total Hardness, mg/L	166	-	-	-	-
Mortality, %	0	0	0	0	0
Control					
pH	8.14	-	-	-	-
Dissolved Oxygen, mg/L	9.6	9.6	9.4	9.6	9.7
Conductivity, μmhos/cm	212	-	-	-	-
Temperature, °C	15.5	14.9	14.8	14.0	14.0
Total Hardness, mg/L	118	-	-	-	-
Mortality, %	0	0	0	0	0

NOTES:

1. Fish toxicity test was a 96-hour LC_{50} single concentration test (Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout. Report EPSI/RM/13 July 1990).

2. Flotation tailings water tested was supernatant water from the total flotation tails of Lock-Cycle Test No. 43 completed on the Ladner Creek overall composite.

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April 23, 1996

Athabaska Gold Resources Ltd.
1185 West Georgia St. Suite 1200
Vancouver BC V6E 4E6

MELIS Project No. 319

Attention: Mr. Jim Kermeen/Mr. Plen Dickson

Dear Jim/Plen:

RE: Ladner Creek Gold Mine Project - Remaining Metallurgical Testwork

The latest Melis Engineering Ltd. status report (April 23, 1996) includes all the metallurgical and environmental work that has been completed to date for the Ladner Creek Gold Mine Project.

Further confirmation metallurgical testwork will be required as part of the formal feasibility to be completed for the project. As an alternative to running a pilot plant, more extensive lock-cycle testing using single stage flotation, the selected processing option for Ladner Creek, will be necessary to quantify expected recoveries and concentrate grades for composites of varying head grades.

Lock-Cycle Testing of Ladner Creek Composites

This lock-cycle testwork can be completed on three composites with head grades of 0.100 oz Au/ton (3.43 g Au/tonne), 0.125 oz Au/ton (4.29 g Au/tonne) and 0.150 oz Au/ton (5.14 g Au/tonne). The composites can be prepared from the existing drum samples on a weighted basis as listed in Table 1.

To confirm achievable recoveries and to quantify the range of gold and arsenic grades in concentrate it will be necessary to complete two single stage flotation lock-cycle tests on each of the three composites. Flotation conditions will be the same as the conditions in the two previous lock-cycle tests, Tests No. 43 and 74. The concentrate produced would be analyzed for key smelter elements, namely Au, Ag, Cu, As, Sb, Bi, Hg, Ni, Pb, S, Si, Zn, Al_2O_3 and MgO.

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Lock-Cycle Testing of Existing Tailings Composite

Two additional lock-cycle tests will need to be completed on the existing tailings composite to quantify achievable gold concentrate grades and recoveries, to determine the range of arsenic levels in concentrate and to provide a detailed analysis of concentrate produced from the existing tailings.

Cyanidation of Flotation Concentrate

Since custom milling of concentrate at the Premier mill can potentially improve overall gold recoveries by 2% to 3%, gold extraction efficiencies need to be confirmed by carbon-in-leach cyanidation testing of flotation concentrate from the three composites of different head grades and from the existing tailings composite.

To generate sufficient flotation concentrate, a 10 kg sample of each composite will be bulk floated and the rougher concentrate cleaned in two or three stages to provide approximately 150 g of concentrate for cyanide leaching. The key aspects to address for each concentrate will be achievable gold recoveries, solution quality, cyanide and lime consumptions, and the potential impact of arsenic on effluent quality.

Flotation Concentrate Samples for Smelters

Smelters will require concentrate samples for their own analysis as part of negotiations to finalize smelter terms. Two separate 100 to 150 g samples of flotation concentrate from the 0.125 oz Au/ton (4.29 g Au/tonne) composite (the composite with the expected mill feed grade) will be prepared by bulk flotation of two separate 10 kg samples and cleaning the concentrates in two or three stages. A small cut of each concentrate will be retained for check analysis by Lakefield Research.

Similarly, two 100 to 150 g samples of flotation concentrate will be prepared from the existing tailings composite.

Flotation Concentrate Samples for Premier

The Premier mine has requested a substantial amount of flotation concentrate to evaluate the suitability of Ladner Creek concentrates to their carbon-in-leach gold recovery circuit. To generate 1.5 kg of concentrate will require bulk flotation of ten 10 kg lots of the 0.125 oz Au/ton (4.29 Au/tonne) composite, using two or three cleaning stages for each 10 kg sample.

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Since flotation concentrate from the existing tailings composite may also be sold to the Premier mill, a 1.5 kg concentrate sample from this composite, prepared in a similar manner, will also be required.

Environmental Analysis

Additional arsenic and copper analysis of flotation tailings water will be obtained on tailings water from the lock-cycle tests.

Quantities of Composites

The following is the estimated quantities of composites which will need to be made up for testing:

Ladner Creek Composites for Remaining Metallurgical Testwork (kg)					
Composite	Lock-Cycle	Concentrate Cyanidation	Smelter Concentrate Samples	Premier Concentrate Samples	Total
0.100 oz Au/ton	24	10	-	-	34, say 50
0.125 oz Au/ton	24	10	20	100	154, say 175
0.150 oz Au/ton	24	10	-	-	34, say 50
Existing Tailings	24	10	20	100	154, say 175

The above program will provide confirmation of metallurgical efficiencies for the Ladner Creek Gold Mine Project, which is data required to complete the formal feasibility for the project. Upon completion of this work a formal metallurgical report will need to be put together to incorporate all the metallurgical testwork reported to date into a single document.

Respectfully submitted,
MELIS ENGINEERING LTD.

Lawrence A. Melis, P.Eng.
President

Bruce C. Fielder
Senior Process Engineer

LAM/BCF:mb

(L0496c2.319)

MELIS ENGINEERING LTD.
Project No. 319
April 23, 1996

TABLE 1

LADNER CREEK GOLD MINE PROJECT
COMPOSITE MAKE-UP FOR LOCK-CYCLE TESTING

Zone	Drum No.	Analysis			Composite Make-up (kg)		
		oz Au/ton	% As	% C (g)	0.100 oz Au/ton	0.125 oz Au/ton	0.150 oz Au/ton
1	1	0.017	0.009	<0.01	7.44	21.92	5.41
	2	0.388	0.74	<0.01	2.62	14.74	5.84
	3	0.058	0.092	<0.01	6.64	21.16	5.45
	6	0.087	0.50	0.14	6.10	20.57	5.48
	10	0.030	0.042	0.08	7.18	21.70	5.42
2	5	0.417	0.93	0.01	2.44	14.18	5.88
	7	0.126	0.40	0.17	5.45	19.82	5.54
	8	0.036	0.18	<0.01	7.06	21.58	5.43
	9	0.151	0.13	0.02	5.07	19.33	5.55
Total	Weight (kg)				50	175	50
	% As				0.25	0.30	0.34
	% C (g)				0.05	0.05	0.05