

**GEOLOGICAL SURVEY BRANCH  
ASSESSMENT REPORT**

**25,364**

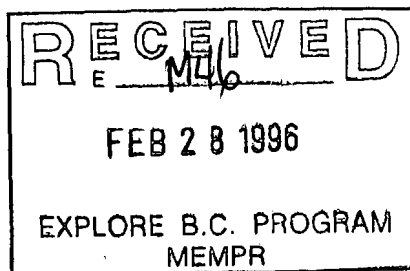
FINAL TECHNICAL REPORT

1995 - 1996 DRILL AND METALLURGICAL TESTING PROGRAM  
TREMBLAY TAILINGS

PHOENIX PROPERTY  
Grant Identification # 95/96 M-46

NTS 82E/2 E

Lat: 49° 07' N  
Long: 118° 33' W



Kettle River Resources Ltd.  
Box 130, 330 Copper St.  
Greenwood, B.C.  
V0H 1J0

Linda Caron  
February, 1996

## TABLE OF CONTENTS

	Page
1.0 INTRODUCTION	
1.1 Location, Access and Terrain	1
1.2 Property and Ownership	1
1.3 History	1
1.4 Description of Work Done	2
2.0 GRID SURVEY, SONIC DRILLING, SAMPLING AND ANALYTICAL WORK	4
2.1 Access Road and Grid Survey	4
2.2 Sonic Drilling	4
2.3 Sampling and Analytical Work	5
3.0 METALLURGICAL WORK	7
4.0 SUMMARY	8
5.0 REFERENCES	9

### LIST OF TABLES

	Page
Table 1 - Phoenix (Tremblay) Tailings - Sonic Drill Samples	6
Table 2 - Comparison of Assay and Composite Head Grades	5

### LIST OF FIGURES

	Page
Figure 1 - Location Map	aft p.1
Figure 2a - 2d - Claim Maps	in pocket
Figure 3 - Surveyed Grid and Drill Hole Location Map	in pocket
Figure 4 - Hole 1 - Samples and Assay Results	aft p. 6
Figure 5 - Hole 2 - Samples and Assay Results	aft p. 6

## LIST OF APPENDICES

APPENDIX 1 - Claim List

APPENDIX 2 - Analytical Results

APPENDIX 3 - a) Flotation Test Results - Phoenix Tailings Samples,  
by : International Metallurgical and Environmental Inc,  
Jeffrey Austin, P.Eng.

b) Flotation Test Results - Phoenix Tailings Samples,  
Variability Testing of 5 Tailings Composites  
by : International Metallurgical and Environmental Inc,  
Jeffrey Austin, P.Eng.

APPENDIX 4 - Statement of Costs

APPENDIX 5 - Statement of Qualifications

## 1.0 INTRODUCTION

### 1.1 Location, Access, Terrain and General Background

The Phoenix property is located about 5 kilometres east of the city of Greenwood on NTS map sheet 82E/2E. Access to the property is from Greenwood east on the Phoenix road, or west and north from Grand Forks on Highway 3, then west on the Phoenix road. The Tremblay tailings which were tested in this program, are situated in the northeast portion of the property, primarily on DL 2116.

The property includes the historic minesite of Phoenix, as well as the mine tailings and a large surrounding area. The Phoenix produced approximately 30 million tons of copper-gold skarn ore from open pit and underground workings during the period 1896-1978. During the early mining period, direct smelting ore was mined from underground and glory hole workings. After a period of inactivity, the Granby Mining Corporation operated the Phoenix as an open pit mine from 1956 to 1978. During this time, the mill treated approximately 14.8 million tons of copper-gold-silver ore. Metal recovery was poor, especially in the early years of operation.

Terrain is generally moderate, with elevations ranging from 900 to 1600 m. The slopes are generally forested, which on north facing slopes can be quite heavy. Some open grasslands occur on south and west facing slopes. The climate is moderate and semi-arid, with hot, dry summers and winter snow accumulations in the order of 1 - 2 metres. Abundant water for exploration is available from old mine workings, ponds or creeks.

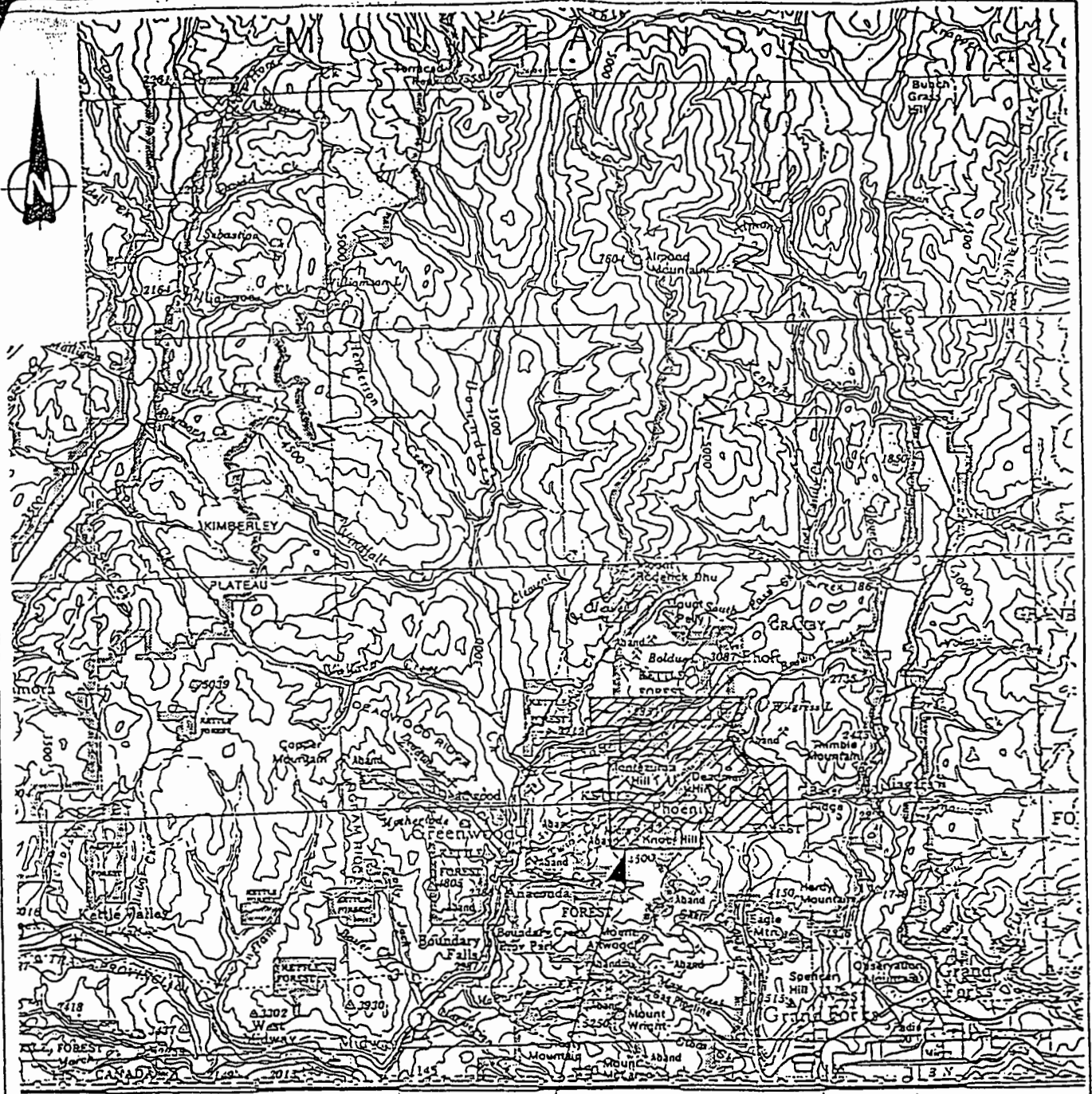
### 1.2 Property and Ownership

The property consists of 135 mineral claims, 55 crown granted mineral claims, 3 reverted crown grants and 12 mining leases, as detailed in Appendix 1, and shown on Figures 2a - 2d. All claims are owned 100% by Kettle River Resources Ltd. Kettle River also owns surface rights to a number of the crown grants and to the areas on which the tailings sit (see claim list).

### 1.3 History

The history of the property is long, with the first claims staked in 1891. Direct smelting copper-gold ore was produced during the period 1896 - 1919. Mining was by underground and open cut methods. The mine was reopened in 1956 by the Granby Mining Corporation, and produced until 1978 by open pit methods. Ore from the Phoenix was treated in a flotation plant mainly for its copper content in the chalcopyrite. Kettle River is in possession of a very large data bank on all aspects of the property - mining, tailings and exploration. A complete summary of all this information is beyond the scope of this report. Instead it is limited to a discussion of the history of exploration on the tailings deposits, as this is related to the current work program.

Historical records of tailings sampling show that gold and silver in the free state were not recovered by the flotation process, and that the lack of regrinding capacity and the presence of oxidized copper minerals resulted in low metal recoveries. A significant amount of metal is thus suspected to be contained in the tailings deposits. The Tremblay tailings represents the waste from the early years of operation and has the highest contained metal grades. Granby tailings records indicate that the Tremblay tailings contain an estimated 4.6 million tons of material at a grade of 0.151% Cu, 0.011 opt Au (0.34 g/t), and 0.109 opt Ag (3.4 g/t). At the tailings site, a large berm was constructed of hydrocycloned tailings which deposited the coarse



UNITED STATES OF AMERICA

145'

30'

**PHOENIX PROJECT**

KETTLE RIVER RESOURCES LTD.

**PHOENIX PROJECT**

**LOCATION MAP**

Scale 1:250,000	Date: April, 1991
NTS-82E/2	FIG. 1

and heavy material. This represents about 2 million tons of the total tailings deposit, and may potentially be of higher grade material.

In 1984, Noranda did minor testing of the Tremblay tailings. A small Vibracor drill was used for the program, but proved unsuccessful because of impenetrable clay layers within the tailings. As a result, the tailings were not adequately tested.

Kettle River Resources conducted very preliminary gravity, magnetic separation, closed circuit cyanidation and flotation testing on surface samples of the Tremblay tailings and results were encouraging. A preliminary cyanidation test recovered 67% of the gold on a representative split of tailings. Because of the large size and partially oxidized nature of the sulfides, it is expected that grinding of the sulfides would result in greatly increased gold recovery. A flotation test run on the Tremblay tailings resulted in a gold recovery of 56.9%, but as above, increased recovery is anticipated with grinding. Magnetic separation showed that the tailings contained 4.8% magnetite and 27.2% of +100 mesh gamet.

Additional testing by an independent company involved running material over a shaker table and further refining the concentrate on a Gemini table. Both the Tremblay and Twin Creek deposits were tested and responded to gravity concentration with gold recoveries from 44 to 55%.

In 1994 - 1995, Echo Bay Exploration examined the Phoenix tailings with the intent that this might be a source of mill feed for the Kettle Project Mill at Curlew. Three surface samples were collected, 2 from the Tremblay tailings (1 berm sample, 1 pond sample), and 1 from the Twin Creek tailings. The samples were submitted to Hazen Research in Golden, Colorado, for gravity concentration, followed by froth flotation and cyanide leach testing. Head grades ranged from 0.013 to 0.031 oz/t Au (0.41 - 0.97 g/t), with the Tremblay berm sample being the highest grade. Gold recovery was good, up to 80%, and this was felt to be a very encouraging program. Echo Bay elected not to continue further work as the permitting and operational procedure was more complex than they had anticipated, however expressed an interest treating any tailings concentrate produced at their Kettle Mill.

These preliminary results were felt to be encouraging enough to justify a thorough (but staged) testing program on the tailings. An Explore BC Grant was obtained to assist in this program, which is the subject of this report.

#### 1.4 Description of Work Done

An initial sample of tailings, along with copies of reports describing previous testing to the tailings was sent to International Metallurgical and Environmental Inc., in Kelowna for preliminary work. Five flotation tests were run on this initial sample of berm material from the tailings to test Au recovery versus grinding, and a suitable process was developed for treating subsequent samples.

An access road onto the tailings was constructed by L. Scott of Boundary Falls, and a grid was then surveyed over the Tremblay tailings for control in locating drill holes, and to provide data for tonnage calculations. Surveying was done by S. Heppert of New Denver.

A sonic drill was used to drill two initial test holes (one in the berm and one in the pond area). Drilling was done by Sonic Drilling of Surrey, B.C. Although a total of approximately 80 holes were planned to test the deposit, a staged approach was used to reduce unjustified expense. The initial two holes were chosen to test the suitability of the drill for this type of sampling, as well as to provide additional material from various locations within the deposit for testing.

Hole 1 tested the tailings in the berm, and intersected the base of the deposit at 77.5 feet. Hole 2 was drilled in the pond area of the tailings, 150 metres back from the edge of the berm. The base of the tailings occurred at 61.5 feet depth. Four inch casings of tailings were recovered from surface to base in both these drill holes.

Samples were collected from the sonic drill samples and submitted to Min-En Labs in Vancouver for gold (including metallic gold) and silver assay to test grade variation with depth and position. The entire samples were then sent to International Metallurgical and Environmental Inc, in Kelowna, for compositing and flotation testing using the previously defined process. The drill holes were sampled by depth, and five additional flotation tests run to test the response of material from the top, middle and bottom sections of Hole 1, and the top and bottom sections of Hole 2.

Initial contact was made with Echo Bay to investigate possibility of shipment of a concentrate to the Kettle Project Mill (closed circuit cyanide) and a very preliminary cost estimate was prepared for the mining and flotation of tailings, trucking of concentrate to Echo Bay's Kettle Mill, and treatment of the concentrate at the mill.

Finally, a final flotation test was run to test the potential from upgrading the material to a copper concentrate, without loss of gold, to explore the feasibility of shipping the concentrate to a copper smelter for treatment.

The tailings exploration program occurred between September, 1995 and February, 1996, under the management and supervision of L. Caron, with general direction from G. Stewart. Drill supervision and tailings sampling was done by T. Parsons.

## 2.0 GRID SURVEY, SONIC DRILLING, SAMPLING AND ANALYTICAL WORK

### 2.1 Access Road and Grid Survey

A short road was constructed from the Phoenix road, at the northwest corner of the Tremblay tailings, to provide access to the tailings for vehicles and the sonic drill. Larry Scott of Boundary Falls was contracted to do this work. Following the work program the access road was deactivated to prevent unauthorized vehicle traffic on the tailings. Siegmund Hepperle of New Denver was contracted to survey a grid over the tailings to provide control in locating drill holes, and if necessary, to provide information for tonnage calculations. The surveyed grid is shown in Figure 3.

### 2.2 Sonic Drilling

Sonic Drilling of Surrey, B.C. was contracted to drill the initial two test holes in the tailings. The tandem axle, sonic drill rig was mobilized onto the site. Due to the water content and caving nature of the tailings, it was necessary to case both holes (7" casing). This casing has been removed. Water for the drill program was pumped out of the Snowshoe pit and trucked to the tailings site in a 500 gallon combination water/service truck provided by Sonic Drilling. A 4.25" tube of tailings was obtained for the depth of each hole, encased in plastic film. The tubes were generally 10' in length, although shorter lengths may have been obtained depending on the run. A geologist on site during the drilling process marked each tube with top and bottom footage so that the entire run could be reconstructed.

Two holes were drilled, as shown on Figure 3. Hole 1 tested the berm area of the tailings, and intersected the base of the deposit at 77.5 feet. The base of the tailings is clearly defined by an organic layer, several feet in thickness, sitting above gravel and dirt (visually very distinct from the tailings). Occasional thin organic zones were intersected in the drill holes (representing boards, etc that found their way into the tailings pond) but these were minimal and very distinctive, hence avoidable when sampling material for assay or flotation testing.

Hole 2 was drilled in the pond area of the tailings, 150 metres back from the edge of the berm. The base of the tailings occurred at 61.5 feet depth.



### 2.3 Sampling and Analytical Work

Samples were collected from the sonic drill samples for gold (including metallic gold) and silver assay to test grade variation with depth and position. Sampling was done by laying the sample flat, slicing the plastic casing open, cutting the sausage of tailings down the long axis, and taking a channel sample down the complete length of the run, across the complete diameter of the sausage. The remainder of the tailings sample was then put into plastic buckets, which were weighed, labelled and sealed prior to shipment for metallurgical testing. The sample for assay was also weighed prior to shipment.

Sixteen samples were collected for assay from Hole 1, and 9 from Hole 2, as summarized in Table 1 on the following page. Samples were sent to Min-En Labs in Vancouver for assay for Au and Ag. Assay for metallic Au was also done.

Analytical results are contained in Appendix 2.

Profiles of the two drill holes, with sample numbers and analytical results are included as Figures 4 and 5. A decrease in grade from the top to the base of Hole 1 (drilled in the berm) appears to occur. A weighted averages for the grade of the top, middle and bottom sections of the hole are shown on Figure 4 (same intervals as metallurgical composite samples). Hole 2 (the pond area), appears to be lower grade than Hole 1. Again, weighted average grades for the top and basal sections of the hole are shown on Figure 5.

The weighted average gold grade for the top portion of Hole 1 (0.50 g/t) is significantly lower than that obtained by surface sampling by Echo Bay (0.94 g/t) and slightly lower than the grade of the surface sample collected for initial metallurgical testing (0.64 g/t), as described in Section 3 of this report. Whether this is a result of spotty gold values and small sample size, or whether significant surface enrichment of gold occurs, is unknown at this point. A comparison between the weighted average assay grade and the head grade of metallurgical composite samples is given below in Table 2. There is a general agreement in these values, with the exception of the top interval in Hole 2, where the assay grade is 50% lower than the composite head grade. This suggests that sample size may be a problem. The higher grades obtained in surface samples also suggests possible surface enrichment.

	Assay weighted avg Au (g/t)	Composite head grade Au (g/t)
Hole 1		
0 - 32.5 ft	0.50	0.56
32.5 - 57.5 ft	0.30	0.28
57.5 - 77.5	0.30	0.28
Hole 2		
0 - 37 ft	0.26	0.52
37 - 61.5 ft	0.30	0.29

TABLE 1

PHOENIX (TREMBLAY) TAILINGS - SONIC DRILL SAMPLES

Hole 1

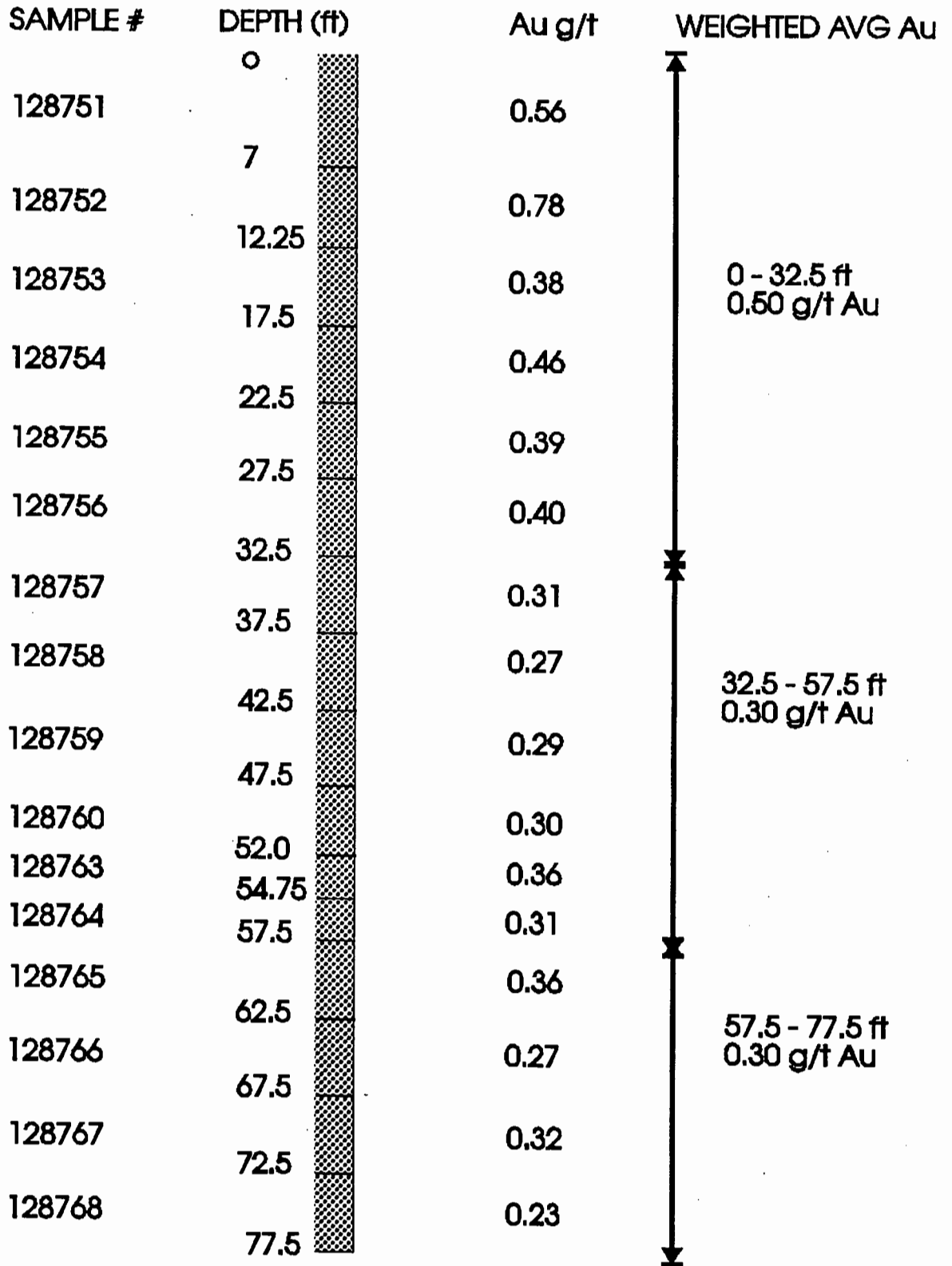
Run	Footage	Weight	Sample	Sample Weight	Sampled by/Notes
0 - 7'	0 - 7'	56 lbs	128751	15 oz	GOMS
7 - 17.5'	7 - 12.25'	34 lbs	128752	2 lb 0.5 oz	GOMS
	12.25 - 17.5'	32 lbs	128753	1 lb	GOMS
17.5 - 27.5'	17.5 - 22.5'	56 lbs	128754	1 lb 12.5 oz	GOMS
	22.5 - 27.5'	44 lbs	128755	1 lb 11.5 oz	GOMS
27.5 - 37.5'	27.5 - 32.5'	64 lbs	128756	1 lb 12 oz	GOMS, siltier, more slimey
	32.5 - 37.5'	52 lbs	128757	1 lb 15.5 oz	GOMS
37.5 - 47.5'	37.5 - 42.5'	60 lbs	128758	1 lb 14 oz	GOMS
	42.5 - 47.5'	60 lbs	128759	4 lbs 6 oz	TP
47.5 - ?	47.5 - 52.0'	60 lbs	128760	2 lbs 2.5 oz	TP, approx length of sample
? - 57.5'	52.0 - 54.75'	64 lbs	128763	2 lbs 15 oz	TP, approx length of sample
	54.75 - 57.5'	70 lbs	128764	2 lbs 12 oz	TP, approx length of sample
57.5 - 67.5'	57.5 - 62.5'	72 lbs	128765	3 lbs 2 oz	TP
	62.5 - 67.5'	64 lbs	128766	2 lbs 10 oz	TP
67.5 - 77.5'	67.5 - 72.5'	67 lbs	128767	3 lbs 1.5 oz	TP
	72.5 - 77.5'	62 lbs	128768	2 lbs 4.5 oz	TP, incl 10" o/b in bottom of hole

Hole 2

Run	Footage	Weight	Sample	Sample Weight	Notes
0 - 7'	0 - 7'	40 lbs	128769	2 lbs 6 oz	TP, incl 6" organ contam @ top, well segregated
7 - 17'	7 - 17'	86 lbs	128770	3 lbs 13.5 oz	TP
17 - 27'	17 - 27'	102 lbs	128771	5 lbs 10 oz	TP
27 - 37'	27 - 32'	58 lbs	128761	3 lbs 5 oz	GOMS
	32 - 37'	72 lbs	128762	3 lbs 9.5 oz	GOMS
37 - 47'	37 - 47'	124 lbs	128772	4 lbs 8 oz	TP, v str segregated - coarse and v fine layers
47 - 57'	47 - 52.5'	65 lbs	128773	2 lbs 7 oz	TP
	52.5 - 57'	75 lbs	128774	2 lbs 3.5 oz	TP
57 - 61.5'	57 - 61.5'	32 lbs	128775	2 lbs 1 oz	TP, inc 14" 80% intermixed organic material (tree stump). Left last 1.5' of run because total organics.

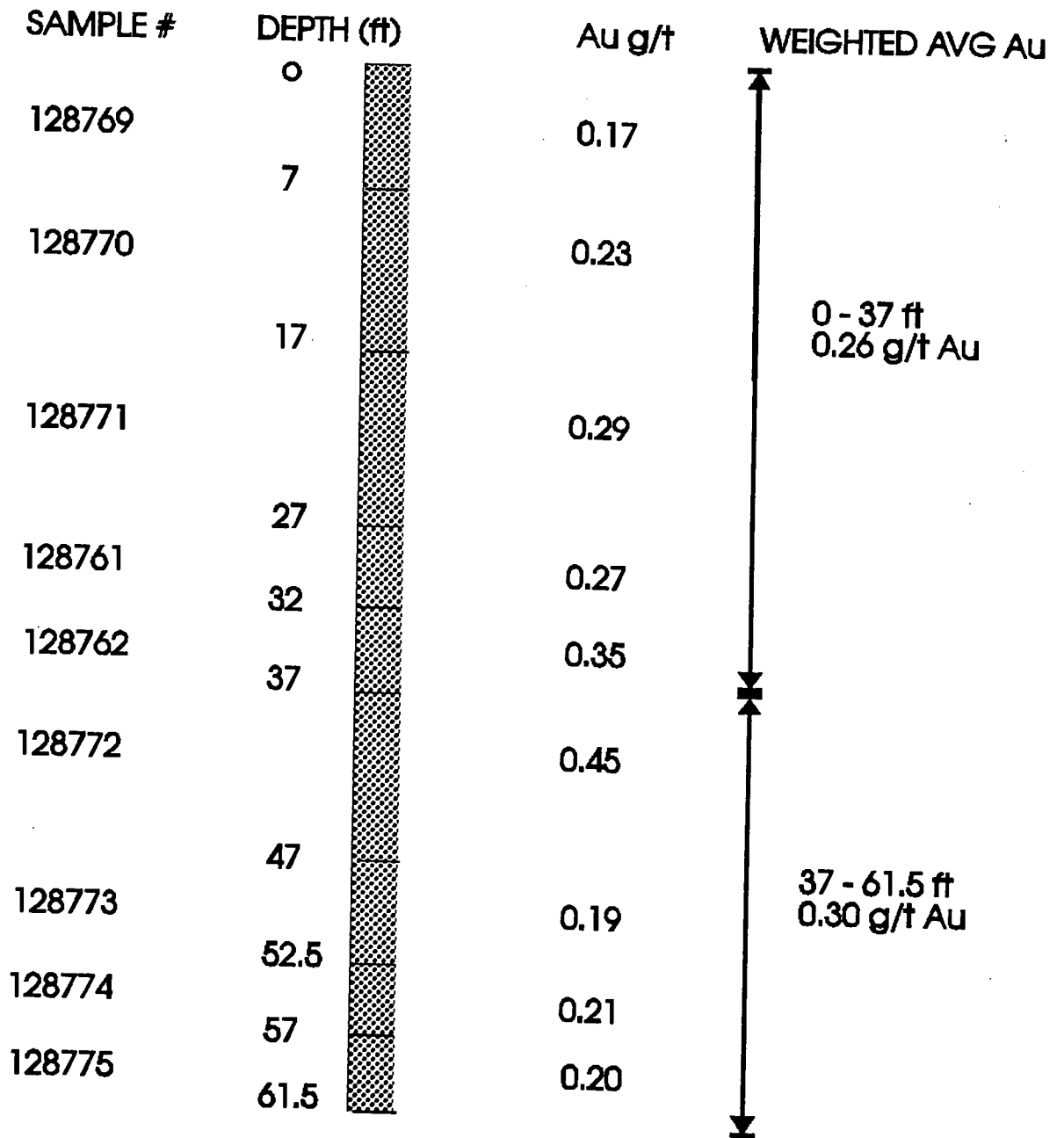
# FIGURE 4

## Hole 1 - Samples and Assay Results



# FIGURE 5

## Hole 2 - Samples and Assay Results



### 3.0 METALLURGICAL WORK

An initial sample of tailings collected from the surface of the deposit (berm area) was submitted to International Metallurgical and Environmental Inc. in Kelowna for flotation testing. The sample had a head grade of 0.64 g/t Au, somewhat lower than that expected from sampling done by Echo Bay (0.94 g/t Au). Five tests were run on this material in order to define a suitable process by which to test subsequent samples. A complete description of the various flotation tests run on this initial surface sample is contained in a report by Jeffrey Austin of International Metallurgical and Environmental Inc, included as Appendix 3a.

The results of this preliminary testing were encouraging. Copper and gold recovery was found to be dependent on grinding. Recoveries of 35-45% Cu and 60-65% Au were achieved when the tailings were ground to 65% minus 200 mesh and treated in a standard Denver flotation machine. Gold values in flotation concentrates were in the range of 25-35 g/t, while copper content averaged 2-3%. A preliminary cost analysis suggested that copper content would prohibit economic treatment of the concentrate at Echo Bay's Kettle Project Mill, however the option of upgrading to a copper concentrate for shipment to a copper smelter felt to be a viable alternative.

The complete sonic drill samples from the two test holes were then submitted (less only the material collected independently and submitted for assay). Hole 1, which tested the berm area, was 77.5 feet in depth. For the purposes of flotation testing, individual runs were combined to form three composite samples 0-32.5 feet, 32.5-57.5 feet, and 57.5-77.5 feet. Hole 2, in the pond area, measured 61.5 feet in depth. Composite samples for the intervals 0-37 feet and 37-61.5 feet were done. Flotation testing was then done on each of these composite samples, using the process defined above. The samples responded to flotation testing as anticipated, with similar copper and gold recoveries as obtained on the preliminary sample, however head grades were significantly lower than previous samples (0.28 - 0.56 g/t Au). The sampling procedure, testing method and results are described in detail in a report by Jeffrey Austin of International Metallurgical and Environmental Inc, included as Appendix 3b.

The possibility of upgrading the concentrate to a copper concentrate for shipment to a copper smelter was then investigated. The rougher flotation concentrate was upgraded using regrinding and cleaner flotation to produce a saleable final concentrate grading approximately 18% Cu and 207 g/t Au. Although a suitable copper + gold concentrate can be obtained, head grades are disappointingly low. Again, the results of this are described in Appendix 3b.

#### 4.0 SUMMARY

- An initial surface sample of tailing was collected on which metallurgical testing was done to develop a suitable procedure for processing drilled samples. The head grade of this initial sample was 0.14% Cu and 0.64 g/t Au (somewhat lower than sample results obtained by Echo Bay (0.94 g/t Au)).
- Copper and gold recovery was found to be dependent on grinding. Recoveries of 35-45% Cu and 60-65% Au were achieved when the tailings were ground to 65% minus 200 mesh and treated in a standard Denver flotation machine. Gold values in flotation concentrates were in the range of 25-35 g/t.
- Initial cost analysis indicated that because of the high copper content of the flotation concentrate, treatment in Echo Bay's Kettle Project (cyanide leach) mill was only marginally economic at best.
- Two sonic drill holes were drilled to provide material for additional testing. Tailings recovered by this procedure were sampled for independent assay, then submitted for compositing and flotation testing using the previously defined procedure.
- The samples responded to flotation testing as anticipated, with similar copper and gold recoveries as obtained on the preliminary sample, however head grades were significantly lower than previous samples (0.28 - 0.56 g/t Au).
- The possibility of upgrading the concentrate to a copper concentrate for shipment to a copper smelter was then investigated. The rougher flotation concentrate was upgraded using regrinding and cleaner flotation to produce a saleable final concentrate grading approximately 18% Cu and 207 g/t Au.
- Although a suitable copper + gold concentrate can be obtained, head grades from the drilled composite samples are disappointingly low. Some variation in grade may occur in the deposit with drilled holes testing low grade portions of the deposit. It is suspected, however, that some surface enrichment occurs in the deposit, and in addition that spotty gold values make large samples necessary to get consistent gold values.
- A detailed cost analysis is recommended prior to any further work done to define the grade distribution of the deposit, to define at what grade such an operation would be worthwhile, and from this to determine whether such a grade is within the realm of possibility.

## 5.0 REFERENCES

- Bentzen, E., 1995.  
Characterization of Three Samples of Phoenix Mill Tailings, HRI Project 8479, by Hazen Research, Inc., for Echo Bay Exploration, Inc.
- Fahmi, K.C., 1975.  
Revised Tailings Disposal and Water Balances, Phoenix, Granby Mining Co.
- Fahmi, K.C., Matthew, P., 1969.  
Operating Tailings Disposal, Phoenix. Granby Mining Co.
- Hardwicke, G.B., 1982.  
Granby Tailings Pond Reports, for Kettle River Resources Ltd.
- Hardwicke, G.B., 1990.  
A Report on the Tailings Retreatment Possibilities at Phoenix, B.C., for Kettle River Resources Ltd.
- Kazakoff, J.M., 1977.  
Test Hole Results from the Tremblay Tailings, Phoenix. Granby Mining Co.
- Keating, J., 1985.  
Assessment Report of Drilling of Tailings, Phoenix 1 Group. Noranda Exploration Co. Ltd.
- Klein, B., 1991.  
Test Work on Phoenix Tailings Material, by Bacon Donaldson and Assoc. Ltd, for Kettle River Resources Ltd.
- Klein, B., 1991.  
Flotation and Magnetic Separation of Phoenix Tailings, by Bacon Donaldson and Assoc. Ltd, for Kettle River Resources Ltd.

**APPENDIX 1**

Claim List



PHOENIX PROPERTY - CLAIM LIST

PHOENIX CLAIMS - LOCATED

CLAIM NAME	R. NBR.	TYPE	units	NEW EXPIRY	SURFACE OWNERSHIP
BART	215984	L	12	12/13/01	
BAT #1	215568	L	10	03/19/02	
BAT #2	215569	L	3	03/23/02	
BAT #3	215574	L	16	03/23/02	
BAT 4	215908	L	18	08/27/02	
BAT FRACTION	215909	L	1	08/27/02	
BOBCAT #10	216409	L	1	07/07/02	
BOBCAT #11 FR.	216410	L	1	07/07/01	
BOBCAT #12 FR	216411	L	1	07/07/01	
BOBCAT #5	216404	L	1	07/07/01	
BOBCAT #6	216405	L	1	07/07/01	
BOBCAT #7	216406	L	1	07/07/02	
BOBCAT #8	216407	L	1	07/07/02	
BOBCAT #9	216408	L	1	07/07/02	
BOBCAT NO 1	216346	L	1	06/13/01	
BOBCAT NO 2	216347	L	1	06/13/01	
BOBCAT NO 3	216348	L	1	06/13/01	
BOBCAT NO 4	216349	L	1	06/13/01	
BULLION FR.	214589	L	1	08/23/02	
CAP 1 FR	216654	L	1	01/28/02	
CAP 2 FR	216655	L	1	01/28/02	
CAP 3 FR	216656	L	1	01/30/02	
COLTHERN #1	215758	L	1	06/20/02	
COLTHERN FR	215759	L	1	06/20/02	
COY # 6	216423	L	1	09/22/02	
COY # 7	216424	L	1	09/22/02	
COY # 8 FR	216425	L	1	09/22/02	
COY NO 1	216378	L	1	09/21/02	
COY NO 2	216379	L	1	09/21/02	
COY NO 3	216380	L	1	09/21/02	
COY NO 4 FR	216381	L	1	09/21/02	
COY NO 5 FR	216382	L	1	09/21/02	
CRACKER JACK 1 FR	214591	L	1	08/23/02	
CRACKER JACK 2 FR	214592	L	1	08/23/02	
CYCLOPS	216351	L	1	07/06/02	
EYE 1 FR	216651	L	1	01/28/02	
EYE 2 FR	216652	L	1	01/28/02	
EYE 3 FR	216653	L	1	01/28/02	
EYE 4 FR	216659	L	1	05/30/02	
GEM FR.	214590	L	1	08/23/02	
GLENSIDE 1	215593	L	1	03/28/02	
GLENSIDE 2	215594	L	1	03/28/02	
GLENSIDE 2 FR	215573	L	1	03/28/02	
GLENSIDE 3	215595	L	1	03/28/02	
GLENSIDE FR	215578	L	1	03/28/02	
PAC #1	216322	L	1	04/03/01	
PAC #17	216386	L	1	06/25/01	
PAC #18	216387	L	1	06/25/01	
PAC #19	216388	L	1	06/25/01	

Y

PHOENIX CLAIMS - LOCATED

CLAIM NAME	R. NBR.	TYPE	units	NEW EXPIRY	SURFACE OWNERSHIP
PAC #2	216323	L	1	04/03/01	
PAC #20	216389	L	1	06/25/01	
PAC #21	216390	L	1	06/25/01	
PAC #22	216391	L	1	06/25/01	
PAC #23	216392	L	1	06/25/01	Y
PAC #24	216393	L	1	06/25/02	Y
PAC #25	216394	L	1	06/25/01	Y
PAC #26	216395	L	1	06/25/02	Y
PAC #27	216396	L	1	06/25/01	Y
PAC #28	216397	L	1	06/25/02	Y
PAC #29	216398	L	1	06/25/01	
PAC #30	216399	L	1	06/25/02	
PAC #31	216400	L	1	06/25/02	
PAC #32	216401	L	1	06/25/02	
PAC #33 FR	216402	L	1	06/25/01	Y
PAC #34 FR	216403	L	1	06/25/01	Y
PAC #35	216412	L	1	07/07/01	Y
PAC #41	216426	L	1	11/02/01	
PAC #42	216427	L	1	11/02/02	
PAC #43	216428	L	1	11/02/02	
PAC #44 FR	216429	L	1	11/02/01	
PAC #45	216430	L	1	11/02/01	
PAC #46	216431	L	1	11/02/01	
PAC #47	216432	L	1	11/02/01	
PAC #48	216433	L	1	11/02/01	
PAC #57	216436	L	1	12/19/01	
PAC #58	216437	L	1	12/19/01	
PAC #60	216643	L	1	06/20/01	
PAC 13	216332	L	1	09/08/01	Y
PAC 14	216333	L	1	09/08/01	
PAC 15	216334	L	1	09/08/01	
PAC 16	216335	L	1	09/08/01	
PAC 33	216413	L	1	08/12/02	Y
PAC 34 FR	216414	L	1	08/12/02	
PAC 35	216415	L	1	08/12/02	
PAC 36	216416	L	1	08/12/02	
PAC 37	216417	L	1	08/12/02	
PAC 38	216418	L	1	08/12/02	
PAC 39 FR	216419	L	1	08/12/02	
PAC 40 FR	216420	L	1	08/12/02	
PAC 49	215603	L	1	04/05/01	
PAC 50	215604	L	1	04/05/01	
PAC 51	215605	L	1	04/05/01	
PAC 52	215606	L	1	04/05/01	
PAC 53	215607	L	1	04/05/01	
PAC 54	215608	L	1	04/05/01	
PAC 55	215609	L	1	04/05/01	
PAC 56	215610	L	1	04/05/01	
PAC NO 10	216329	L	1	06/21/01	Y

PHOENIX CLAIMS - LOCATED

CLAIM NAME	R. NBR.	TYPE	units	NEW EXPIRY	SURFACE OWNERSHIP
PAC NO 11	216330	L	1	06/21/01	Y
PAC NO 12	216331	L	1	06/21/01	Y
PAC NO 9 FR	216328	L	1	06/21/01	
PAX FR	214688	L	1	06/17/02	
PIPE 5 FR	214588	L	1	08/23/02	
PRADO #1 FR	216658	L	1	04/05/02	
PRIOR #9	215587	L	1	03/23/02	
PRIOR #1	215579	L	1	03/22/02	
PRIOR #2	215580	L	1	03/22/02	
PRIOR #3	215581	L	1	03/22/02	
PRIOR #4	215582	L	1	03/22/02	
PRIOR #5	215583	L	1	03/22/02	
PRIOR #6	215584	L	1	03/22/02	
PRIOR #7	215585	L	1	03/22/02	
PRIOR #8	215586	L	1	03/22/02	
PRIOR 10	215588	L	1	03/23/02	
PRIOR 11	215589	L	1	03/23/02	
PRIOR 12	215590	L	1	03/23/02	
PRIOR 13	215591	L	1	03/23/02	
PRIOR 14	215592	L	1	03/23/02	
PRIOR FR.	215760	L	1	06/08/02	
SAWHIDE FR.	216313	L	1	06/12/01	
SILVER CHIEF FR	216352	L	1	07/07/02	
SIMPSON	215985	L	12	12/10/01	
SUPERCHIEF FR	216660	L	1	06/04/02	
VAL #1	216320	L	1	02/20/01	
VAL #2 FR	216321	L	1	02/20/01	
VAL #3 FR	216327	L	1	12/01/01	
VAL 4 FR	214578	L	1	06/18/01	
WENDY FR	214583	L	1	07/06/02	
WENDY NO 13	216325	L	1	10/26/02	
WENDY NO 15 FR	216326	L	1	10/26/01	
LEWELLAH	342174	L	1	11/16/96	
LITTLE BURNE	342173	L	1	11/16/96	
HOPEWELL	341508	L	1	11/02/96	
BALSAM FR.	341514	L	1	11/02/96	

PHOENIX CLAIMS - CROWN GRANTS

CLAIM NAME	R. NBR.	TYPE	units	SURFACE OWNERSHIP
AETNA	CG978	CG	1	Y
AETNA FR.	1024s	CG	1	
ALMA FR.	CG2125	CG	1	
BANK OF ENGLAND	CG1235	CG	1	
BANNER	CG1847	CG	1	Y
BROOKLYN	CG796	CG	1	Y
BULLION	CG865	CG	1	
CIMERON	CG980	CG	1	Y
CURLEW	CG893	CG	1	
DENVER	CG2875	CG	1	
DEXTER FR	CG3298	CG	1	
ETHEL VERNE FR	CG3170	CG	1	
FAIRPLAY FR.	CG1328	CG	1	
FOUR PAW	CG3550	CG	1	
FOURTH OF JULY	CG922	CG	1	Y
GARFIELD	CG1264	CG	1	Y
GILT EDGE	CG977	CG	1	
GIPSY	CG1811	CG	1	
GOLD DROP	CG899	CG	1	Y
GOLD DROP FR.	CG1252	CG	1	Y
GOLDEN EAGLE	CG921	CG	1	Y
GREY EAGLE	CG793	CG	1	
IDAHO	CG981	CG	1	Y
JOKER	CG1692	CG	1	
KNOB HILL	CG590	CG	1	
LITTLE DALLES	CG2628	CG	1	
LOG CABIN FR	CG3299	CG	1	
MAY	CG2629	CG	1	
MIDNIGHT	CG1809	CG	1	
MISSING LINK	CG979	CG	1	Y
MONARCH	CG701	CG	1	
MONTE CRISTO FR	CG3381	CG	1	
MONTEZUMA	CG915	CG	1	
NEW YORK	CG901	CG	1	Y
NUGGET	CG1257	CG	1	Y
NUMBER 13	CG1260	CG	1	
OLD IRONSIDES	CG589	CG	1	Y
PHEASANT	CG864	CG	1	
PHILLIPSBURG FR	CG1842	CG	1	
PHOENIX	CG894	CG	1	Y
PILOT	CG3297	CG	1	
RAWHIDE	CG892	CG	1	
ROB ROY	CG1556	CG	1	
SNOWSHOE	CG891	CG	1	Y
SNOWSHOE FR	3002s	CG	1	
STANDARD	CG982	CG	1	
STEMWINDER	CG588	CG	1	
SURPRISE FR	CG2384	CG	1	
SYLVESTER K	CG2385	CG	1	
TIMER FR	CG1705	CG	1	
TOOTHPICK FR	CG3171	CG	1	
VICTORIA	CG933	CG	1	
WAR EAGLE	CG678	CG	1	
WOODSTOCK	CG2627	CG	1	
YELLOW JACKET	CG1327	CG	1	

PHOENIX CLAIMS - REVERTED CROWN GRANTS

CLAIM NAME	R. NBR.	TYPE	units	NEW EXPIRY	<u>SURFACE OWNERSHIP</u>
CRACKER JACK	214577	R	1	06/08/02	
LITTLE BURNE FR	214596	R	1	08/04/02	
ORONOCO	214575	R	1	06/08/02	
YUKON FR	214576	R	1	06/08/02	

PHOENIX CLAIMS - MINERAL LEASES

CLAIM NAME	R. NBR.	TYPE	units	NEW EXPIRY	<u>SURFACE OWNERSHIP</u>
BELMONT FR	216287	M102	1	10/26/95	
BOSTON	306733	M098	1	11/21/95	Y
BRANDON	216285	M100	1	10/22/95	
BRANDON FR.	216285	M100	1	10/22/95	
CUSTER FR.	216285	M100	1	10/22/95	
LITTLE ANNIE	216285	M100	1	10/22/95	
LITTLE BROWN	216285	M100	1	10/22/95	
MARSHALL	216285	M100	1	10/22/95	
MARSHALL FRACTION	216288	M103	1	04/21/95	
STAFFORD FR	306733	M098	1	11/21/95	Y
SYLVESTER K FR.	216291	M106	1	09/22/95	
WILLAMENA FR	306733	M098	1	11/21/95	Y

**APPENDIX 2**  
**Analytical Results**



**MINERAL  
• ENVIRONMENTS  
LABORATORIES**  
(DIVISION OF ASSAYERS CORP.)

SPECIALISTS IN MINERAL ENVIRONMENTS  
CHEMISTS • ASSAYERS • ANALYSTS • GEOCHEMISTS

VANCOUVER OFFICE:  
8222 SHERBROOKE STREET  
VANCOUVER, B.C. CANADA V5X 4E8  
TELEPHONE (604) 327-3436  
FAX (604) 327-3423

SMITHERS LAB:  
3176 TATLOW ROAD  
SMITHERS, B.C. CANADA V0J 2N0  
TEL (604) 847-3004  
FAX (604) 847-3005

Assay Certificate

5V-0531-RA1

Company: KETTLE RIVER RESOURCES  
Project: 009  
Assn: LINDA CARON

Date: NOV-27-95

Copy to: Kettle River Res., Greenwood, B.C.

We hereby certify the following Assay of 24 TAILINGS samples  
submitted NOV-20-95 by LINDA CARON.

Sample Number	Au-fire g/tonne	Au-fire oz/ton	Ag g/tonne	Ag oz/ton
128751	.56	.016	4.7	.14
128752	.78	.023	5.4	.16
128753	.38	.011	4.7	.14
128754	.46	.013	4.9	.14
128755	.39	.011	4.4	.13
128756	.40	.012	4.8	.14
128757	.31	.009	4.2	.12
128758	.27	.008	4.7	.14
128759	.29	.008	4.8	.14
128760	.30	.009	4.6	.13
128761	.27	.008	5.2	.15
128762	.35	.010	5.1	.15
128763	.36	.011	4.8	.14
128764	.31	.009	5.4	.16
128765	.36	.011	5.5	.16
128766	.27	.008	5.0	.15
128767	.32	.009	5.3	.15
128768	.23	.007	4.8	.14
128769	.17	.005	4.7	.14
128770	.23	.007	5.6	.16
128771	.29	.008	4.9	.14
128772	.45	.013	5.0	.15
128773	.19	.006	5.4	.16
128774	.21	.006	5.6	.16

Certified by



MIN-EN LABORATORIES



# MINERAL ENVIRONMENTS LABORATORIES

(DIVISION OF ASSAYERS CORP.)

SPECIALISTS IN MINERAL ENVIRONMENTS  
CHEMISTS • ASSAYERS • ANALYSTS • GEOCHEMISTS

VANCOUVER OFFICE:  
8282 SHERBROOKE STREET  
VANCOUVER, B.C. CANADA V5X 4E8  
TELEPHONE (604) 327-3436  
FAX (604) 327-3423

SMITHERS LAB:  
3176 TATLOW ROAD  
SMITHERS, B.C. CANADA V0J 2H0  
TEL (604) 847-3004  
FAX (604) 847-3005

## Assay Certificate

5V-0531-RA2

Company: KETTLE RIVER RESOURCES  
Project: 009  
Attn: LINDA CARON

Date: NOV-27-95

copy 1. Kettle River Res., Greenwood, B.C.

We hereby certify the following Assay of 1 TAILINGS samples submitted NOV-20-95 by LINDA CARON.

Sample Number	Au-fire g/tonne	Au-fire oz/ton	Ag g/tonne	Ag oz/ton
128775	.20	.006	5.2	.15

Certified by \_\_\_\_\_

MIN-EN LABORATORIES



**MINERAL ENVIRONMENTS LABORATORIES**  
(DIVISION OF ASSAYERS CORP.)

SPECIALISTS IN MINERAL ENVIRONMENTS  
CHEMISTS • ASSAYERS • ANALYSTS • GEOCHEMISTS

VANCOUVER OFFICE:  
8282 SHERBROOKE STREET  
VANCOUVER, B.C. CANADA V5X 4E8  
TELEPHONE (604) 327-3436  
FAX (604) 327-3423

SMITHERS LAB:  
3176 TATLOW ROAD  
SMITHERS, B.C. CANADA V0J 2H0  
TEL (604) 847-3004  
FAX (604) 847-3005

Metallic Assay Certificate

5V-0531-RM1

Company: **KETTLE RIVER RESOURCES**  
Project: **009**  
Attn: **LINDA CARON**

Date: **NOV-30-95**  
Copy 1. Kettle River Res., Greenwood, B.C.

We hereby certify the following Metallic Assay of 25 pulp samples submitted NOV-20-95 by LINDA CARON.

Sample Number	Total		Assay Value Au		Total Weight Au		Metallic Au		Net Au	
	Wt (g)	+150 M We (g)	+150 (g/t)	-150 (g/t)	+150 (mg)	-150 (mg)	(oz/ton)	(g/t)	(oz/ton)	(g/t)
123751	403.1	49.70	.54	.54	0.027	0.154	0.002	0.07	0.015	0.54
123752	301.1	56.90	.80	.73	0.046	0.130	0.004	0.15	0.023	0.78
123753	320.0	49.85	.37	.37	0.019	0.130	0.002	0.06	0.011	0.37
123754	274.9	23.90	.40	.43	0.021	0.156	0.001	0.04	0.013	0.43
123755	150.0	55.41	.31	.35	0.017	0.133	0.001	0.05	0.010	0.34
123756	304.2	52.89	.32	.37	0.017	0.094	0.002	0.05	0.011	0.36
123757	334.2	52.13	.20	.33	0.011	0.093	0.001	0.03	0.002	0.31
123758	302.9	52.12	.23	.27	0.012	0.056	0.001	0.04	0.003	0.24
123759	314.5	58.01	.30	.29	0.017	0.072	0.002	0.03	0.003	0.29
123760	341.3	49.50	.25	.31	0.012	0.059	0.001	0.05	0.003	0.30
123761	266.7	38.50	.21	.27	0.009	0.062	0.001	0.03	0.003	0.26
123762	179.8	83.80	.10	.37	0.003	0.108	0.002	0.07	0.010	0.35
123763	155.8	62.39	.25	.35	0.015	0.123	0.001	0.04	0.010	0.33
123764	324.8	46.37	.23	.30	0.011	0.024	0.001	0.03	0.003	0.29
123765	317.3	49.14	.23	.31	0.014	0.081	0.001	0.04	0.003	0.31
123766	315.4	48.07	.17	.24	0.009	0.054	0.001	0.03	0.007	0.23
123767	318.1	50.86	.29	.32	0.014	0.065	0.001	0.04	0.003	0.31
123768	313.0	51.07	.21	.26	0.011	0.069	0.001	0.03	0.007	0.26
123769	262.7	28.34	.17	.13	0.005	0.042	0.001	0.02	0.005	0.13
123770	323.8	52.40	.27	.24	0.014	0.065	0.001	0.04	0.007	0.24
123771	253.3	47.32	.24	.29	0.012	0.050	0.001	0.03	0.004	0.28
123772	343.6	60.01	.41	.36	0.025	0.122	0.002	0.07	0.011	0.37
123773	349.9	58.63	.16	.14	0.009	0.056	0.001	0.03	0.005	0.14
123774	303.0	51.00	.13	.17	0.007	0.043	0.001	0.02	0.005	0.15
123775	208.2	42.45	.16	.13	0.007	0.030	0.001	0.01	0.005	0.13

Certified by 

MIN-EN LABORATORIES

### APPENDIX 3

a) Flotation Test Results - Phoenix Tailings Samples

by: Jeffrey Austin, P.Eng  
International Metallurgical and Environmental Inc.  
13-2550 Acland Rd.  
Kelowna, B.C.  
V1X 7L4

b) Flotation Test Results - Phoenix Tailings Samples  
Variability Testing of 5 Tailings Composites

by: Jeffrey Austin, P.Eng  
International Metallurgical and Environmental Inc.  
13-2550 Acland Rd.  
Kelowna, B.C.  
V1X 7L4

809

Kettle River Resources Ltd.

Flotation Test Results - Phoenix Tailings Samples

Prepared by

International Metallurgical and Environmental Inc.  
13 - 2550 Acland Rd.  
Kelowna, B.C.  
V1X 7L4

Prepared by:



Jeffrey B. Austin, P.Eng. - President  
International Metallurgical and Environmental Inc.

## SUMMARY

Metallurgical test work has been completed at International Metallurgical and Environmental Inc. using sample material from the Phoenix tailings project located in Greenwood, British Columbia. The Phoenix tailings are being evaluated by Kettle River Resources with the objective to re-process the tailings to recover residual copper and gold values.

The sample material was shown to be capable of being processed to recover residual values of copper and gold into a rougher flotation concentrate. The sample of tailings provided by Kettle River Resources for test work contained copper and gold values of 0.14 percent copper and 0.64 g/t gold respectively.

Copper and gold recoveries from the Phoenix tailings were shown to be dependent on grinding the tailings samples to provide additional liberation of particularly gold values. Copper and gold recoveries of 35 to 45 and 60 to 65 percent respectively are expected from the tailings when they are ground to 65 percent minus 200 mesh 75( $\mu$ m). The tailings sample "as received" was 20 percent minus 200 mesh.

Copper concentrates of 2 to 3 percent copper were produced in this test program, and mineralogical analysis of the concentrate indicates that significant upgrading of the concentrate is possible. Gold values in the flotation concentrates were substantial, with gold grades of 25 to 35 g/t gold readily produced in the flotation concentrates. Gold recovery consistently exceeded the copper recovery by 25 to 30 percent in all tests.

Additional test work to further define the metallurgical parameters of up-grading the copper values is needed.

## TERMS OF REFERENCE

The Phoenix tailings deposits are being evaluated by Kettle River Resources to determine if there exists sufficient recoverable value to allow for the establishment of a tailings re-treatment operation. The Phoenix tailings contain residual copper and gold values which were not recovered during the operation of the Phoenix mine under the direction of Granby Mining Co.

Metallurgical test work at International Metallurgical and Environmental Inc. has been managed by Jeff Austin, P.Eng., and laboratory test work completed by Scott Reddick, metallurgical technician. All analytical results have been provided by International Metallurgical and Environmental Inc.

Primary liaison with Kettle River Resources has been Mr. George Stewart, President of Kettle River Resources.

This report has been prepared by Jeff Austin, P.Eng. - President, International Metallurgical and Environmental Inc.

## METHODS AND PROCEDURES

### Test Samples

A sample of Phoenix tailings material was provided to International Metallurgical and Environmental Inc. by Mr. George Stewart, President of Kettle River Resources Ltd. Sampling of the existing deposits of tailings were undertaken by Kettle River Resources Ltd. to provide preliminary grades of the tailings and acquire samples for metallurgical testing of the tailings. The tailings were produced by the Phoenix Mine operated by Granby Mining Co. which recovered copper from the tailings during the 1950's and 1960's. The tailings sample provided is relatively coarse at 20 percent minus 200 mesh and does not appear to have undergone oxidation of the sulphide minerals. Head assays of the sample material are shown in Table 1, and are based on the average of the calculated head assays of the flotation tests conducted in this test program.

Table 1  
Summary of Head Assays\* - Phoenix Tailings Sample

Sample	Cu %	Au g/t
Phoenix Tailing Sample	0.14	0.64

\* Head assays are based on the average of calculated head assays from metallurgical tests.

Based on the assay values shown in Table 1 and metal prices of \$US1/pound copper and \$US400/ounce gold, the tailings samples are classified as a potential gold ore, with contained dollar values of \$3.08 and \$7.46 per metric tonne, for copper and gold respectively.

### Detailed Test Procedures

Sample material for metallurgical testing was received as a single pail of tailings material provided by Kettle River Resources Ltd. The sample was air dried to remove residual moisture and subsequently riffle split into 2 kg lots of sample in preparation for metallurgical testing.

Sample grinding was conducted in a stainless batch grinding mill at 66 percent solids. The grinding time was used to control the particle size distribution produced in the grinding stage, and grinding time varied from 2 to 10 minutes in the various tests in this program. The ground product

was washed from the mill and transferred to a standard Denver flotation machine for flotation testing. Reagent schedules for all test work is associated with the appropriate metallurgical balances contained in Appendix 1.

Flotation products were oven dried and prepared for assay by ring pulverizing. All analytical work was conducted by International Metallurgical and Environmental Inc., under the direction of Malcolm Whitehouse.

## RESULTS AND DISCUSSIONS

The metallurgical program conducted at International Metallurgical and Environmental Inc. comprised five batch flotation tests, with the objective to recover copper and gold values via flotation techniques. The tailings samples are the result of a grinding and flotation process, that was used by Granby Mining, and as such it was expected that additional liberation of mineral values would be required to provide enhanced recoveries. Initial test work evaluated the flotation recovery of copper and gold at 4 different grind sizes produced by batch grinding. The results of all flotation test work is summarized in Table 2.

Table 2  
Summary of Flotation Recoveries and Final Concentrate Grades

Test No.	Grind Size	Recoveries		Concentrate Grades	
		Cu %	Au %	Cu %	Au g/t
100	34.1	23.0	53.0	2.70	35
101	52.1	35.5	65.6	2.70	24
102	20.8	2.2	28.9	0.67	248
103	64.9	37.2	72.7	2.80	32
104	64.9	46.4	73.2	2.80	27

The flotation test results indicate that significant copper and gold values may be recovered from the Phoenix tailings by traditional flotation techniques. The recoveries of copper and gold are shown as a function of grind size in Figure 1.



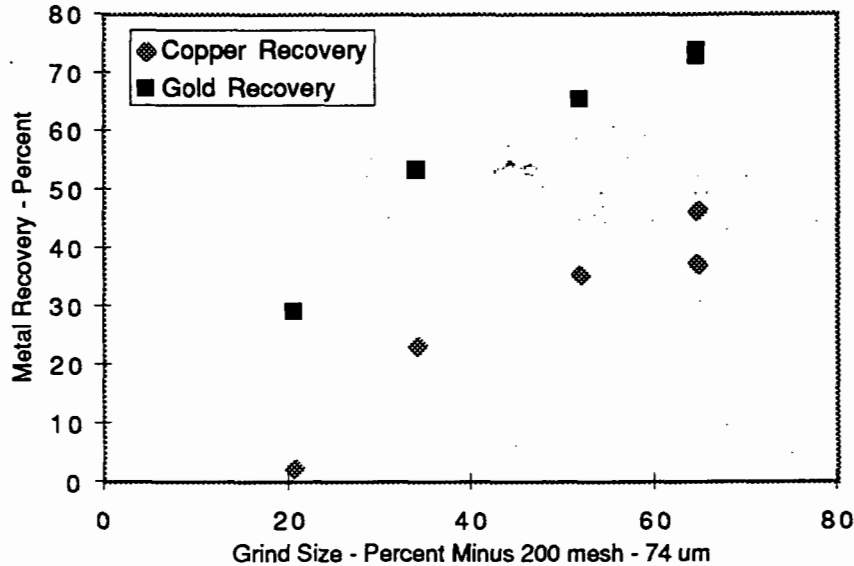


Figure 1.- Metal Recovery versus Grind Size

The gold and copper recovery are intimately related and a model of the gold recovery can be developed as:

$$\text{Gold Recovery} = \text{Copper Recovery} + 28 \text{ percent}$$

The primary conclusions of the results shown in Figure 1 and Table 2 is that copper and gold values can be extracted into flotation concentrates with relatively good recoveries. The fact that the un-ground material(test 102) and the next coarsest sample(test 100) had very low recoveries of copper and gold is a possible indication that the Phoenix operation may have been very efficient at copper and gold recovery. Also very evident, is that copper and gold recoveries are controlled by the grind size used in the flotation process. The production of a very high grade concentrate in terms of gold was accomplished in test 102, and also indicates that a component of the gold is free gold and independent of the copper values. This free gold component results in the gold recovery consistently exceeding the copper recovery by approximately 25 to 30 percent.

A mineralogical examination of the concentrate produced from test 104 was completed by Dr. Jeff Harris of Harris Explorations, the objective to determine the degree of liberation of the copper minerals, and attempt to observe free gold in the flotation product. The report of Dr. Jeff Harris is contained in Appendix 2. The observations of Dr. Harris indicate that copper minerals, namely chalcopyrite are nearly fully liberated from the other sulphide minerals in the flotation concentrate.

The concentrate produced from test 104 had been re-ground prior to cleaner flotation, one of the reasons for the high degree of liberation of the minerals contained in flotation concentrate 104. Dr. Harris did not report the presence of free gold in the concentrate, possibly the result of the grade of the concentrate being too low to statistically allow for gold to be observed in the concentrate.

A comparison of the grade-recovery curves for the batch tests provides some indication of the benefits of using re-grinding to the flotation process. Test results for both tests 103 and 104 are shown in Figure 2, test 104 which includes re-grinding of the rougher flotation concentrate.

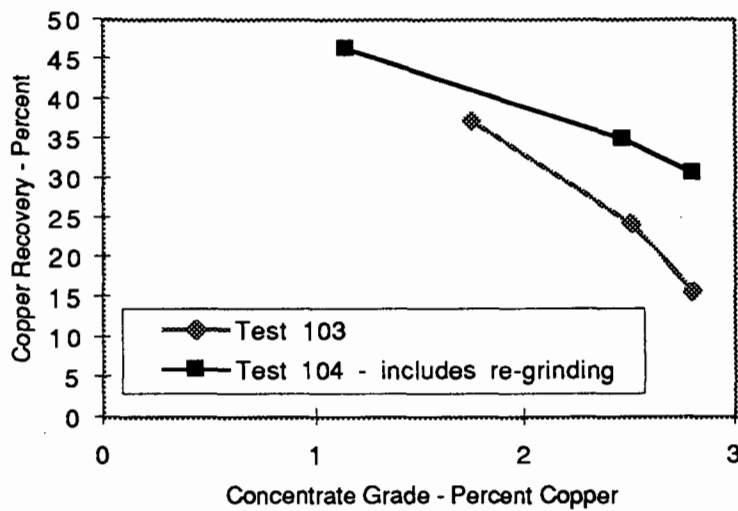


Figure 2 - Batch Grade-Recovery Curves for Copper - Phoenix Tailings

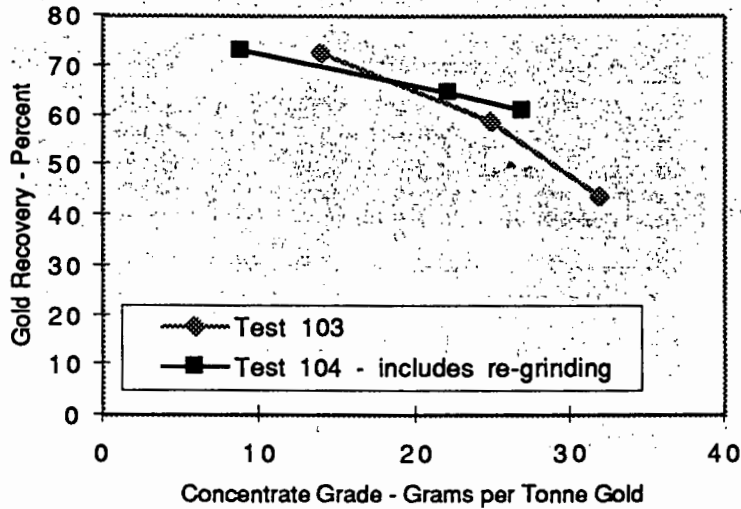


Figure 3 - Batch Grade-Recovery Curves for Gold - Phoenix Tailings

Both the copper and gold values were shown to have a flatter grade recovery curve with the inclusion of re-grinding in the process test work. This indicates that higher grade products are expected at higher recoveries when re-grinding of the rougher concentrates are undertaken. The liberation of copper as observed by Dr. Harris was described as being complete, and as such the flotation chemistry could probably be managed to produce a chalcopyrite concentrate of salable grade at the re-grind size used in test 104.

Based on the preliminary results of this test program, a grinding and flotation process as shown in Figure 4 is indicated. This is most likely a copy of the process used to recover copper in the Phoenix Mine operations this similarity is due to the identical response of the residual metal values in the tailings as compared to the ore processed by the Phoenix Mine.

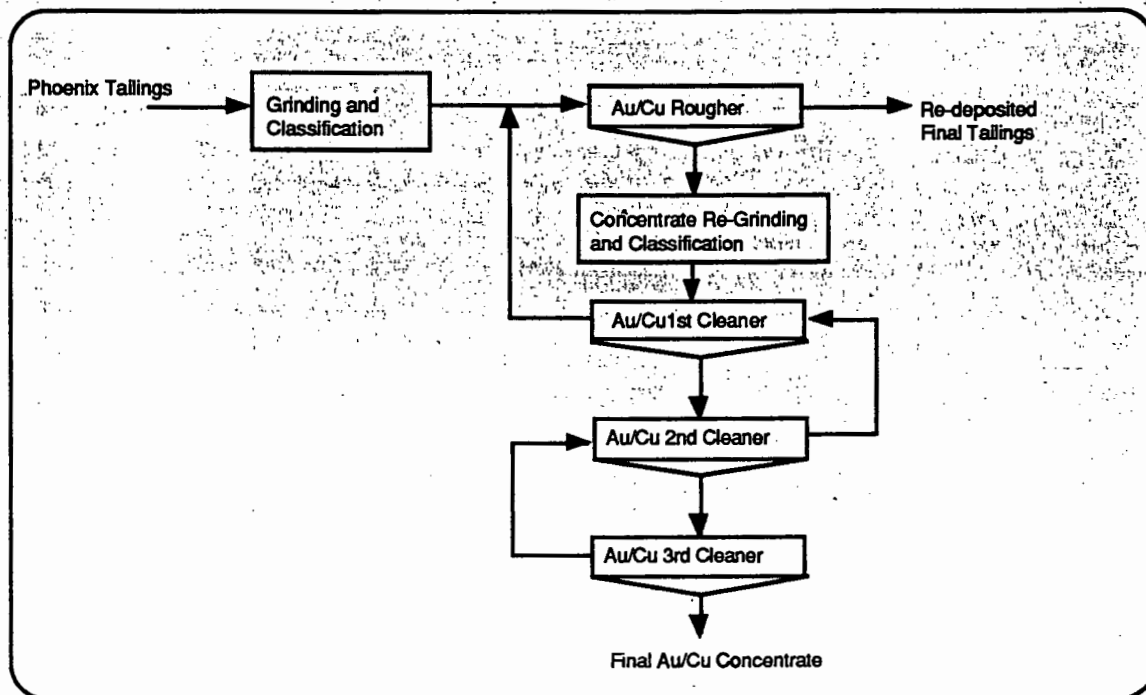


Figure 4. - Proposed Tailings Re-treatment Process

Estimates of the overall recovery of copper and gold to a final concentrate are preliminary and based on assumptions that copper concentrates could be made from the rougher concentrates produced in this test program. Based on the test results contained herein it is expected that gold recoveries of 60 to 65 percent and copper recoveries of 35 to 45 percent could be achieved to a salable copper concentrate. Additional test work is need to demonstrate the ability to upgrade the copper values, although it has been demonstrated that the liberation requirements have been met in the re-grind test work conducted in this test program. Additional test requirements are addressed in the following section.

The quality of the copper concentrate that could be produced from the processing of tailings could be very high in terms of gold values. The concentrate produced in test 102 was in excess of 200 g/t gold, however estimates of 100 to 200 g/t gold in an upgraded concentrate are not out of the realm of possibility.

Historically the Phoenix Mine produced a copper concentrate of 25 to 27 percent copper and contained approximately 30 to 40 grams of gold (Conversation with John Jewitt - former manager).

## CONCLUSIONS AND RECOMMENDATIONS

Based on the results of metallurgical test work conducted at International Metallurgical and Environmental Inc., it can be concluded that:

1) The tailings from the Phoenix Mine are amenable to copper and gold recovery using traditional grinding and flotation technology. Metal recoveries were shown to be grind sensitive and grade-recovery curves for the batch tests were improved with the inclusion of re-grinding in the process.

2) Predictions of gold and copper recovery, which are based on batch test, range from 60 to 65 percent for gold values and 35 to 45 percent for copper values. Predictions of the quality of concentrate which could be produced from the tailings are based on the mineralogical evaluations of Dr. Jeff Harris. Concentrates of 15 to 20 percent copper and 50 to 100 g/t gold should be capable of being produced.

It is recommended that the following test program be initiated to evaluate two primary concerns left un-answered in this test program.

1) A series of different tailings samples should be subject to grinding and flotation test work to confirm similar metallurgical performance to the samples tested in this program. This test work would assist in providing confidence in the metallurgical performance of the bulk of the in-place tailings.

2) Additional test work to upgrade the concentrates to salable copper concentrate grades should focus on chemical or reagent conditions that improve the selectivity of the flotation process. Process conditions such as grinding in lime and the reduction of collector addition rates are the most evident means of improving selectivity in the flotation process.

Appendix 1

Metallurgical Balances

International Metallurgical and Environmental Inc.

Client: Kettle River Resources  
 Test No. 100  
 Test Sample: Phoenix tailings  
 Test Objectives: Sulphide mineral flotation  
 Grind: 34.1% passing 200 mesh

Metallurgical Balance

Sample	Wt. %	Assay		Distribution	
		Cu %	Au g/t	Cu %	Au %
Cu/Au Conc	0.74	2.70	34.5	14.3	40.6
2nd Cl Tail	0.13	0.92	9.36	.9	2.0
1st Cl Tail	1.21	0.90	5.41	7.8	10.4
Final Tail	97.9	0.109	0.30	77.0	47.0
Calculated Head	100.0	0.14	0.63		
Assayed Head					

Flotation test 100

Cumulative Metallurgical Balance

Sample	Wt. %	Assay		Distribution	
		Cu %	Au g/t	Cu %	Au %
Cu/Au Conc	0.7	2.70	34.5	14.3	40.6
1st CI Conc	0.9	2.43	30.6	15.2	42.6
Rougher Conc	2.1	1.54	16.0	23.0	53.0
Final Tail	97.9	0.109	0.30	77.0	47.0
Calculated Head		0.14	0.63		
Assayed Head					



**International Metallurgical and Environmental Inc.**  
**Flotation Test Reagent Schedule**

Project: Kettle River Resources  
 Flotation Test: 100  
 Sample: Phoenix tailings  
 Test Objectives: Sulphide Flotation  
 Grinding Time: 3 minutes  
 Primary Grind: 34.1% passing 200 mesh

Reagent						Process	
Stage	pH	mV	PAX g/t	3418A g/t	MIBC	Cond min	Froth min
<b>Rougher/Scav</b>							
Grind						3	
Cu/Au Rougher	8.21		50	10	7	1	5
<b>Cleaners</b>							
1st Cu/Au Cl	8.24		5				3
2nd Cu/Au Cl	8.15				7		3

International Metallurgical and Environmental Inc.

Client: Kettle River Resources  
 Test No. 101  
 Test Sample: Phoenix tailings  
 Test Objectives: Sulphide mineral flotation  
 Grind: 52.1% passing 200 mesh

Metallurgical Balance

Sample	Wt. %	Assay		Distribution	
		Cu %	Au g/t	Cu %	Au %
Cu/Au Conc	1.41	2.70	24	28.0	55.6
2nd Cl Tail	0.29	1.90	13.0	4.0	6.2
1st Cl Tail	0.78	0.59	3.0	3.4	3.8
Final Tail	97.5	0.090	0.22	64.5	34.4
Calculated Head	100.0	0.14	0.61		
Assayed Head		0.14	0.71		

Flotation test 101

Cumulative Metallurgical Balance

Sample	Wt. %	Assay		Distribution	
		Cu %	Au g/t	Cu %	Au %
Cu/Au Conc	1.4	2.70	24.0	28.0	55.6
1st CI Conc	1.7	2.56	22.1	32.1	61.8
Rougher Conc	2.5	1.94	16.1	35.5	65.6
Final Tail	97.5	0.090	0.22	64.5	34.4
Calculated Head		0.14	0.61		
Assayed Head		0.14	0.71		

International Metallurgical and Environmental Inc.  
Flotation Test Reagent Schedule

Project: Kettle River Resources  
 Flotation Test: 101  
 Sample: Phoenix tailings  
 Test Objectives: Sulphide Flotation  
 Grinding Time: 6 minutes  
 Primary Grind: 52.1% passing 200 mesh

Reagent						Process	
Stage	pH	mV	PAX g/t	3418A g/t	MIBC	Cond min	Froth min
<b>Rougher/Scav</b>							
Grind						6	
Cu/Au Rougher	8.32		50	10	7	1	5
<b>Cleaners</b>							
1st Cu/Au Cl	8.46		5		7		3
2nd Cu/Au Cl	8.25						3

International Metallurgical and Environmental Inc.

Client: Kettle River Resources  
 Test No. 102  
 Test Sample: Phoenix tailings  
 Test Objectives: Sulphide mineral flotation  
 Grind: 20.8% passing 200 mesh

Metallurgical Balance

Sample	Wt. %	Assay		Distribution	
		Cu %	Au g/t	Cu %	Au %
Cu/Au Conc	0.05	0.67	248	.2	20.3
2nd Cl Tail	0.15	0.48	24	.5	6.1
1st Cl Tail	0.39	0.48	3.8	1.4	2.5
Final Tail	99.4	0.130	0.42	97.8	71.1
Calculated Head	100.0	0.13	0.59		
Assayed Head		0.14			

Flotation test 102

Cumulative Metallurgical Balance

Sample	Wt. %	Assay		Distribution	
		Cu %	Au g/t	Cu %	Au %
Cu/Au Conc	0.0	0.67	248	.2	20.3
1st CI Conc	0.2	0.53	78.7	.8	26.4
Rougher Conc	0.6	0.50	29.1	2.2	28.9
Final Tail	99.4	0.130	0.42	97.8	71.1
Calculated Head		0.13	0.59		
Assayed Head		0.14			

International Metallurgical and Environmental Inc.  
Flotation Test Reagent Schedule

Project: Kettle River Resources  
 Flotation Test: 102  
 Sample: Phoenix tailings  
 Test Objectives: Sulphide Flotation  
 Grinding Time: none  
 Primary Grind: 20.8% passing 200 mesh

Reagent						Process	
Stage	pH	mV	PAX g/t	3418A g/t	MBC	Cond min	Froth min
<b>Rougher/Scav</b>							
Grind							
Cu/Au Rougher	8.22		50	10	7	1	5
<b>Cleaners</b>							
1st Cu/Au Cl	8.38		5		7		3
2nd Cu/Au Cl	8.05						3

International Metallurgical and Environmental Inc.

Client: Kettle River Resources  
 Test No. 103  
 Test Sample: Phoenix tailings  
 Test Objectives: Sulphide mineral flotation  
 Grind: 64.9% passing 200 mesh

Metallurgical Balance

Sample	Wt. %	Assay		Distribution	
		Cu %	Au g/t	Cu %	Au %
Cu/Au Conc	0.85	2.80	32	15.7	43.7
2nd Cl Tail	0.61	2.10	15	8.5	14.8
1st Cl Tail	1.77	1.11	5.0	13.0	14.2
Final Tail	96.8	0.098	0.18	62.8	27.3
Calculated Head	100.0	0.151	0.62		
Assayed Head					



Flotation test 103

Cumulative Metallurgical Balance

Sample	Wt. %	Assay		Distribution	
		Cu %	Au g/t	Cu %	Au %
Cu/Au Conc	0.8	2.80	32	15.7	43.7
1st Cl Conc	1.5	2.51	24.9	24.2	58.5
Rougher Conc	3.2	1.74	13.9	37.2	72.7
Final Tail	96.8	0.098	0.18	62.8	27.3
Calculated Head		0.15	0.62		
Assayed Head		0.00	0.00		

International Metallurgical and Environmental Inc.  
Flotation Test Reagent Schedule

Project: Kettle River Resources  
 Flotation Test: 103  
 Sample: Phoenix tailings  
 Test Objectives: Sulphide Flotation  
 Grinding Time: 10 min  
 Primary Grind: 64.9% passing 200 mesh

Reagent						Process	
Stage	pH	mV	PAX g/t	3418A g/t	MIBC	Cond min	Froth min
<b>Rougher/Scav</b>							
Grind						10	
Cu/Au Rougher			50	10	7	1	5
<b>Cleaners</b>							
1st Cu/Au Cl			5		7		3
2nd Cu/Au Cl							3

International Metallurgical and Environmental Inc.

Client: Kettle River Resources

Test No. 104

Test Sample: Phoenix tailings

Test Objectives: Sulphide mineral flotation, with regrinding the rougher conc

Metallurgical Balance

Sample	Wt. %	Assay		Distribution	
		Cu %	Au g/t	Cu %	Au %
Cu/Au Conc	1.51	2.80	27	30.8	61.0
2nd Cl Tail	0.44	1.30	5.55	4.2	3.7
1st Cl Tail	3.65	0.43	1.56	11.4	8.5
Final Tail	94.4	0.078	0.19	53.6	26.8
Calculated Head	100.0	0.14	0.67		
Assayed Head					

Flotation test 104

Cumulative Metallurgical Balance

Sample	Wt. %	Assay		Distribution	
		Cu %	Au g/t	Cu %	Au %
Cu/Au Conc	1.5	2.80	27	30.8	61.0
1st CI Conc	2.0	2.46	22.1	35.0	64.7
Rougher Conc	5.6	1.14	8.7	46.4	73.2
Final Tail	94.4	0.078	0.19	53.6	26.8
Calculated Head		0.14	0.67		
Assayed Head		0.00	0.00		

International Metallurgical and Environmental Inc.  
Flotation Test Reagent Schedule

Project: Kettle River Resources

Flotation Test: 104

Sample: Phoenix tailings

Test Objectives: Sulphide Flotation, with regrinding the rougher conc

Grinding Time: 10 min

Reagent						Process	
Stage	pH	Lime g/t	PAX g/t	3418A g/t	MIBC	Cond min	Froth min
<b>Rougher/Scav</b>							
Grind						10	
Cu/Au Rougher	8.32		50	10	7	1	5
<b>Cleaners</b>							
Regrind						20	
1st Cu/Au Cl	9.50	90					3
2nd Cu/Au Cl	10.55	70					3

Appendix 2

Mineralogical Report

*Harris*  
EXPLORATION  
SERVICES

MINERALOGY AND GEOCHEMISTRY

534 ELLIS STREET, NORTH VANCOUVER, B.C., CANADA V7H 2G6

TELEPHONE (604) 929-5867

Report for: Jeff Austin,  
I.M. and E. Inc.,  
13 - 2550 Acland Rd.,  
KELOWNA, B.C.  
V1X 7L4

Report 96-1(b)

January 11, 1996

MINERALOGICAL EXAMINATION OF KETTLE RIVER CONCENTRATE

Introduction:

A sample, labelled Kettle River Flot. 104: Cu Concentrate, was submitted for examination. A small portion was prepared as a smear-mount polished thin section (Slide 96-004X).

Description:

Estimated mode

Pyrite	96
Marcasite	0.5
Chalcopyrite	3
Galena	0.1
Sphalerite	0.1
Tetrahedrite	0.1
Hematite)	0.2
Limonite)	
Silicates	1

This product has a particle size range of 5 - 100 microns.

It consists almost entirely of pyrite. Chalcopyrite is a very minor accessory, and there are also traces of galena, sphalerite, tetrahedrite and Fe oxides, plus a little gangue.

Liberation of all constituents is essentially 100%, and, on the basis of the microscopic observations, it would appear that it should be possible to make a better grade chalcopyrite concentrate. Additional tests with modified reagent conditions to maximize selectivity between chalcopyrite and pyrite would appear merited.

Minor evidence of oxidation of pyrite and, very rarely, chalcopyrite was seen in the form of rimming or partial replacement by limonite. However, this does not appear widespread enough to affect bulk flotation properties.

**Photomicrographs:**

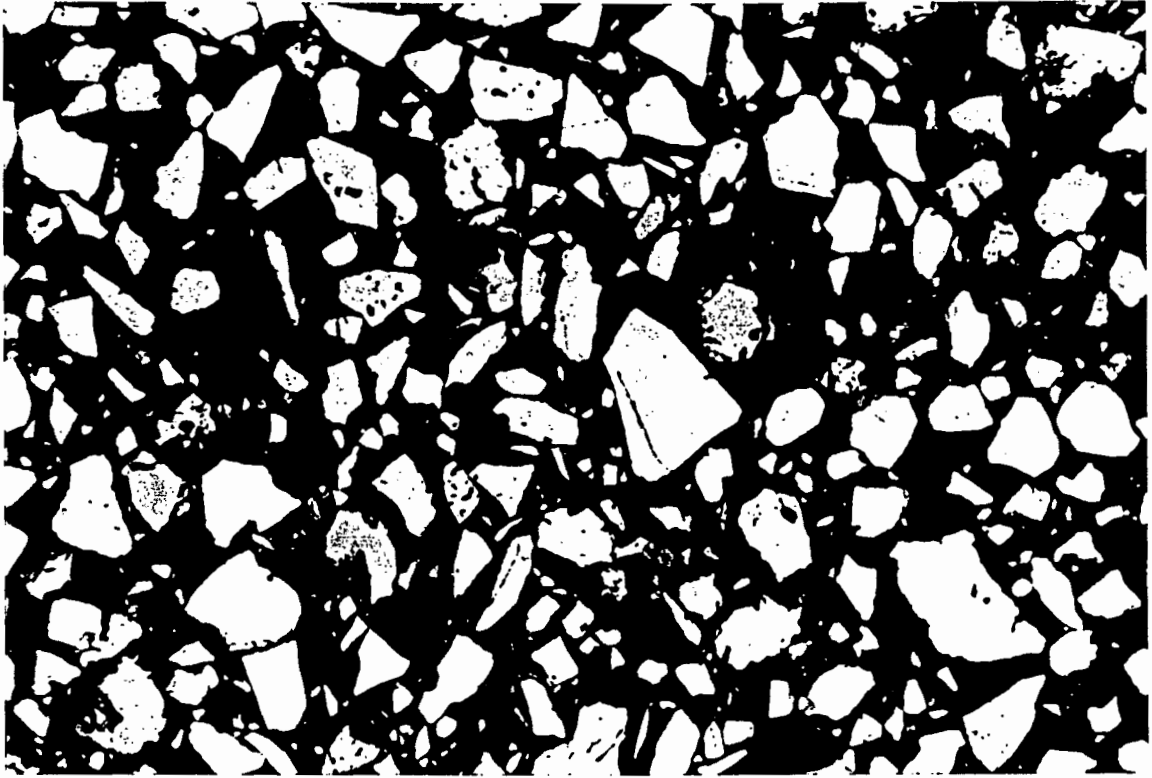
Photos are of typical fields, by reflected light at a scale of 1 cm = 85 microns.

**Neg. 387-5:** Note simple composition. Dominant constituent (cream colour) is pyrite. Minor accessory chalcopyrite (yellow) appears fully liberated. This field includes about 8 grains of chalcopyrite.

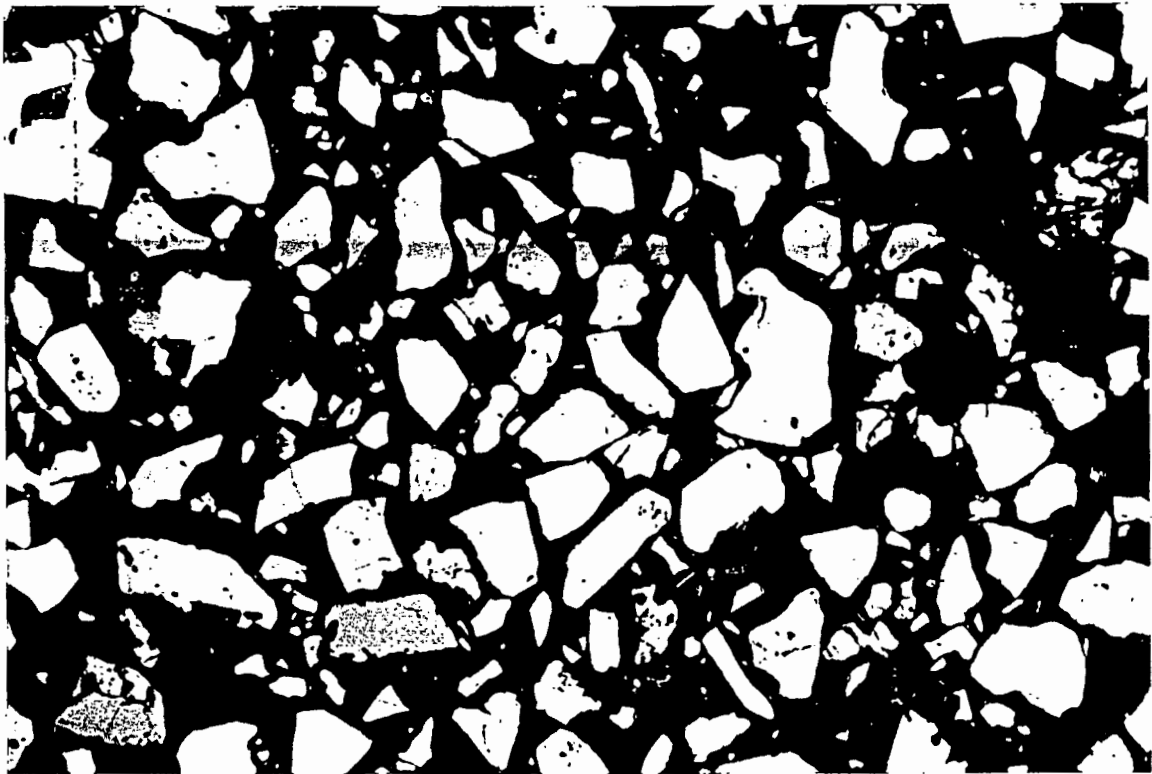
**Neg. 387-6:** Colour key as for 387-5. One of the five grains of chalcopyrite in this field is locked with pyrite (far left centre). Another (upper right) is cut by a network of limonite (dark grey) indicating partial oxidation. A couple of pyrite grains also show partial limonitization. That at left centre is almost totally altered; that at right centre has a small "corner" of limonite.

J.F. Harris Ph.D.





387-5 Cu Conc



387-6 Cu Conc

Kettle River Resources Ltd.

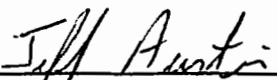
Flotation Test Results - Phoenix Tailings Samples

Variability Testing of 5 Tailings Composites

Prepared by

International Metallurgical and Environmental Inc.  
13 - 2550 Acland Road  
Kelowna, B.C.  
V1X 7L4

Prepared by:

  
\_\_\_\_\_  
Jeffrey B. Austin, P.Eng. - President  
International Metallurgical and Environmental Inc.

## SUMMARY

Metallurgical test work has been completed at International Metallurgical and Environmental Inc. using sample material from the Phoenix tailings project located in Greenwood, British Columbia. The Phoenix tailings are being evaluated by Kettle River Resources with the objective to re-process the tailings to recover residual copper and gold values.

Five individual samples of tailings from the Phoenix tailings deposit were subject to grinding and flotation testing for copper and gold recovery. These samples were all shown to be capable of being processed to recover residual values of copper and gold into a rougher flotation concentrate. The rougher flotation concentrate was upgraded using re-grinding and cleaner flotation to produce a salable final concentrate of 17 to 18 percent copper which contains very high grade gold values, in the range of 200 g/t gold.

The sample of tailings contained copper values that ranged from 0.10 to 0.15 percent copper and from 0.25 to 0.56 g/t gold. The gold content of the test samples decreased with depth of sampling and definite trending of the gold content was observed in the samples received. The evaluation of the contained gold and copper values in the tailings deposit is probably the largest single problem for the project. A majority of the in-situ value of the tailings is gold. The copper content of the tailings is low and has limited economic value in terms of contained copper. However, the upgrading of the limited copper values to a salable concentrate could allow for excellent payment of gold values contained in a copper concentrate.

It is un-likely that the project will be viable if gold grades of 0.25 g/t are contiguous through out the tailings deposit, although a preliminary evaluation of the project economics is warranted.

The recovery of gold from the samples was demonstrated for all 5 samples, and gold recoveries in rougher flotation ranged from 63 to 80 percent of the contained gold. Gold recovery was reduced in the lower grade samples as well as within the coarse samples. The highest gold recoveries were observed in the upper level pond sample, which also contained the finest particle size distribution and relatively high grade gold values of 0.52 g/t gold. The berm samples which were the coarsest of the samples had reduced gold recoveries in the range of 60 to 70 percent, which is consistent with the results of previous metallurgical test work. The well defined grind-recovery relationship which was defined in a previous test program was not seen in the grind-recovery data of this test program and implications are that metal recovery is a function of the power input to the ore in terms of grinding.

The residual copper values were shown to be capable of upgrading in a flotation concentrate to the range of 17 to 18 percent copper. This significantly impacts the project economics, as it allows the project operator to sell the flotation product as a copper concentrate under terms and conditions which will improve project economics. The copper concentrate produced from the upgrading test work contained gold values of up to 207 g/t gold, and gold recoveries exceed copper recoveries in the upgrading stages of flotation. Re-grinding of the rougher concentrate was required to assist the cleaning stages of flotation to produce a salable copper concentrate. Rougher concentrate grades of the all 5 test samples were similar and in the range of 0.9 to 1.5 percent copper.

It is recommended that efforts be made to better define the gold content of the tailings deposit, with the intent of increasing the grade of the deposit, perhaps by defining higher grade zones within the deposited tailings.

## TERMS OF REFERENCE

The Phoenix tailings deposits are being evaluated by Kettle River Resources to determine if there exists sufficient recoverable value to allow for the establishment of a tailings re-treatment operation. The Phoenix tailings contain residual copper and gold values which were not recovered during the operation of the Phoenix mine under the direction of Granby Mining Co.

Metallurgical test work at International Metallurgical and Environmental Inc. has been managed by Jeff Austin, P.Eng., and laboratory test work completed by Scott Reddick, metallurgical technician. All analytical results have been provided by International Metallurgical and Environmental Inc.

Primary liaison with Kettle River Resources has been Ms Linda Carron, Project Geologist of Kettle River Resources.

This report has been prepared by Jeff Austin, P.Eng. - President, International Metallurgical and Environmental Inc.

## METHODS AND PROCEDURES

### Test Samples

Kettle River Resources has provided sample material from two exploratory bore holes drilled into the Phoenix tailings deposit. This material was provided to International Metallurgical and Environmental Inc. by Mr. George Stewart, President of Kettle River Resources Ltd. Sampling of the existing deposits of tailings were undertaken by Kettle River Resources Ltd. to provide preliminary grades of the tailings and acquire samples for metallurgical testing of the tailings. The tailings were produced by the Phoenix Mine operated by Granby Mining Co. which recovered copper from the tailings during the 1950's and 1960's. Head assays of the sample material are shown in Table 1, and are based on the average of the calculated head assays of the flotation tests conducted in this test program.

Table 1  
Summary of Head Assays\* - Phoenix Tailings Samples

Sample	Cu %	Au g/t
Pond Drill Hole		
0 - 37 ft	0.12	0.52
37 - 61.5 ft	0.14	0.29
Berm Drill Hole		
0 - 32.5 ft	0.12	0.56
32.5 - 57.5 ft	0.10	0.28
57.5 - 77.5 ft	0.16	0.28

\* Head assays are based on the calculated head assays from metallurgical tests.

### Detailed Test Procedures

Sample material for metallurgical testing was received as a number of pails of tailings material provided by Kettle River Resources Ltd. The samples were air dried to remove residual moisture and subsequently riffle split into 2 kg lots of sample in preparation for metallurgical testing.

Sample grinding was conducted in a stainless batch grinding mill at 66 percent solids. The ground product was washed from the mill and transferred to a standard Denver flotation machine for flotation testing. Re-grinding of the rougher flotation concentrate in test 110 was completed using a ceramic mill and ceramic charge. Reagent schedules for all test work is associated with the appropriate metallurgical balances contained in Appendix 1.

Flotation products were oven dried and prepared for assay by ring pulverizing. All analytical work was conducted by International Metallurgical and Environmental Inc., under the direction of Malcolm Whitehouse, Analytical Laboratory Supervisor.

## RESULTS AND DISCUSSIONS

The metallurgical program conducted at International Metallurgical and Environmental Inc. comprised five batch flotation tests, with the objective to recover copper and gold values via flotation techniques. The tailings samples are the result of a grinding and flotation process operated by Granby Mining, and as such it was expected that additional liberation of mineral values would be required to provide enhanced recoveries. The results of all flotation test work is summarized in Table 2.

Table 2  
Summary of Flotation Recoveries and Final Concentrate Grades

Test No.	Grind Size	Recoveries		Concentrate Grades	
		Cu %	Au %	Cu %	Au g/t
105	97.4	55.3	80.3	3.20	35
106	97.0	46.2	66.6	3.40	16
107	83.9	51.2	71.1	2.70	19
108	95.1	47.1	62.8	2.50	14
109	91.6	47.8	69.4	3.00	10
110	83.9	49.0	63.0	17.8	207

The flotation test results indicate that significant copper and gold values may be recovered from the Phoenix tailings by traditional flotation techniques. In all flotation tests, the gold recovery was significantly higher than the copper recovery, and this trend was consistent through the upgrading flotation stages of the flotation tests. Each of the test samples was subject to an identical 10 minute grind and as such was subject to an identical power input for size reduction. The particle size distributions from the batch grinding were varied in terms of the particle size of the mill discharge and undoubtedly reflects the differences in size distributions of the tailings samples. The recovery of gold although variable from sample to sample is trapped between 62 and 80 percent and does not appear directly related to the grind size of the flotation feed.

*It is probable that the gold recovery is a response to a specific grinding power input. This would imply that high grade fines in the tailings deposit should be capable of metal recoveries comparable to that produced by grinding coarse tailings. It appears that the feed size fraction or the final product size fraction plays little role in the metal recovery.*



Shown in Figure 1 is the relationship between gold recovery and particle size distribution for the five individual samples tested in this program. There is little correlation between particle size distribution and gold recovery for the various samples. This lack of correlation is at odds with the results of recovery test work conducted with a single sample and previously reported. The impact of liberation on metal recovery for a single sample was evaluated in the previous test program and this relationship is shown in Figure 2.

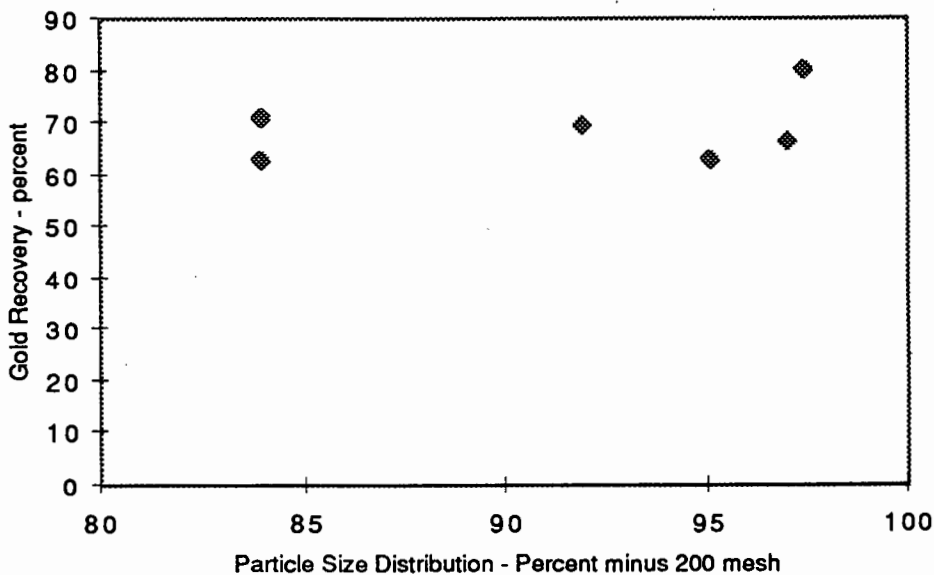


Figure 1. - Gold Recovery versus Particle Size Distribution, all samples tested

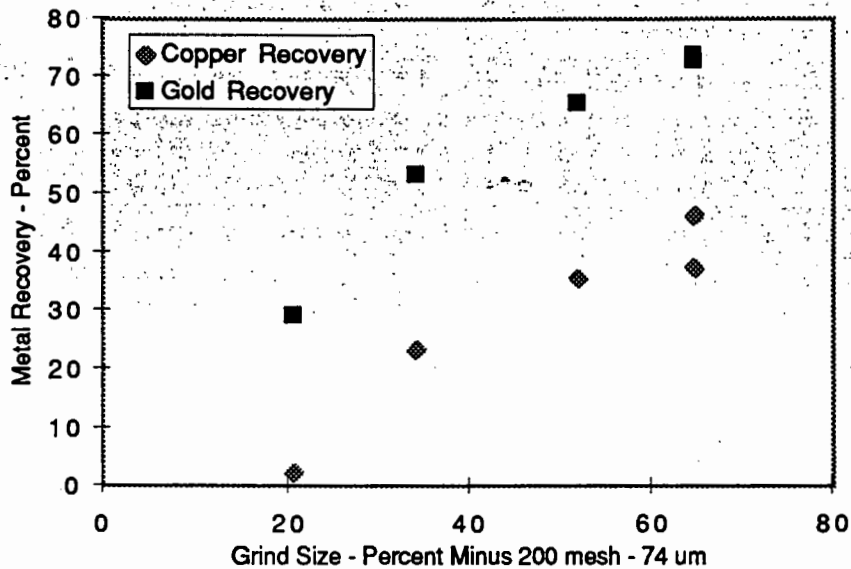


Figure 2.- Metal Recovery versus Grind Size(data from previous report)

A single test to evaluate the upgrading of the rough flotation concentrates was completed as test 110. The procedure used to depress pyrite, the main contaminant of the copper/gold concentrate was to re-grind the rough concentrate in lime and adjust the pH in cleaner flotation to 11.5 with lime. A final copper/gold flotation concentrate was produced which graded 17.8 percent copper and 207 g/t gold. This product would be salable as a copper concentrate to a traditional copper smelter for payable copper and gold values. The low copper grade may result in penalties that could be significant, however the value of the concentrate is primarily the gold content. Gold values are typically very well paid by smelting operations, particularly in copper concentrates and payable rates are typically 96 to 98 percent of the gold contained in the copper concentrate.

Based on the preliminary results of this test program, a grinding and flotation process as shown in Figure 4 was indicated. This is most likely a copy of the process used to recover copper in the Phoenix Mine operations and this similarity is due to the identical response of the residual metal values in the tailings as compared to the ore processed by the Phoenix Mine. The results of upgrading the rougher concentrate in test 110, has provided assurance that the copper and gold values can be upgraded to a concentrate grade that would be salable to a concentrate treatment facility.

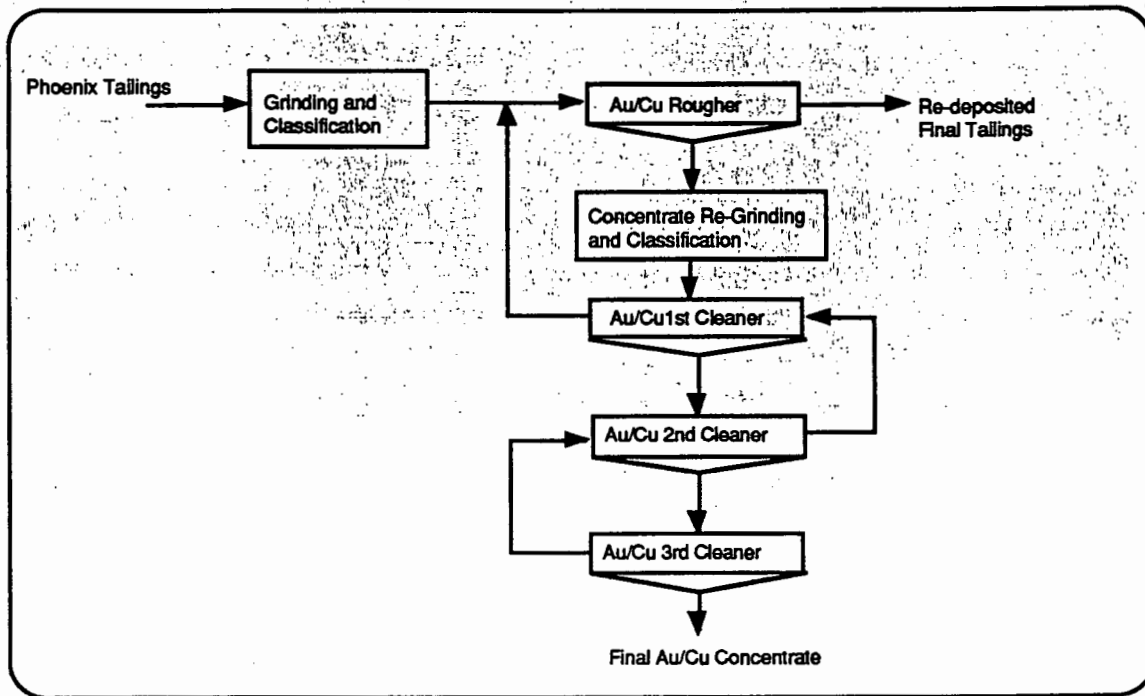


Figure 4. - Proposed Tailings Re-treatment Process

Historically the Phoenix Mine produced a copper concentrate of 25 to 27 percent copper and contained approximately 30 to 40 grams of gold (Conversation with John Jewitt - former manager).

## CONCLUSIONS AND RECOMMENDATIONS

Based on the results of metallurgical test work conducted at International Metallurgical and Environmental Inc., it can be concluded that:

1) The tailings from the Phoenix Mine are amenable to copper and gold recovery using traditional grinding and flotation technology. Metal recoveries were shown to be grind sensitive within a single sample. Testing of 5 different samples shows that this relationship breaks down and metal recoveries are probably related to power input during size reduction. This relationship implies that zones of the deposit that may be comprised of finer material should have comparable recoveries to those zones of coarse tailings.

2) Predictions of gold and copper recovery, which are based on batch tests, range from 60 to 65 percent for gold values and 35 to 45 percent for copper values.

3) Concentrates of 15 to 20 percent copper and 100 to 200 g/t gold should be capable of being produced. Re-grinding of the rough concentrate and the use of lime for the elevation of the pulp pH is required to reject pyrite from the concentrates.

It is recommended that the project be reviewed to evaluate the in-situ resource, proposed operational plan and preliminary economics of the concept to re-process the Phoenix Tailings.

International Metallurgical and Environmental Inc.

Client: Kettle River Resources

Test No. 105

Test Sample: Pond 0 - 37

Test Objectives: Sulphide mineral flotation, with regrinding the rougher conc

Grind: 10 min, 97.4% passing 200 mesh

Metallurgical Balance

Sample	Wt. %	Assay		Distribution	
		Cu %	Au g/t	Cu %	Au %
Cu/Au Conc	0.90	3.2	35	24.4	60.8
2nd CI Tail	1.24	1.33	3.78	14.0	9.1
1st CI Tail	5.70	0.35	0.94	16.9	10.4
Final Tail	92.2	0.057	0.11	44.7	19.7
Calculated Head	100.0	0.118	0.52		
Assayed Head		0.118	0.73		

Flotation test 105

Cumulative Metallurgical Balance

Sample	Wt. %	Assay		Distribution	
		Cu %	Au g/t	Cu %	Au %
Cu/Au Conc	0.9	3.20	35	24.4	60.8
1st CI Conc	2.1	2.11	16.9	38.4	69.9
Rougher Conc	7.8	0.83	5.3	55.3	80.3
Final Tail	92.2	0.057	0.11	44.7	19.7
Calculated Head		0.118	0.52		
Assayed Head		0.118	0.73		

**International Metallurgical and Environmental Inc.**  
**Flotation Test Reagent Schedule**

Project: Kettle River Resources

Flotation Test: 105

Sample: Pond 0 - 37

Test Objectives: Sulphide Flotation, with regrinding the rougher conc

Grind Time: 10 min, 97.4% passing 200 mesh

Reagent						Process	
Stage	pH	Lime g/t	PAX g/t	3418A g/t	MIBC	Cond min	Froth min
<b>Rougher/Scav</b>							
Grind						10	
Cu/Au Rougher	7.84		50	10	7	1	5
<b>Cleaners</b>							
Regrind						20	
1st Cu/Au Cl	9.50	60					3
2nd Cu/Au Cl	10.50	75					3

## International Metallurgical and Environmental Inc.

Client: Kettle River Resources

Test No. 106

Test Sample: Pond 37 - 61.5

Test Objectives: Sulphide mineral flotation, with regrinding the rougher conc

Grind: 10 min, 97.0% passing 200 mesh

### Metallurgical Balance

Sample	Wt. %	Assay		Distribution	
		Cu %	Au g/t	Cu %	Au %
Cu/Au Conc	0.95	3.40	15.5	23.1	50.4
2nd CI Tail	0.96	1.39	2.89	9.5	9.5
1st CI Tail	4.90	0.39	0.40	13.6	6.7
Final Tail	93.2	0.081	0.11	53.8	33.4
Calculated Head	100.0	0.140	0.29		
Assayed Head		0.135	0.34		



Flotation test 106

Cumulative Metallurgical Balance

Sample	Wt. %	Assay		Distribution	
		Cu %	Au g/t	Cu %	Au %
Cu/Au Conc	1.0	3.40	16	23.1	50.4
1st Cl Conc	1.9	2.39	9.2	32.6	59.9
Rougher Conc	6.8	0.95	2.9	46.2	66.6
Final Tail	93.2	0.081	0.11	53.8	33.4
Calculated Head		0.140	0.29		
Assayed Head		0.135	0.34		

International Metallurgical and Environmental Inc.  
Flotation Test Reagent Schedule

Project: Kettle River Resources

Flotation Test: 106

Sample: Pond 37 - 61.5

Test Objectives: Sulphide Flotation, with regrinding the rougher conc

Grind: 10 min, 97.0% passing 200 mesh

Reagent						Process	
Stage	pH	Lime g/t	PAX g/t	3418A g/t	MIBC	Cond min	Froth min
<b>Rougher/Scav</b>							
Grind						10	
Cu/Au Rougher	8.00		50	10	7	1	5
<b>Cleaners</b>							
Regrind						20	
1st Cu/Au Cl	9.50	60					3
2nd Cu/Au Cl	10.50	80					3

International Metallurgical and Environmental Inc.

Client: Kettle River Resources

Test No. 107

Test Sample: Berm 0 - 32.5

Test Objectives: Sulphide mineral flotation, with regrinding the rougher conc

Grind: 10 min, 83.9% passing 200 mesh

Metallurgical Balance

Sample	Wt. %	Assay		Distribution	
		Cu %	Au g/t	Cu %	Au %
Cu/Au Conc	1.51	2.70	18.5	32.7	49.4
2nd Cl Tail	1.25	0.70	4.29	7.0	9.5
1st Cl Tail	4.07	0.35	1.69	11.5	12.2
Final Tail	93.2	0.065	0.18	48.8	28.9
Calculated Head	100.0	0.124	0.56		
Assayed Head		0.121	0.53		

Flotation test 107

Cumulative Metallurgical Balance

Sample	Wt. %	Assay		Distribution	
		Cu %	Au g/t	Cu %	Au %
Cu/Au Conc	1.5	2.70	19	32.7	49.4
1st CI Conc	2.8	1.79	12.1	39.8	58.9
Rougher Conc	6.8	0.93	5.9	51.2	71.1
Final Tail	93.2	0.065	0.18	48.8	28.9
Calculated Head		0.124	0.56		
Assayed Head		0.121	0.53		

International Metallurgical and Environmental Inc.  
Flotation Test Reagent Schedule

Project: Kettle River Resources

Flotation Test: 107

Sample: Berm 0 -32.5

Test Objectives: Sulphide Flotation, with regrinding the rougher conc

Grind: 10 min, 83.9% passing 200 mesh

Reagent						Process	
Stage	pH	Lime g/t	PAX g/t	3418A g/t	MIBC	Cond min	Froth min
<b>Rougher/Scav</b>							
Grind						10	
Cu/Au Rougher	8.02		50	10	7	1	5
<b>Cleaners</b>							
Regrind						20	
1st Cu/Au Cl	9.50	55					3
2nd Cu/Au Cl	10.50	65					3

## International Metallurgical and Environmental Inc.

Client: Kettle River Resources

Test No. 108

Test Sample: Berm 32.5 - 57.5

Test Objectives: Sulphide mineral flotation, with regrinding the rougher conc

Grind: 10 min, 95.1% passing 200 mesh

### Metallurgical Balance

Sample	Wt. %	Assay		Distribution	
		Cu %	Au g/t	Cu %	Au %
Cu/Au Conc	0.91	2.50	14	22.1	43.4
2nd Cl Tail	0.69	0.96	3.26	6.5	8.0
1st Cl Tail	3.11	0.61	1.03	18.5	11.4
Final Tail	95.3	0.057	0.11	52.9	37.2
Calculated Head	100.0	0.103	0.28		
Assayed Head		0.106	0.23		

Flotation test 108

Cumulative Metallurgical Balance

Sample	Wt. %	Assay		Distribution	
		Cu %	Au g/t	Cu %	Au %
Cu/Au Conc	0.9	2.50	14	22.1	43.4
1st CI Conc	1.6	1.83	9.1	28.6	51.5
Rougher Conc	4.7	1.03	3.8	47.1	62.8
Final Tail	95.3	0.057	0.11	52.9	37.2
Calculated Head		0.103	0.28		
Assayed Head		0.106	0.23		

**International Metallurgical and Environmental Inc.**  
**Flotation Test Reagent Schedule**

Project: Kettle River Resources

Flotation Test: 108

Sample: Berm 32.5 - 57.5

Test Objectives: Sulphide Flotation, with regrinding the rougher conc

Grind: 10 min, 95.1% passing 200 mesh

Reagent						Process	
Stage	pH	Lime g/t	PAX g/t	3418A g/t	MIBC	Cond min	Froth min
<b>Rougher/Scav</b>							
Grind						10	
Cu/Au Rougher	7.97		50	10	7	1	5
<b>Cleaners</b>							
Regrind						20	
1st Cu/Au Cl	9.50	50					3
2nd Cu/Au Cl	10.50	60					3



International Metallurgical and Environmental Inc.

Client: Kettle River Resources

Test No. 109

Test Sample: Berm 57.5 - 77.5

Test Objectives: Sulphide mineral flotation, with regrinding the rougher conc

Grind: 10 min, 91.6% passing 200 mesh

Metallurgical Balance

Sample	Wt. %	Assay		Distribution	
		Cu %	Au g/t	Cu %	Au %
Cu/Au Conc	1.35	3.00	9.6	25.9	47.0
2nd Cl Tail	0.90	1.34	3.73	7.7	12.2
1st Cl Tail	3.71	0.60	0.76	14.2	10.2
Final Tail	94.0	0.087	0.09	52.2	30.6
Calculated Head	100.0	0.157	0.28		
Assayed Head		0.151	0.25		

Flotation test 109

Cumulative Metallurgical Balance

Sample	Wt. %	Assay		Distribution	
		Cu %	Au g/t	Cu %	Au %
Cu/Au Conc	1.4	3.00	10	25.9	47.0
1st Cl Conc	2.3	2.34	7.3	33.6	59.2
Rougher Conc	6.0	1.26	3.2	47.8	69.4
Final Tail	94.0	0.087	0.09	52.2	30.6
Calculated Head		0.157	0.28		
Assayed Head		0.151	0.25		

**International Metallurgical and Environmental Inc.**  
**Flotation Test Reagent Schedule**

Project: Kettle River Resources

Flotation Test: 109

Sample: Berm 57.5 - 77.5

Test Objectives: Sulphide Flotation, with regrinding the rougher conc

Grind: 10 min, 91.6% passing 200 mesh

Reagent						Process	
Stage	pH	Lime g/t	PAX g/t	3418A g/t	MBC	Cond min	Froth min
<b>Rougher/Scav</b>							
Grind						10	
Cu/Au Rougher	7.85		50	10	7	1	5
<b>Cleaners</b>							
Regrind						20	
1st Cu/Au Cl	9.50	60					3
2nd Cu/Au Cl	10.50	75					3

International Metallurgical and Environmental Inc.

Client: Kettle River Resources

Test No. 110

Test Sample: Berm 0 - 32.5

Test Objectives: Addition of lime to the regrind, with higher cleaner pH

Grind: 10 min, 83.9% passing 200 mesh

Metallurgical Balance

Sample	Wt. %	Assay		Distribution	
		Cu %	Au g/t	Cu %	Au %
Cu/Au Conc	0.06	17.8	207	9.0	27.1
3rd Cl Tail	0.82	2.30	8.05	15.5	14.0
2nd Cl Tail	1.12	0.82	3.75	7.5	8.9
1st Cl Tail	3.77	0.55	1.63	17.0	13.0
Final Tail	94.2	0.066	0.19	51.0	37.0
Calculated Head	100.0	0.122	0.47		
Assayed Head		0.133	0.46		

Flotation test 110

Cumulative Metallurgical Balance

Sample	Wt. %	Assay		Distribution	
		Cu %	Au g/t	Cu %	Au %
Cu/Au Conc	0.1	17.80	207	9.0	27.1
2nd Cl Conc	0.8	3.64	23.6	24.5	41.1
1st Cl Conc	1.2	3.31	20.0	32.0	50.0
Rougher Conc	4.9	1.21	6.0	49.0	63.0
Final Tail	94.2	0.066	0.19	51.0	37.0
Calculated Head		0.122	0.47		
Assayed Head		0.133	0.46		

**International Metallurgical and Environmental Inc.**  
**Flotation Test Reagent Schedule**

Project: Kettle River Resources

Flotation Test: 110

Sample: Berm 0 - 32.5

Test Objectives: Regrinding with lime and higher pH in the cleaners

Grind: 10 min, 83.9% passing 200 mesh

Reagent						Process	
Stage	pH	Lime g/t	PAX g/t	3418A g/t	MIBC	Cond min	Froth min
<b>Rougher/Scav</b>							
Grind						10	
Cu/Au Rougher			50	10	7	1	5
<b>Cleaners</b>							
Regrind	9.8	150				20	
1st Cu/Au Cl	10.50	25			3.5		3
2nd Cu/Au Cl	11.50	255			3.5		2
3rd Cu/Au Cl	12.00	605			7		2

**APPENDIX 4**

**Cost Statement**

## COST STATEMENT

### Labour

G. Stewart	6 days @ \$453.58/day	\$ 2,721.48
L. Caron	9.5 days @ \$200/day	1,900.00
T. Parsons	6 days @ \$175/day	<u>1,050.00</u>
	Total:	\$ 5,671.48

### Sonic Drilling

Sonic Drilling, for 2 test holes	\$ 2,236.37	
Water pump rental	<u>15.00</u>	
	Total:	\$ 2,251.37

### Access Road and Grid Survey

Larry Scott, for access road construction	\$ 120.00	
S. Hepperle, for grid survey	<u>423.57</u>	
	Total:	\$ 543.57

### Analytical and Metallurgical Costs

Min- En Labs, 25 samples for Au, Ag, metallic Au assay	\$ 1,768.75	
International Metallurgical (11 flotation tests, mineralogical tests, reports)	4,609.00	
Sampling supplies (bags, pipes, buckets)	<u>363.65</u>	
	Total:	\$ 6,741.40

### Transportation, Meals and Accommodation

Fuel	\$ 150.00	
Meals	<u>147.90</u>	
	Total:	297.90

### Office Expenses

Copying charges (reports and maps)	\$ 200.00	
Telephone, fax	45.00	
Misc	<u>67.83</u>	
	Total:	\$ 312.83

- TOTAL EXPENSES: \$15,818.55



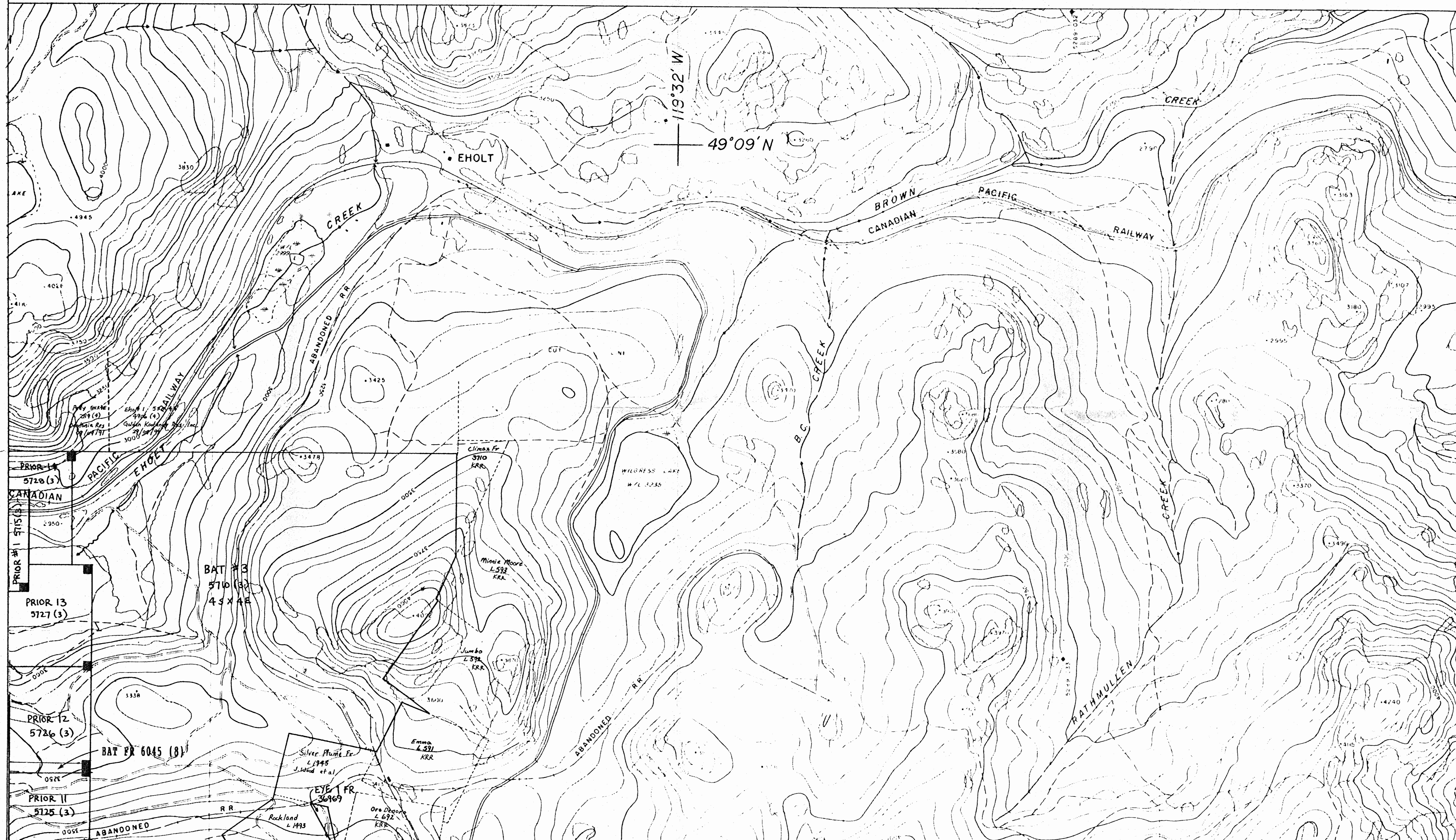
**APPENDIX 5**

**Statement of Qualifications**

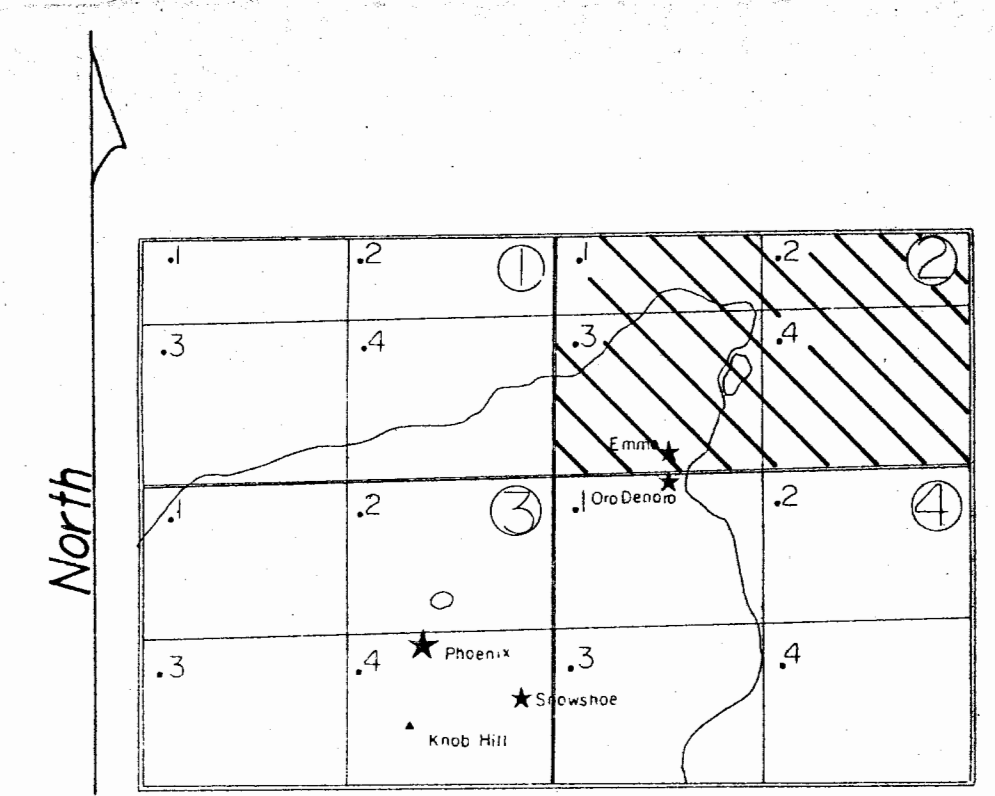
## STATEMENT OF QUALIFICATIONS

I, Linda J. Caron, certify that:

1. I am an exploration geologist residing at Bubar Road (RR #2), Rock Creek, B.C.
2. I obtained a B.A.Sc. in Geological Engineering (Honours) in the Mineral Exploration Option, from the University of British Columbia (1985).
3. I graduated with an M.Sc. in Geology and Geophysics from the University of Calgary (1988).
4. I have practised my profession since 1987 and have worked in the mineral exploration industry since 1980.
5. I am currently employed by Kettle River Resources Ltd. and New Nadina Explorations Limited as an exploration geologist.



GEOLOGICAL SURVEY BRANCH  
ASSESSMENT REPORT  
**25,364**

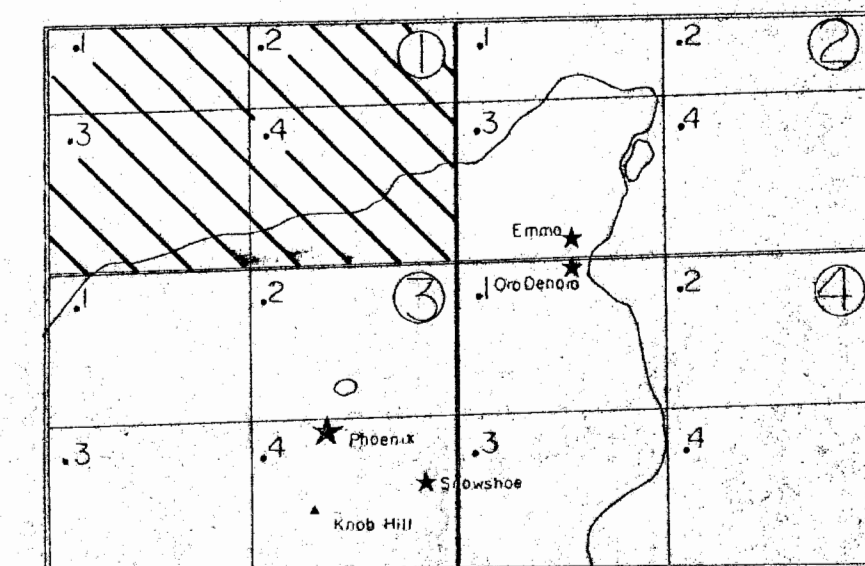
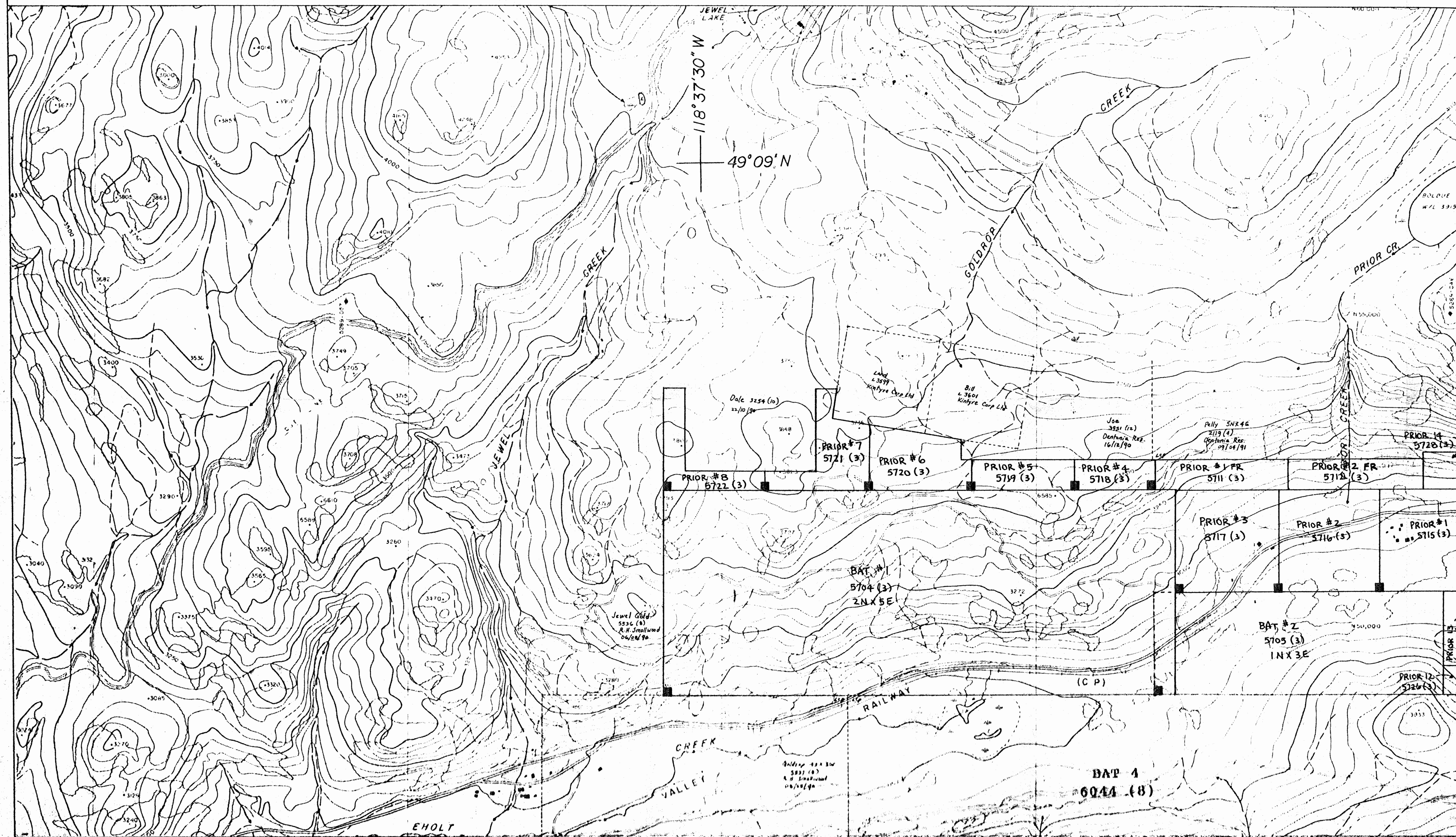


BATTLE MOUNTAIN (CANADA) INC.  
PHOENIX PROJECT

CLAIM MAP

RECEIVED  
FEB 28 1996  
EXPLORE B.C. PROGRAM  
MEMPR

PROJECT No.	75-96	DATA BY	
NTS	82E-2	DRAWN BY	
DRAWING No.	41	DATE	20-06-90 rev.
SCALE	1:10,000		



North

GEOLOGICAL SURVEY BRANCH  
ASSESSMENT REPORT

**25,364**  
FEB 9 1999  
EXPLORE B.C. PROGRAM  
MEMPR

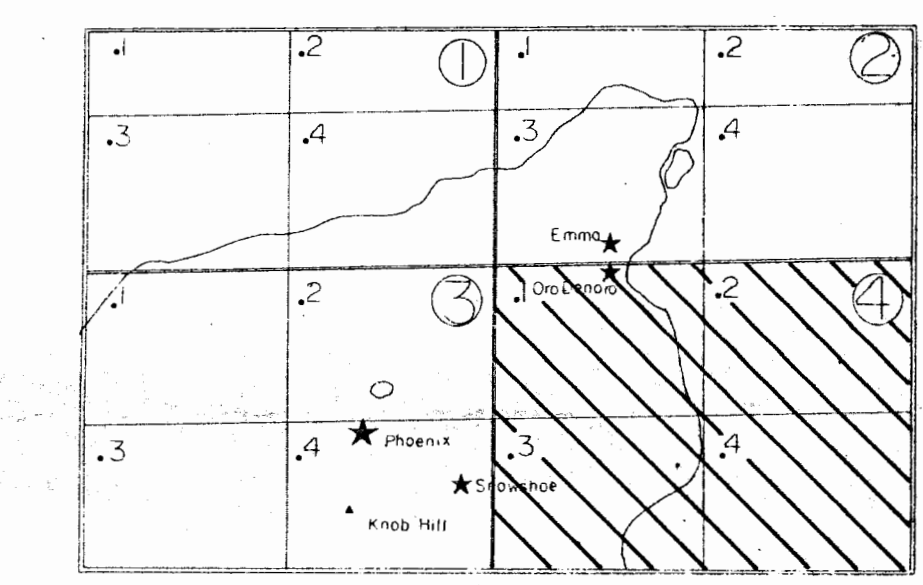
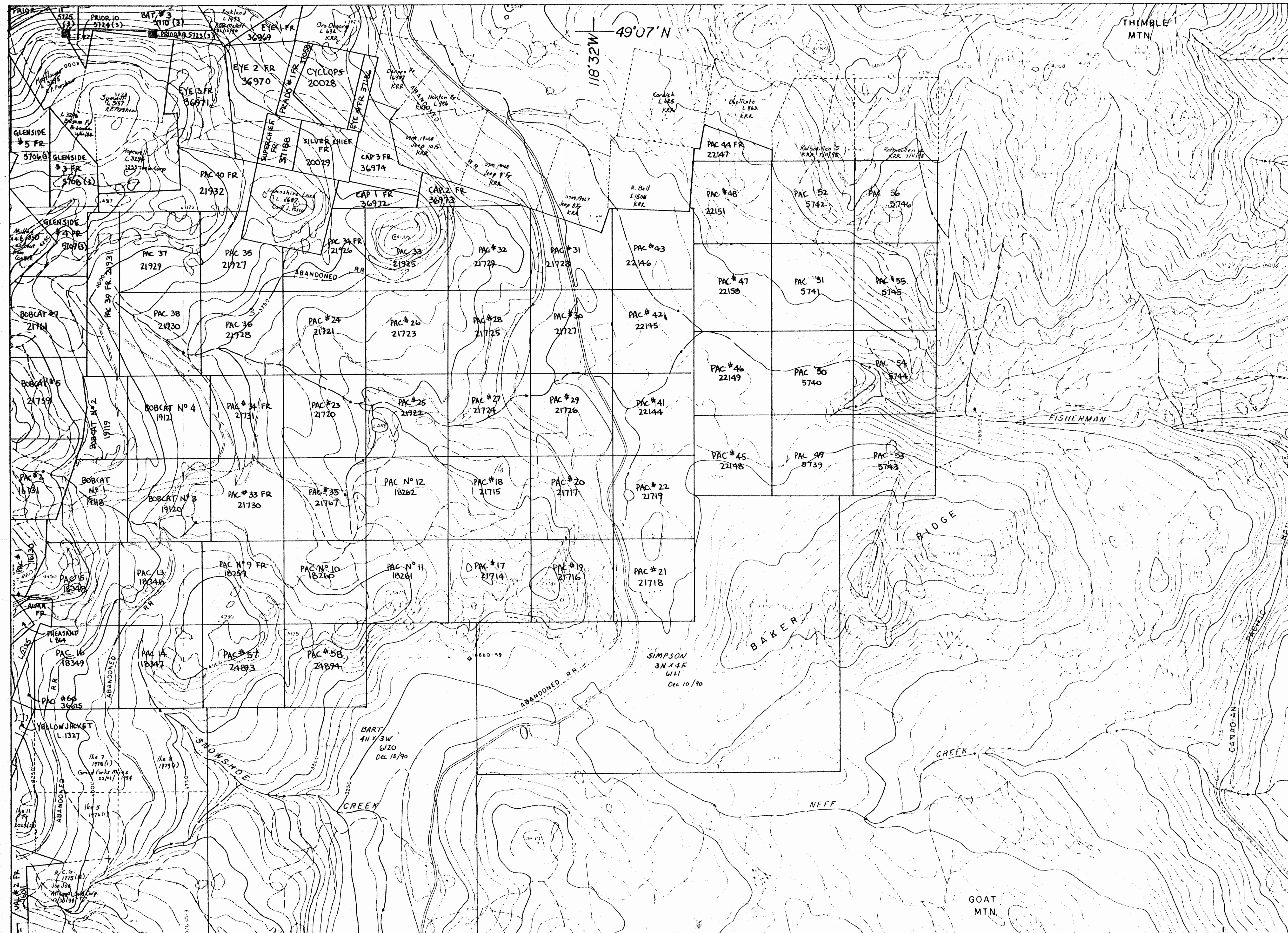
BATTLE MOUNTAIN (CANADA) INC.  
PHOENIX PROJECT

CLAIM MAP

Fig 2a

PROJECT No.	75-96	DATA BY	
NTS	82E-2	DRAWN BY	
DRAWING No.	10	DATE	20-06-90 rev.
SCALE:	1:10000		

July 10, 1999



GEOLOGICAL SURVEY BRANCH  
ASSESSMENT REPORT

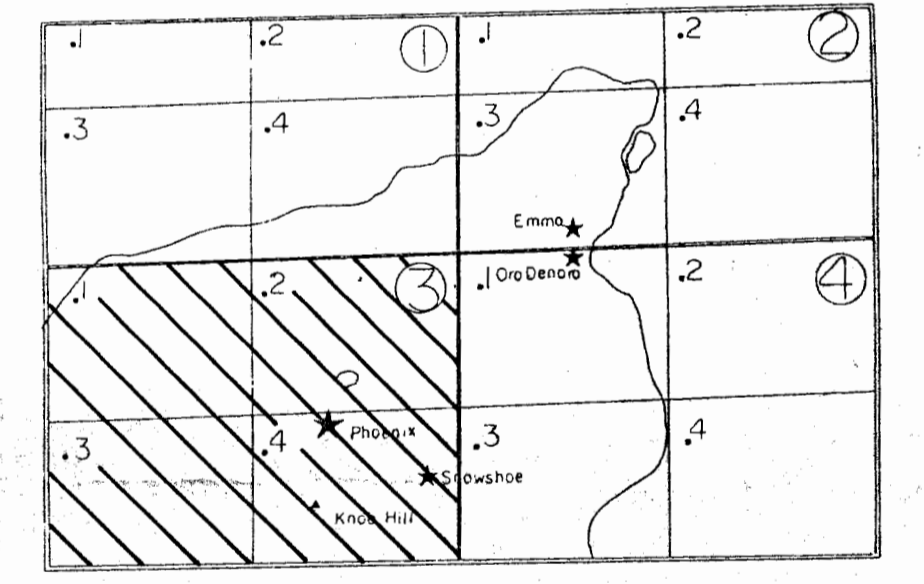
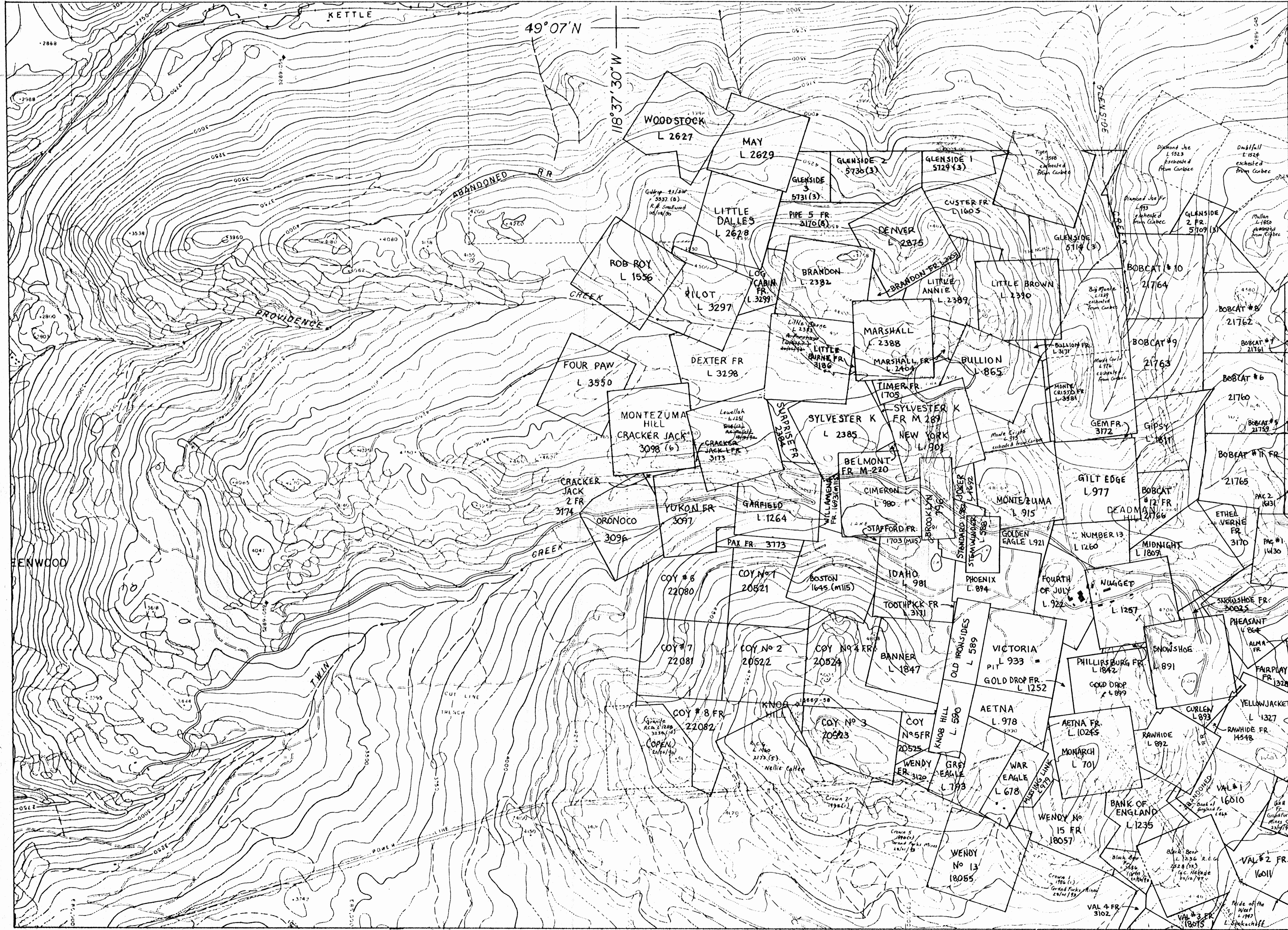
RECEIVED  
FEB 28 1990  
EXPLORE B.C. PROGRAM  
MEMBR

BATTLE MOUNTAIN (CANADA) INC.  
PHOENIX PROJECT

CLAIM MAP  
Fig 2d.

PROJECT No	75-96	DATA BY	
N.T.S.	82E-1,2	DRAWN BY	
DRAWING No	43	DATE	20-06-90 rev.
SCALE	1:10,000		

0 200 400 600 800 1000 1200 m



GEOLOGICAL SURVEY BRANCH  
 ASSESSMENT REPORT

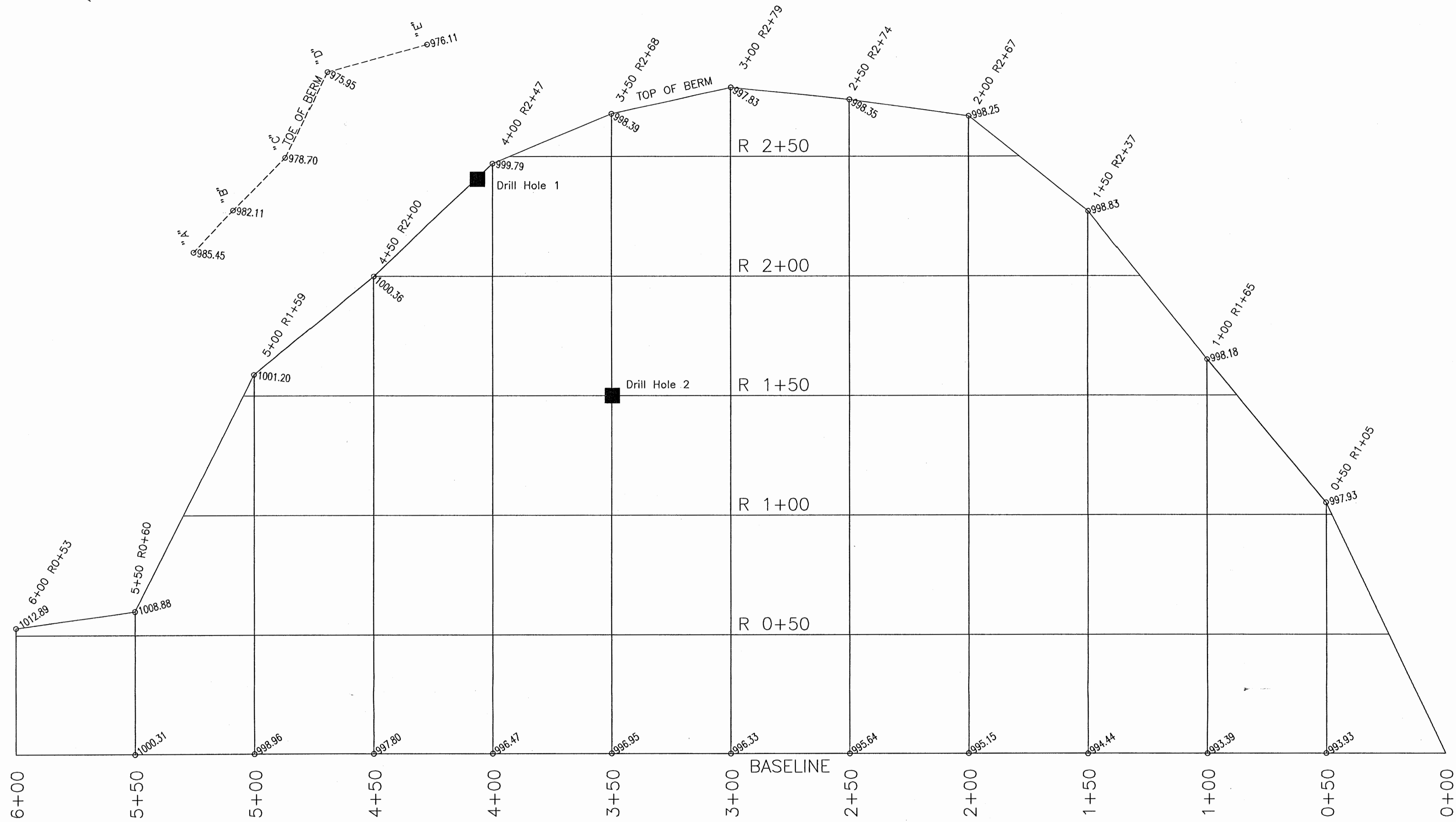
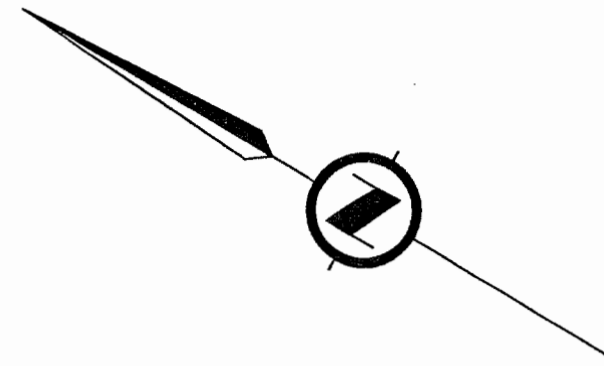
**25364**  
 RECEIVED  
 FEB 28 1986  
 EXPLORE B.C. PROGRAM  
 MEMPR

BATTLE MOUNTAIN (CANADA) INC.  
 PHOENIX PROJECT

CLAIM MAP

Fig. 2c

PROJECT No.	75-96	DATA BY	
N.T.S.	82E-2	DRAWN BY	
DRAWING No.	42	DATE	20-06-90 rev.
SCALE	1:10000		



GEOLOGICAL SURVEY BRANCH  
ASSESSMENT REPORT

25,364

Stakes placed shown thus: ○  
(spot elevation shown)

KETTLE RIVER RESOURCES

PHOENIX TAILINGS

Figure 3  
Surveyed Grid And  
Drill Hole Location  
Map

DATE: February 22, 1996 1:1000

