WITTECK DEVELOPMENT INC.
2640 South Sheridan Way, Mississauga, Ontario, Canada L5J 2M4
Telephone: (416) 823-7381 Telex: 06-982328

HEAP LEACHING
GRADE AND METALLURGICAL EVALUATION
OF WHITE CHANNEL GRAVELS

FINAL REPORT

Project No. 5203

For

Northern Affairs Program
Department of Indian Affairs and
Northern Development
200 Range Road
Whitehorse, Yukon
Y1A 3V1

March 31, 1987

D. Newman

D. Newman, P.Eng.
Sr. Project Metallurgist

C. Chapman

C. Chapman, P.Eng.
General Manager

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF TABLES AND FIGURES

1.0 SUMMARY

Twenty-five White Channel gravel samples were processed in order to estimate the gold content. Selected samples were used to determine the viability of gold extraction by heap leaching.

Gold levels ranged from < 0.03 to 0.33 g/t, and averaged 0.08 g/t. Pre-concentration of the gold by screening at 4 mesh was successful in upgrading gold levels by an average of 2.4 times, without gold loss. The average grade of the -4 mesh product was 0.19 g/t Au.

Use of gravity concentration principally as an analytical method (i.e. to upgrade gold for more reliable analysis) and, secondly, as a potential processing method, was not successful as only three samples yielded high gold recoveries.

Metallurgical evaluation of selected samples was completed. Bottle rolls and column tests with cyanide yielded maximum gold extractions of greater than 65%. Cyanide consumptions were less than 1.2 kg/t of leach feed. More testwork is required to confirm extractions and to further develop agglomeration procedures.

Sampling was a problem due to the low grade of the material and the discrete nature of the gold particles, which may result in the heterogenous segregation of the gold during the sampling and assay procedures. These effects are more commonly known as the "nugget" effect. A more suitable method of assaying the feed would be to leach the material with cyanide, and calculate a head assay from the leach products.

2.0 INTRODUCTION

The White Channel gravels in the Yukon Territory were examined for gold content by Witteck Development in a Phase I investigation. This hydrothermally altered deposit was found to contain low gold values (less than 0.33 g/tonne). Cyanide heap leaching technology is a potential process for extracting the gold contained in this deposit.

The metallurgical evaluation included the investigation of cyanide leaching to examine the extraction of gold from ore samples of the White Channel deposit. This report summarizes head grade and pre-concentration evaluation testwork done in Phase I, and assesses the amenability of the White Channel gravels to cyanide heap leaching as Phase II of the project.

3.0 PROCEDURES

A flowsheet summarizing the evaluation of the head grade is shown in Figure 1. Samples 85011-85017 were tailings samples. All other samples were ore samples.

3.1 Sample Splitting and Screening

All samples (except Dago 85021 and 85022) were air dried for at least 48 hours to remove moisture. Samples were coned three times, split in half, and weighed. One half of each sample was saved for Phase II cyanidation work. The other half was screened at 4 mesh and each fraction was weighed.

3.2 Gravity Table Concentration

Half of the -4 mesh material was gravity concentrated on a Deister concentrating table. The concentrates were collected in plastic buckets. Table tailings were dewatered using vacuum pan filters. All samples were filtered, then dried at 100°C and weighed.

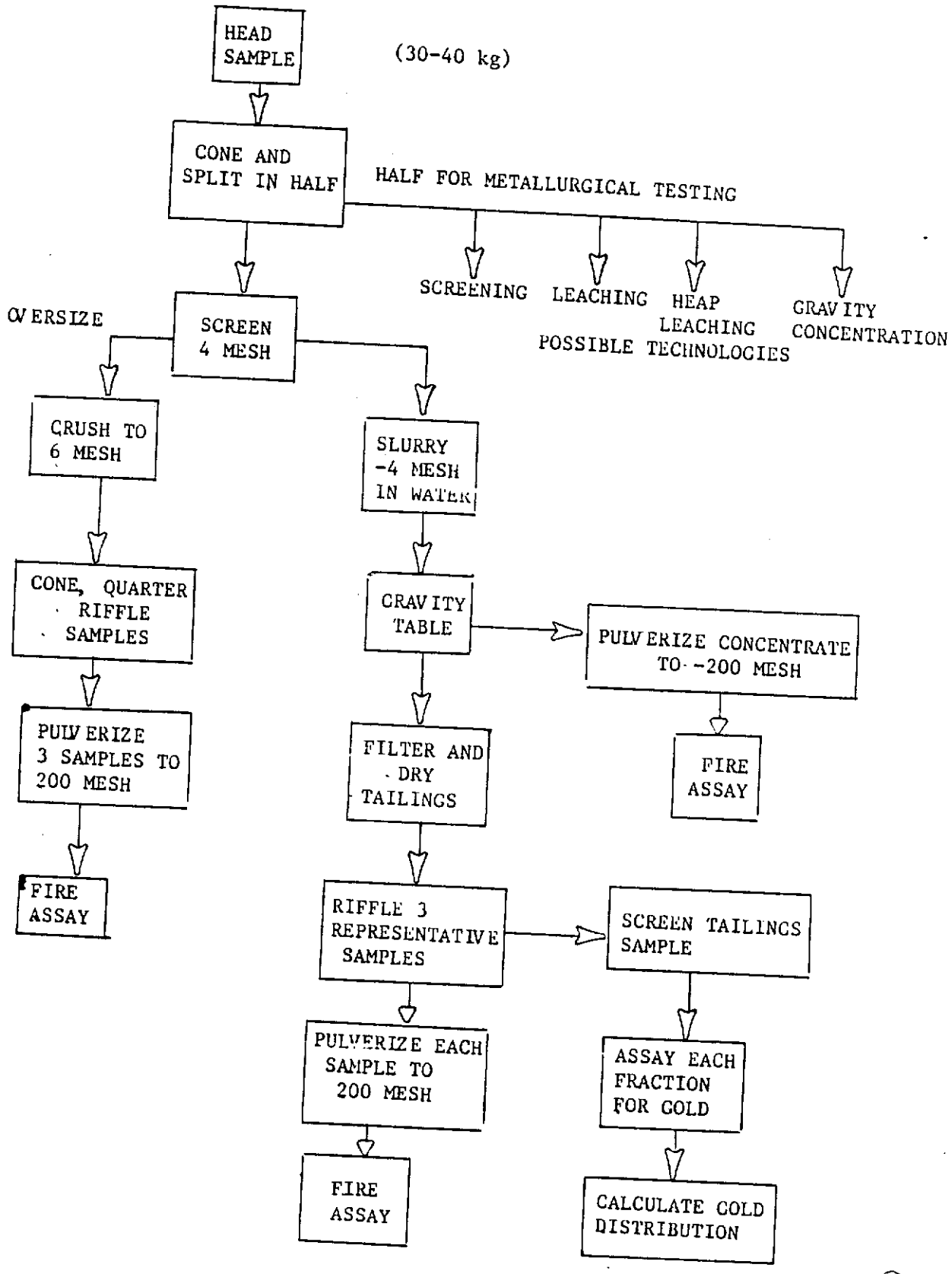
3.3 Sample Preparation

3.3.1 Oversize Fractions

The +4 mesh screen fraction was crushed in a jaw crusher followed by cone crushing to -6 mesh. The -6 mesh material was rolled and three representative samples were riffled out for assay. These samples were pulverized using a shatterbox, then screened at 200 mesh to assess the presence of metallics. All the material passed 200 mesh and no metallics were found.

FIGURE 1

EVALUATION OF HEAD GRADE



3.3.2 Gravity Table Tails and Concentrate

Gravity table concentrates were pulverized to -80 mesh with a disc pulverizer. A representative sample was then riffled out. This sample was pulverized in a shatterbox and then screened at 200 mesh. As no residual metallics could be identified in the +200 mesh fraction, the +200 mesh material was returned to the shatterbox until all of the material passed 200 mesh.

Three representative samples were riffled from the table tailings. One sample was retained as a reject, the second was assayed, and the third was screened for size analysis.

3.3.3 Screen Analysis of Gravity Table Tails

The table tailing samples were first wet screened at 200 mesh to remove all fines. The -200 mesh fraction was collected on a filter, dried and weighed. The +200 mesh material was dried, then screened using a Ro-Tap screen shaker. The screens used were 35, 65 and 115 mesh. All screen fractions were collected and weighed. Screen fractions were then pulverized to -200 mesh using a shatterbox. All samples passed 200 mesh prior to assay.

3.4 Cyanide Leaching Tests

Cyanide bottle leaching tests were performed to assess the leachability of the While Channel gravels. Composite samples were prepared from equal weights of the -4 mesh fractions of selected samples as per the client's instructions:

Composite WC-1)	Dago Composite 85011/85012/85015*
WC-2)	Dago Composite 85002/85023
WC 3)	Nugget 85003
WC 4)	Dago 85005
WC 5)	Dago Composite 85018/85019

---

* WC-1 - Prepared from tailings samples; all other composites were prepared from ore feed samples.

One kilogram samples of the above material were used to determine the leachability of the ores to cyanidation in separate leaching tests. Tests were carried out in 14 L plastic bottles (26 cm diameter).

Leaching was conducted at 40% solids for 48 hours using a horizontal bottle roller operated at 15 rpm. Free cyanide levels were maintained at 0.1% (1.0 g/L) NaCN. The free cyanide was monitored by $AgNO_3$ titration, with additions of sodium cyanide made as required. The pH was maintained at 10.5 - 11.0 using hydrated lime.

Leached slurry was filtered and washed with 5 x 400 mLs water. Residues were dried, weighed and prepared for assay. Solutions (filtrate, wash and titration solutions) were analyzed for gold. Solutions were also titrated to determine residual cyanide.

3.5 Column Heap Leach Tests

Composite WC-6 was prepared by combining 3 kg of each of composites WC1-WC4, and used in HL1 and HL2. Composite WC-5 was not included due to poor leach extraction in Test BR2.

Two other composites were used for additional heap leach testwork. Composite WC-7 was prepared with equal weights of Dago 85001 and Dago 85003, and used in HL3. Composite WC-8, prepared in a manner identical to WC-1, was used in HL4.

Each composite was mixed and rolled to ensure homogeneity and used for the column heap leaches.

Agglomeration was performed on ore feed samples, but was not performed on tailings samples. Agglomeration tests were performed as follows:

1) HL1 - Ore feed - no agglomeration; 4.3 kg of ore was used.

2) HL2 - Ore feed - 7.2 kilograms of ore; 7.5 kg/t Portland II cement and 10 kg/t lime were added. Cyanide solution at a concentration of 10 g/L (addition equivalent to 1.5 kg/t) was sprayed on to the ore mixture with gentle rolling. The moisture content of the ore was 13% when agglomeration was complete. The ore mixture was then allowed to cure for 24 hours.

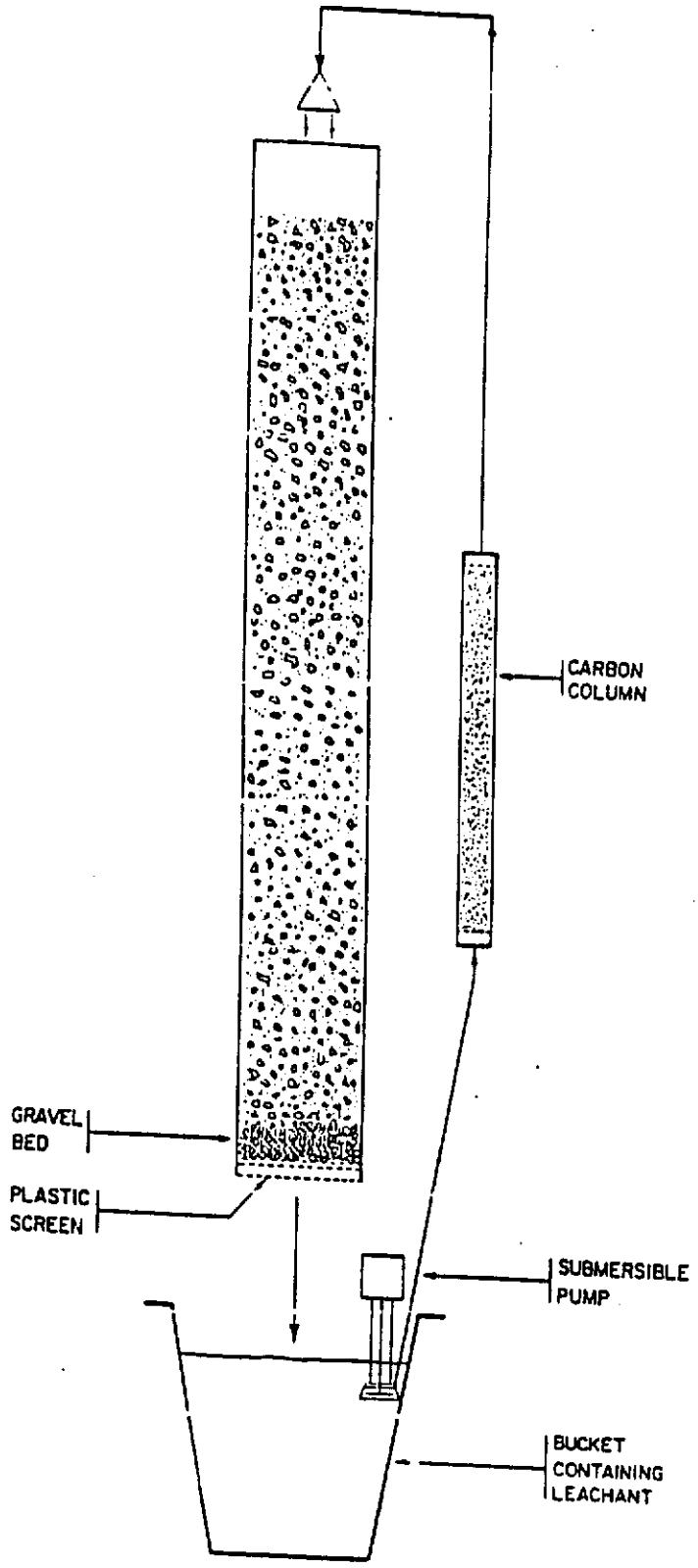
3) HL3 - Ore feed - 13.2 kg of ore; as for HL-2 but a 1 gpL cyanide solution was used (addition equivalent to 0.15 kg/t).

4) HL4 - Tailings - 15.1 kg of ore; the ore was sprayed with water and rolled to cause fines to stick to coarser particles.

A schematic of the heap leaching test operation is shown in Figure 2. Five centimetre diameter columns were used in Tests HL1 and 2. Fifteen centimetre diameter columns were used in tests HL 3 and 4.

Approximately 20 litres of tap water in a 25 litre bucket was adjusted to pH 11.0 using lime. Sodium cyanide was then added to a concentration of 1 gram per liter or 0.1%. Cyanide and pH levels were monitored frequently using a standard $AgNO_3$ titration for NaCN.

HEAP LEACH COLUMN TESTING
SCHEMATIC DIAGRAM



The cyanide solution was pumped to the top of the heap leach column. The pregnant solution at the bottom was first passed through a carbon column to strip contained gold. This column was 2 cm diameter by 40 cm long and containing approximately 10 - 20 grams of 6 x 16 Calgon GRC-22 activated carbon. The depleted gold solution leaving the carbon column was distributed on top of the leach column. The flow rate of solution was controlled using a pinch valve.

Solution and carbon samples were taken periodically and analyzed for gold.

At the completion of the leach cycle, the column was washed by recycling fresh water for 24 hours. The volume of the barren and wash solutions was measured and samples taken for cyanide and gold analyses. The column was emptied and the residue was oven-dried. The residue was weighed and a sample riffled out for analysis.

3.6 Analytical Procedures

Oversize material, gravity table concentrates and all screen fractions were prepared to -200 mesh, then assayed in one assay ton units by fire assay with atomic adsorption (A.A.) finish.

All residue assays were performed by combining the beads from two fire assays to increase resolution. All liquid samples from cyanide leaching tests were filtered and assayed for gold content directly by A.A., or by the Chiddey method. The detection limit by the Chiddey method is approximately 0.006 ppm Au.

The composite tails assays were obtained by doing four one assay ton fusions, and combining the beads into one assay. The assay limit for solids using a one assay ton sample is 0.03 g/t. Values below the detection limit were assigned a value of zero g/t Au.

3.7 Mineralogy

Microscopic examinations by stereobinocular microscope and polarizing microscope were conducted on four samples. The samples consisted of bulk material used for the leaching testwork.

The microscopy samples were riffled from -4 mesh bulk samples. After careful mixing of the bulk samples, one kilogram portions were riffled out and ground in a shatterbox until all the material passed 48 mesh.

Samples for head assays were also riffled out and ground to pass 150 mesh.

Each one kilogram sample was vanned using a 25 cm vanning plaque to concentrate the precious metals. Each concentrate was then dried, weighed and prepared into a 25 mm polished ore mount. The tailings material was filtered, dried and weighed. Two samples were riffled from each product for one assay ton fire assays. The duplicate tailings samples and the composite head samples were assayed, in sequence, for precious metal content.

The polished mounts of the vanned concentrates were scanned on the polarizing microscope at magnifications of 50x, 100x, 200x and 500x.

The remaining concentrates were examined by stereobinocular microscope for gold particles. The coarse gold could contribute to nugget effects. Each composite concentrate was examined at magnifications from 7x to 40x.

4.0 RESULTS

4.1 Evaluation of Gold Content

A description of the samples and their mining source locations are summarized in Appendix I.

A summary of the Phase I metallurgical evaluation results are presented in Table 1. Detailed mass balances are shown in Appendix II. A flowsheet illustrating the head assay calculation method is shown in Figure 3.

4.1.1 Screening

Gold levels for the individual samples ranged from <0.03 to 0.33 g/t Au with an average level of 0.08 g/t Au. Rejection of the +4 mesh fraction by screening resulted in products with 0.03 to 0.68 g/t Au (average 0.19 g/t). Concentration ratios were 1.4-3.1 times (average 2.4). Only trace amounts of gold were found in +4 mesh fractions.

Therefore, pre-concentration by screening was extremely successful.

4.1.2 Gravity Separation

Tabling was conducted firstly as a method of concentrating gold for assay purposes and only secondly as a potential processing method. Tabling was generally unsuccessful in concentrating the gold from the -4 mesh fractions. Gold recoveries ranged from 1 to 99%, with an average recovery of only 24.33% in 6.30% of the weight. Only two samples provided recoveries of over 50%. Concentrate grades ranged from 0.03 to 7.56 g/t Au (average 0.58 g/t).

Table 1

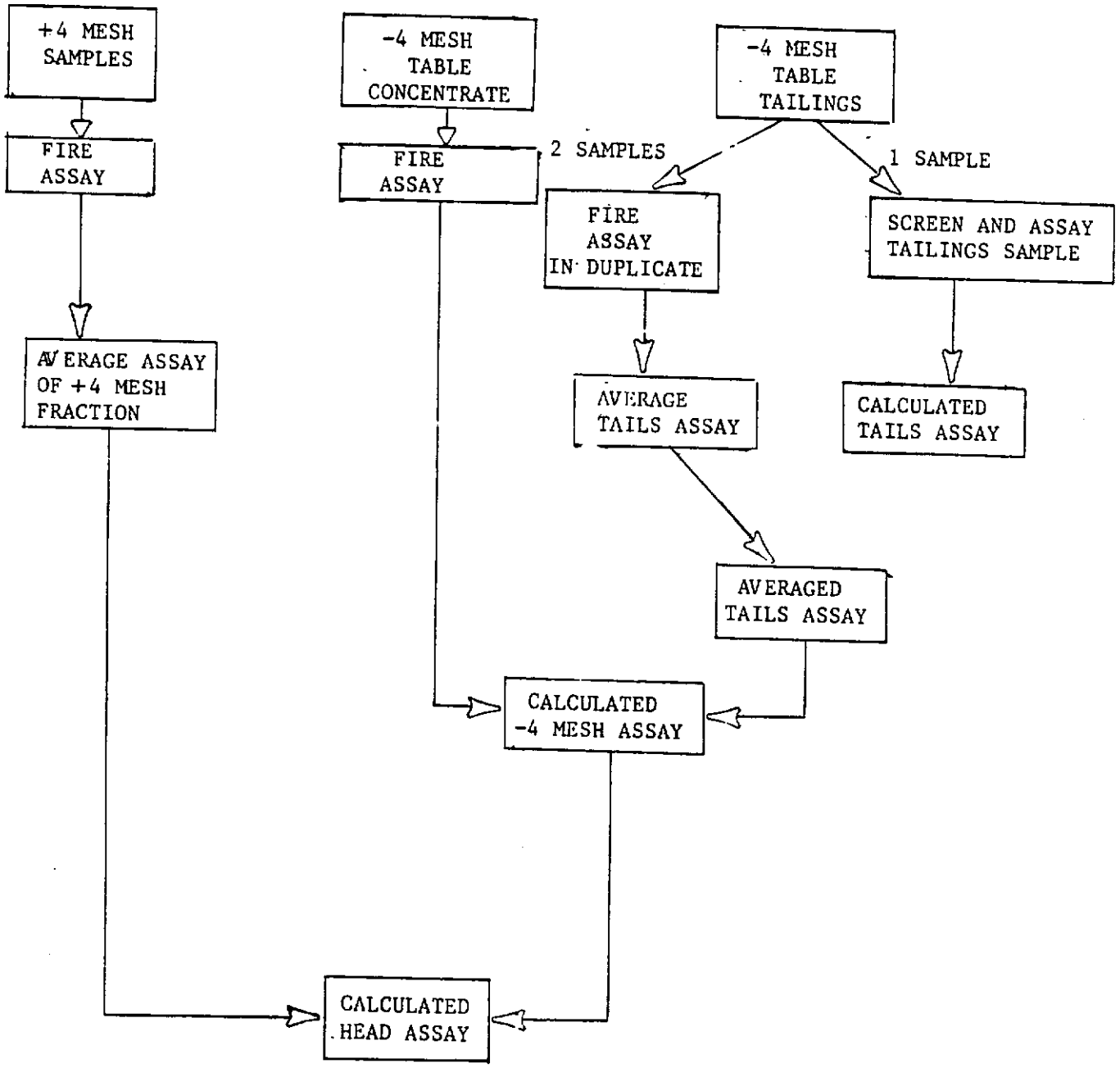
SUMMARY OF METALLURGICAL EVALUATION RESULTS

Source	Sample	Overall (g/t Au)	-4 Mesh Grade (g/t Au)	-4 Mesh % Wt Dist	-4 Mesh Conc Ratio	Table Conc (g/t Au)	Table Conc % Au Dist	Table Conc % Wt Dist
Dago Hill								
Section 85022	85001	0.10	0.26	38.04	2.6	2.56	> 99.00	3.86
	85002	0.04	0.09	45.66	2.2	< 0.03	< 1.00	5.04
	85003	0.05	0.12	42.08	2.4	1.81	49.25	2.74
	85004	0.05	0.15	36.54	2.7	0.52	36.80	4.17
	85005	0.11	0.32	33.81	3.0	0.79	6.57	2.21
	85006	0.03	0.08	38.08	2.6	0.10	11.35	5.25
	85007	0.07	0.10	72.82	1.4	< 0.03	> 1.00	18.44
	85008	< 0.03	< 0.03	44.70	2.2	< 0.03	> 1.00	3.51
	85009	0.06	0.12	53.16	1.9	< 0.03	> 1.00	8.10
	85010	0.06	0.14	39.42	2.5	0.37	18.34	4.19
	85017	0.05	0.12	42.74	2.3	0.16	14.26	4.56
	85018	0.11	0.24	45.56	2.2	0.24	9.33	8.27
	85019	0.12	0.25	46.66	2.1	1.26	40.58	4.15
	85020	< 0.03	< 0.03	36.20	2.8	< 0.03	> 1.00	5.78
	85023	0.33	0.68	48.19	2.1	2.15	52.19	7.36
	85024	0.06	0.18	30.94	2.2	0.80	40.23	3.26
	Avg.	0.07	0.18	40.86	2.5	0.52	23.68	5.68
Dago Hill	85011	0.14	0.44	32.03	3.1	0.41	11.49	4.57
	85012	0.17	0.43	39.24	2.5	1.03	72.46	14.32
	85013	< 0.03	< 0.03	31.02	3.2	< 0.03	> 1.00	7.19
	85014	0.02	0.05	39.02	2.6	< 0.03	> 1.00	4.61
	85015	0.08	0.18	42.61	2.3	0.61	39.86	12.80
	85016	< 0.03	< 0.03	38.65	2.6	< 0.03	> 1.00	9.63
	Avg.	0.07	0.18	37.10	2.7	0.46	20.64	8.85
Nugget Hill	85001	0.07	0.16	40.85	2.4	0.28	24.88	6.33
	85002	< 0.03	< 0.03	48.03	2.1	< 0.03	> 1.00	4.75
	85003	0.22	0.55	39.06	2.6	7.56	80.55	2.41
	Avg	0.10	0.22	42.65	2.3	1.48	35.14	4.50
Overall		0.08	0.19	41.80	2.4	0.58	24.33	6.30

0657A

ELOWSHEET FOR HEAD ASSAY CALCULATIONS

FIGURE 3



Therefore, gravity concentration was not successful as a method of concentrating gold for assay purposes, nor as a recovery method. Further jigging and tabling studies were not undertaken due to the very poor initial response.

4.1.3 Gold Distributions in Table Tails

Gold distributions in the table tails were quite variable, as shown in Appendix II. The data did not indicate any possibility of further pre-concentration by screening. There was no particular concentration of gold in the very coarse, or the very fine fractions, which would have a significant effect on leaching.

4.2. Metallurgical Evaluation

4.2.1 Leaching

The head assays for each of the composites used in the leaching testwork are summarized in Table 2. Leaching results are presented in Table 3. Summary leach data sheets are included in Apprendix III.

4.2.1.1 Bottle Leaching Tests

Gold extractions ranged from 1% for WC-5 (BR2) to 84.2% for WC-4 (BR5). There was virtually no gold detected in the leach products of WC-3 (BR4). Extractions for WC-1 (BR1) and WC-2 (BR3) were on the order of 20%.

The low extractions in three of the five tests were likely due to the relatively short retention time of 48 hours. Increased leaching time should have been allowed.

Cyanide consumptions were less than 0.5 kg/t. Lime consumptions were 1.8-3.1 kg/t (per tonne of -4 mesh feed).

4.2.1.2 Column Heap Leaching Tests

Leaching of WC-6 in HL1 was not possible. Plugging of the column by fines occured rapidly. Agglomeration of the same feed material in HL2 provided satisfactory percolation.

Gold extraction over seven days in HL2 was 65.29%. A longer retention time may have resulted in increased extraction. Cyanide and lime consumptions were 2.05 kg/t and 10.54 kg/t respectively (per tonne of -4 mesh feed). Most of the cyanide consumption was due to the addition (1.50 kg/t) made in the agglomeration. The cyanide used in the agglomeration of the feed for HL3 was therefore reduced.

Gold extractions in HL3 and HL4 were virtually complete. However, the calculated head assay was quite low. This was due to the difficulty in obtaining representative samples. Further testwork must be conducted to confirm extraction from samples containing representative gold levels.

No problems were encountered with plugging or flowrate reduction with the unagglomerated tailings feed in HL4. However, percolation rate in HL3 decreased after approximately 20 days from 0.03 USG/ft^2/min to 0.01 USG/ft^2/min.

Cyanide and lime consumptions were 0.57 kg/t and 10.00 kg/t for HL3. Cyanide consumption was 1.29 kg/t in HL4. Lime consumption was 0.50 kg/t.

Table 2

COMPOSITE ASSAYS

WC-1	Dago 85011	0.44
	Dago 85012	0.43
	Dago 85015	0.18
	Avg.	0.35
WC-5	Dago 85018	0.24
	Dago 85019	0.25
	Avg.	0.25
WC-2	Dago 85002	0.09
	Dago 85023	0.68
	Avg.	0.39
WC-3	Nugget 85003	0.55
	Avg.	0.55
WC-4	Dago 85005	0.32
	Avg.	0.32
WC-6	WC-1-4	0.40
WC-7	Dago 85001	0.26
	Dago 85003	0.12
	Avg.	0.19
WC-8	As WC-1	0.35

0657A

Table 3

LEACHING RESULTS

Test #	Composite #	Leach Type	Time Days	Consumptions (kg/t)			Au			
				NaCN	Lime	Cement	Residue g/t Au	Calc.Hd. g/t Au	Assay Hd. g/t Au	% Au Extr.
BR1	WC-1	Bottle	2.0	0.09	1.83	-	0.42	0.51	0.35	18.8
BR2	WC-5	Bottle	2.0	0.24	2.75	-	0.42	0.42	0.25	tr
BR3	WC-2	Bottle	2.0	0.11	3.16	-	0.31	0.39	0.39	21.6
BR4	WC-3	Bottle	2.0	0.16	2.68	-	<0.03	0.05	0.55	>99
BR5	WC-4	Bottle	2.0	0.43	2.28	-	0.06	0.38	0.32	84.2
HL1	WC-6	Heap	NA	NA	NA	7.5	NA	NA	NA	NA
HL2	WC-6	Heap	7.0	2.05	10.54	7.5	0.215	0.63	0.40	65.3
HL3	WC-7	Heap	30.0	0.57	10.00	7.5	<0.03	0.04	0.19	>99
HL4	WC-8	Heap	30.0	1.29	0.50	7.5	<0.03	0.05	0.35	>99

4.3 Mineralogy

The stereobinocular microscope examination identified the presence of fourteen native gold particles. The gold formed irregular, flattened, elongate to equant particles occurring as free grains. These showed localized greyish discolouration and/or contained white inclusions, possibly silica or clays. The frequency and size distribution of the gold occurrences is given in Table 4.

Table 4

DISTRIBUTION OF GOLD PARTICLES IN VAN CONCENTRATES

Sample #	Approximate Size (microns)
WC-1	1. 75 - 100
	2. 200
	3. 150 - 200
WC-2	1. 50 - 75
	2. 200 - 250
WC-3	1. 200 x 650 - 700
	2. 150 - 200
	3. 100 - 150
	4. 100 - 200
	5. 200
	6. 150 - 200
WC-4	1. 200 - 250
	2. 150 - 200
	3. 200 - 225

The gold particles varied in length from 50-700 microns with most grains in the 150-250 micron range. The flattened particles were from 10-50 microns in thickness.

The microscopic investigation of the polished mounts using the polarizing microscope identified a single free particle of gold. This was 60-70 microns in diameter (composite sample WC-3).

Most of the observed gold particles were in themselves large enough to have been recovered on the shaking table. In fact, coarse gold, which occurred in at least one feed sample within three of the four composites (i.e. WC-1, 2 and 3), was concentrated on the table.

The high density gangue mineralogy comprised rutile, magnetite, hematite, sphene, iron hydroxides (limonite), pyrite, chalcopyrite, pyrrhotite, psilomelane, pyrolusite, and arsenopyrite.

5.0 DISCUSSION AND RECOMMENDATIONS

1. The White Channel gravels have a very low grade gold occurrence, with the average calculated head assay for all 25 samples being 0.08 g/t Au. Calculated average assays of the -4 mesh fraction are higher in grade at 0.19 g/t Au. By screening the gravels at 4 mesh and rejecting the oversize material, the gold content of the gravel can be upgraded by approximately 2.4 times, with no gold losses.

2. The nature of the gold distribution in this type of deposit commonly causes inherent difficulties in sampling and fire assaying due to nugget effect. Sample splits gave variable assays on the same material. Consequently, mass balances from leaching tests were more wide-ranging than is generally acceptable. A more successful method of obtaining reliable head assays would be to cyanide leach a large quantity of ore, and assay the leach solutions and the residue.

3. The cyanide bottle leaching tests were inconclusive in indicating gold extraction levels. Extraction by heap leaching was 65% after seven days. Subsequent tests provided virtually complete extraction, but on lower grade material. Further larger scale testwork is required to confirm gold extractions, and to confirm the improved agglomeration procedures.

4. The mineralogical examinations supported the assumption that assay inconsistencies were caused by nugget effect. The sparse distribution of gold particles within the samples (3 to 6 coarse free gold particles/kg) gives an indication of the high probability of sampling error. Coarse gold was observed in all of the composites.

APPENDIX I

Description of Samples

DESCRIPTION OF SAMPLES: WHITE CHANNEL GRAVELS

A: NUGGET HILL

1. 85001 - 0.0 to 0.5 metres above bedrock contact.
2. 85002 - 1.0 to 1.5 metres above bedrock contact.
3. 85003 - 1.5 to 2.0 metres above bedrock contact.

B: DAGO HILL

4. 85011 - White Channel tailings.
5. 85012 - White Channel tailings.
6. 85013 - White Channel tailings.
7. 85014 - White Channel tailings.
8. 85015 - White Channel tailings.
9. 85016 - White Channel tailings.

SECTION 85022

10. 85001 - 1.0 metres above bedrock contact.
11. 85002 - 3.0 metres above bedrock contact.
12. 85003 - 5.0 metres above bedrock contact.
13. 85004 - 7.0 metres above bedrock contact.
14. 85005 - 9.0 metres above bedrock contact.
15. 85006 - 11.0 metres above bedrock contact.
16. 85007 - 0.5 to 1.0 metres below bedrock contact at 20 metres south of Dago 85001.
17. 85008 - 2.0 metres below bedrock contact at 20 metres south of Dago 85001.
18. 85009 - 3.0 to 3.5 metres above bedrock contact at 45 metres south of Dago 85001.
19. 85010 - 3.0 to 3.5 metres above bedrock contact at 70 metres south of Dago 85001.
20. 85017 - 13.0 metres above bedrock contact.
21. 85018 - 15.0 metres above bedrock contact.
22. 85019 - 17.0 metres above bedrock contact.
23. 85020 - 19.0 metres above bedrock contact.
24. 85021* - 21.0 metres above bedrock contact.
25. 85022* - 23.0 metres above bedrock contact.
26. 85023 - 2.0 metres above bedrock contact.
27. 85024 - 4.0 metres above bedrock contact.

* - no Phase I analyses done.

APPENDIX II

MASS BALANCE AND SCREEN ANALYSIS DATA

DAGO HILL 85001 MASS BALANCE CALCULATIONS

Fraction	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
Tails	7368	<0.03	0	0	34.18
Conc	833	2.56	2.13	100	3.86
+4 Mesh	13355	< 0.03	0	0	61.96
TOTAL	21555	0.10	2.13	100	100.00

Calculated -4 Mesh Assay of Tails and Concentrate = 0.26 g/T Au

SCREEN DISTRIBUTION OF -4 MESH TABLE TAILINGS

Mesh	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
+35	36.9	<0.03	-	-	17.86
+65	33.4	< 0.03	-	-	16.15
+115	31.6	< 0.03	-	-	15.28
+200	18.0	< 0.03	-	-	8.70
-200	86.8	< 0.03	-	-	42.01
TOTAL	206.7	< 0.03	-	-	100.00

1. Tails Assay Done in Duplicate = (< 0.03 + < 0.03)/2 = < 0.03 g/T Au
2. Calculated Tails Assay From Screen Analysis = < 0.03 g/T Au
3. Triplicate Assays of +4 Mesh Material for Mass Balance Calculation
   (< 0.03 + < 0.03 + < 0.03)/3 = < 0.03 g/T Au
4. Dago Hill 85001 Calculated Head Assays = 0.10 g/T Au

DAGO HILL 85002 MASS BALANCE CALCULATIONS

Product	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
Tails	8106	0.10	0.8106	100	40.62
Conc	1006	< 0.03	0	0	5.04
+4 Mesh	10843	< 0.03	0	0	54.34
TOTAL	19955	0.04	0.8106	100	100.00

Calculated -4 Mesh Assay of Tails and Concentrate = 0.09 g/T Au

SCREEN DISTRIBUTION OF -4 MESH TABLE TAILINGS

Mesh	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
+35	55.6	0.29	0.0161	8.09	28.65
+65	34.3	0.23	0.0079	3.97	17.67
+115	27.0	< 0.03	0.0008	0.40	13.91
+200	21.4	7.23	0.1547	77.74	11.02
-200	55.8	0.35	0.0195	9.80	28.75
TOTAL	194.1	1.03	0.1990	100.00	100.00

1. Tails Assay Done in Duplicate = (0.10 + 0.09)/2 = 0.10 g/T Au
2. Calculated Tails Assay From Screen Analysis = 1.03 g/T Au
3. Triplicate Assays of +4 Mesh Material for Mass Balance Calculation
   (< 0.03 + < 0.03 + < 0.03)/3 = < 0.03 g/T Au
4. Dago Hill 85002 Calculated Head Assay = 0.04 g/T Au

0657A

DAGO HILL 85003 MASS BALANCE CALCULATIONS

Product	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
Tails	8323	< 0.03	0	48.76	39.34
Conc	580	1.81	1.0498	51.24	2.74
+4 Mesh	12252	< 0.03	0	0	57.92
TOTAL	21155	0.05	1.0498	100.00	100.00

Calculated -4 Mesh Assay of Tails and Concentrate = 0.12 g/T Au

SCREEN DISTRIBUTION OF -4 MESH TABLE TAILINGS

Mesh	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
+35	48.9	0.24	0.0117	16.05	15.84
+65	70.1	0.27	0.0189	25.93	22.72
+115	62.8	0.27	0.0169	23.18	20.35
+200	41.5	0.20	0.0083	11.38	13.44
-200	85.3	0.20	0.0171	23.46	27.65
TOTAL	308.6	0.24	0.0729	100.00	100.00

1. Tails Assay Done in Duplicate = (< 0.03 + < 0.03)/2 = < 0.03 g/T Au
2. Calculated Tails Assay From Screen Analysis = 0.24 g/T Au
3. Triplicate Assays of +4 Mesh Material for Mass Balance Calculation
   (< 0.03 + < 0.03 + < 0.03)/3 = < 0.03 g/T Au
4. Dago Hill 85003 Calculated Head Assays = 0.05 g/T Au

DAGO HILL 85004 MASS BALANCE CALCULATIONS

Product	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
Tails	5680	0.10	0.5680	63.18	32.37
Conc	732	0.52	0.3806	36.82	4.17
+4 Mesh	11133	<0.03	0	0	63.46
TOTAL	17545	0.05	0.9486	100.00	100.00

Calculated -4 Mesh Assay of Tails and Concentrate = 0.15 g/T Au

SCREEN DISTRIBUTION OF -4 MESH TABLE TAILINGS

Mesh	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
+35	52.5	0.11	0.0057	26.76	33.15
+65	33.1	0.12	0.0040	18.78	20.90
+115	20.3	0.13	0.0026	12.21	12.81
+200	12.4	0.31	0.0038	17.84	7.82
-200	40.1	0.13	0.0052	24.41	25.32
TOTAL	158.4	0.13	0.0213	100.00	100.00

1. Tails Assay Done in Duplicate = (0.10 + 0.10)/2 = 0.10 g/T Au
2. Calculated Tails Assay From Screen Analysis = 0.13 g/T Au
3. Triplicate Assays of +4 Mesh Material for Mass Balance Calculation
   (<0.03 + <0.03 + <0.03)/3 = 0.03 g/T Au
4. Dago Hill 85004 Calculated Head Assays = 0.05 g/T Au

DAGO HILL 85005 MASS BALANCE CALCULATIONS

Product	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
Tails	6969	0.29	2.0210	93.43	31.60
Conc	487	0.79	0.3847	6.57	2.21
+4 Mesh	14600	<0.03	0	0	66.19
TOTAL	22056	0.11	2.4057	100.00	100.00

Calculated -4 Mesh Assay of Tails and Concentrate = 0.32 g/T Au

SCREEN DISTRIBUTION OF -4 MESH TABLE TAILINGS

Mesh	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
+35	59.8	0.29	0.0173	6.50	28.67
+65	44.1	3.81	0.1680	63.13	21.14
+115	26.5	0.86	0.0228	8.57	12.70
+200	18.8	1.85	0.0348	13.08	9.01
-200	59.4	0.39	0.0232	8.72	28.48
TOTAL	208.6	1.28	0.2661	100.00	100.00

1. Tails Assay Done in Duplicate = (0.29 + 0.29)/2 = 0.29 g/T Au
2. Calculated Tails Assay From Screen Analysis = 1.28 g/T Au
3. Triplicate Assays of +4 Mesh Material for Mass Balance Calculation
   (<0.03 + <0.03 + <0.03)/3 = <0.03 g/T Au
4. Dago Hill 85005 Calculated Head Assays = 0.11 g/T Au

DAGO HILL 85006 MASS BALANCE CALCULATIONS

Product	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
Tails	6960	0.08	0.5568	88.65	32.83
Conc	1114	0.10	0.1114	11.35	5.25
+4 Mesh	13124	< 0.03	0	0	61.92
TOTAL	21198	0.03	0.6682	100.00	100.00

Calculated -4 Mesh Assay of Tails and Concentrate = 0.08 g/T Au

SCREEN DISTRIBUTION OF -4 MESH TABLE TAILINGS

Mesh	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
+35	30.5	0.11	0.0034	11.56	17.47
+65	46.4	0.12	0.0056	19.05	26.59
+115	28.2	0.18	0.0051	17.35	16.16
+200	16.6	0.22	0.0037	12.59	9.51
-200	52.8	0.22	0.0116	39.45	30.27
TOTAL	174.5	0.17	0.0294	100.00	100.00

1. Tails Assay Done in Duplicate = (0.08 + 0.08)/2 = 0.08 g/T Au
2. Calculated Tails Assay From Screen Analysis = 0.17 g/T Au
3. Triplicate Assays of +4 Mesh Material for Mass Balance Calculation
   (<0.03 + <0.03 + <0.03)/3 = <0.03 g/T Au
4. Dago Hill 85006 Calculated Head Assays = 0.03 g/T Au

0657A

DAGO HILL 85007 MASS BALANCE CALCULATIONS

Product	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
Tails	9441	0.13	1.2273	100	54.38
Conc	3201	< 0.03	0	0	18.44
+4 Mesh	4720	< 0.03	0	0	27.18
TOTAL	17362	0.07	1.2273	100	100.00

Calculated -4 Mesh Assay of Tails and Concentrate = 0.10 g/T Au

SCREEN DISTRIBUTION OF -4 MESH TABLE TAILINGS

Mesh	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
+35	55.4	0.19	0.0105	19.92	38.62
+65	18.9	0.41	0.0077	14.61	13.17
+115	11.3	0.60	0.0068	12.90	7.87
+200	9.9	0.67	0.0066	12.52	6.89
-200	48.0	0.44	0.0211	40.05	33.45
TOTAL	143.5	0.37	0.0527	100.00	100.00

1. Tails Assay Done in Duplicate = (0.12 + 0.14)/2 = 0.13 g/T Au
2. Calculated Tails Assay From Screen Analysis = 0.37 g/T Au
3. Average Tails Assay for Mass Balance Calculation

   (0.13 + 0.37)/2 = 0.25 g/T Au

5. Dago Hill 85007 Calculated Head Assays = 0.07 g/T Au

DAGO HILL 85008 MASS BALANCE CALCULATIONS

Product	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
Tails	9245	< 0.03	-	-	41.19
Conc	787	< 0.03	-	-	3.51
+4 Mesh	12414	< 0.03	-	-	55.30
TOTAL	22446	< 0.03	-	-	100.00

Calculated -4 Mesh Assay of Tails and Concentrate = 0.03 g/T Au

SCREEN DISTRIBUTION OF -4 MESH TABLE TAILINGS

Mesh	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
+35	84.9	< 0.03	-	-	28.17
+65	48.1	< 0.03	-	-	15.95
+115	42.2	< 0.03	-	-	14.00
+200	29.9	< 0.03	-	-	9.92
-200	96.3	< 0.03	-	-	31.96
TOTAL	301.4	< 0.03	-	-	100.00

1. Tails Assay Done in Duplicate = (< 0.03 + < 0.03)/2 = < 0.03 g/T Au
2. Calculated Tails Assay From Screen Analysis = < 0.03 g/T Au
3. Triplicate Assays of +4 Mesh Material for Mass Balance Calculation
   (< 0.03 + < 0.03 + < 0.03)/3 = < 0.03 g/T Au
4. Dago Hill 85008 Calculated Head Assays = < 0.03 g/T Au

DAGO HILL 85009 MASS BALANCE CALCULATIONS

Product	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
Tails	9581	0.14	1.3413	100	45.06
Conc	1723	<0.03	0	0	8.10
+4 Mesh	9960	<0.03	0	0	46.84
TOTAL	21264	0.06	1.3413	100	100.00

Calculated -4 Mesh Assay of Tails and Concentrate = 0.12 g/T Au

SCREEN DISTRIBUTION OF -4 MESH TABLE TAILINGS

Mesh	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
+35	111.1	<0.03	0	0	36.83
+65	61.9	<0.03	0	0	20.52
+115	37.8	0.24	0.0091	21.72	12.52
+200	23.5	0.59	0.0139	33.17	7.78
-200	67.4	0.28	0.0189	45.11	22.35
TOTAL	301.7	0.14	0.0419	100.00	100.00

1. Tails Assay Done in Duplicate = (0.12 + 0.15)/2 = 0.14 g/T Au
2. Calculated Tails Assay From Screen Analysis = 0.14 g/T Au
3. Triplicate Assays of +4 Mesh Material for Mass Balance Calculation
   (<0.03 + <0.03 + <0.03)/3 = <0.03 g/T Au
4. Dago Hill 85009 Calculated Head Assays = 0.06 g/T Au

DAGO HILL 85010 MASS BALANCE CALCULATIONS

Product	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
Tails	7146	0.13	0.9290	81.61	35.23
Conc	849	0.370	0.3141	18.39	4.19
+4 Mesh	12287	<0.03	0	0	60.58
TOTAL	20282	0.06	1.2431	100.00	100.00

Calculated -4 Mesh Assay of Tails and Concentrate = 0.16 g/T Au

SCREEN DISTRIBUTION OF -4 MESH TABLE TAILINGS

Mesh	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
+35	46.8	0.20	0.0094	19.18	25.33
+65	42.2	0.24	0.0101	20.61	22.83
+115	26.8	0.33	0.0088	17.96	14.50
+200	18.8	0.37	0.0070	14.29	9.84
-200	50.8	0.27	0.0137	27.96	27.50
TOTAL	184.8	0.26	0.0490	100.00	100.00

1. Tails Assay Done in Duplicate = (< 0.03 + 0.13)/2 = 0.13* g/T Au
2. Calculated Tails Assay From Screen Analysis = 0.26 g/T Au
3. Triplicate Assays of +4 Mesh Material for Mass Balance Calculation
   (< 0.03 + < 0.03 + < 0.03)/3 = <0.03 g/T Au
4. Dago Hill 850010 Calculated Head Assays = 0.06 g/T Au

* 0.13 g/t Au used; < 0.03 g/t Au appears to be too low when compared with screen analyses assays.

0657A

DAGO HILL 85011 MASS BALANCE CALCULATIONS

Product	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
Tails	7330	0.44	3.2252	88.51	27.46
Conc	1219	0.41	0.4998	11.49	4.57
+4 Mesh	18142	<0.03	0	0	67.97
TOTAL	26691	0.14	3.7250	100.00	100.00

Calculated -4 Mesh Assay of Tails and Concentrate = 0.44 g/T Au

SCREEN DISTRIBUTION OF -4 MESH TABLE TAILINGS

Mesh	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
+35	85.3	0.36	0.0307	29.35	50.03
+65	38.2	0.48	0.0183	17.50	22.41
+115	16.8	1.12	0.0188	17.97	9.85
+200	8.0	1.83	0.0146	13.96	4.69
-200	22.2	1.00	0.0222	21.22	13.02
TOTAL	170.5	0.61	0.1046	100.00	100.00

1. Tails Assay Done in Duplicate = (0.44 + 0.44)/2 = 0.44 g/T Au
2. Calculated Tails Assay From Screen Analysis = 0.61 g/T Au
3. Triplicate Assays of +4 Mesh Material for Mass Balance Calculation
   (<0.03 + < 0.03 + < 0.03)/3 = < 0.03 g/T Au
4. Dago Hill 850011 Calculated Head Assays = 0.14 g/T Au

DAGO HILL 85013 MASS BALANCE CALCULATIONS

Product	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
Tails	6100	< 0.03	-	-	23.83
Conc	1840	< 0.03	-	-	7.19
+4 Mesh	17652	< 0.03	-	-	68.98
TOTAL	25592	< 0.03	-	-	100.00

Calculated -4 Mesh Assay of Tails and Concentrate = 0.03 g/T Au

SCREEN DISTRIBUTION OF -4 MESH TABLE TAILINGS

Mesh	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
+35	113.3	< 0.03	-	-	54.94
+65	59.6	< 0.03	-	-	28.89
+115	22.4	< 0.03	-	-	10.85
+200	7.7	< 0.03	-	-	3.73
-200	3.3	< 0.03	-	-	1.59
TOTAL	206.3	< 0.03	-	-	100.00

1. Tails Assay Done in Duplicate = (< 0.03 + < 0.03)/2 = 0.03 g/T Au
2. Calculated Tails Assay From Screen Analysis = < 0.03 g/T Au
3. Triplicate Assays of +4 Mesh Material for Mass Balance Calculation
   (0.10 + < 0.03 + < 0.03)/3 = < 0.03 g/T Au
4. Dago Hill 850013 Calculated Head Assays = < 0.03 g/T Au

0657A

DAGO HILL 85014 MASS BALANCE CALCULATIONS

Product	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
Tails	8284	< 0.03	0	0	34.41
Conc	1109	0.39	0.4325	100	4.61
+4 Mesh	14682	< 0.03	0	0	60.98
TOTAL	24075	0.02	0.4325	100	100.00

Calculated -4 Mesh Assay of Tails and Concentrate = 0.05 g/T Au

SCREEN DISTRIBUTION OF -4 MESH TABLE TAILINGS

Mesh	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
+35	149.8	< 0.03	-	-	69.37
+65	33.6	< 0.03	-	-	15.55
+115	13.5	< 0.03	-	-	6.25
+200	5.7	< 0.03	-	-	2.63
-200	13.4	< 0.03	-	-	6.20
TOTAL	216.0	< 0.03	-	-	100.00

1. Tails Assay Done in Duplicate = (< 0.03 + < 0.03)/2 = < 0.03 g/T Au
2. Calculated Tails Assay From Screen Analysis = < 0.03 g/T Au
3. Triplicate Assays of +4 Mesh Material for Mass Balance Calculation
   (< 0.03 + < 0.03 + < 0.03)/3 = < 0.03 g/T Au
4. Dago Hill 850014 Calculated Head Assay = 0.02 g/T Au

DAGO HILL 85012 MASS BALANCE CALCULATIONS

Product	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
Tails	5252	0.08	0.4202	27.54	24.92
Conc	3018	1.030	3.1085	72.46	14.32
+4 Mesh	12806	< 0.03	0	0	60.76
TOTAL	21076	0.17	3.5287	100.00	100.00

Calculated -4 Mesh Assay of Tails and Concentrate = 0.43 g/T Au

SCREEN DISTRIBUTION OF -4 MESH TABLE TAILINGS

Mesh	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
+35	102.9	0.21	0.0216	36.55	64.02
+65	31.5	0.28	0.0088	14.89	19.58
+115	11.8	0.79	0.0093	15.74	7.33
+200	5.6	1.61	0.0090	15.22	3.48
-200	9.0	1.16	0.0104	17.60	5.59
TOTAL	160.8	0.37	0.0591	100.00	100.00

1. Tails Assay Done in Duplicate = (0.08 + 0.08)/2 = 0.08 g/T Au
2. Calculated Tails Assay From Screen Analysis = 0.37 g/T Au
3. Triplicate Assays of +4 Mesh Material for Mass Balance Calculation
   (< 0.03 + < 0.03 + < 0.03)/3 = < 0.03 g/T Au
4. Dago Hill 850011 Calculated Head Assays = 0.17 g/T Au

DAGO HILL 85015 MASS BALANCE CALCULATIONS

Product	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
Tails	7247	< 0.03	0	1.52	29.81
Conc	3111	0.61	1.8977	96.32	12.80
+4 Mesh	13953	< 0.03	0	0.00	57.39
TOTAL	24311	0.08	1.8977	100.00	100.00

Calculated -4 Mesh Assay of Tails and Concentrate = 0.18 g/T Au

SCREEN DISTRIBUTION OF -4 MESH TABLE TAILINGS

Mesh	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
+35	55.9	< 0.03	0	0	38.25
+65	32.7	< 0.03	0	0	22.36
+115	24.0	< 0.03	0	0	16.41
+200	16.2	< 0.03	0	0	11.08
-200	17.4	0.18	0.0031	100	11.90
TOTAL	146.2	0.02	0.0031	100	100.00

1. Tails Assay Done in Duplicate = (<0.03 + <0.03)/2 = <0.03 g/T Au
2. Calculated Tails Assay From Screen Analysis = 0.02 g/T Au
3. Triplicate Assays of +4 Mesh Material for Mass Balance Calculation
   0.61, < 0.03, < 0.03 = < 0.03 g/T Au *
4. Dago Hill 850015 Calculated Head Assays = 0.08 g/T Au

* 0.61 g/t Au in ore assay considered anaomalously high.

0657A

DAGO HILL 85016 MASS BALANCE CALCULATIONS

Product	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
Tails	6167	< 0.03	0	100	29.02
Conc	2046	< 0.03	0	0	9.63
+4 Mesh	13039	< 0.03	0	0	61.35
TOTAL	21252	< 0.03	0	100	100.00

Calculated -4 Mesh Assay of Tails and Concentrate = 0.03 g/T Au

SCREEN DISTRIBUTION OF -4 MESH TABLE TAILINGS

Mesh	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
+35	194.3	< 0.03	0	0	51.72
+65	91.7	< 0.03	0	0	24.40
+115	38.7	< 0.03	0	0	10.29
+200	16.2	< 0.03	0	0	4.31
-200	34.9	0.25	0.0087	100	9.28
TOTAL	375.8	0.02	0.0087	100	100.00

1. Tails Assay Done in Duplicate = (< 0.03 + < 0.03)/2 = < 0.03 g/T Au
2. Calculated Tails Assay From Screen Analysis = 0.02 g/T Au
3. Triplicate Assays of +4 Mesh Material for Mass Balance Calculation
   (< 0.03 + < 0.03 + < 0.03)/3 = < 0.03 g/T Au
4. Dago Hill 850016 Calculated Head Assays = < 0.03 g/T Au

DAGO HILL 85017 MASS BALANCE CALCULATIONS

Product	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
Tails	6526	0.11	0.7179	85.74	38.18
Conc	780	0.16	0.1248	14.26	4.56
+4 Mesh	9786	0.03	0	0	57.26
TOTAL	17092	0.05	0.8427	100.00	100.00

Calculated -4 Mesh Assay of Tails and Concentrate = 0.12 g/T Au

SCREEN DISTRIBUTION OF -4 MESH TABLE TAILINGS

Mesh	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
+35	31.8	< 0.03	0.0010	4.72	17.32
+65	30.9	< 0.03	0.0009	4.25	16.83
+115	27.3	0.24	0.0066	31.13	14.86
+200	22.3	0.57	0.0127	59.90	12.14
-200	71.3	0.03	0	0	38.85
TOTAL	183.6	0.12	0.0212	100.00	100.00

1. Tails Assay Done in Duplicate = (0.11 + 0.11)/2 = 0.11 g/T Au
2. Calculated Tails Assay From Screen Analysis = 0.12 g/T Au
3. Triplicate Assays of +4 Mesh Material for Mass Balance Calculation
   (<0.03 + < 0.03 + < 0.03)/3 = < 0.03 g/T Au
4. Dago Hill 850017 Calculated Head Assays = 0.05 g/T Au

0657A

DAGO HILL 85018 MASS BALANCE CALCULATIONS

Product	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
Tails	6938	0.24	1.6651	81.43	36.29
Conc	1582	0.24	0.3797	18.57	8.27
+4 Mesh	10600	< 0.03	0	0.0	55.44
TOTAL	19120	0.11	2.0448	100.00	100.00

Calculated -4 Mesh Assay of Tails and Concentrate = 0.24 g/T Au

SCREEN DISTRIBUTION OF -4 MESH TABLE TAILINGS

Mesh	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
+35	155.0	< 0.03	0	0	49.42
+65	48.9	4.11	0.2010	100	15.58
+115	27.9	< 0.03	0	0	8.89
+200	18.7	< 0.03	0	0	5.96
-200	63.2	< 0.03	0	0	20.15
TOTAL	313.7	0.64	0.2010	100	100.00

1. Tails Assay Done in Duplicate = (0.24 + 0.24)/2 = 0.24 g/T Au
2. Calculated Tails Assay From Screen Analysis = 0.64 g/T Au
3. Triplicate Assays of +4 Mesh Material for Mass Balance Calculation
   (< 0.03 + < 0.03 + < 0.03)/3 = 0.03 g/T Au
4. Dago Hill 850018 Calculated Head Assays = 0.11 g/T Au

DAGO HILL 85019 MASS BALANCE CALCULATIONS

Product	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
Tails	7976	0.15	1.1964	59.42	42.51
Conc	778	1.26	0.9803	40.58	4.15
+4 Mesh	10010	< 0.03	0	0	53.34
TOTAL	18764	0.12	2.1767	100.00	100.00

Calculated -4 Mesh Assay of Tails and Concentrate = 0.25 g/T Au

SCREEN DISTRIBUTION OF -4 MESH TABLE TAILINGS

Mesh	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
+35	81.7	< 0.03	0	0	34.65
+65	50.6	< 0.03	0	0	21.46
+115	31.0	0.83	0.0257	52.02	13.14
+200	16.4	0.66	0.0108	21.86	6.95
-200	56.1	0.23	0.0129	26.12	23.80
TOTAL	235.8	0.21	0.0494	100.00	100.00

1. Tails Assay Done in Duplicate = (0.11 + 0.19)/2 = 0.15 g/T Au
2. Calculated Tails Assay From Screen Analysis = 0.21 g/T Au
3. Triplicate Assays of +4 Mesh Material for Mass Balance Calculation
   (< 0.03 + < 0.03 + < 0.03)/3 = < 0.03 g/T Au
4. Dago Hill 850019 Calculated Head Assays = 0.12 g/T Au

DAGO HILL 85020 MASS BALANCE CALCULATIONS

	Weight	Assay	Units	% Distribution	
Product	(g)	(g/T)	(mg)	Au	Wt
Tails	6091	< 0.03	-	-	30.42
Conc	1158	< 0.03	-	-	5.78
+4 Mesh	12776	< 0.03	-	-	63.80
TOTAL	20025	< 0.03	-	-	100.00

Calculated -4 Mesh Assay of Tails and Concentrate = 0.03 g/T Au

SCREEN DISTRIBUTION OF -4 MESH TABLE TAILINGS

	Weight	Assay	Units	% Distribution	
Mesh	(g)	(g/T)	(mg)	Au	Wt
+35	78.8	< 0.03	-	-	45.10
+65	30.8	< 0.03	-	-	17.62
+115	17.4	< 0.03	-	-	9.92
+200	11.3	< 0.03	-	-	6.46
-200	36.5	< 0.03	-	-	20.90
TOTAL	174.8	< 0.03	-	-	100.00

1. Tails Assay Done in Duplicate = (<0.03 + < 0.03)/2 = < 0.03 g/T Au
2. Calculated Tails Assay From Screen Analysis = < 0.03 g/T Au
3. Triplicate Assays of +4 Mesh Material for Mass Balance Calculation
   (< 0.03 + < 0.03 + < 0.03)/3 = < 0.03 g/T Au
4. Dago Hill 850020 Calculated Head Assays = < 0.03 g/T Au

0657A

WD1

DAGO HILL 85023 MASS BALANCE CALCULATIONS

Product	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
Tails	7408	0.41	3.0373	47.81	40.83
Conc	1335	2.15	2.8703	52.19	7.36
+4 Mesh	9400	< 0.03	0	0	51.81
TOTAL	18143	0.33	5.9076	100.00	100.00

Calculated -4 Mesh Assay of Tails and Concentrate = 0.68 g/T Au

SCREEN DISTRIBUTION OF -4 MESH TABLE TAILINGS

Mesh	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
+35	46.4	0.13	0.0060	11.21	25.65
+65	36.5	0.14	0.0051	9.53	20.18
+115	25.0	0.40	0.0100	18.69	13.81
+200	19.0	1.08	0.0205	38.32	10.50
-200	54.0	0.22	0.0119	22.25	29.86
TOTAL	180.9	0.30	0.0535	100.00	100.00

1. Tails Assay Done in Duplicate = (0.41 + 0.41)/2 = 0.41 g/T Au
2. Calculated Tails Assay From Screen Analysis = 0.30 g/T Au
3. Triplicate Assays of +4 Mesh Material for Mass Balance Calculation
   (<0.03 + <0.03 + <0.03)/3 = < 0.03 g/T Au
4. Dago Hill 850023 Calculated Head Assays = 0.33 g/T Au

0657A

WDI

DAGO HILL 85024 MASS BALANCE CALCULATIONS

Product	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
Tails	6257	0.11	0.6883	59.77	27.70
Conc	737	0.80	0.5896	40.23	3.26
+4 Mesh	15590	< 0.03	0	0	69.06
TOTAL	25285	0.06	1.2779	100.00	100.00

Calculated -4 Mesh Assay of Tails and Concentrate = 0.18 g/T Au

SCREEN DISTRIBUTION OF -4 MESH TABLE TAILINGS

Mesh	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
+35	165.1	0.13	0.0215	46.94	62.50
+65	41.7	0.14	0.0058	12.66	15.79
+115	13.1	0.40	0.0052	11.35	4.95
+200	4.2	1.08	0.0045	9.83	1.58
-200	40.1	0.22	0.0088	19.22	15.18
TOTAL	264.2	0.17	0.0458	100.00	100.00

1. Tails Assay Done in Duplicate = (0.11 + 0.11)/2 = 0.11 g/T Au
2. Calculated Tails Assay From Screen Analysis = 0.17 g/t Au
3. Triplicate Assays of +4 Mesh Material for Mass Balance Calculation
   (< 0.03 + < 0.03 + < 0.03)/3 = < 0.03 g/T Au
4. Dago Hill 850024 Calculated Head Assays = 0.06 g/T Au

0657A

NUGGET HILL 85001 MASS BALANCE CALCULATIONS

Product	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
Tails	6300	0.14	0.8820	75.12	34.52
Conc	1155	0.28	0.3234	24.88	6.33
+4 Mesh	10796	< 0.03	0	0	59.15
TOTAL	18251	0.07	1.2054	100.00	100.00

Calculated -4 Mesh Assay of Tails and Concentrate = 0.16 g/T Au

SCREEN DISTRIBUTION OF -4 MESH TABLE TAILINGS

Mesh	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
+35	46.1	0.11	0.0051	18.08	27.60
+65	31.2	0.13	0.0041	14.54	18.68
+115	25.5	0.19	0.0048	17.02	15.27
+200	19.5	0.18	0.0035	12.41	11.68
-200	44.7	0.24	0.0107	37.95	26.77
TOTAL	167.2	0.17	0.0282	100.00	100.00

1. Tails Assay Done in Duplicate = (0.13 + 0.15)/2 = 0.14 g/T Au
2. Calculated Tails Assay From Screen Analysis = 0.17 g/T Au
3. Triplicate Assays of +4 Mesh Material for Mass Balance Calculation
   (<0.03 + <0.03 + <0.03)/3 = < 0.03 g/T Au
4. Nugget Hill 85001 Calculated Head Assays = 0.07 g/T Au

WDI

NUGGET HILL 85002 MASS BALANCE CALCULATIONS

Product	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
Tails	9304	< 0.03	-	-	43.28
Conc	1022	< 0.03	-	-	4.75
+4 Mesh	11170	< 0.03	-	-	51.97
TOTAL	21496	0.03	-	-	100.00

Calculated -4 Mesh Assay of Tails and Concentrate = 0.03 g/T Au

SCREEN DISTRIBUTION OF -4 MESH TABLE TAILINGS

Mesh	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
+35	80.0	< 0.03	-	-	30.13
+65	57.1	< 0.03	-	-	21.49
+115	38.4	< 0.03	-	-	14.45
+200	16.5	< 0.03	-	-	6.21
- 200	73.6	< 0.03	-	-	27.72
TOTAL	265.6	< 0.03	-	-	100.00

1. Tails Assay Done in Duplicate = (< 0.03 + < 0.03)/2 = < 0.03 g/T Au
2. Calculated Tails Assay From Screen Analysis = < 0.03 g/T Au
3. Triplicate Assays of +4 Mesh Material for Mass Balance Calculation
   (<0.03 + < 0.03 + <0.03)/3 = < 0.03 g/T Au
4. Nugget Hill 85002 Calculated Head Assays =< 0.03 g/T Au

0657A

NUGGET HILL 85003 MASS BALANCE CALCULATIONS

Product	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
Tails	7912	0.09	0.7121	19.45	36.65
Conc	520	7.56	3.9312	80.55	2.41
+4 Mesh	13155	< 0.03	0	0	60.94
TOTAL	21587	0.22	4.6433	100.00	100.00

Calculated -4 Mesh Assay of Tails and Concentrate = 0.55 g/T Au

SCREEN DISTRIBUTION OF -4 MESH TABLE TAILINGS

Mesh	Weight (g)	Assay (g/T)	Units (mg)	% Distribution Au	% Distribution Wt
+35	43.6	0.14	0.0061	22.43	24.40
+65	30.7	0.09	0.0028	10.29	17.17
+115	24.9	0.16	0.0040	14.71	13.93
+200	20.0	0.18	0.0036	13.24	11.30
-200	59.3	0.18	0.0107	39.33	33.20
TOTAL	178.7	0.15	0.0272	100.00	100.00

1. Tails Assay Done in Duplicate = (0.09 + 0.09)/2 = 0.09 g/T Au
2. Calculated Tails Assay From Screen Analysis = 0.15 g/T Au
4. Triplicate Assays of +4 Mesh Material for Mass Balance Calculation
   (< 0.03 + < 0.03 + < 0.03)/3 = < 0.03 g/T Au
5. Nugget Hill 85003 Calculated Head Assays = 0.22 g/T Au

WDI

APPENDIX III

CYANIDATION LEACH SUMMARIES

CYANIDATION LEACH SUMMARY

TEST NO: BR1

PURPOSE: Bottle Roll Test

FEED: 945 grams of: Composite WC-1

GRIND: None

PRE-AER'N: None

LEACH: 48 hours; 40 % solids

REPULP: None

WASH: 5 x 400 mls water - twice solids weight

REAGENTS: Leach - NaCN - 1.00 g/L; Lime: pH 10.5-11.0

CONSUMPTIONS (kg/t) NaCN: 0.085 LIME: 1.83

MASS BALANCE

PRODUCT	WT/VOL g/ml	Au ppm	Au mg	Au DIST'N
Filtrate	1263	0.07	0.09	18.75
Wash	1478	< 0.03	tr	tr
Titration	210	< 0.03	0	tr
Residue	936	0.42*	0.39	81.25
Total		(0.51)	0.48	100.00

Au EXTRACTION: 18.75 % CALC. HEAD: 0.51 g/t
ASSAYED HEAD: 0.35 g/t MASS BALANCE: 146 %

* Average of 0.50, 0.33 g/t Au

CYANIDATION LEACH SUMMARY

TEST NO: BR2

PURPOSE: Bottle Roll Test

FEED: 937.0 grams of: Composite WC-5

GRIND: None

PRE-AER'N: None

LEACH: 48 hours; 40 % solids

REPULP: None

WASH: 5 x 400 mls water - twice solids weight

REAGENTS: Leach - NaCN - 1.00 g/L; Lime - pH 10.5-11.0

CONSUMPTIONS (kg/t) NaCN: 0.24 LIME: 2.75

MASS BALANCE

PRODUCT	WT/VOL g/ml	Au ppm	Au mg	Au DIST'N
Filtrate	1086	< 0.03	tr	tr
Wash	1840	< 0.03	tr	tr
Titration	330	< 0.03	tr	tr
Residue	925	0.42*	0.39	> 99
Total		(0.42)	0.39	100.00

Au EXTRACTION: tr %
ASSAYED HEAD: 0.25 g/t
CALC. HEAD: 0.42 g/t
MASS BALANCE: 168 %

* Average of 0.53, 0.31 g/t Au

CYANIDATION LEACH SUMMARY

TEST NO:	BR3
PURPOSE:	Bottle Roll Test
FEED:	946.3 grams of: Composite WC-2
GRIND:	None
PRE-AER'N:	None
LEACH:	48 hours; 40 % solids
REPULP:	None
WASH:	5 x 400 mls water - twice solids weight
REAGENTS:	Leach - NaCN - 1.00 g/L; Lime - pH 10.5-11.0

CONSUMPTIONS (kg/t) NaCN: 0.106 LIME: 3.16

MASS BALANCE

PRODUCT	WT/VOL g/ml	Au ppm	Au mg	Au DIST'N
Filtrate	1144	0.07	0.08	21.62
Wash	2020	< 0.03	tr	tr
Titration	288	< 0.03	tr	tr
Residue	928	0.31*	0.29	78.38
Total		(0.39)	0.37	100.00

Au EXTRACTION: 21.62 %
ASSAYED HEAD: 0.39 g/t
CALC. HEAD: 0.39 g/t
MASS BALANCE: 100 %

* Average of 0.33, 0.30 g/t Au

CYANIDATION LEACH SUMMARY

TEST NO: BR4

PURPOSE: Bottle Roll Test

FEED: 940.7 grams of: Composite WC-3

GRIND: None

PRE-AER'N: None

LEACH: 48 hours; 40 % solids

REPULP: None

WASH: 5 x 400 mls water - twice solids weight

REAGENTS: Leach - NaCN - 1.00 g/L; Lime - pH 10.5-11.0

CONSUMPTIONS (kg/t) NaCN: 0.16 LIME: 2.68

MASS BALANCE

PRODUCT	WT/VOL g/ml	Au ppm	Au mg	Au DIST'N
Filtrate	1072	0.05	0.05	>99
Wash	1930	< 0.03	0	0
Titration	248	< 0.03	0	0
Residue	929	< 0.03*	0	0
Total		(0.05)	0.05	100.00

Au EXTRACTION: > 99 %
ASSAYED HEAD: 0.55 g/t
CALC. HEAD: 0.05 g/t
MASS BALANCE: 10 %

* Average of < 0.03, < 0.03 g/t Au

0657A

CYANIDATION LEACH SUMMARY

TEST NO: BR5

PURPOSE: Bottle Roll Test

FEED: 1006.1 grams of: Composite WC-4

GRIND: None

PRE-AER'N: None

LEACH: 48 hours; 40 % solids

REPULP: None

WASH: 5 x 400 mls water - twice solids weight

REAGENTS: Leach - NaCN - 1.00 g/L; Lime: pH 10.5-11.0

CONSUMPTIONS (kg/t) NaCN: 0.43 LIME: 2.28

MASS BALANCE

PRODUCT	WT/VOL g/ml	Au ppm	Au mg	Au DIST'N
Filtrate	1285	0.25	0.32	69.57
Wash	2060	0.04	0.08	17.39
Titration	378	< 0.03	tr	tr
Residue	992	0.06*	0.06	13.04
Total		(0.46)	0.46	100.00

Au EXTRACTION: 86.96 % CALC. HEAD: 0.46 g/t
ASSAYED HEAD: 0.32 g/t MASS BALANCE: 144 %

* Average of 0.06, 0.06 g/t Au

0657A

CYANIDATION LEACH SUMMARY

TEST NO: HL1

PURPOSE: Agglomerated Heap Leach

FEED: 4300 grams of: WC-6

GRIND: None

AGGLOMERATION None

LEACH: Column plugged; test terminated

REPULP: None

WASH: None

REAGENTS: None

CONSUMPTIONS (kg/t) NaCN: - LIME: -

MASS BALANCE

PRODUCT	WT/VOL g/ml	Au ppm	Au mg	Au DIST'N

Not applicable

Au EXTRACTION: - CALC. HEAD: -
ASSAYED HEAD: - MASS BALANCE: -

CYANIDATION LEACH SUMMARY

TEST NO: HL2

PURPOSE: Agglomerated Heap Leach

FEED: 7184 grams of: WC-6

GRIND: None

AGGLOMERATION With lime, cement, cyanide; 13% moisture

LEACH: 7 days

REPULP: None

WASH: 24 litres water, recirculated

REAGENTS: Agglomeration - NaCN: 1.5 kg/t, Lime 10.0 kg/t; Cement 7.5 kg/t
Leach - NaCN - 1.00 g/L; Lime - pH 10.5-11.0

CONSUMPTIONS (kg/t) NaCN: 2.05 LIME: 10.54

MASS BALANCE

PRODUCT	WT/VOL g/ml	Au ppm	Au mg	Au DIST'N
Filtrate	19000	0.06	1.14	23.37
Wash	17500	0.08	1.40	31.15
Carbon	35.62	(11.06)	0.394	8.77
Residue	7244	0.215*	1.56	34.71
Total		(0.62)	4.494	100.00

Au EXTRACTION: 65.29 %
ASSAYED HEAD: 0.40 g/t
CALC. HEAD: 0.63 g/t
MASS BALANCE: 158 %

* Avg of 0.24, 0.19 g/t Au

CYANIDATION LEACH SUMMARY

TEST NO:	HL3
PURPOSE:	Agglomerated Heap Leach
FEED:	13200 grams of: WC-7
GRIND:	None
AGGLOMERATION	With lime, cement, cyanide; 13% moisture
LEACH:	30 days
REPULP:	None
WASH:	5 litres water, single pass
REAGENTS:	Agglomeration - NaCN: 0.15 kg/t, Lime 10.0 kg/t; Cement 7.5 kg/t Leach - NaCN - 1.00 g/L; Lime - pH greater than 11

CONSUMPTIONS (kg/t) NaCN: 0.57 LIME: 10.00

MASS BALANCE

PRODUCT	WT/VOL g/ml	Au ppm	Au mg	Au DIST'N
Filtrate & Wash	25600	0.006	1.154	27.80
Liquid Samples	10680	(0.013)	0.143	25.81
Carbons	35.9	(7.16)	0.257	46.39
Residue	13200	< 0.03*	tr.	tr.
Total		(0.04)	0.554	100.00

Au EXTRACTION:	> 99 %	CALC. HEAD:	0.04 g/t
ASSAYED HEAD:	0.19 g/t	MASS BALANCE:	21 %

* Avg of<0.03,<0.03 g/t Au

0657A

CYANIDATION LEACH SUMMARY

TEST NO: HL4

PURPOSE: Agglomerated Heap Leach

FEED: 15100 grams of: WC-8

GRIND: None

AGGLOMERATION Water only

LEACH: 30 days

REPULP: None

WASH: 5 litres water, single pass

REAGENTS: Agglomeration - None
Leach - NaCN - 1.00 g/L; Lime - pH 10.5-11.0

CONSUMPTIONS (kg/t) NaCN: 1.29 LIME: 0.50

MASS BALANCE

PRODUCT	WT/VOL g/ml	Au ppm	Au mg	Au DIST'N
Filtrate & Wash	16000	0.006	0.096	13.99
Liquid Samples	13.38	(0.022)	0.300	43.73
Carbons	34.2	(8.50)	0.290	42.28
Residue	15100	< 0.03*	tr.	tr.
Total		(0.05)	0.686	100.00

Au EXTRACTION: > 99 %
ASSAYED HEAD: 0.35 g/t
CALC. HEAD: 0.05 g/t
MASS BALANCE: 14 %

* Avg of <0.03, <0.03 g/t Au

0657A

SECTION 1
Welcome to VTLS

VTLS began in 1974 at Virginia Polytechnic Institute and State University's Newman Library. The Institute was searching for an automated library system. Unable to find one that suited its needs, Virginia Tech began a project to develop its own system. The predecessor of VTLS consisted of an online public access catalogue and a circulation system. By 1985 VTLS was a fully integrated system, and is today is used in over 120 libraries worldwide.

What is an integrated library system?

An integrated system is one that incorporates all functions of a library into one system. Although it is not apparent to anyone using the system, there are several modules operating within VTLS. Books are ordered in the ACQUISITIONS module. Titles are searched in the ONLINE PUBLIC ACCESS CATALOGUE (OPAC). You must know the call number of a book to find it on the shelf - that information appears on your screen because of the CATALOGUING module. If a book has been checked out, or if there is a waiting list for a title, the CIRCULATION portion of the system provides that information. It is possible to determine if the Library has a specific issue of a journal through the SERIALS module of VTLS.

You will be searching VTLS on the ONLINE PUBLIC ACCESS CATALOGUE (OPAC) where all the information pertaining to a particular title is integrated.

SECTION 2
Accessing and Logging Off VTLS

In order to access the Library's catalogue, you must have the following:

1. A communications line. If you use DRMS, E-MAIL, or Ministerial Tracking, then you already have the line.

2. A script file that allows you to access the Department's Hewlett Packard (HP) computer.

3. A session name (your own ID).

4. A temporary password which you must change to your personal one the first time you use VTLS.

If you are missing any of these things, contact the Informatics Help Desk at: (819)953-4263.

DIALING IN TO VTLS

Choose from your Commander Keyword Menus the option that allows you to access the Department's HP computers. This may be labelled HP ACCESS, INAC NETWORK ACCESS... etc. Ask the Help Desk at (819)953-4263 if you are unsure how to access the network.

The screen displayed may already have values entered for the SERVICE NAME, the SESSION NAME, the USER ID and the ACCOUNT NAME. Verify that the values correspond to those below. If you use only VTLS on the network, these values should appear each time you access the system once you have set them initially. If you share a computer, or use other departmental applications, you may have to press ***M*** to modify each of the lines. Once the values correspond to those needed for you to dial in to VTLS, press ***C*** to establish the connection.

To modify the values on your screen:
Type ***m***

At the prompt PLEASE ENTER SERVICE NAME:
Type ***library***

At the prompt SESSION NAME:
Type the first five letters of **YOUR LAST NAME AND YOUR FIRST INITIAL,**
e.g. **smithj**

At the prompt USER ID:
Type ***user***

At the prompt ACCOUNT NAME:
Type ***clas01***

Press ***C*** to establish the connection.

The connection will then proceed until you are prompted for your password.

If this is the first time you are logging into the system, you will be asked to enter a temporary password. Check with the instructor, (or with the Informatics Help Desk if you are not in a course) for this password. Once you have entered the temporary password, you will be prompted to input one your own. You will need this password every time you log into the Library's system. Your password should be,

6 - 8 characters, one of which should be a number or a symbol

If you have logged into the Library's catalogue before, you will already have established a password. (If you forget your password, call the Informatics Help Desk at (819)953-4263 to have the system reset to accept a new password.)

When you are presented with a list of terminal types and asked to choose one,
Type ***3***

When you are prompted for a location code,
Type ***100***

At this point you will have accessed the Departmental Library's online catalogue. You may proceed with your search as described in the following pages.

LOGGING OUT OF VTLS

When you are finished searching, do not forget to log out of the system:
Type ***/quit***

You will now be out of VTLS and back at the MAIN MENU of Keyword Commander.

SECTION 3
Searching with Menus

Type **?** from any screen at any time to search with menus.

Section 3.1 - General Help

The first option on the menu - **General Help** - is where to find general information about the Departmental Library, the services we offer and how to search the catalogue.

Type ***0*** to look at **General Help.** Then you can,

Type ***3*** for information and hints on searching the catalogue using commands. Searching with commands will be covered in Section 4 of this manual.

Type ***5*** to display a submenu of information about the policies, hours, staff and services of the Departmental Library.

Type ***53*** for a list of Library services available.

Type ***54*** to display a map of the Library.

Section 3.2 - Searching with Menus

If you are an occasional user of the Library's on-line catalogue you may decide that the easiest way to use the system is **by searching with menus.** Here is a sample author search and word search using menus.

EXAMPLE: You wish to know what books the Library has by Bradford Morse.

Type ***?*** to get to the list of menu options.

Type ***1*** to search for publications by a specific author. You will note that detailed instructions are provided on how to enter the name of the author.

Type ***morse brad***

Note: Either upper or lower case can be used, and punctuation is not necessary.

You are now at an alphabetical list of authors. If the system finds an exact match, your inquiry is displayed at line number 1. If the VTLS does not find an exact match, the system displays one entry before where yours would appear, and one entry after. To see the books that the Library has by Morse,

Type ***the line number that corresponds to Morse***

The list displayed contains the title, the author, the date of publication and the call number where the book will be found on the shelf.

EXAMPLE: You wish to know what books the Library has on masks.

Type ***?*** to return to the menus.

Type ***5*** to perform a search by word.

Note: The use of **Word Search** instead of **Official Library of Congress Subject Headings Search** will be discussed in section 5.

Again, you will note that detailed instructions are provided on how to search by word.

Before entering the word to be searched, you must answer the question:

Do you want to save word searches already done (Y/N)?

Since this is your first word search,

Answer ***N***

Note: You would answer Y to this question if you wish to save a list of your word searches. If Y is answered, the system will display these searches at the **KEYWORDS SEARCHED SCREEN.**

Type ***masks***

You are now at the **WORDS SEARCHED SCREEN.** For each word searched there is a corresponding line number and, on the right hand side of the screen, there is the number of entries in our catalogue that contain that word.

DIAND LIB./BIBLIO. MAINC - - - VTLS - - - - - - - - WORDS SEARCHED	
1. masks	23 ENTRIES

You now realize that you are also interested in beadwork. To return to the menu,

Type ***?***

To perform another **Word Search**,

Type ***5***

At the prompt, Do you want to save word searches already done (Y/N)?

Type ***y***

You answer Y because you have not yet looked at the titles the Library has on masks. Now,

Type ***beadwork***

The following will appear on your screen,

DIAND LIB./BIBLIO. MAINC- - - VTLS - - - - - - - - WORDS SEARCHED	
1. masks	23 ENTRIES
2. beadwork	14 ENTRIES

To see the titles the Library has on masks,

Type ***1***

The list displayed contains the title, the author, the date of publication and the call number where the book will be found on the shelf. After examining these titles,

Type ***ps***

until you return to the **WORDS SEARCHED SCREEN.** To see the titles the Library has on beadwork,

Type ***2***

SECTION 4
Searching with Commands

It is much quicker to search VTLS using commands instead of using the menus.

Any command can be issued from any screen at any time.

Frequently used commands are:

a/ author search
t/ title search
c/ call number search
w/ word search
b/ combined word search

See Section 8 QUICK REFERENCE for a more complete list of commands.

Help using these commands can be found in **General Help** under choice 3 **Searching the Catalogue**. (Remember, to see **General Help** you type **?** to get to the menu, then **0** to get to General Help. From there type **3** for help with searching).

Use either upper or lower case. Punctuation is not required. DO NOT use a space before or after the slash (/) when typing a command. To correct mistakes, use the BACKSPACE and/or DELETE keys. THE CURSOR KEYS WILL NOT WORK.

Section 4.1 Author Search

When searching for an author, type as much of the author's name as you know. Type the last name first.

EXAMPLE: You wish to know what books the Library has by Evelyn Peters.

Type ***a/peters e***

You are now at an alphabetical list of authors at the name **closest** to the one you have typed. If the Library has books by the author, his or her name will appear at line

number 1. The number immediately preceding the author's name indicates the number of titles the Library has for that author.

If you wish to see the titles written by the author,

Type ***3***
Note: This will display the **PUBLICATIONS BY SELECTED AUTHOR SCREEN**

The list you now see consists of the title, the author's name, the date of publication and the Library's call number for each publication the Library has by that author.

At this point you have enough information to find the book on the shelf. But, you want to know if the book is on the shelf before you go to the Library. From the screen you are at, pick a title and

Type ***the corresponding line number***

You are now at the **COPIES AND VOLUMES SCREEN.** It will tell you how many copies of the title we have, where each is located in the Library and if a copy is available, on loan, or on order. If a book is on loan, the status will say "Due" followed by the date the book is expected back in the Library. If all copies of the book are on loan, or on order, you may place a hold on it to see it when a copy arrives in the Library. To place a hold, call Loans at (819)997-0799.

If you want to obtain similar information on other titles by the author you have chosen,

Type ***next***

This will display the next title from the **PUBLICATIONS BY SELECTED AUTHOR SCREEN.**

To return to a previous item,

Type ***prev***

Now, determine on your own if the Library has any books by

Sarah Carter
Hugh Brody
An author in whom you are interested

Remember to check if the book is in the Library or is on loan.

Section 4.2 Title Search

When searching for a title, type as much of the title as you know.
If the first word is an article (the, a, an, la, le, les, l', un, une) do not type it.

EXAMPLE: You want to know if the Library has the Treasury Board of Canada's publication **The People Side of Operating Budgets.**

Type ***t/people side of operating budgets***

You are now at an alphabetical list of titles closest to the one you have searched. If the Library has the title you have typed, it will be located at line number 1.

Type ***1***

The screen you now see gives you descriptive information about the book as well as information about whether the book is available, on loan or on order.

PRACTICE

On your own, determine if the Library has the following titles:

Canada's First Nations. By Olive Patricia Dickason
His Majesty's Indian Allies. By Robert S. Allen
A History of the Original Peoples of Northern Canada. By Keith Crowe, or

any title in which you are interested.

> Note: When you choose a line number from the **TITLES SCREEN** and there is more than one edition in the Library's collection you will see the title, author, date of publication and call number for each of the editions.

Don't forget, if the title you are looking for does not appear on the screen, you may call (819) 994-1347 to borrow the book on inter-library loan from another library.

Note: The Departmental Library cannot borrow material from other libraries for regional employees because of the short loan periods and delays in getting items to the regions. We will, however, try to locate libraries where regional employees may find material in their area.

SECTION 5
Searching with Commands: Word Searches

When you are interested in materials on a specific topic, the best way to search is using **Word** and **Combined Word Searches**. Searching by word is much more flexible than searching by subject because:

1. A word search will search anywhere in the record the Library has created to describe the document. This means that if the word you are searching appears in a title, an author's name, a note **or** a subject heading, the record will be found.

2. If you wish to search by subject, you must know the exact official Library of Congress Subject Heading. For example, if you were interested in books on native land claims in Ontario and wanted to perform a subject search, you would have to enter,
   Indians of North America – Ontario – Claims

Section 5.1 Word Search

Searching by word will retrieve a document if the word appears anywhere in the record.

EXAMPLE: You wish to know what books the Library has on native basketry.

Type ***w/basketry***

You are now looking at the **WORDS SEARCHED SCREEN**. A line number appears on the left hand side of the screen beside the word you have searched. The number of records the Library has containing that word appear on the right hand side of the screen.

```
DIAND LIB./BIBLIO. MAINC- - - - VTLS - - - - - - - WORDS SEARCHED

 1.  basketry                              15 ENTRIES
```

To see the titles of the books with the word you searched,

Type ***1***

You are now at the **PUBLICATIONS WITH SELECTED WORDS SCREEN.** This list displays the title, the author, the date of publication and the Library's call number.

Seven titles will be displayed on the screen at a time. To see more titles, simply press ***<Enter>.***

Note: Remember to type the line number to find out if a book is on the shelf. Remember also, you can type **next** and **prev** from the **COPIES AND VOLUMES SCREEN** to see the next or previous record.

Section 5.2 Word Search with Truncation

It is possible to retrieve words with alternate endings.

EXAMPLE: You are interested in all aspects of management (managers, managing, etc.).

It is not necessary to search each word separately. To search all the variations of a word, type the root followed by *, the truncation symbol for VTLS.

Type ***w/manag****

This will retrieve any word that begins with manag. A list of these words will be displayed.

Press ***<Enter>*** when you are prompted to do so.

Note: If you notice inappropriate words on the list (e.g. polic* will give you police, policing, policy, policies) you might perform your search again using a longer root.

You will then be at the **WORDS SEARCHED SCREEN.** To see the titles that contain the word,

Type ***2***

Practice

On your own determine what the Library has on:

Herbs
Pottery
Budgets, budgeting

NOTE: Due to system limitations, there are several roots that cannot be used. They are:

Indian*
North*
Canad*
report*
develop*
econom*

Section 5.3 Combined Word Search - Combining Two Words

It is possible to refine your search by combining two words using the command b/ with an operator "or", "and", "not" (the symbols "+", "&", "-", can also be used).

USE	TO
or	Create a set containing records with either word but not necessarily both.

EXAMPLE: You are interested in information on the Ojibwa. You know that sometimes Chippewa is used so you want to include both variations.

Type ***b/ojibwa or chippewa***

You will then be at the **WORDS SEARCHED SCREEN.** To see the titles, type the line number that corresponds to the set with records containing either word.

USE	TO
and	Create a set containing records with both words. Records that have only one of the words will not be included.

EXAMPLE: You are interested in searching for information on native land claims in Ontario.

Type ***b/claims and ontario***

You will then be at the **WORDS SEARCHED SCREEN.** To see the titles, type the line number that corresponds to the set with records containing both words.

USE	TO
not	Create a set containing records with the first word only.

EXAMPLE: You are interested in information on secondary education but do not want to see anything on elementary education.

Type ***b/secondary not elementary***

You are now at the **WORDS SEARCHED SCREEN.** To see the titles, type the line number that corresponds to the set with records containing the first word but not the second.

*****Caution: Be extremely careful when using "not", it is possible to eliminate valuable information by trying to be too restrictive.

Section 5.4 Combined Word Search - Combining Two or More Words

Before beginning the next part, you must erase all of the words you have previously searched. This can only be done from the **WORDS SEARCHED SCREEN.** To get to this screen,

Type ***/kw***

Note: /kw can be used from any screen to return to the **WORDS SEARCHED SCREEN.**

At the bottom left, you will notice *E #* and *E #/#*. You can erase one line number at a time, or a range of line numbers. The # represents the line number. If you wish to erase all entries,

Type ***e all***

You will have noticed in Section 5.3 above, only two words were searched using the b/ command. It is possible to combine two or more words using the w/ command. Up to 15 words may be searched in one line.

No boolean operators are needed when using w/ to perform a combined word search. The "and" is implied and does not need to be typed.

EXAMPLE: You are interested in looking at the annual reports of the Department of Employment and Immigration but are unsure exactly what the name of the department is.

Type ***w/employment immigration annual report***

You will see,

DIAND LIB./BIBLIO. MAINC- - - VTLS - - - - - - - - WORDS SEARCHED	
1. employment & immigration & annual & report	3 ENTRIES

To see your three choices,

Type ***1***

EXAMPLE: You are interested in information on oil and gas in the Yukon.

Type ***w/oil gas yukon***

You will see,

DIAND LIB./BIBLIO. MAINC- - - VTLS - - - - - - - - WORDS SEARCHED	
1. employment & immigration & annual & report	3 ENTRIES
2. oil & gas & yukon	61 ENTRIES

To see the titles,

Type ***2***

Section 5.5 Combining Previous Search Results

Before proceeding, erase all previous searches,

Type ***/kw***
Type ***e all***

It is also possible to combine **previous search results** with the b/ command and the operators "or" "and" "not" (or symbols "+" "&" "-")

FOR EXAMPLE: You want to find out what the Library has on mining.

Type ***w/mining***

Once you see that there are 638 entries, you decide to narrow your search to mining in the Northwest Territories.

Type ***w/northwest territories***

You will see,

DIAND LIB./BIBLIO. MAINC- - - VTLS - - - - - - - - WORDS SEARCHED	
1. mining	638 ENTRIES
2. northwest & territories	4431 ENTRIES

To combine the two results so that you have mining only in the Northwest Territories

Type ***b/1 and 2***

To see the results,
Type ***3***

Practice

On your own, look for information on,

Indian Act
Housing on reserves in Ontario
James Bay Hydro-Electric Project, or

Any topic you are interested in.

Try your searches using different combinations of the **w/** and **b/** commands.

SECTION 6
Using the Function Keys

It is possible to use the function keys instead of some of the commands.

FUNCTION KEY	RESULT
F1	You will be taken to General Help.
F2	Using this key provides you with context Specific Help. If at any time you are unsure of what screen you are looking at, or if you are unsure how to proceed, pressing F2 will explain the screen and outline the options you have. To return to your search, press the <Enter> key.
F3	Pressing F3 will do one of two things. If you are in a list (title, authors, subjects) using F3 will allow you to move backward through the list. If you are at any screen other than a list, pressing F3 will take you to whichever screen was displayed immediately before the one you are at.
F4	Pressing F4 allows you to move forward in any list.
F5	Hit F5 and you will note that the T/ command appears at your cursor. You may then type a title and press <Enter> to perform a Title Search.
F6	F6 places the W/ command at the cursor. Type a word and press <Enter> to perform a Word Search.
F7	F7 places the A/ command at the cursor. Type an author's name (last name first) and press <Enter> to perform an Author Search.
F8	F8 is a key to switch the language you use to communicate with the system from English to French, or from French to English.

SECTION 7
Client Activity Screen

It is possible to see what you have on loan or on hold.

From any screen at any time,

Type / ***then the barcode number on the back of your employee identification card. Example: /20000000001***

Note: Remember, there is no space following the /.

You are then prompted for a 2nd ID number. This is the number on the front of your card.

Example A1234.

Note: The letter is part of your ID number and must be included to see your record. Type the letter as a capital.

SECTION 8
Quick Reference

TROUBLE DIALING IN - CALL INFORMATICS HELP DESK (819)953-4263

TROUBLE SEARCHING - CALL THE LIBRARY'S REFERENCE DESK
(819)997-0811

? TO SEARCH WITH MENUS
0 FROM THE MENU ONLY FOR GENERAL HELP

COMMANDS		FUNCTION KEYS	
a/	AUTHOR SEARCH	F1	GENERAL HELP
t/	TITLE SEARCH	F2	CONTEXT SPECIFIC HELP
c/	CALL NUMBER SEARCH	F3	PREVIOUS SCREEN
w/	WORD SEARCH, or COMBINING TWO OR MORE WORDS	F4	NEXT SCREEN
b/	COMBINED WORD SEARCH - TWO WORDS OR PREVIOUS SEARCH RESULTS	F5	TITLE SEARCH
/kw	TO RETURN TO **WORDS SEARCHED SCREEN**	F6	WORD SEARCH
e #	TO ERASE A SPECIFIC LINE NUMBER ON THE **WORDS SEARCHED SCREEN**	F7	AUTHOR SEARCH
e #/#	TO ERASE A RANGE OF LINE NUMBERS ON THE **WORDS SEARCHED SCREEN**	F8	ENGLISH/FRENCH SWITCH
e all	TO ERASE ALL WORDS ON THE **WORDS SEARCHED SCREEN**		