

**APPENDICES FOR CHAPTER 2  
IN THE ENVIRONMENTAL IMPACT STATEMENT  
OF THE MINAGO PROJECT**

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Quarry Lease QL-2067

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# **APPENDIX 2.2**

## **Supplemental Material to Certificate of Title and Mineral Depositions**

Quarry Lease QL-2067



Innovation, Energy and Mines  
Mines Branch  
360-1385 Ellice Ave, Winnipeg, Manitoba R3G 3P2  
T 204 946-6505 F 204 948-2578  
www.manitoba.ca

December 14, 2009

Mr. Paul Jones  
Victory Nickel Inc.  
80 Richmond Street West, Suite 1802  
Toronto Ontario M5H 2A4

Dear Paul:

**RE: QUARRY LEASE NO. QL-2067**

Attached in duplicate is Quarry Lease No. QL-2067 prepared in the name of Victory Nickel Inc. in accordance with Subsection 139(2) of The Mines and Minerals Act. Prior to the commencement of mining the following conditions shall be met:

1. A work permit must be obtained from the local Natural Resources Office; and
2. All lease boundaries shall be marked and the Mining Recording Office advised upon completion.
3. Please refer to the "additional clauses" in your lease document and contact MTS and any other utility prior to any excavating.

Your application for Quarry Lease No. QL-2067 was submitted with annual rent in the amount of \$1,676.00. The actual rent required to cover 69.92 hectares is \$1,680.00. Therefore, we require \$2.00 to cover the additional rent for Quarry Lease No. QL-2067. We will recover the \$2.00 from your application fee for casual quarry permit.

Please find attached a copy of the Minago River Final Consultation Report dated November 5, 2009.

If you require assistance in preparing the Mine Closure Plan please contact Mrs. Doina Priscu, P.Eng., Chief Mining Engineer telephone no. (204) 945-6517, Fax No. (204) 948-2578.

Yours truly,

Ernie Armitt  
Director of Mines

Enclosure

cc Doina Priscu, Chief Mining Engineer

/tlz  
QLSIGN1.DOC

## QUARRY LEASE

Quarry  
Lease No. QL-2067

THIS LEASE made in duplicate this 20th day of November, 2009

### BETWEEN:

Her Majesty the Queen in right of the  
Province of Manitoba, represented by the  
Minister of Science, Technology, Energy  
and Mines

(the "Minister")

of the First Part

- and -

VICTORY NICKEL INC.  
80 RICHMOND ST W, SUITE 1802  
TORONTO ON M5H 2A4

(the "Lessee")

of the Second Part

The parties agree as follows:

1. In this Lease:

- (a) "Act" means The Mines and Minerals Act, Cap. M162 C.C.S.M., as amended, revised or substituted from time to time;
- (b) "regulations" means regulations made pursuant to the Act, and as amended, revised or substituted from time to time;

2. Subject and pursuant to the Act and regulations, the Minister conveys to the lessee the exclusive right to explore for, develop, and produce the following quarry minerals, namely

**ROCK OR STONE (PROCESSED STONE- LIMESTONE)** \_\_\_\_\_

that are the property of the Crown and are found on or under the land described as:

**ALL THAT PORTION OF UNSURVEYED TOWNSHIP 59 RANGE 12 WPM CONTAINED  
WITHIN THE FOLLOWING LIMITS DETERMINED BY GRID LINES FROM NAD 83 (CSRS**

**98) BEING IN UTM 6° ZONE 14, EXPRESSED IN METRES AND FURTHER DESCRIBED AS FOLLOWS:**

**COMMENCING AT A POINT AT THE INTERSECTION OF UTM GRID LINES 484973 E AND 5996120 N; THENCE ELY IN A STRAIGHT LINE TO THE INTERSECTION OF UTM GRID LINES 485733 E AND 5996120 N; THENCE SLY IN A STRAIGHT LINE TO THE INTERSECTION OF UTM GRID LINES 485733 E AND 5995200 N; THENCE WLY IN A STRAIGHT LINE TO THE INTERSECTION OF UTM GRID LINES 484973 E AND 5995200 N; THENCE NLY IN A STRAIGHT LINE TO THE POINT OF COMMENCEMENT.**

(the "Lands") and being **69.92** hectares, more or less, for a term of 10 years, commencing the **2nd day of November, 2009** renewable in accordance with the Act.

3. The Lessee shall comply with the Act and regulations; including, without restricting the generality of the foregoing, the payment of rent, royalty and rehabilitation levy prescribed thereunder.
4. The Lessee shall and does hereby indemnify and save harmless the Minister against any and all actions, suits, claims or demands that may be brought or made against the Minister for or by reason of any act or thing done or omitted to be done by the Lessee or its agents with respect to the Lands.
5. To be effective and binding, any waiver by the Minister of a breach by the Lessee of any term or condition of this Lease, the Act or the regulations must be in writing. Any such waiver shall extend only to the events of breach enumerated therein and shall not limit or affect the Minister's rights with respect to any other breach.
6. If the Lessee defaults, breaches, fails to perform or observe any term or condition of this Lease, the Act or the regulations, and any such event is not remedied within such notice period as the Minister may give, the Minister may cancel this Lease. Notwithstanding any such cancellation by the Minister, the rights of the Minister against the Lessee shall not be prejudiced and the Minister shall have the full remedies against the Lessee as if the Lease remained in full force and effect.
7. Any notice to a party hereto shall be in writing and may be delivered personally, sent by telegram, telex, telecopier or other means of electronic communication, or may be forwarded by mail subject to Canada Post confirmation of delivery to that party at the following address:

To the Minister:

Science, Technology, Energy and Mines  
Unit 360-1395 Ellice Avenue  
Winnipeg, Manitoba  
R3G 3P2

To the Lessee:

VICTORY NICKEL INC.  
80 RICHMOND ST W, SUITE 1802  
TORONTO ON M5H 2A4

8. This lease shall be interpreted in accordance with the laws of Manitoba.
9. Any amendments to this Lease shall be in writing and signed by both parties.
10. The Lessee shall not assign this lease except with the prior written consent of the Minister which shall not be unreasonably withheld. Any obligations of the Lessee outstanding at the date of any assignment shall remain the responsibility of the Lessee, to the extent the obligations are not performed by the permitted assignee.
11. This Lease shall enure to the benefit of and be binding upon the heirs, executors, administrators, successors and permitted assigns of the parties.
12. Additional clauses:

*Mining operations shall not commence on this lease until a Mine Closure Plan has been submitted by the lessee, accompanied by the required financial security deposit and approved by the Director of Mines.*

*It is the lessee's responsibility to locate all utilities, (including but not limited to gas, electric and telecommunications) that may exist within the limits of this disposition prior to any excavation. "Call Before You Dig" and "611 Cable Locate Service". The lessee shall comply with all requirements imposed by the utility company.*

*The lessee shall comply with The Workplace Safety and Health Act and Regulation.*

In witness whereof the Minister and the Lessee have executed this Lease on the dates shown below their respective signatures.

Signed, sealed and delivered  
in the presence of:

Her Majesty the Queen in right of the Province Of  
Manitoba

Renee Jonsson  
Witness

[Signature]  
Minister of Science, Technology, Energy and Mines

**Authorized Signing Authority**  
Ernest Arnold, P.Eng.  
Director of Mines

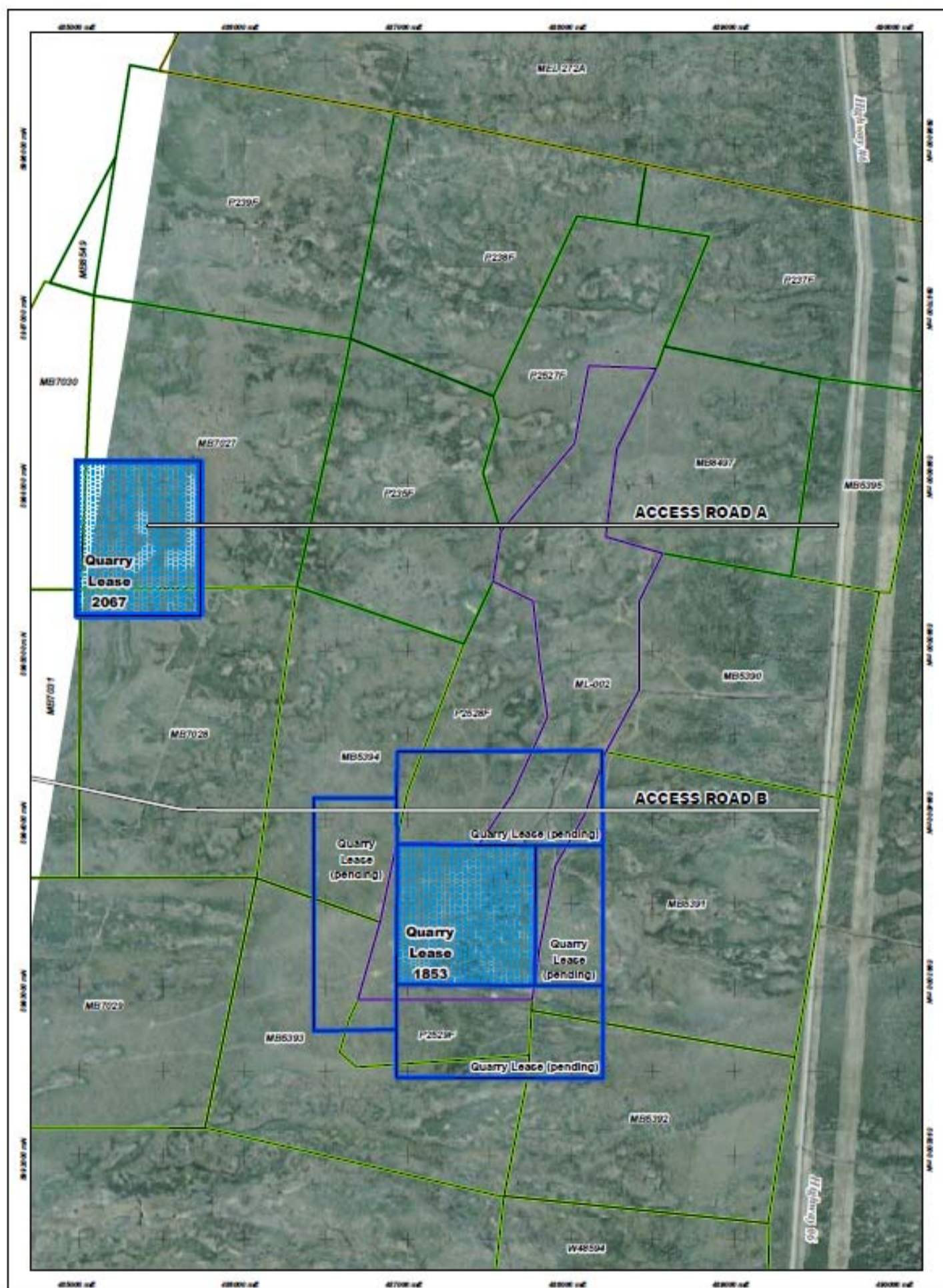
Dec 11 2009  
Date

David Tomalty  
Witness

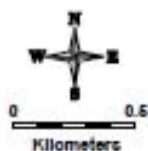
[Signature]  
Lessee VICTORY NICKEL INC.

NOV 20 2009  
Date





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-  VNI Quarry: Complete
-  VNI Quarry: Pending
-  VNI Exploration Lease
-  VNI Lease
-  VNI Claims, Optioned (Xstrata)
-  VNI Claims

**VICTORY NICKEL INC.**

MINAGO PROJECT - SOUTH BLOCK AREA  
 Minago River Area, Manitoba - G3J03

*Property and Access*

DATUM: NAD 83, ZONE 14



# APPENDIX 2.8-A

## Waste Rock

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# **APPENDIX 2.8-A1**

## **Phase I and Phase II Drill Log Summaries**

**Phase I  
Drill Log  
Summary**

2.8-3


Drillhole N0727 Lithology Log

<b>DDH</b>	<b>From (m)</b>	<b>To (m)</b>	<b>Unit</b>	<b>Lithology</b>
N0727	0.00	8.10	1	Overburden
N0727	8.10	76.45	2	Dolomite
N0727	76.45	86.00	3	Sandstone
N0727	86.00	88.35	5	Granite
N0727	88.35	116.84	4	Serpentinite
N0727	116.84	122.49	5	Granite
N0727	122.49	133.92	4	Serpentinite
N0727	133.92	135.90	5	Granite
N0727	135.90	186.61	4	Serpentinite
N0727	186.61	206.34	5	Granite
N0727	206.34	213.12	4	Serpentinite
N0727	213.12	218.74	5	Granite
N0727	218.74	228.52	4	Serpentinite
N0727	228.52	233.00	5	Granite
N0727	233.00	239.00	4	Serpentinite

## Drillhole N0729 Lithology Log

<b>DDH</b>	<b>From (m)</b>	<b>To (m)</b>	<b>Unit</b>	<b>Lithology</b>
N0729	0.00	10.60	1	Overburden
N0729	10.60	71.90	2	Dolomite
N0729	71.90	80.90	3	Sandstone
N0729	80.90	91.30	11	Regolith
N0729	91.30	98.40	5	Granite
N0729	98.40	107.00	6	Amphibolite
N0729	107.00	117.45	5	Granite
N0729	117.45	135.60	6	Amphibolite
N0729	135.60	141.10	5	Granite
N0729	141.10	200.00	6	Amphibolite
N0729	200.00	244.00	5	Granite
N0729	244.00	298.00	6	Amphibolite

## Drillhole N0729 Lithology Log

<b>DDH</b>	<b>From (m)</b>	<b>To (m)</b>	<b>Unit</b>	<b>Lithology</b>
N0729	0.00	10.60	1	Overburden
N0729	10.60	71.90	2	Dolomite
N0729	71.90	80.90	3	Sandstone
N0729	80.90	91.30	11	Regolith
N0729	91.30	98.40	5	Granite
N0729	98.40	107.00	6	Amphibolite
N0729	107.00	117.45	5	Granite
N0729	117.45	135.60	6	Amphibolite
N0729	135.60	141.10	5	Granite
N0729	141.10	200.00	6	Amphibolite
N0729	200.00	244.00	5	Granite
N0729	244.00	298.00	6	Amphibolite





















**Phase II  
Sample  
Selection**

**Summary of Phase II Static Tests Sample Selection  
Minago Project  
August 2008**

Numeric Code	Alpha Code	Description	# Samples		
			BHK holes	N holes	SUBTOTAL
1	OVB	Overburden			0
2	PZD	Dolomite			0
3	PZS	Sandstone			0
4	SPT	Serpentinite	10	22	32
5	GT	Granite	16	17	33
6	AMP	Amphibolite	1	3	4
7	PYX	Pyroxenite			0
8	PER	Peridotite			0
9	SCH	Schist			0
10	LC	Lost Core			0
11	R	Regolith		1	1
12	MD	Mafic Dike		3	3
13	MSD	Metasediment		6	6
14	MMV	Mafic Metavolcanic		2	2
<b>TOTAL</b>			<b>27</b>	<b>54</b>	<b>81</b>

Su  
Bf  
Mii

Sa	Cc	Ho	Frc	To	Lei	Sa	Ni	Ni	Pt	Pd	Cu	Cc	Au	Ag
	SF	BH	60	61	3.3	25	14		<0	0.0		74	<0	<0
	SF	BH	10	10	4.7	36	>1	1.1	0.1	0.2	50	16	0.0	<0
	GT	BH	10	10		36	17		<0	0.0	18		0.0	<0
	GT	BH	76	77		49	28		<0	0.0	19		<0	<0
	GT	BH	96	96		49	12		<0	<0			0.0	<0
	GT	BH	96	96		49	12		<0	<0			0.0	<0
	GT	BH	10	10		36	34		<0	0.0	17	18	<0	<0
	GT	BH	11	11		36	38		<0	<0	19		<0	<0
	GT	BH	92	93	10	49	33		<0	<0	12		<0	<0
10	GT	BH	46	46	3.7	25	40		<0	<0	15		<0	<0
11	GT	BH	49	50	10	25			<0	<0	17		<0	<0
12	GT	BH	73	74										
13	SF	BH	74	74	3.4	25	45		0.0	0.1	26	96	0.0	<0
14	SF	BH	81	82		25	>1	1.6	0.1	0.4	10	19	0.0	0.5
15	GT	BH	83	83	1.8	25	64		<0	0.0	57		0.0	<0
16	SF	BH	92	93		25	26		0.0	0.0	94	11	0.0	<0
17	GT	BH	10	10	1.5	25	10		<0	<0	20		<0	<0
18	AM	BH	66	66		49	12		0.0	0.0	68	17	<0	<0
19	SF	BH	74	74		49	16		0.0	0.0	17	70	0.0	<0
20	SF	BH	77	78		49	24		0.0	0.0		61	<0	<0
21	SF	BH	80	80		49	48		0.0	0.0	20	97	0.0	<0
22	SF	BH	81	81		49	62		0.0	0.0	20	88	0.0	<0
23	GT	BH	81	82		49	64		0.0	0.0	23		<0	<0
24	GT	BH	85	86	8.5	49	14		0.0	0.0	14		<0	<0
25	GT	BH	86	87		49	13		0.0	0.0	29		<0	<0
26	SF	BH	11	11	5.5	49	17		<0	0.0	20	55	<0	<0
27	GT	BH	11	11		49	49		<0	<0	14		<0	<0

Summary of Phase II Static Test Samples Selected  
N Drillcore Intersections  
Minago Project

Code	DDH	Sample #	From (m)	To (m)	Length (m)	Sample Type	Description	Cu (ppm)	Ni (ppm)	Ni (%)	SG
GT	N0702	924204	117.50	119.00	1.50	CORE	Granite	59	230		
SPT	N0702	924224	141.50	142.74	1.24	CORE	SPT	11	1920		
SPT/GT	N0702	924234	151.60	152.40	0.80	CORE	SPT	10	1840		
GT	N0702	924235	152.40	153.70	1.30	CORE	Granite	13	2180		
MSD	N0705	924548	99.5	100.6	1.1	CORE	Met Sed	250	580		
MD	N0705	924551	101.6	102.6	1	CORE	Alt UM	71	250		
GT	N0705	924558	107.35	108.35	1	CORE	Gran Gneiss	240	62		2.49
GT	N0706	924350	102.50	103.25	0.75	CORE	alt'd granite	36	2450		
GT	N0706	924424	178.30	179.70	1.40	CORE	Gran Gneiss	30	5		
GT	N0707	924591	109.30	110.80	1.50	CORE	Alt Gran	23	500		
SPT	N0707	924626	143.6	145.1	1.5	CORE	Alt UM +SPT	21	>5000	1.32	
MD	N0707	924669	191	192.5	1.5	CORE	Molson Dyke	41	81		
SPT	N0707	924686	209	210.5	1.5	CORE	SPT	5	4250		
SPT	N0707	924709	233	234.2	1.2	CORE	Alt Gran+millrite	<1	2460		
SPT	N0707	924724	257	258.5	1.5	CORE	Alt Ultramafic	9	1110		
MSD	N0710	924730	126.1	126.6	0.5	CORE	Iron Fm	300	230		
MSD	N0710	924738	135.4	136.2	0.8	CORE	Iron Fm+Meta Se	83	93		2.66
SPT	N0710	924747	144	145.5	1.5	CORE	Alt. Ultramafic+FR	12	2200		
SPT	N0710	924762	164	165.5	1.5	CORE		<1	3490		
SPT	N0710	924772	177	177.6	0.6	CORE	1-2% pn	1210	>5000	1.03	
SPT	N0710	924827	240.5	242	1.5	CORE	SPT	1	2700		
GT	N0710	924890	312.3	312.9	0.6	CORE	EGRAN	8	960		
MSD	N0712	925841	197	198.5	1.5	CORE	spt	64	3880		
SPT	N0712	925856	214.5	215.45	0.95	CORE	alt'd gran	34	1010		
SPT	N0712	925866	225.5	227	1.5	CORE	spt	340	>5000	0.81	
MMV	N0712	925884	249.5	251	1.5	CORE	amph	72	200		
GT	N0713	924964	203.2	204.7	1.5	CORE	granite, nil sulphid	7	170		
GT	N0713	924981	221	222.5	1.5	CORE	40% alt um, nil su	24	1670		
SPT	N0713	925017	255.51	257	1.49	CORE	2-3% fgr diss sulph	<1	>5000	0.67	
SPT	N0713	925075	317	318.53	1.53	CORE	peridotite, 1-2% fg	77	3350		
GT	N0713	925116	371.04	371.7	0.66	CORE	foliated mafic dyk	93	380		
GT	N0713	925132	436.3	437.27	0.97	CORE	granite, nil sulphid	5	27		2.64
MSD	N0701	924169	185	186.4	1.4	CORE	banded to 25 cm of near massive py; sulph			0.221	
MSD	N0701	924159	173.45	174.9	1.45	CORE	disseminated to thin layers of pyritic sulph			0.315	
SPT	N0719	925999	492.02	493.47	1.45	CORE	Dark green serp.	3	2840		
GT	N0720	925273	249.3	251	1.7	CORE	granite, nil sulphid	12	260		
SPT	N0720	925276	254.84	256.33	1.49	CORE	altered um, partly	10	2300		
GT	N0724	929308	171.18	171.96	0.78	CORE	90% amphibolite w	43	110		2.87
AMP	N0724	929311	185.68	186.84	1.16	CORE	100% amphibolite	97	73		
AMP	N0724	929314	190	190.84	0.84	CORE	100% Amphibolite	100	78		
AMP	N0724	929318	196.15	197	0.85	CORE	100% Amphibolite	77	200		
GT	N0725	925315	138.64	139.56	0.92	CORE	altgran bleached	7	100		
MMV	N0726	926231	109.00	110.00	1.00	CORE	Amphibolite with f	39	150		
SPT	N0726	926235	125.94	126.72	0.78	CORE	Contaminated ultr	15	880		
SPT	N0726	926243	133.69	134.54	0.85	CORE	Amphibolite with t	170	1390		
GT	N0726	926297	215.81	218	2.19	CORE	EGRAN, with serp	32	520		
SPT	N0726	926312	284.39	285.4	1.01	CORE	Med green, trem a	160	2950		
R	N0730	926397	94.53	95.23	0.7	CORE	regolith chl-phlog	28	1000		
SPT	N0730	929407	104.25	105.25	1	CORE	Alt UUM 25cm mic	11	1560		
SPT	N0730	929433	135.5	137	1.5	CORE	grey-grm spt sim t	31	2150		
MD	N0730	929437	141	143	2	CORE	mvolc nil sulph	200	180		
GT	N0730	929488	197.7	198.8	1.1	CORE	alt'd gran	38	300		
SPT	N0730	929490	200	201.5	1.5	CORE	fg purple-limegrn	17	1640		
GT	N0733	929497	164.00	165.00	1.00	CORE	sim to prev	8	280		

## **APPENDIX 2.8-A2**

**Phase I Static Test and Metal Results  
Phase II Grainsize, Static, and Metal Test Results**

## Phase I Static Test and Metal Results

### Table A2.8.1 Geochemical Sample Description for Phase I Static Testing

No.	Drill Hole	ARD Sample #	Composition <sup>1</sup>					Description	Rock Type by Lithology	Rock Type by Code	Mass (kg)
			OB	LS	FS	AR	ORE				
1	N0727	OB/AR	1.0				1.7	Overburden-Alteration	glacial lacustrine clay-granite,serpentine	1-5,4	2.70
2	N0727	FS/AR			1.0	1.3		Frac Sand-Alteration Composite	sandstone-granite,serpentine	3-5,4	2.25
3	N0727	FS/LS			1.0	7.0		Frac Sand-Limestone Composite	sandstone-dolomite	3-2	2.00
4	N0727	LS/OB	1.0	10.0				Limestone-Overburden Composite	dolomite-glacial lacustrine clay	2-1	2.20
5	N0727	ORE/AR				1.0	11.6	Ore-Alteration Composite	granite,serpentine-granite,serpentine	5,4-5,4	2.52
6	N0727	LS/AR		5.6		1.0		Limestone-Alteration Composite	dolomite-granite,serpentine	2-5,4	2.31
7	N0727	ORE/LS		1.0			2.1	Ore-Limestone Composite	granite,serpentine-dolomite	5,4-2	2.17
8	N0727	OB	1.0					Overburden	glacial lacustrine clay	1	2.01
9	N0727	LS		1.0				Limestone	dolomite	2	2.72
10	N0727	FS			1.0			Frac Sand	sandstone	3	2.80
11	N0727	AR					1.0	Alteration	granite,serpentine	5,4	2.12
12	N0727	ORE <sup>2</sup>					1.0	Ore	granite,serpentine	5,4	na
13	N0727	OB/LS/FS/AR/ORE	0.05	0.49	0.07	0.08	1.0	Overburden-Limestone-Frac Sand-Alteration-Ore Composite	glacial lacustrine clay-dolomite-sandstone-granite,serpentine-granite,serpentine	1-2-3-5,4-5,4	2.36
14	N0728	OB/AR	25.0				1.0	Overburden-Alteration Composite	glacial lacustrine clay-serpentine	1-4	2.60
15	N0728	FS/AR				25.0	1.0	Frac Sand-Alteration Composite	sandstone-serpentine	3-4	2.60
16	N0728	FS/LS		7.0	1.0			Frac Sand-Limestone Composite	sandstone-dolomite	3-2	2.40
17	N0728	LS/OB	1.0	7.0				Limestone-Overburden Composite	dolomite-glacial lacustrine clay	2-1	2.40
18	N0728	ORE/AR				1.0	66.0	Ore-Alteration Composite	mafic dike,serpentine,granite,mafic metavolcanic,amphibolite-serpentine	7,4,5,9,6-4	2.01
19	N0728	LS/AR		18.0			1.0	Limestone-Alteration Composite	dolomite-serpentine	2-4	2.09
20	N0728	ORE/LS		1.0			3.7	Ore-Limestone Composite	mafic dike,serpentine,granite,mafic metavolcanic,amphibolite-dolomite	7,4,5,9,6-2	2.35
21	N0728	OB	1.0					Overburden	glacial lacustrine clay	1	>2.00
22	N0728	LS		1.0				Limestone	dolomite	2	2.48
23	N0728	FS			1.0			Frac Sand	sandstone	3	2.36
24	N0728	AR					1.0	Alteration	serpentine	4	2.23
25	N0728	ORE <sup>2</sup>					1.0	Ore	mafic dike,serpentine,granite,mafic	7,4,5,9,6	na
26	N0728	OB/LS/FS/AR/ORE	0.03	0.19	0.03	0.01	1.0	Overburden-Limestone-Frac Sand-Alteration-Ore Composite	glacial lacustrine clay-dolomite-sandstone-serpentine-mafic dike,serpentine,granite,mafic metavolcanic,amphibolite	1-2-3-4-7,4,5,9,6	2.28
27	N0729	OB/AR	27.5				1.0	Overburden-Alteration Composite	glacial lacustrine clay-regolith,granite	1-11,5	2.85
28	N0729	FS/AR			1.0	2.0		Frac Sand-Alteration Composite	sandstone-regolith,granite	3-11,5	2.10
29	N0729	FS/LS		7.0	1.0			Frac Sand-Limestone Composite	sandstone-dolomite	3-2	2.80
30	N0729	LS/OB		3.6			1.0	Limestone-Overburden Composite	dolomite-glacial lacustrine clay	2-1	2.60
31	N0729	ORE/AR				1.0	12.0	Ore-Alteration Composite	amphibolite,granite-regolith,granite	6,5-11,5	2.60
32	N0729	LS/AR		3.6		1.0		Limestone-Alteration Composite	dolomite-regolith,granite	2-11,5	2.30
33	N0729	ORE/LS		1.0			3.3	Ore-Limestone Composite	amphibolite,granite-dolomite	6,5-2	2.15
34	N0729	OB	1					Overburden	glacial lacustrine clay	1	2.10
35	N0729	LS		1.0				Limestone	dolomite	2	2.30
36	N0729	FS			1.0			Frac Sand	sandstone	3	2.25
37	N0729	AR					1.0	Alteration	regolith,granite	11,5	2.65
38	N0729	ORE <sup>2</sup>					1.0	Ore	amphibolite,granite	6,5	na
39	N0729	OB/LS/FS/AR/ORE	0.05	0.30	0.04	0.08	1.0	Overburden-Limestone-Frac Sand-Alteration-Ore Composite	glacial lacustrine clay-dolomite-sandstone-regolith,granite- amphibolite,granite	1-2-3-11,5-6,5	2.98
40	N0736	OB/AR	0.03				1.0	Overburden-Alteration Composite	glacial lacustrine clay-??	1-?	2.06
41	N0736	FS/AR			0.05	1.0		Frac Sand-Alteration Composite	sandstone-??	3-?	2.10
42	N0736	FS/LS		1.0	0.15			Frac Sand-Limestone Composite	sandstone-dolomite	3-2	2.30
43	N0736	LS/OB	0.08	1.0				Limestone-Alteration Composite	dolomite-??	2-?	2.16
44	N0736	ORE/AR				1.0	0.26	Ore-Alteration Composite	??-??	??-?	2.52
45	N0736	LS/AR		0.35		1.0		Limestone-Alteration Composite	dolomite-??	2-?	2.70
46	N0736	ORE/LS		1.0			0.75	Ore-Limestone Composite	??-dolomite	??-2	2.33
47	N0736	OB	1.0					Overburden	glacial lacustrine clay	1	2.75
48	N0736	LS		1.0				Limestone	dolomite	2	2.43
49	N0736	FS			1.0			Frac Sand	sandstone	3	2.40
50	N0736	AR					1.0	Alteration	??	?	2.50
51	N0736	ORE					1.0	Ore	??	?	2.75
52	N0736	OB/LS/FS/AR/ORE	0.03	0.35	0.05	1.0	0.26	Overburden-Limestone-Frac Sand-Alteration-Ore Composite	glacial lacustrine clay-dolomite-sandstone-??-??	1-2-3-?-?	3.38

**Notes:**

- 1 Lithologies: OB=overburden, LS=dolomite, FS=sandstone, AR=altered Precambrian basement, ORE=Precambrian basement
- 2 no sample collected

**CLIENT** : David Machaina  
**PROJECT** : Minago (Nuinsco Resources Ltd.)  
**CEMI Project #** : 0714  
**Test** : Modified Acid-Base Accounting  
**Date** : April 17/23, 2007

Sample ID	Paste pH	TIC %	CaCO <sub>3</sub> NP	S(T) %	S(SO <sub>4</sub> ) %	S(S-2) %	AP	NP	Net NP	Fizz Test
#1-NO727-OB/AR	8.11	0.91	75.8	0.16	0.01	0.15	4.7	55.1	50.4	Moderate
#1-NO728-OB/AR	8.05	2.36	196.7	0.04	<0.01	0.04	1.3	196.0	194.8	Strong
#2-NO727-FS/AR	8.89	1.09	90.8	0.08	<0.01	0.08	2.5	99.4	96.9	Slight
#2-NO728-FS/AR	9.07	1.21	100.8	0.06	<0.01	0.06	1.9	95.8	93.9	Slight
#3-NO727-FS/LS	8.87	10.49	874.2	0.08	<0.01	0.08	2.5	824.1	821.6	Strong
#3-NO728-FS/LS	8.75	10.77	897.5	0.04	<0.01	0.04	1.3	837.2	836.0	Strong
#3-NO729-FS/LS	8.82	10.63	885.8	0.07	<0.01	0.07	2.2	854.3	852.1	Strong
#4-NO727-LB/OB	8.34	11.09	924.2	0.07	<0.01	0.07	2.2	903.3	901.1	Strong
#4-NO728-LB/OB	8.23	10.68	890.0	0.04	<0.01	0.04	1.3	864.3	863.1	Strong
#5-NO727-ORE/AR	9.70	0.29	24.2	0.3	0.02	0.28	8.8	59.0	50.3	None
#5-NO728-ORE/AR	9.67	0.52	43.3	0.08	<0.01	0.08	2.5	41.4	38.9	Slight
#5-NO729-ORE/AR	9.40	0.22	18.3	0.12	<0.01	0.12	3.8	40.7	37.0	Slight
#6-NO727-LS/AR	8.66	10.69	890.8	0.1	<0.01	0.10	3.1	919.0	915.9	Strong
#6-NO728-LS/AB	8.51	12.06	1005.0	0.02	<0.01	0.02	0.6	967.3	966.7	Strong
#6-NO729-LS/AR	8.51	9.83	819.2	0.09	<0.01	0.09	2.8	809.7	806.9	Strong
#7-NO727-ORE/LS	9.63	5.25	437.5	0.23	<0.01	0.23	7.2	412.9	405.7	Strong
#7-NO728-ORE/LS	9.60	3.13	260.8	0.08	<0.01	0.08	2.5	245.1	242.6	Moderate
#8-NO727-OB	7.88	2.46	205.0	0.04	<0.01	0.04	1.3	198.6	197.4	Strong
#8-NO728-OB	7.88	2.46	205.0	0.03	<0.01	0.03	0.9	193.6	192.7	Strong
#8-NO729-OB	7.98	2.65	220.8	0.04	<0.01	0.04	1.3	229.8	228.6	Strong
#9-NO727-LS	8.80	12.02	1001.7	0.1	<0.01	0.10	3.1	831.7	828.6	Strong
#9-NO728-LS	8.69	12.5	1041.7	0.04	<0.01	0.04	1.3	665.7	664.5	Strong
#9-NO729-LS	8.79	12.25	1020.8	0.03	<0.01	0.03	0.9	738.1	737.2	Strong
#10-NO727-FS	9.16	1.69	140.8	0.13	<0.01	0.13	4.1	141.4	137.3	Moderate
#10-NO728-FS	8.89	1.04	86.7	0.02	<0.01	0.02	0.6	83.1	82.5	Moderate
#10-NO729-FS	8.95	1.52	126.7	0.19	<0.01	0.19	5.9	122.2	116.3	Moderate
#11-NO727-AR	8.06	0.11	9.2	0.34	0.01	0.33	10.3	10.2	-0.1	None
#11-NO728-AR	7.99	0.34	28.3	0.69	0.04	0.65	20.3	30.8	10.5	None
#11-NO729-AR	8.55	1.04	86.7	0.14	<0.01	0.14	4.4	86.3	81.9	Slight
#13-NO727-OB/LS/FS/AR/ORE	9.65	3.29	274.2	0.24	0.01	0.23	7.2	231.7	224.5	Moderate
#13-NO728-OB/LS/FS/AR/ORE	9.66	2.18	181.7	0.07	<0.01	0.07	2.2	122.8	120.6	Moderate
<b>Duplicates</b>										
#1-NO727-OB/AR		0.9		0.15	<0.01					
#1-NO728-OB/AR	8.06							197.3		Strong
#3-NO729-FS/LS		10.61		0.06	-					
#6-NO728-LS/AB	8.58							968.6		Strong
#8-NO728-OB		2.46		0.04	<0.01					
#10-NO727-FS		1.7		0.13	<0.01					
#13-NO728-OB/LS/FS/AR/ORE	9.66							138.8		Moderate

**Note:**

AP = Acid potential in tonnes CaCO<sub>3</sub> equivalent per 1000 tonnes of material. AP is determined from calculated sulphide sulphur content: S(T) - S(SO<sub>4</sub>).

NP = Neutralization potential in tonnes CaCO<sub>3</sub> equivalent per 1000 tonnes of material.

NET NP = NP - AP

Carbonate NP is calculated from TIC originating from carbonates and is expressed in kg CaCO<sub>3</sub>/tonne.



CL : D : N  
 PF : 0 : N  
 CE : A : N  
 Te :  
 Da :

Sa	Pa pH	Tik %	Ca NF	S( %	S( %	S( %	AF	NF	Ne NF	Fiz
#1	7.8	2.8	21	0.0	<0	0.0	1.8	20	20	Str
#2	8.8	0.7	59	0.1	<0	0.1	3.8	48	45	Sli
#4	8.0	11	93	0.0	<0	0.0	1.8	91	91	Str
#7	9.6	2.2	18	0.0	<0	0.0	2.8	18	18	Mc
#1	9.2	2.1	17	0.1	<0	0.1	4.1	17	17	Mc
Du	8.0	2.8		0.0	<0			21		Str

No

AF

NF

NE

Ca

Vic

Ap

H:\

No  
 UF



Cl : E : N : A  
 PR : 0 : 0 : A  
 CE : N : N : A  
 To : : :  
 Da : : : A

	Sa	Al	Si	As	Bi	Br	Ca	Cr	Cu	Fe	Hf	La	Mn	Mo	Ni	Nb	Co	Sc	Th	Ti	V	Zr
#1	<0	<0	0.1	<5	64	<0	14	14	14	11	<1	20	23	46	0.1	0.1	43	47	0.1	0.1	28	26
#2	<0	<0	1.4	<5	15	0.1	41	33	33	2.1	<1	59	20	35	0.1	0.1	12	43	0.1	0.1	32	29
#4	<0	<0	0.1	<5	13	<0	16	<1	<1	0.4	<1	<1	14	14	0.1	0.1	<1	55	<0	0.1	14	<1
#7	<0	<0	1.4	<5	26	<0	30	17	14	2.1	<1	49	12	50	0.1	0.1	19	31	0.1	0.1	37	44
#1	<0	<0	1.1	<5	24	<0	48	37	37	2.1	<1	54	20	33	0.1	0.1	20	32	0.1	0.1	43	36

CL : K : N  
 PF : N  
 CE : N  
 Te : N  
 Da : N

Sa	Pa pH	TiC %	Ca NF	S( ) %	S( ) %	S( ) %	AF	NF	Ne NF	Fiz
	9.2	0.1	10	0.1	<0	0.1	5.0	28	23	Nc
	8.8	0.1	13	0.1	<0	0.1	5.8	20	14	Nc
	8.8	11	97	0.0	<0	0.0	2.8	96	96	Mc
	8.2	11	97	0.0	<0	0.0	1.8	95	95	Mc
	9.2	0.1	8.8	0.8	0.0	0.8	10	20	10	Nc
	9.2	2.8	24	0.1	<0	0.1	3.8	23	22	Sli
	8.8	7.8	64	1.2	<0	1.2	38	64	61	Mc
	7.7	2.2	20	0.1	0.0	0.1	3.1	19	19	Mc
	8.8	11	99	0.0	<0	0.0	2.8	97	96	Mc
	8.8	0.8	76	0.2	<0	0.2	6.8	68	61	Sli
	9.8	0.0	6.7	0.1	<0	0.1	5.8	17	12	Nc
	9.1	0.2	16	4.1	0.0	4.0	12	37	-88	Nc
	9.0	2.2	20	0.8	<0	0.8	19	20	18	Mc
Du										
	9.8	0.1		0.1	<0	0.1		24		Nc
	9.2	0.8		0.2	<0	0.2		20		Mc

Nc

AP

NF

NE

Ca

Su

Su

Vic

H( )

AP

No  
UF

CL : K : H : A  
 PF : 0 : J : B  
 To : :  
 Di : : H

Sa	Ac	Al	At	Ba	Bc	Be	Bi	Ca	Cc	Cr	Cl	Co	Hf	La	Mi	Mn	Mo	Ni	Nb	Pb	Pd	Pf	Sc	Sr	Tf	U	V	W	Zr
NC	<-3	1.4	<-5	61	0.4	<-5	0.1	13	14	12	17	2.1	0.3	10	2.1	17	2.1	0.1	<-2	69	2.1	<-5	33	20	0.1	<-1	28	<-1	40
NC	<-3	1.4	<-5	12	0.4	<-5	0.1	11	11	11	19	0.1	0.4	69	1.1	18	2.1	0.1	<-2	54	2.1	<-5	24	20	0.1	<-1	22	<-1	40
NC	<-3	0.1	<-5	<-1	<-3	<-5	>1	<-1	<-1	16	11	0.1	0.1	<-1	10	13	<-2	0.1	<-2	64	2.1	<-5	47	20	0.1	<-1	13	<-1	40
NC	<-3	0.1	<-5	<-1	<-3	<-5	>1	<-1	<-1	11	14	0.1	0.1	<-1	10	15	<-2	0.1	<-2	61	2.1	<-5	31	17	0.1	<-1	12	<-1	38
NC	<-3	1.4	<-5	70	0.1	<-5	0.1	26	26	14	23	2.1	0.4	74	2.1	20	<-2	0.1	<-2	46	2.1	<-5	24	24	0.1	<-1	20	<-1	38
NC	<-3	1.4	<-5	5	0.1	<-5	0.1	0	0	6	11	2.1	0.4	11	2.1	11	<-2	0.1	<-2	11	2.1	<-5	14	21	0.1	<-1	10	<-1	18
NC	<-3	0.1	<-5	58	0.1	<-5	11	20	20	11	12	2.1	0.4	13	9.1	18	<-2	0.1	<-2	11	2.1	<-5	14	21	0.1	<-1	10	<-1	18
NC	<-3	0.1	<-5	10	0.4	<-5	5.1	12	43	16	2.1	2.1	0.1	27	2.1	34	<-2	0.1	<-2	42	2.1	<-5	34	15	0.1	<-1	53	<-1	51
NC	<-3	0.1	<-5	<-1	<-3	<-5	>1	<-1	<-1	12	12	0.1	0.1	<-1	10	13	<-2	0.1	<-2	63	2.1	<-5	33	33	0.1	<-1	12	<-1	24
NC	<-3	0.1	<-5	<-1	<-3	<-5	>1	<-1	<-1	10	53	25	0.1	0.1	30	72	<-2	0.1	<-2	40	2.1	<-5	10	13	0.1	<-1	28	<-1	19
NC	<-3	0.1	<-5	56	0.1	<-5	0.1	12	61	31	31	1.1	0.4	58	1.1	16	<-2	0.1	<-2	52	2.1	<-5	10	13	0.1	<-1	14	<-1	40
NC	<-3	1.1	<-5	53	0.1	<-5	0.1	39	20	13	13	2.1	0.1	37	4.1	26	<-2	0.1	<-2	19	2.1	<-5	10	13	0.1	<-1	18	<-1	40
NC	<-3	1.1	<-5	39	0.1	<-5	4.1	12	69	44	44	2.1	0.1	37	4.1	26	<-2	0.1	<-2	37	2.1	<-5	25	19	0.1	<-1	38	<-1	25

**Table A2.8.2**  
**Total Metal Concentrations**  
**Phase I Static Test Results**  
**Minago Project**

Sample #	Rock Type	Comp Ratio	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Hg	K	La	Mg	Mn
			ppm	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%	ppm	%	ppm
#8-N0727-OB	1	1	<0.2	1.99	<5	139	0.9	<5	6.81	<1	15	58	27	3.04	<1	0.43	32	2.34	482
#8-N0728-OB	1	1	<0.2	1.84	<5	135	0.8	<5	6.57	<1	13	54	25	2.79	1	0.39	30	2.29	412
#8-N0729-OB	1	1	<0.2	1.88	<5	128	0.8	<5	6.95	<1	13	54	26	2.87	<1	0.41	30	2.37	469
#8-N0736-OB	1	1	<0.2	1.42	<5	100	0.6	<5	5.86	1	12	43	16	2.18	1	0.28	27	2.01	342
<b>Minimum</b>			<b>0.00</b>	<b>1.42</b>	<b>&lt;5</b>	<b>100.00</b>	<b>0.60</b>	<b>&lt;5</b>	<b>5.86</b>	<b>1.00</b>	<b>12.00</b>	<b>43.00</b>	<b>16.00</b>	<b>2.18</b>	<b>1.00</b>	<b>0.28</b>	<b>27.00</b>	<b>2.01</b>	<b>342.00</b>
<b>Maximum</b>			<b>0.00</b>	<b>1.99</b>	<b>&lt;5</b>	<b>139.00</b>	<b>0.90</b>	<b>&lt;5</b>	<b>6.95</b>	<b>1.00</b>	<b>15.00</b>	<b>58.00</b>	<b>27.00</b>	<b>3.04</b>	<b>1.00</b>	<b>0.43</b>	<b>32.00</b>	<b>2.37</b>	<b>482.00</b>
#9-N0727-LS	2	1	0.2	0.1	<5	<10	<0.5	<5	>15.00	<1	<1	3	1	0.43	<1	0.07	<10	12.51	220
#9-N0728-LS	2	1	0.5	0.04	<5	<10	<0.5	<5	>15.00	<1	<1	1	4	0.43	<1	0.03	<10	12.72	317
#9-N0729-LS	2	1	0.5	0.07	<5	<10	<0.5	<5	>15.00	<1	<1	2	<1	0.26	<1	0.04	<10	12.78	162
#9-N0736-LS	2	1	<0.2	0.12	<5	<10	<0.5	<5	>15.00	<1	2	12	3	0.32	<1	0.07	<10	10.72	137
<b>Minimum</b>			<b>0.20</b>	<b>0.04</b>	<b>&lt;5</b>	<b>&lt;10</b>	<b>&lt;0.5</b>	<b>&lt;5</b>	<b>&gt;15.0</b>	<b>&lt;1</b>	<b>2.00</b>	<b>1.00</b>	<b>1.00</b>	<b>0.26</b>	<b>&lt;1</b>	<b>0.03</b>	<b>&lt;10</b>	<b>10.72</b>	<b>137.00</b>
<b>Maximum</b>			<b>0.50</b>	<b>0.12</b>	<b>&lt;5</b>	<b>&lt;10</b>	<b>&lt;0.5</b>	<b>&lt;5</b>	<b>&gt;15.0</b>	<b>&lt;1</b>	<b>2.00</b>	<b>12.00</b>	<b>4.00</b>	<b>0.43</b>	<b>&lt;1</b>	<b>0.07</b>	<b>&lt;10</b>	<b>12.78</b>	<b>317.00</b>
#10-N0727-FS	3	1	0.7	0.05	<5	<10	<0.5	<5	3.06	<1	1	188	22	0.55	<1	0.02	<10	1.72	103
#10-N0728-FS	3	1	0.8	0.23	<5	12	<0.5	<5	2.03	<1	2	126	18	0.55	<1	0.04	<10	1.09	103
#10-N0729-FS	3	1	<0.2	0.1	<5	<10	<0.5	<5	2.6	<1	1	193	10	0.54	<1	0.04	<10	1.49	82
#10-N0736-FS	3	1	0.6	0.13	<5	<10	<0.5	<5	1.37	<1	10	53	25	0.79	<1	0.06	30	0.85	72
<b>Minimum</b>			<b>0.60</b>	<b>0.05</b>	<b>&lt;5</b>	<b>12.00</b>	<b>&lt;0.5</b>	<b>&lt;5</b>	<b>1.37</b>	<b>&lt;1</b>	<b>1.00</b>	<b>53.00</b>	<b>10.00</b>	<b>0.54</b>	<b>&lt;1</b>	<b>0.02</b>	<b>30.00</b>	<b>0.85</b>	<b>72.00</b>
<b>Maximum</b>			<b>0.80</b>	<b>0.23</b>	<b>&lt;5</b>	<b>12.00</b>	<b>&lt;0.5</b>	<b>&lt;5</b>	<b>3.06</b>	<b>&lt;1</b>	<b>10.00</b>	<b>193.00</b>	<b>25.00</b>	<b>0.79</b>	<b>&lt;1</b>	<b>0.06</b>	<b>30.00</b>	<b>1.72</b>	<b>103.00</b>
#11-N0727-AR	5,4	1	<0.2	0.75	5	73	0.6	<5	0.27	<1	14	41	151	0.79	<1	0.31	51	0.5	107
#11-N0728-AR	4	1	<0.2	2.46	7	46	2.3	<5	0.81	<1	123	237	480	3.42	<1	0.3	201	5.01	199
#11-N0729-AR	11,5	1	<0.2	2.59	<5	121	1.4	<5	2.6	<1	65	981	68	4.79	<1	0.37	44	4.85	440
#11-N0736-AR	?	1	<0.2	0.97	<5	56	<0.5	<5	0.5	1	12	61	31	1.65	<1	0.43	58	1.14	160
<b>Minimum</b>			<b>0.00</b>	<b>0.75</b>	<b>5.00</b>	<b>46.00</b>	<b>0.60</b>	<b>&lt;5</b>	<b>0.27</b>	<b>1.00</b>	<b>12.00</b>	<b>41.00</b>	<b>31.00</b>	<b>0.79</b>	<b>&lt;1</b>	<b>0.30</b>	<b>44.00</b>	<b>0.50</b>	<b>107.00</b>
<b>Maximum</b>			<b>0.00</b>	<b>2.59</b>	<b>7.00</b>	<b>121.00</b>	<b>2.30</b>	<b>&lt;5</b>	<b>2.60</b>	<b>1.00</b>	<b>123.00</b>	<b>981.00</b>	<b>480.00</b>	<b>4.79</b>	<b>&lt;1</b>	<b>0.43</b>	<b>201.00</b>	<b>5.01</b>	<b>440.00</b>
#12-N0736-ORE	?	1	<0.2	1.18	<5	83	0.6	<5	0.4	3	38	211	130	6.37	<1	0.55	37	6.09	274
#1-N0727-OB/AR	1-4,5	1:1.7	<0.2	1.99	<5	162	1.3	<5	2.61	<1	15	78	35	3.19	<1	0.89	20	1.56	490
#1-N0728-OB/AR	1-4	25:1	<0.2	1.85	<5	114	0.9	<5	5.62	<1	12	49	21	2.97	<1	0.33	25	2.42	372
#1-N0729-OB/AR	1-5,11	27.5:1	<0.2	0.86	<5	64	<0.5	<5	6.22	<1	7	144	14	1.55	<1	0.19	20	2.13	258
#1-N0736-OB/AR	1-?	0.03:1	<0.2	1.86	<5	61	1	<5	0.64	1	14	126	17	2.71	<1	0.75	104	2.13	177
<b>Minimum</b>			<b>0.00</b>	<b>0.86</b>	<b>&lt;5</b>	<b>61.00</b>	<b>0.90</b>	<b>&lt;5</b>	<b>0.64</b>	<b>1.00</b>	<b>7.00</b>	<b>49.00</b>	<b>14.00</b>	<b>1.55</b>	<b>&lt;1</b>	<b>0.19</b>	<b>20.00</b>	<b>1.56</b>	<b>177.00</b>
<b>Maximum</b>			<b>0.00</b>	<b>1.99</b>	<b>&lt;5</b>	<b>162.00</b>	<b>1.30</b>	<b>&lt;5</b>	<b>6.22</b>	<b>1.00</b>	<b>15.00</b>	<b>144.00</b>	<b>35.00</b>	<b>3.19</b>	<b>&lt;1</b>	<b>0.89</b>	<b>104.00</b>	<b>2.42</b>	<b>490.00</b>
#2-N0727-FS/AR	3-4,5	1:1.25	<0.2	1.32	<5	74	0.8	<5	2.25	<1	5	107	37	1.89	<1	0.64	16	2.13	282
#2-N0728-FS/AR	3-4	25:1	0.8	0.31	<5	<10	<0.5	<5	2.11	<1	3	166	19	0.64	<1	0.04	<10	1.51	106
#2-N0729-FS/AR	3-5,11	1:2	<0.2	1.81	<5	156	0.9	<5	1.5	<1	17	414	33	2.38	<1	0.55	59	3.05	250
#2-N0736-FS/AR	3-?	0.05:1	<0.2	1.43	<5	120	0.6	<5	0.61	1	13	114	19	2.36	1	0.64	69	1.37	184
<b>Minimum</b>			<b>0.80</b>	<b>0.31</b>	<b>&lt;5</b>	<b>74.00</b>	<b>0.60</b>	<b>&lt;5</b>	<b>0.61</b>	<b>1.00</b>	<b>3.00</b>	<b>107.00</b>	<b>19.00</b>	<b>0.64</b>	<b>1.00</b>	<b>0.04</b>	<b>16.00</b>	<b>1.37</b>	<b>106.00</b>
<b>Maximum</b>			<b>0.80</b>	<b>1.81</b>	<b>&lt;5</b>	<b>156.00</b>	<b>0.90</b>	<b>&lt;5</b>	<b>2.25</b>	<b>1.00</b>	<b>17.00</b>	<b>414.00</b>	<b>37.00</b>	<b>2.38</b>	<b>1.00</b>	<b>0.64</b>	<b>69.00</b>	<b>3.05</b>	<b>282.00</b>

**Notes:** Lithologies: OB=overburden, LS=dolomite, FS=sandstone, AR=altered Precambrian basement, ORE=Precambrian basement  
Rock Types: 1=glacial lacustrine clay, 2=dolomite, 3=sandstone, 4=serpentinite, 5=granite, 6=amphibolite, 7=mafic dike, 9=mafic metavolcanic, 11=regolith

**Table A2.8.2 (Cont.'d)**  
**Total Metal Concentrations**  
**Phase I Static Test Results**  
**Minago Project**

Sample #	Rock Type	Comp Ratio	Mo ppm	Na %	Ni ppm	P ppm	Pb ppm	S %	Sb ppm	Sc ppm	Sr ppm	Th ppm	Ti %	Tl ppm	U ppm	V ppm	W ppm	Zn ppm	Zr ppm
#8-N0727-OB	1	1	<2	0.04	41	582	4	0.02	9	6	66	11	0.11	24	<10	53	<10	66	35
#8-N0728-OB	1	1	<2	0.04	35	514	6	0.02	9	5	69	9	0.1	14	<10	48	<10	62	25
#8-N0729-OB	1	1	<2	0.04	38	551	8	0.01	6	5	63	11	0.1	18	<10	50	<10	65	34
#8-N0736-OB	1	1	<2	0.03	27	429	5	0.11	<5	4	34	15	0.08	<10	53	39	<10	51	24
<b>Minimum</b>			<b>&lt;2</b>	<b>0.03</b>	<b>27.00</b>	<b>429.00</b>	<b>4.00</b>	<b>0.01</b>	<b>6.00</b>	<b>4.00</b>	<b>34.00</b>	<b>9.00</b>	<b>0.08</b>	<b>14.00</b>	<b>53.00</b>	<b>39.00</b>	<b>&lt;10</b>	<b>51.00</b>	<b>24.00</b>
<b>Maximum</b>			<b>&lt;2</b>	<b>0.04</b>	<b>41.00</b>	<b>582.00</b>	<b>8.00</b>	<b>0.11</b>	<b>9.00</b>	<b>6.00</b>	<b>69.00</b>	<b>15.00</b>	<b>0.11</b>	<b>24.00</b>	<b>53.00</b>	<b>53.00</b>	<b>&lt;10</b>	<b>66.00</b>	<b>35.00</b>
#9-N0727-LS	2	1	<2	0.02	27	169	<2	0.16	6	<1	58	<5	<0.01	21	<10	2	<10	<1	2
#9-N0728-LS	2	1	<2	0.02	5	101	<2	0.07	5	<1	52	<5	<0.01	18	<10	1	<10	<1	1
#9-N0729-LS	2	1	<2	0.02	3	75	<2	0.03	<5	<1	53	<5	<0.01	24	<10	2	<10	<1	1
#9-N0736-LS	2	1	<2	0.02	7	63	4	0.12	6	<1	33	6	<0.01	<10	129	3	<10	4	1
<b>Minimum</b>			<b>&lt;2</b>	<b>0.02</b>	<b>3.00</b>	<b>63.00</b>	<b>4.00</b>	<b>0.03</b>	<b>5.00</b>	<b>&lt;1</b>	<b>33.00</b>	<b>6.00</b>	<b>&lt;0.01</b>	<b>18.00</b>	<b>129.00</b>	<b>1.00</b>	<b>&lt;10</b>	<b>4.00</b>	<b>1.00</b>
<b>Maximum</b>			<b>&lt;2</b>	<b>0.02</b>	<b>27.00</b>	<b>169.00</b>	<b>4.00</b>	<b>0.16</b>	<b>6.00</b>	<b>&lt;1</b>	<b>58.00</b>	<b>6.00</b>	<b>&lt;0.01</b>	<b>24.00</b>	<b>129.00</b>	<b>3.00</b>	<b>&lt;10</b>	<b>4.00</b>	<b>2.00</b>
#10-N0727-FS	3	1	4	0.01	43	24	5	0.12	9	<1	9	<5	<0.01	<10	<10	3	<10	<1	3
#10-N0728-FS	3	1	2	0.01	45	43	<2	<0.01	8	<1	11	<5	0.01	21	<10	5	<10	2	4
#10-N0729-FS	3	1	3	0.01	15	13	3	0.17	6	<1	8	<5	<0.01	18	<10	3	<10	<1	5
#10-N0736-FS	3	1	<2	0.01	27	40	2	0.21	<5	1	<1	<5	<0.01	<10	28	4	<10	19	4
<b>Minimum</b>			<b>2.00</b>	<b>0.01</b>	<b>15.00</b>	<b>13.00</b>	<b>2.00</b>	<b>0.12</b>	<b>6.00</b>	<b>1.00</b>	<b>8.00</b>	<b>&lt;5</b>	<b>0.01</b>	<b>18.00</b>	<b>28.00</b>	<b>3.00</b>	<b>&lt;10</b>	<b>2.00</b>	<b>3.00</b>
<b>Maximum</b>			<b>4.00</b>	<b>0.01</b>	<b>45.00</b>	<b>43.00</b>	<b>5.00</b>	<b>0.21</b>	<b>9.00</b>	<b>1.00</b>	<b>11.00</b>	<b>&lt;5</b>	<b>0.01</b>	<b>21.00</b>	<b>28.00</b>	<b>5.00</b>	<b>&lt;10</b>	<b>19.00</b>	<b>5.00</b>
#11-N0727-AR	5.4	1	<2	0.02	183	61	3	0.29	<5	3	18	12	0.02	31	<10	18	<10	24	18
#11-N0728-AR	4	1	<2	0.07	4061	333	8	0.71	20	9	56	19	0.01	82	13	63	<10	82	13
#11-N0729-AR	11.5	1	<2	0.12	647	218	3	0.13	30	11	94	<5	0.06	19	11	79	<10	56	13
#11-N0736-AR	?	1	<2	0.08	27	527	2	0.18	<5	4	10	13	0.04	<10	14	38	<10	40	10
<b>Minimum</b>			<b>&lt;2</b>	<b>0.02</b>	<b>27.00</b>	<b>61.00</b>	<b>2.00</b>	<b>0.13</b>	<b>20.00</b>	<b>3.00</b>	<b>10.00</b>	<b>12.00</b>	<b>0.01</b>	<b>19.00</b>	<b>11.00</b>	<b>18.00</b>	<b>&lt;10</b>	<b>24.00</b>	<b>10.00</b>
<b>Maximum</b>			<b>&lt;2</b>	<b>0.12</b>	<b>4061.00</b>	<b>527.00</b>	<b>8.00</b>	<b>0.71</b>	<b>30.00</b>	<b>11.00</b>	<b>94.00</b>	<b>19.00</b>	<b>0.06</b>	<b>82.00</b>	<b>14.00</b>	<b>79.00</b>	<b>&lt;10</b>	<b>82.00</b>	<b>18.00</b>
#12-N0736-ORE	?	1	4	0.07	1899	170	7	3.98	9	3	<1	10	0.04	<10	18	36	12	40	11
#1-N0727-OB/AR	1-4.5	1:1.7	<2	0.04	74	566	5	0.14	10	8	39	9	0.15	17	<10	62	<10	63	25
#1-N0728-OB/AR	1-4	25:1	<2	0.04	163	442	3	0.02	8	6	59	9	0.08	20	<10	49	<10	53	22
#1-N0729-OB/AR	1-5.11	27.5:1	2	0.03	28	460	2	0.04	<5	3	47	6	0.06	11	<10	28	<10	26	17
#1-N0736-OB/AR	1-?	0.03:1	<2	0.12	22	697	<2	0.14	<5	6	33	20	0.03	<10	28	72	<10	36	14
<b>Minimum</b>			<b>2.00</b>	<b>0.03</b>	<b>22.00</b>	<b>442.00</b>	<b>2.00</b>	<b>0.02</b>	<b>8.00</b>	<b>3.00</b>	<b>33.00</b>	<b>6.00</b>	<b>0.03</b>	<b>11.00</b>	<b>28.00</b>	<b>28.00</b>	<b>&lt;10</b>	<b>26.00</b>	<b>14.00</b>
<b>Maximum</b>			<b>2.00</b>	<b>0.12</b>	<b>163.00</b>	<b>697.00</b>	<b>5.00</b>	<b>0.14</b>	<b>10.00</b>	<b>8.00</b>	<b>59.00</b>	<b>20.00</b>	<b>0.15</b>	<b>20.00</b>	<b>28.00</b>	<b>72.00</b>	<b>&lt;10</b>	<b>63.00</b>	<b>25.00</b>
#2-N0727-FS/AR	3-4.5	1:1.25	<2	0.04	118	109	<2	0.06	11	4	24	<5	0.09	21	<10	38	<10	37	13
#2-N0728-FS/AR	3-4	25:1	3	0.01	94	36	<2	0.05	10	<1	10	<5	0.01	16	<10	4	<10	<1	4
#2-N0729-FS/AR	3-5.11	1:2	<2	0.07	208	355	6	0.09	12	5	43	7	0.06	36	<10	32	<10	29	15
#2-N0736-FS/AR	3-?	0.05:1	3	0.08	22	540	<2	0.17	5	6	24	20	0.03	<10	22	46	<10	40	14
<b>Minimum</b>			<b>3.00</b>	<b>0.01</b>	<b>22.00</b>	<b>36.00</b>	<b>6.00</b>	<b>0.05</b>	<b>5.00</b>	<b>4.00</b>	<b>10.00</b>	<b>7.00</b>	<b>0.01</b>	<b>16.00</b>	<b>22.00</b>	<b>4.00</b>	<b>&lt;10</b>	<b>29.00</b>	<b>4.00</b>
<b>Maximum</b>			<b>3.00</b>	<b>0.08</b>	<b>208.00</b>	<b>540.00</b>	<b>6.00</b>	<b>0.17</b>	<b>12.00</b>	<b>6.00</b>	<b>43.00</b>	<b>20.00</b>	<b>0.09</b>	<b>36.00</b>	<b>22.00</b>	<b>46.00</b>	<b>&lt;10</b>	<b>40.00</b>	<b>15.00</b>

**Notes:** Lithologies: OB=overburden, LS=dolomite, FS=sandstone, AR=altered Precambrian basement, ORE=Precambrian basement  
Rock Types: 1=glacial lacustrine clay, 2=dolomite, 3=sandstone, 4=serpentinite, 5=granite, 6=amphibolite, 7=mafic dike, 9=mafic metavolcanic, 11=regolith

**Table A2.8.2 (Cont.'d)**  
**Total Metal Concentrations**  
**Phase I Geochemical Assessment**  
**Minago Project**

Sample #	Rock Type	Comp Ratio	Ag ppm	Al %	As ppm	Ba ppm	Be ppm	Bi ppm	Ca %	Cd ppm	Co ppm	Cr ppm	Cu ppm	Fe %	Hg ppm	K %	La ppm	Mg %	Mn ppm
#3-N0727-FS/LS	3-2	1:7	0.4	0.12	<5	<10	<0.5	<5	>15.00	<1	<1	55	8	0.41	<1	0.07	<10	10.84	200
#3-N0728-FS/LS	3-2	1:7	0.9	0.06	<5	<10	<0.5	<5	>15.00	<1	<1	50	4	0.33	<1	0.04	<10	10.96	167
#3-N0729-FS/LS	3-2	1:7	0.5	0.1	<5	<10	<0.5	<5	>15.00	<1	<1	59	3	0.38	<1	0.06	<10	10.96	184
#3-N0736-FS/LS	3-2	0.15:1	<0.2	0.17	<5	<10	<0.5	<5	>15.00	<1	1	16	2	0.35	<1	0.1	<10	10.64	130
<b>Minimum</b>			0.4	0.06	<5	<10	<0.5	<5	>15.00	<1	1	16	2	0.33	<1	0.04	<10	10.64	130
<b>Maximum</b>			0.9	0.17	<5	<10	<0.5	<5	>15.00	<1	1	59	8	0.41	<1	0.1	<10	10.96	200
#4-N0727-LS/OB	2-1	10:1	0.2	0.25	<5	19	<0.5	<5	>15.00	<1	<1	8	3	0.54	<1	0.08	<10	11.13	189
#4-N0728-LS/OB	2-1	7:1	0.4	0.29	<5	21	<0.5	<5	>15.00	<1	<1	16	5	0.76	<1	0.09	15	10.85	335
#4-N0729-LS/OB	2-1	5.5:1	<0.2	0.15	<5	13	<0.5	<5	>15.00	<1	<1	16	1	0.43	<1	0.07	<10	11.71	194
#4-N0736-LS/OB	2-1	1.0:0.08	<0.2	0.14	<5	<10	<0.5	<5	>15.00	<1	1	11	1	0.33	<1	0.07	<10	10.47	152
<b>Minimum</b>			0.2	0.14	<5	13	<0.5	<5	>15.00	<1	1	8	1	0.33	<1	0.07	15	10.47	152
<b>Maximum</b>			0.4	0.29	<5	21	<0.5	<5	>15.00	<1	1	16	5	0.76	<1	0.09	15	11.71	335
#5-N0727-ORE/AR	4.5-4.5	11.6:1	<0.2	1.36	<5	88	0.7	<5	0.55	<1	75	107	305	3.98	<1	0.38	21	14.76	348
#5-N0728-ORE/AR	4.5,7,9-4	66:1	<0.2	1.16	<5	80	0.9	<5	1.24	<1	35	295	20	2.66	<1	0.36	103	7.06	326
#5-N0729-ORE/AR	5.6-5.11	12:1	<0.2	1.84	<5	357	0.6	<5	0.8	<1	23	474	33	2.73	1	1.13	70	2.67	253
#5-N0736-ORE/AR	?-?	0.26:1	<0.2	1.43	<5	70	0.9	<5	0.4	1	26	140	23	2.34	<1	0.63	74	2.43	201
<b>Minimum</b>			0	1.16	<5	70	0.6	<5	0.4	1	23	107	20	2.34	1	0.36	21	2.43	201
<b>Maximum</b>			0	1.84	<5	357	0.9	<5	1.24	1	75	474	305	3.98	1	1.13	103	14.76	348
#6-N0727-LS/AR	2-4.5	5.6:1	0.5	0.25	<5	19	<0.5	<5	>15.00	<1	<1	23	14	0.58	<1	0.17	11	10.92	242
#6-N0728-LS/AB	2-4	18:1	<0.2	0.17	<5	10	<0.5	<5	>15.00	<1	<1	3	4	0.97	<1	0.02	16	12.42	403
#6-N0729-LS/AR	2-5,11	3.6:1	<0.2	0.85	<5	77	<0.5	<5	>15.00	<1	8	217	6	1.44	<1	0.36	14	11.39	323
#6-N0736-LS/AR	2-?	0.35:1	<0.2	1.26	<5	69	0.7	<5	4.76	1	10	52	22	1.81	1	0.65	77	3.83	169
<b>Minimum</b>			0.5	0.17	<5	10	0.7	<5	4.76	1	8	3	4	0.58	1	0.02	11	3.83	169
<b>Maximum</b>			0.5	1.26	<5	77	0.7	<5	4.76	1	10	217	22	1.81	1	0.65	77	12.42	403
#7-N0727-ORE/LS	4.5-2	2.1:1	<0.2	1.48	<5	236	0.7	<5	8.94	<1	116	41	76	2.52	<1	0.59	21	12.59	327
#7-N0728-ORE/LS	4.5,6,7,9-2	3.7:1	<0.2	0.92	<5	103	0.6	<5	5.54	<1	23	243	10	1.95	<1	0.45	47	8.04	307
#7-N0729-ORE/LS	5.6-2	3.3:1	<0.2	1.48	<5	262	<0.5	<5	4.26	<1	14	300	17	2.25	<1	0.72	49	4.31	211
#7-N0736-ORE/LS	7-2	0.75:1	<0.2	0.5	<5	58	<0.5	<5	11.3	1	20	118	120	2.42	<1	0.28	13	9.16	187
<b>Minimum</b>			0	0.5	<5	58	0.6	<5	4.26	1	14	41	10	1.95	<1	0.28	13	4.31	187
<b>Maximum</b>			0	1.48	<5	262	0.7	<5	11.3	1	116	300	120	2.52	<1	0.72	49	12.59	327
#13-N0727-OB/LS/FS/AR/ORE	1-2-3-4.5-4.5	0.05:0.49:0.07:0.08:1	0.6	1.47	<5	198	0.8	<5	5.55	<1	57	59	108	3.05	<1	0.49	26	12.7	315
#13-N0728-OB/LS/FS/AR/ORE	1-2-3-4-4.5,6,7,9	0.03:0.19:0.03:0.01:1	<0.2	1.07	<5	75	0.8	<5	4.2	<1	22	310	16	2.15	<1	0.37	52	6.74	310
#13-N0729-OB/LS/FS/AR/ORE	1-2-3-5,11-5.6	0.05:0.3:0.04:0.08:1	<0.2	1.24	<5	248	<0.5	<5	4.15	<1	19	483	37	2.39	<1	0.84	54	4.11	220
#13-N0736-OB/LS/FS/AR/ORE	1-2-3-?-?	0.03:0.35:0.05:1:0.26	<0.2	1.08	<5	38	0.6	<5	4.22	1	12	69	44	2.23	<1	0.44	51	4.52	155
<b>Minimum</b>			0.6	1.07	<5	38	0.6	<5	4.15	1	12	59	16	2.15	<1	0.37	26	4.11	155
<b>Maximum</b>			0.6	1.47	<5	248	0.8	<5	5.55	1	57	483	108	3.05	<1	0.84	54	12.7	315

**Notes:** Lithologies: OB=overburden, LS=dolomite, FS=sandstone, AR=altered Precambrian basement, ORE=Precambrian basement  
Rock Types: 1=glacial lacustrine clay, 2=dolomite, 3=sandstone, 4=serpentinite, 5=granite, 6=amphibolite, 7=mafic dike, 9=mafic metavolcanic, 11=regolith

**Table A2.8.2 (Cont.'d)**  
**Total Metal Concentrations**  
**Phase I Geochemical Assessment**  
**Minago Project**

Sample #	Rock Type	Comp Ratio	Mo	Na	Ni	P	Pb	S	Sb	Sc	Sr	Th	Ti	Tl	U	V	W	Zn	Zr
			ppm	%	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
#3-NO727-FS/LS	3-2	1:7	<2	0.02	11	148	3	0.13	6	<1	60	<5	<0.01	23	<10	3	<10	<1	2
#3-NO728-FS/LS	3-2	1:7	<2	0.02	3	55	<2	0.05	7	<1	64	<5	<0.01	22	<10	2	<10	<1	1
#3-NO729-FS/LS	3-2	1:7	<2	0.02	7	81	<2	0.1	7	<1	56	<5	<0.01	25	<10	3	<10	1	2
#3-NO736-FS/LS	3-2	0.15:1	<2	0.02	5	64	<2	0.12	<5	<1	47	7	<0.01	<10	130	5	<10	4	2
<b>Minimum</b>			<2	0.02	3	55	3	0.05	6	<1	47	7	<0.01	22	130	2	<10	1	1
<b>Maximum</b>			<2	0.02	11	148	3	0.13	7	<1	64	7	<0.01	25	130	5	<10	4	2
#4-NO727-LS/OB	2-1	10:1	<2	0.03	5	137	<2	0.09	<5	1	55	<5	0.01	17	<10	7	<10	1	5
#4-NO728-LS/OB	2-1	7:1	<2	0.03	10	274	<2	0.06	<5	1	55	<5	0.01	20	<10	8	<10	5	5
#4-NO729-LS/OB	2-1	5.5:1	<2	0.02	7	144	3	0.11	<5	<1	55	<5	<0.01	14	<10	4	<10	2	2
#4-NO736-LS/OB	2-1	1.0:0.08	<2	0.02	5	61	<2	0.08	<5	<1	31	8	<0.01	<10	123	5	<10	3	2
<b>Minimum</b>			0	0.02	5	61	3	0.06	<5	1	31	8	0.01	14	123	4	<10	1	2
<b>Maximum</b>			0	0.03	10	274	3	0.11	<5	1	55	8	0.01	20	123	8	<10	5	5
#5-NO727-ORE/AR	4,5-4,5	11.6:1	<2	0.17	4370	175	3	0.27	11	6	26	7	0.02	14	13	26	<10	16	6
#5-NO728-ORE/AR	4,5,7,9-4	66:1	<2	0.07	848	520	3	0.05	12	6	50	24	0.05	50	<10	33	<10	34	9
#5-NO729-ORE/AR	5,6-5,11	12:1	<2	0.1	229	326	5	0.09	15	4	32	15	0.11	27	16	51	<10	48	15
#5-NO736-ORE/AR	?-?	0.26:1	<2	0.1	461	465	<2	0.31	<5	4	24	17	0.03	<10	20	30	<10	38	13
<b>Minimum</b>			<2	0.07	229	175	3	0.05	11	4	24	7	0.02	14	13	26	<10	16	6
<b>Maximum</b>			<2	0.17	4370	520	5	0.31	15	6	50	24	0.11	50	20	51	<10	48	15
#6-NO727-LS/AR	2-4,5	5.6:1	<2	0.03	36	150	<2	0.15	9	<1	54	<5	0.01	16	<10	5	<10	1	3
#6-NO728-LS/AB	2-4	18:1	<2	0.04	55	145	<2	0.04	10	1	53	<5	0.01	15	<10	9	<10	<1	2
#6-NO729-LS/AR	2-5,11	3.6:1	<2	0.05	107	159	<2	0.12	13	3	69	<5	0.03	26	<10	22	<10	11	5
#6-NO736-LS/AR	2-?	0.35:1	<2	0.08	18	410	<2	0.1	<5	4	23	21	0.03	<10	69	35	<10	34	13
<b>Minimum</b>			<2	0.03	18	145	<2	0.04	9	1	23	21	0.01	15	69	5	<10	1	2
<b>Maximum</b>			<2	0.08	107	410	<2	0.15	13	4	69	21	0.03	26	69	35	<10	34	13
#7-NO727-ORE/LS	4,5-2	2.1:1	<2	0.16	3111	209	<2	0.27	8	2	42	<5	0.03	29	<10	18	<10	13	8
#7-NO728-ORE/LS	4,5,6,7,9-2	3.7:1	<2	0.07	652	198	<2	0.05	12	3	34	18	0.04	33	<10	21	<10	21	8
#7-NO729-ORE/LS	5,6-2	3.3:1	<2	0.09	123	507	37	0.08	19	3	31	13	0.12	35	<10	37	<10	44	8
#7-NO736-ORE/LS	?-2	0.75:1	3	0.04	669	110	3	1.28	7	1	14	9	0.02	<10	107	20	<10	18	5
<b>Minimum</b>			3	0.04	123	110	3	0.05	7	1	14	9	0.02	29	107	18	<10	13	5
<b>Maximum</b>			3	0.16	3111	507	37	1.28	19	3	42	18	0.12	35	107	37	<10	44	8
#13-NO727-OB/LS/FS/AR/ORE	1-2-3-4,5-4,5	0.05:0.49:0.07:0.08:1	<2	0.17	2664	222	2	0.24	7	3	38	7	0.04	38	<10	22	<10	23	6
#13-NO728-OB/LS/FS/AR/ORE	1-2-3-4-4,5,6,7,9	0.03:0.19:0.03:0.01:1	<2	0.06	495	424	<2	0.04	16	4	42	10	0.05	31	<10	28	<10	28	7
#13-NO729-OB/LS/FS/AR/ORE	1-2-3-5,11-5,6	0.05:0.3:0.04:0.08:1	<2	0.08	206	334	9	0.11	20	2	32	11	0.1	34	<10	43	<10	36	10
#13-NO736-OB/LS/FS/AR/ORE	1-2-3-?-?	0.03:0.35:0.05:1:0.26	<2	0.06	378	374	2	0.62	<5	4	25	18	0.02	<10	61	36	<10	25	12
<b>Minimum</b>			<2	0.06	206	222	2	0.04	7	2	25	7	0.02	31	61	22	<10	23	6
<b>Maximum</b>			<2	0.17	2664	424	9	0.62	20	4	42	18	0.1	38	61	43	<10	36	12

**Notes:** Lithologies: OB=overburden, LS=dolomite, FS=sandstone, AR=altered Precambrian basement, ORE=Precambrian basement  
Rock Types: 1=glacial lacustrine clay, 2=dolomite, 3=sandstone, 4=serpentinite, 5=granite, 6=amphibolite, 7=mafic dike, 9=mafic metavolcanic, 11=regolith

## Phase II Grainsize, Static Test and Metal Results

BHK Drillcore Samples  
Phase II Static Testing  
Minago Project

Code	Hole ID	From (ft.)	To (ft.)	Length (ft.)	Sample #	Au ppm	Pt ppm	Pd ppm	Cu ppm	Ni ppm	Ni %	Co ppm	Ag ppm
SPT	BHK 41-R1-90	607	610.35	3.35	259758	<0.001	<0.005	0.005	8	1,420		74	<0.5
<b>SPT</b>	<b>BHK 41-R1-90</b>	<b>1,051.5</b>	<b>1,056.2</b>	<b>4.7</b>	<b>365627</b>	<b>0.048</b>	<b>0.126</b>	<b>0.239</b>	<b>505</b>	<b>&gt;10000</b>	<b>1.16</b>	<b>167</b>	<b>&lt;0.5</b>
GT	BHK 41-R1-90	1,080	1,083	3	365633	0.001	<0.005	0.003	180	178		8	<0.5
<b>GT</b>	<b>BHK 42-90</b>	<b>767</b>	<b>774</b>	<b>7</b>	<b>49092</b>	<b>&lt;0.001</b>	<b>&lt;0.005</b>	<b>0.005</b>	<b>19</b>	<b>28</b>		<b>6</b>	<b>&lt;0.5</b>
<b>GT</b>	<b>BHK 42-90</b>	<b>962</b>	<b>967</b>	<b>5</b>	<b>49125</b>	<b>0.002</b>	<b>&lt;0.005</b>	<b>&lt;0.001</b>	<b>5</b>	<b>12</b>		<b>4</b>	<b>&lt;0.5</b>
<b>GT</b>	<b>BHK 42-R2-90</b>	<b>1,089</b>	<b>1,094</b>	<b>5</b>	<b>365507</b>	<b>&lt;0.001</b>	<b>&lt;0.005</b>	<b>0.001</b>	<b>17</b>	<b>34</b>		<b>18</b>	<b>&lt;0.5</b>
<b>GT</b>	<b>BHK 42-R2-90</b>	<b>1,166</b>	<b>1,172</b>	<b>6</b>	<b>365525</b>	<b>&lt;0.001</b>	<b>&lt;0.005</b>	<b>&lt;0.001</b>	<b>19</b>	<b>38</b>		<b>5</b>	<b>&lt;0.5</b>
<b>GT</b>	<b>BHK 43-90</b>	<b>927</b>	<b>937</b>	<b>10</b>	<b>49427</b>	<b>&lt;0.001</b>	<b>&lt;0.005</b>	<b>&lt;0.001</b>	<b>12</b>	<b>334</b>		<b>8</b>	<b>&lt;0.5</b>
<b>GT</b>	<b>BHK 49-R9-90</b>	<b>463.75</b>	<b>467.5</b>	<b>3.75</b>	<b>258551</b>	<b>&lt;0.001</b>	<b>&lt;0.005</b>	<b>&lt;0.001</b>	<b>15</b>	<b>40</b>		<b>6</b>	<b>&lt;0.5</b>
	BHK 49-R9-90	467.5	495.5	28	258554	<0.001	<0.005	<0.001	24	8		2	<0.5
GT	BHK 49-R9-90	495.5	505.5	10	258555	<0.001	<0.005	<0.001	17	7		7	<0.5
GT	BHK 49-R9-90	739	746.5										
<b>SPT</b>	<b>BHK 49-R9-90</b>	<b>746.5</b>	<b>749.9</b>	<b>3.4</b>	<b>258612</b>	<b>0.011</b>	<b>0.072</b>	<b>0.142</b>	<b>26</b>	<b>4,540</b>		<b>96</b>	<b>&lt;0.5</b>
<b>SPT</b>	<b>BHK 49-R9-90</b>	<b>818.5</b>	<b>821.5</b>	<b>3</b>	<b>258774</b>	<b>0.028</b>	<b>0.186</b>	<b>0.403</b>	<b>1050</b>	<b>&gt;10000</b>	<b>1.61</b>	<b>190</b>	<b>0.9</b>
<b>GT</b>	<b>BHK 49-R9-90</b>	<b>833.2</b>	<b>835</b>	<b>1.8</b>	<b>258779</b>	<b>0.013</b>	<b>&lt;0.005</b>	<b>0.01</b>	<b>57</b>	<b>649</b>		<b>6</b>	<b>&lt;0.5</b>
SPT	BHK 49-R9-90	927	932	5	258618	0.002	0.048	0.095	94	2,620		111	<0.5
<b>GT</b>	<b>BHK 49-R9-90</b>	<b>1,015.5</b>	<b>1,017.0</b>	<b>1.5</b>	<b>258637</b>	<b>&lt;0.001</b>	<b>&lt;0.005</b>	<b>&lt;0.001</b>	<b>20</b>	<b>104</b>		<b>7</b>	<b>&lt;0.5</b>
<b>GT</b>	<b>BHK 50-90</b>	<b>399.75</b>	<b>405</b>	<b>5.25</b>	<b>365663</b>	<b>0.006</b>	<b>0.136</b>	<b>0.452</b>	<b>20</b>	<b>7,720</b>		<b>125</b>	<b>&lt;0.5</b>
<b>AMP</b>	<b>BHK 52-90</b>	<b>660</b>	<b>665</b>	<b>5</b>	<b>49809</b>	<b>&lt;0.001</b>	<b>0.007</b>	<b>0.006</b>	<b>68</b>	<b>129</b>		<b>17</b>	<b>&lt;0.5</b>
<b>SPT</b>	<b>BHK 52-90</b>	<b>744</b>	<b>749</b>	<b>5</b>	<b>49816</b>	<b>0.001</b>	<b>0.007</b>	<b>0.005</b>	<b>17</b>	<b>1,660</b>		<b>70</b>	<b>&lt;0.5</b>
SPT	BHK 52-90	776	781	5	49822	<0.001	0.007	0.004	6	2,400		61	<0.5
<b>SPT</b>	<b>BHK 52-90</b>	<b>801</b>	<b>806</b>	<b>5</b>	<b>49828</b>	<b>0.016</b>	<b>0.04</b>	<b>0.063</b>	<b>20</b>	<b>4,880</b>		<b>97</b>	<b>&lt;0.5</b>
<b>SPT</b>	<b>BHK 52-90</b>	<b>811</b>	<b>815</b>	<b>4</b>	<b>49830</b>	<b>0.009</b>	<b>0.042</b>	<b>0.081</b>	<b>20</b>	<b>6,270</b>		<b>88</b>	<b>&lt;0.5</b>
<b>GT</b>	<b>BHK 52-90</b>	<b>817</b>	<b>820</b>	<b>3</b>	<b>49832</b>	<b>&lt;0.001</b>	<b>0.005</b>	<b>0.003</b>	<b>23</b>	<b>640</b>		<b>7</b>	<b>&lt;0.5</b>
<b>GT</b>	<b>BHK 52-90</b>	<b>856.5</b>	<b>865</b>	<b>8.5</b>	<b>49842</b>	<b>&lt;0.001</b>	<b>0.005</b>	<b>0.002</b>	<b>14</b>	<b>143</b>		<b>2</b>	<b>&lt;0.5</b>
<b>GT</b>	<b>BHK 52-90</b>	<b>865</b>	<b>870</b>	<b>5</b>	<b>49843</b>	<b>&lt;0.001</b>	<b>0.005</b>	<b>0.014</b>	<b>29</b>	<b>1,315</b>		<b>2</b>	<b>&lt;0.5</b>
<b>SPT</b>	<b>BHK 52-90</b>	<b>1,110</b>	<b>1,116</b>	<b>5.5</b>	<b>49904</b>	<b>&lt;0.001</b>	<b>&lt;0.005</b>	<b>0.001</b>	<b>20</b>	<b>1,725</b>		<b>55</b>	<b>&lt;0.5</b>
<b>GT</b>	<b>BHK 52-90</b>	<b>1,128</b>	<b>1,133</b>	<b>5</b>	<b>49907</b>	<b>&lt;0.001</b>	<b>&lt;0.005</b>	<b>&lt;0.001</b>	<b>14</b>	<b>49</b>		<b>3</b>	<b>&lt;0.5</b>

TOTAL # SAMPLES 28

# SAMPLES TESTED 21

Bolded and shaded samples were static tested



Table A2.8.4  
N Drillcore Samples  
Phase II Static Testing  
Minago Project

Code	DDH	Sample #	From (m)	To (m)	Length (m)	Sample Type	Description	Cu (ppm)	Ni (ppm)	Ni (%)	SG
GT	N0702	924204	117.50	119.00	1.50	CORE	Granite	59	230		
SPT	N0702	924224	141.50	142.74	1.24	CORE	SPT	11	1,920		
SPT/GT	N0702	924234	151.60	152.40	0.80	CORE	SPT	10	1,840		
GT	N0702	924235	152.40	153.70	1.30	CORE	Granite	13	2,180		
MSD	N0705	924548	99.5	100.6	1.1	CORE	Met Sed	250	580		
MD	N0705	924551	101.6	102.6	1	CORE	Alt UM	71	250		
GT	N0705	924558	107.35	108.35	1	CORE	Gran Gneiss	240	62		2.49
GT	N0706	924350	102.50	103.25	0.75	CORE	alt'd granite	36	2,450		
GT	N0706	924424	178.30	179.70	1.40	CORE	Gran Gneiss	30	5		
GT	N0707	924591	109.30	110.80	1.50	CORE	Alt Gran	23	500		
SPT	N0707	924626	143.6	145.1	1.5	CORE	Alt UM +SPT	21	>5000	1.32	
MD	N0707	924669	191	192.5	1.5	CORE	Molson Dyke	41	81		
SPT	N0707	924686	209	210.5	1.5	CORE	SPT	5	4,250		
SPT	N0707	924709	233	234.2	1.2	CORE	Alt Gran+millrite	<1	2,460		
SPT	N0707	924724	257	258.5	1.5	CORE	Alt Ultramafic	9	1,110		
MSD	N0710	924730	126.1	126.6	0.5	CORE	Iron Fm	300	230		
MSD	N0710	924738	135.4	136.2	0.8	CORE	Iron Fm+Meta Sed	83	93		2.66
SPT	N0710	924747	144	145.5	1.5	CORE	Alt. Ultramafic+FRGR	12	2,200		
SPT	N0710	924762	164	165.5	1.5	CORE		<1	3,490		
SPT	N0710	924772	177	177.6	0.6	CORE	1-2% pn	1210	>5000	1.03	
SPT	N0710	924827	240.5	242	1.5	CORE	SPT	1	2,700		
GT	N0710	924890	312.3	312.9	0.6	CORE	FGRAN	8	960		
MSD	N0712	925841	197	198.5	1.5	CORE	spt	64	3,880		
SPT	N0712	925856	214.5	215.45	0.95	CORE	alt'd gran	34	1,010		
SPT	N0712	925866	225.5	227	1.5	CORE	spt	340	>5000	0.81	
MMV	N0712	925884	249.5	251	1.5	CORE	amph	72	200		
GT	N0713	924964	203.2	204.7	1.5	CORE	granite, nil sulphide	7	170		
GT	N0713	924981	221	222.5	1.5	CORE	40% alt um, nil sulph	24	1,670		
SPT	N0713	925017	255.51	257	1.49	CORE	2-3% fgr diss sulphide, 2-3% fgr diss magnetite	<1	>5000	0.67	
SPT	N0713	925075	317	318.53	1.53	CORE	peridotite, 1-2% fgr diss sulphide	77	3,350		
GT	N0713	925116	371.04	371.7	0.66	CORE	foliated mafic dyke, 15% granite, 2-3% pyrite	93	380		
GT	N0713	925132	436.3	437.27	0.97	CORE	granite, nil sulphide	5	27		2.64
SPT	N0714	928023	172.5	174	1.5	CORE	spt 1-2%ss, tr-1% mt			0.6	
SPT	N0714	928367	489.45	491	1.55	CORE	grey-grn spt banded talc? alt'n tr-1% ss			0.52	
SPT	N0716	928708	168.43	169.28	0.85	CORE	ALTUM			0.31	
GT	N0716	928710	170	171.42	1.42	CORE	FGRAN+ALTUM			0.08	
SPT	N0717	928414	144.15	145.45	1.3	CORE	spt, patches of trem in med green spt (sper			0.19	
MSD	N0717	929147	367.25	368.6	1.35	CORE	gran gneiss 1-2% py			0.003	
MSD	N0717	929149	370.4	370.7	0.3	CORE	fefmtn, 75% py			0.33	
MSD	N0701	924169	185	186.4	1.4	CORE	banded to 25 cm of near massive py:sulph 2-025%, massive py from 185.75 to 186.00m			0.221	
MSD	N0717	929151	371.42	372.4	0.98	CORE	as above 3-4% py			0.038	
MSD	N0701	924159	173.45	174.9	1.45	CORE	disseminated to thin layers of pyritic sulphide 2-3%			0.315	
GT	N-07-18	929194	240.55	242.20	1.65	CORE	frag alt'd gran			0.034	
SPT	N-07-18	929206	257	258.5	1.5	CORE	c-txt grn spt, nil-tr sulph			0.32	
SPT	N0719	925999	492.02	493.47	1.45	CORE	Dark green serp, fg, 1-2% sulph	3	2,840		
GT	N0720	925273	249.3	251	1.7	CORE	granite, nil sulphide	12	260		
SPT	N0720	925276	254.84	256.33	1.49	CORE	altered um, partly zoned, hematized, some dark pseudomorphs, nil sulphide	10	2,300		
GT	N0724	929308	171.18	171.96	0.78	CORE	90% amphibolite with tr of sulp., 10 % felsic dykes.	43	110		2.87
AMP	N0724	929311	185.68	186.84	1.16	CORE	100% amphibolite with traces of sulph.	97	73		
AMP	N0724	929314	190	190.84	0.84	CORE	100% Amphibolite with 1% sulp.	100	78		
AMP	N0724	929318	196.15	197	0.85	CORE	100% Amphibolite with 1% sulp.	77	200		
GT	N0725	925315	138.64	139.56	0.92	CORE	altgran bleached	7	100		
MMV	N0726	926231	109.00	110.00	1.00	CORE	Amphibolite with fine sulfide disseminations, no adjacent sample.	39	150		
SPT	N0726	926235	125.94	126.72	0.78	CORE	Contaminated ultramafics, mottled green, tr sulp, slightly magnetic	15	880		
SPT	N0726	926243	133.69	134.54	0.85	CORE	Amphibolite with traces of fine sulfide disseminations.	170	1,390		
GT	N0726	926297	215.81	218	2.19	CORE	FGRAN, with serp infills, nil sulp	32	520		
SPT	N0726	926312	284.39	285.4	1.01	CORE	Med green, trem altered SPT, tr sulp, mag diss and talc stringers.	160	2,950		
R	N0730	926397	94.53	95.23	0.7	CORE	regolith ch-phlog blebby sulph weathd contaminated UM?	28	1,000		
SPT	N0730	929407	104.25	105.25	1	CORE	ALTUM 25cm mica at LCT nil vis sulph	11	1,560		
SPT	N0730	929433	135.5	137	1.5	CORE	grey-grn spt sim to prev	31	2,150		
MD	N0730	929437	141	143	2	CORE	mvolc nil sulph	200	180		
GT	N0730	929488	197.7	198.8	1.1	CORE	alt'd gran	38	300		
SPT	N0730	929490	200	201.5	1.5	CORE	fg purple-limegrm mass spt, tr sulph	17	1,640		
GT	N0733	929497	164.00	165.00	1.00	CORE	sim to prev	8	280		

TOTAL # SAMPLES 64  
# SAMPLES TESTED 30  
Bolded and shaded samples static tested

**CLIENT** : David Machaina  
**PROJECT** : Minago (Nuinsco Resources Ltd.)  
**CEMI Project #** : 0714  
**Test** : Screen Assay  
**Date** : June 28, 2007

#### HC-1 AR

Sieve Designation	Aperture (mm)	Weight Retained		
		(g)	(%)	Cumulative (%)
+1/4"	6.300	16.02	16.2%	16.2%
-1/4" + 10	1.700	39.79	40.2%	56.3%
-10 + 35	0.425	19.84	20.0%	76.4%
- 35 + 100	0.150	6.44	6.5%	82.9%
-100 + 270	0.053	11.09	11.2%	94.1%
-270	-0.053	5.87	5.9%	100.0%
TOTAL		99.05	100.0%	

#### HC-2 ORE/AR

Sieve Designation	Aperture (mm)	Weight Retained		
		(g)	(%)	Cumulative (%)
+1/4"	6.300	35.78	35.9%	35.9%
-1/4" + 10	1.700	45.83	45.9%	81.8%
-10 + 35	0.425	8.76	8.8%	90.6%
- 35 + 100	0.150	1.90	1.9%	92.5%
-100 + 270	0.053	4.79	4.8%	97.3%
-270	-0.053	2.70	2.7%	100.0%
TOTAL		99.76	100.0%	

#### HC-3 ORE/LS

Sieve Designation	Aperture (mm)	Weight Retained		
		(g)	(%)	Cumulative (%)
+1/4"	6.300	28.25	28.4%	28.4%
-1/4" + 10	1.700	45.02	45.3%	73.8%
-10 + 35	0.425	11.75	11.8%	85.6%
- 35 + 100	0.150	2.88	2.9%	88.5%
-100 + 270	0.053	6.05	6.1%	94.6%
-270	-0.053	5.38	5.4%	100.0%
TOTAL		99.33	100.0%	

#### HC-4 OB/LS/FS/AR/ORE

Sieve Designation	Aperture (mm)	Weight Retained		
		(g)	(%)	Cumulative (%)
+1/4"	6.300	19.63	19.6%	19.6%
-1/4" + 10	1.700	45.74	45.8%	65.4%
-10 + 35	0.425	15.44	15.5%	80.9%
- 35 + 100	0.150	4.00	4.0%	84.9%
-100 + 270	0.053	2.60	2.6%	87.5%
-270	-0.053	12.50	12.5%	100.0%
TOTAL		99.91	100.0%	

CL : D : N  
 PF : 0 : N  
 CE : J : N  
 Te : J : N  
 Da : J : N

Sa	Pa pH	TiC %	Ca NF	S(ˆ) %	S(ˆ) %	S(ˆ) %	AF	NF	Ne NF	Fi:
HC	8.7	0.3	29	0.2	<0	0.2	8.8	31	23	Sli
HC	9.6	0.2	20	0.1	<0	0.1	5.0	39	34	Nc
HC	9.5	4.5	37	0.3	<0	0.3	10	44	43	Str
HC	9.7	2.6	21	0.7	<0	0.7	22	23	21	Mc
Du										
HC	8.6	0.3		0.2	0.0			29		Sli

Nc

NE

NF

AP

Ca

CL : D : N : N  
 PF : 0 : J : J  
 Ce : : : :  
 Te : : : :  
 Da : : : :

Sample	Ag	Al	As	Br	Ba	Bi	Ca	Cl	Cr	Cd	Cu	Co	Fe	Hg	Li	Mn	Mg	Mo	Ni	Nb	Pb	Se	Sr	Th	U	V	W	Zn
HC	<0.1	1.1	<0.1	65.3	1.1	<0.1	<1	3.4	3.4	4.4	3.4	3.4	2.1	<1	0.3	2.3	2.3	1.0	1.0	3.1	5.1	4.4	16	0.1	0.1	<1	<1	43.1
HC	0.1	1.1	<0.1	15	0.1	<0.1	<1	21	21	22	52	2.1	2.1	<1	0.4	6.1	26	0.1	0.1	48	4.8	4.8	<5	0.1	0.1	26	<1	22
HC	0.1	1.1	<0.1	13	0.1	<0.1	<1	26	26	28	89	4.2	3.1	<1	0.4	7.4	26	0.1	0.1	35	4.4	4.4	<5	0.1	0.1	35	<1	32

CL : N : N : N  
 PR : N : N : N  
 CE : 0 : S : N  
 Te : S : N : N  
 Da : S : N : N

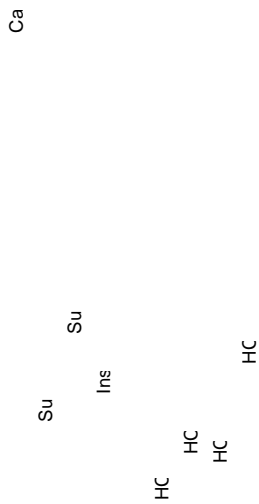
Sa	Pa	Tik	Ca	H	S(	S(	S(	In:	AF	Mc	NP	Ne	Fiz
HC	8.2	0.2	30	0.2	<0	0.2	0.2	0.0	9.1	31	22	22	Sli
HC	8.4	0.2	22	0.2	<0	0.2	0.2	0.0	9.7	45	36	36	Sli
HC	8.4	4.2	35	0.4	<0	0.4	0.4	<0	17	35.	33	33	Mc
HC	8.4	2.4	21	0.4	<0	0.4	0.4	0.0	12	21	19	19	Mc
Du													
HC	8.2	0.2		0.2	<0	0.2	0.2			31			Sli

Nc

NE

NF

AP



CL : N : M : M  
 PR : 0 : S : M  
 CE : 0 : S : M  
 To : : : :  
 Da : : : :

	Sn	Ag	Al	As	Ba	Ba	Ba	Bi	Cd	Cd	Co	Co	Cr	Cs	Cu	Fe	Ga	Ga	Hf	Hf	n	ζ	La	J	Mg	Mg	Mn	Na
	pp	pp	%	pp	pp	pp	pp	pp	pp	pp	pp	pp	pp	pp	pp	%	pp	pp	pp	pp	pp	%	pp	pp	%	pp	pp	%
HC	0.2	0.2	2.3	<0	53	53	17	0.7	<0	53	53	33	0.1	19	2.7	2.7	0.2	0.2	0.2	0.2	0.2	0.2	86	10	2.8	24	1.1	0.0
HC	0.2	0.2	1.3	<0	10	12	12	0.4	<0	20	20	20	2.1	95	3.4	3.4	0.2	0.2	0.2	0.2	0.2	62	99	7.6	32	1.5	0.0	
HC	0.2	0.2	0.5	<0	12	12	56	5.7	<0	25	25	15	1.8	12	2.4	2.4	0.1	0.1	0.2	0.2	0.2	27	53	7.4	24	2.7	0.0	
HC	0.2	0.2	1.2	<0	12	12	90	3.7	<0	37	37	19	1.8	77	2.8	2.8	0.2	0.2	0.2	0.2	0.2	46	76	7.4	25	1.5	0.0	

HC  
 HC  
 HC

HC

CL  
PR  
CE

To  
Da

	Sn	Ni	Ni	Co	Cr	Fe	Al	Si	Ca	Mg	Mn	Mo	Cu	Zn	Zr
	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
HC	0.1	>1	0.1	1.6	5.2	0.2	<0	<0	<0	<0	0.1	0.2	0.2	0.1	1.1
HC	0.1	>1	0.1	2.8	4.4	0.1	<0	<0	<0	<0	0.1	0.1	0.1	0.1	1.0
HC	0.2	>1	0.1	2.3	2.2	0.1	<0	<0	<0	<0	0.1	0.1	0.1	0.1	0.6
HC	0.2	>1	0.1	2.4	3.4	0.1	<0	<0	<0	<0	0.1	0.1	0.1	0.1	0.8

HC  
HC  
HC

**Table A2.8.5**  
**Total Metal Concentrations**  
**Phase II Static Testing**  
**Minago Project**

Sample #	Rock Type	Code	Rock Drill Hole #	From (ft)	To (ft)	Length (ft)	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Hg	K	La	Mg	Mn	Sample #
							ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	%	ppm	%	ppm	
49809	Amphibolite	AMP	BHK 52-90	660	665	5.00	0.1	3.16	2.5	76	2.1	2.5	0.36	1	16	213	75	2.69	0.5	0.78	61	4.39		49809
929318	Amphibolite	AMP	N0724	196.15	197	0.85	0.8	1.18	2.5	166	0.25	2.5	0.66	1	31	308	75	2.22	0.5	0.72	5	1.7	215	929318
	<b>Average</b>						<b>0.5</b>	<b>2.2</b>	<b>2.5</b>	<b>121.0</b>	<b>1.2</b>	<b>2.5</b>	<b>0.5</b>	<b>1.0</b>	<b>23.5</b>	<b>260.5</b>	<b>75.0</b>	<b>2.5</b>	<b>0.5</b>	<b>0.8</b>	<b>33.0</b>	<b>3.0</b>	<b>215.0</b>	
925273	Granite	GT	N0720	249.3	251	1.70	0.1	0.75	2.5	204	0.5	2.5	0.18	0.5	6	173	6	0.9	0.5	0.64	79	1.12	110	925273
929488	Granite	GT	N0730	197.7	198.8	1.10	0.1	4.09	2.5	22	1.2	2.5	0.18	1	7	23	34	2.01	0.5	0.19	23	13.7	176	929488
365633	Granite	GT	BHK 41-R1-90	1080	1083	3.00	0.1	0.98	5	126	0.7	2.5	0.76	0.5	6	129	39	1.37	0.5	0.2	154	2.75	111	365633
49092	Granite	GT	BHK 42-90	767	774	7.00	0.1	0.89	2.5	65	0.7	2.5	0.19	0.5	4	132	7	0.86	0.5	0.35	40	0.94	86	49092
49125	Granite	GT	BHK 42-90	962	967	5.00	0.1	0.5	2.5	108	0.6	2.5	0.29	0.5	2	143	0.5	0.79	0.5	0.28	60	0.87	102	49125
365507	Granite	GT	BHK 42-R1-90	1089	1094	5.00	0.1	1.33	2.5	223	0.5	2.5	0.76	1	14	124	3	2.27	1	0.91	84	1.81	250	365507
365525	Granite	GT	BHK 42-R2-90	1156	1172	16.00	0.1	0.56	2.5	132	0.5	2.5	0.35	0.5	3	127	13	1.18	0.5	0.33	94	0.74	125	365525
49427	Granite	GT	BHK 43-90	927	937	10.00	0.1	1.3	2.5	74	0.9	2.5	0.1	1	11	211	2	1.79	0.5	0.52	29	2.48	91	49427
258551	Granite	GT	BHK 49-R9-90	463.75	467.5	3.75	0.1	1.27	10	89	1.2	2.5	0.42	0.5	5	89	4	1.59	0.5	0.56	292	1.46	124	258551
258637	Granite	GT	BHK 49-R9-90	1015.5	1017	1.50	0.1	3.15	2.5	286	1.3	2.5	0.26	0.5	3	40	18	1.19	0.5	0.27	48	9.99	858	258637
258779	Granite	GT	BHK 49-R9-90	833.2	835	1.80	0.6	2.13	2.5	66	0.9	2.5	0.15	1	24	79	112	2.4	0.5	0.25	18	7.56	263	258779
49832	Granite	GT	BHK 52-90	817	820	3.00	0.4	0.79	2.5	60	0.7	2.5	0.03	0.5	3	152	14	0.8	0.5	0.21	10	1.18	81	49832
49842	Granite	GT	BHK 52-90	856.5	865	8.50	0.1	0.51	2.5	376	0.25	2.5	0.05	0.5	2	143	4	0.86	0.5	0.23	37	0.56	69	49842
49843	Granite	GT	BHK 52-90	865	870	5.00	0.1	2.18	2.5	44	0.8	2.5	0.08	0.5	4	82	8	1.18	0.5	0.23	54	4.77	77	49843
49907	Granite	GT	BHK 52-90	1126	1133	7.00	0.1	0.78	5	109	0.5	2.5	0.12	0.5	4	130	3	1.27	0.5	0.36	93	0.98	113	49907
924235	Granite	GT	N0702	162.4	163.7	1.30	0.8	4.26	2.5	36	2.2	2.5	0.08	1	30	53	5	2.6	0.5	0.15	16	8.45	297	924235
924558	Granite	GT	N0705	107.35	108.35	1.00	0.3	1.15	2.5	77	0.7	2.5	0.21	0.5	12	115	323	1.39	0.5	0.54	41	0.73	185	924558
924350	Granite	GT	N0706	102.5	103.25	0.75	0.1	4.53	2.5	138	2.2	2.5	0.58	1	10	66	36	4.06	0.5	0.39	63	8.32	173	924350
924424	Granite	GT	N0706	178.3	179.7	1.40	0.05	0.82	2.5	117	0.25	2.5	0.15	1	5	104	26	2.16	0.5	0.41	36	0.48	247	924424
924591	Granite	GT	N0707	109.3	110.6	1.30	0.1	1.39	6	79	0.7	2.5	0.88	0.5	4	68	15	1.11	0.5	0.74	143	1.44	119	924591
924890	Granite	GT	N0710	312.3	312.9	0.60	0.1	4.77	2.5	224	2.5	2.5	0.1	1	15	64	0.5	2.19	0.5	0.31	58	12.49	338	924890
924964	Granite	GT	N0713	203.2	204.7	1.50	0.2	1.48	2.5	196	0.7	2.5	0.13	0.5	7	101	6	1.12	0.5	0.32	46	2.42	93	924964
925132	Granite	GT	N0713	436.3	437.27	0.97	0.1	0.66	2.5	118	0.5	2.5	0.09	0.5	3	105	1	0.86	0.5	0.34	119	0.86	81	925132
929308	Granite	GT	N0724	171.18	171.96	0.78	0.6	2.26	2.5	11	0.7	2.5	1.56	2	23	291	32	4.46	0.5	0.11	14	2.68	558	929308
925315	Granite	GT	N0725	138.64	139.56	0.92	0.1	1.99	6	79	1	2.5	0.12	0.5	7	80	3	1.23	0.5	0.73	119	2.49	126	925315
926297	Granite	GT	N0726	215.81	218	2.19	1.5	2.32	2.5	85	2	2.5	0.13	1	5	149	19	1.79	0.5	0.22	27	4.65	75	926297
929497	Granite	GT	N0733	164	165	1.00	0.1	2.68	2.5	40	2	2.5	0.1	0.5	4	66	4	1.5	0.5	0.2	38	7.37	146	929497
258554	Granite	GT	258554	485.00	495.50	10.50	0.1	0.99	5	111	0.7	2.5	0.26	0.5	6	144	2	1.34	0.5	0.57	136	0.95	167	258554
	<b>Average</b>						<b>0.23</b>	<b>1.80</b>	<b>3.29</b>	<b>117.68</b>	<b>0.98</b>	<b>2.50</b>	<b>0.30</b>	<b>0.71</b>	<b>8.18</b>	<b>113.68</b>	<b>26.43</b>	<b>1.65</b>	<b>0.52</b>	<b>0.38</b>	<b>70.39</b>	<b>3.72</b>	<b>187.18</b>	
924551	Mafic Dike	MD	N0705	101.6	102.6	1.00	0.1	1.27	10	89	1.2	2.5	0.42	0.5	5	89	4	1.59	0.5	0.56	292	1.46	124	924551
929437	Mafic Dike	MD	N0730	141	143	2.00	0.1	3.54	2.5	38	1	2.5	0.46	2	35	96	201	5.51	0.5	0.1	18	10.22	350	929437
	<b>Average</b>						<b>0.1</b>	<b>2.4</b>	<b>6.3</b>	<b>63.5</b>	<b>1.1</b>	<b>2.5</b>	<b>0.4</b>	<b>1.3</b>	<b>20.0</b>	<b>92.5</b>	<b>102.5</b>	<b>3.6</b>	<b>0.5</b>	<b>0.3</b>	<b>155.0</b>	<b>5.8</b>	<b>237.0</b>	
<b>925884</b>	<b>Mafic Metavolcanic</b>	<b>MMV</b>	<b>N0712</b>	<b>249.5</b>	<b>251</b>	<b>1.50</b>	<b>0.8</b>	<b>1.12</b>	<b>2.5</b>	<b>181</b>	<b>0.25</b>	<b>2.5</b>	<b>0.42</b>	<b>1</b>	<b>17</b>	<b>216</b>	<b>54</b>	<b>2.2</b>	<b>0.5</b>	<b>0.83</b>	<b>38</b>	<b>1.45</b>	<b>221</b>	<b>925884</b>
924159	Metasediment	MSD	N0701	173.45	174.9	1.45	0.3	2.02	2.5	198	1.9	2.5	0.72	2	27	148	64	4.61	0.5	1.36	39	2.09	414	924159
924548	Metasediment	MSD	N0705	99.5	100.8	1.30	0.1	1.08	2.5	53	0.9	2.5	0.12	0.5	27	122	254	1.19	1	0.7	61	0.69	133	924548
924738	Metasediment	MSD	N0710	135.4	136.2	0.80	0.9	3.13	2.5	62	1.4	2.5	0.1	4	18	140	58	9.15	0.5	1.14	45	2.3	520	924738
925841	Metasediment	MSD	N0712	197	198.5	1.50	1	0.9	2.5	127	0.25	2.5	0.68	2	106	380	47	4.38	0.5	0.58	5	>15.00	364	925841
	<b>Average</b>						<b>0.575</b>	<b>1.7825</b>	<b>&lt;3</b>	<b>110</b>	<b>1.1125</b>	<b>&lt;3</b>	<b>0.405</b>	<b>2.125</b>	<b>44.5</b>	<b>197.5</b>	<b>105.75</b>	<b>4.8325</b>	<b>&lt;1</b>	<b>0.945</b>	<b>&lt;38</b>	<b>&gt;5.02</b>	<b>357.75</b>	
<b>926397</b>	<b>Regolith</b>	<b>R</b>	<b>N0730</b>	<b>94.53</b>	<b>95.23</b>	<b>0.70</b>	<b>1.3</b>	<b>0.56</b>	<b>5</b>	<b>30</b>	<b>0.5</b>	<b>2.5</b>	<b>12.33</b>	<b>1</b>	<b>97</b>	<b>170</b>	<b>24</b>	<b>2.73</b>	<b>0.5</b>	<b>0.01</b>	<b>22</b>	<b>8.57</b>	<b>583</b>	<b>926397</b>
365627	Serpentinite	SPT	BHK 41-R1-90	1051.5	1056.2	4.70	0.1	0.48	2.5	194	0.25	2.5	0.16	2	170	302	479	5.65	0.5	0.44	53	>15.00	451	365627
258612	Serpentinite	SPT	BHK 49-R9-90	746.5	749.9	3.40	0.1	0.53	2.5	116	0.8	2.5	1.78	1	112	284	11	3.75	0.5	0.28	120	>15.00	468	258612
924724	Serpentinite	SPT	N0707	257	258.5	1.50	0.1	0.74	2.5	57	1.1	2.5	5.58	0.5	97	202	7	1.8	0.5	0.43	29	6.1	412	924724
258774	Serpentinite	SPT	BHK 49-R9-90	818.5	821.5	3.00	0.6	0.66	2.5	170	0.6	2.5	0.81	1	158	250	835	3.17	0.5	0.44	58	>15.00	383	258774
49816	Serpentinite	SPT	BHK 52-90	744	749	5.00	0.1	0.97	8	417	0.6	2.5	2.27	2	66	565	0.5	5.48	0.5	0.41	210	>15.00	682	49816
49828	Serpentinite	SPT	BHK 52-90	801	806	5.00	0.1	0.59	5	202	0.25	2.5												



**Table A2.8.5 (Cont.'d)**  
**Total Metal Concentrations**  
**Phase II Static Testing**  
**Minago Project**

Sample #	Rock Type	Rock Code	Drill Hole #	From (ft)	To (ft)	Length (ft)	Ag ppm	Al %	As ppm	Ba ppm	Be ppm	Bi ppm	Ca %	Cd ppm	Co ppm	Cr ppm	Cu ppm	Fe %	Hg ppm	K %	La ppm	Mg %	Mn ppm
365627	Serpentinite	SPT	BHK 41-R1-90	1051.5	1056.2	4.70	<0.2	0.48	<5	194	<0.5	<5	0.16	2	170	302	479	5.65	<1	0.44	53	>15.00	451
258612	Serpentinite	SPT	BHK 49-R9-90	746.5	749.9	3.40	<0.2	0.53	<5	116	0.8	<5	1.78	1	112	284	11	3.75	<1	0.28	120	>15.00	468
924724	Serpentinite	SPT	N0707	257	258.5	1.50	<0.2	0.74	<5	57	1.1	<5	5.58	<1	97	202	7	1.8	<1	0.43	29	6.1	412
258774	Serpentinite	SPT	BHK 49-R9-90	818.5	821.5	3.00	0.6	0.66	<5	170	0.6	<5	0.81	1	158	250	835	3.17	<1	0.44	58	>15.00	383
49816	Serpentinite	SPT	BHK 52-90	744	749	5.00	<0.2	0.97	8	417	0.6	<5	2.27	2	66	565	<1	5.48	<1	0.41	210	>15.00	682
49828	Serpentinite	SPT	BHK 52-90	801	806	5.00	<0.2	0.59	5	202	<0.5	<5	1.7	2	79	557	3	5	<1	0.15	75	>15.00	631
49830	Serpentinite	SPT	BHK 52-90	811	815	4.00	0.2	0.44	<5	30	<0.5	<5	1.63	2	93	495	3	5.33	<1	0.05	54	>15.00	604
49904	Serpentinite	SPT	BHK 52-90	1110	1115.5	5.50	<0.2	1.45	<5	242	1.6	<5	0.22	1	38	467	14	2.27	<1	0.84	65	5.74	157
924686	Serpentinite	SPT	N0707	233	243.2	10.20	<0.2	0.21	<5	72	<0.5	<5	1.17	2	56	230	<1	5.21	<1	0.2	90	>15.00	605
925856	Serpentinite	SPT	N0712	214.5	215.45	0.95	0.7	3.65	<5	630	1.6	<5	0.08	1	18	96	23	2.36	<1	1.23	60	9.08	327
925017	Serpentinite	SPT	N0713	371.04	371.7	0.66	0.9	0.56	6	91	<0.5	<5	0.3	2	79	512	<1	4.44	<1	0.3	24	>15.00	364
925276	Serpentinite	SPT	N0720	254.84	256.33	1.49	0.6	0.56	<5	66	1.2	<5	1.54	1	146	191	1	3.23	<1	0.27	23	11.94	283
926243	Serpentinite	SPT	N0726	133.69	134.54	0.85	1.3	0.99	7	17	<0.5	<5	1.42	1	79	887	157	3.83	<1	0.15	18	9.66	326
929407	Serpentinite	SPT	N0730	104.25	105.25	1.00	<0.2	0.76	<5	36	0.7	<5	0.05	1	69	222	9	3.22	<1	0.15	19	>15.00	455
	<b>Minimum</b>						<0.2	0.21	<5	17	<0.5	<5	0.05	<1	18	96	<1	1.8	<1	0.05	18	5.74	157
	<b>Average</b>						<b>0.4</b>	<b>0.9</b>	<b>3.6</b>	<b>167.1</b>	<b>0.7</b>	<b>2.5</b>	<b>1.3</b>	<b>1.4</b>	<b>90.0</b>	<b>375.7</b>	<b>110.3</b>	<b>3.9</b>	<b>0.5</b>	<b>0.4</b>	<b>64.1</b>	<b>12.7</b>	<b>439.1</b>
	<b>Maximum</b>						1.3	3.65	8	630	1.6	<5	5.58	2	170	887	835	5.65	<1	1.23	210	>15	682
<b>924234</b>	<b>Serp/Gran</b>	<b>SPT/GT</b>	<b>N0702</b>	<b>161.6</b>	<b>162.4</b>	<b>0.80</b>	<b>0.4</b>	<b>0.82</b>	<b>5</b>	<b>50</b>	<b>0.5</b>	<b>&lt;5</b>	<b>0.02</b>	<b>1</b>	<b>42</b>	<b>317</b>	<b>&lt;1</b>	<b>2.99</b>	<b>&lt;1</b>	<b>0.15</b>	<b>15</b>	<b>&gt;15.00</b>	<b>284</b>

Table A2.8.5 (Cont.'d)  
Total Metal Concentrations  
Phase II Static Testing  
Minago Project

Rock Type	Rock Code	Drill Hole #	From (ft)	To (ft)	Length (ft)	Mo ppm	Na %	Ni ppm	P ppm	Pb ppm	Se ppm	S %	Sb ppm	Sc ppm	Sr ppm	Th ppm	Ti %	Tl ppm	U ppm	V ppm	W ppm	Zn ppm	Zr ppm
Amphibolite	AMP	BHK 52-90	660	665	5.00	<2	0.3	128	717	<2	<0.1	0.09	8	12	<1	27	0.05	<10	18	93	<10	34	12
Amphibolite	AMP	N0724	196.15	197	0.85	4	0.11	199	430	<2	<0.1	0.12	20	3	<3	<5	0.21	<10	24	57	<10	27	3
<b>Minimum</b>						2	0.11	128	430	<2	<0.1	0.09	8	3	<1	<5	0.05	<10	18	57	<10	27	3
<b>Average</b>						2.5	0.205	163.5	573.5	1	0.05	0.105	14	7.5	1.75	14.75	0.13	0.5	21	75	5	30.5	7.5
<b>Maximum</b>						4	0.3	199	717	<2	<0.1	0.12	20	12	3	27	0.21	<10	24	93	<10	34	12
Granite	GT	N0720	249.3	251	1.70	2	0.05	267	111	8	0.4	0.02	5	1	<1	20	0.04	<10	35	7	<10	28	37
Granite	GT	N0730	197.7	198.8	1.10	<2	0.69	396	108	<2	<0.1	0.03	<5	1	<1	6	0.02	<10	25	7	<10	19	7
Granite	GT	BHK 41-R1-90	1080	1083	3.00	<2	0.11	258	615	6	<0.1	0.03	<5	1	38	34	0.06	<10	15	14	<10	26	18
Granite	GT	BHK 42-90	767	774	7.00	<2	0.04	51	274	<2	<0.1	0.02	<5	1	<1	11	0.02	<10	13	7	<10	23	12
Granite	GT	BHK 42-90	962	967	5.00	2	0.07	9	245	6	<0.1	0.01	<5	1	15	22	0.02	<10	18	7	<10	31	19
Granite	GT	BHK 42-R1-90	1089	1094	5.00	<2	0.09	38	1846	<2	<0.1	0.04	7	5	<1	18	0.1	13	11	53	<10	54	12
Granite	GT	BHK 42-R2-90	1156	1172	16.00	<2	0.05	25	534	9	<0.1	0.05	<5	1	<1	33	0.04	<10	20	12	<10	51	15
Granite	GT	BHK 43-90	927	937	10.00	<2	0.09	261	348	5	<0.1	0.03	<5	2	<1	20	0.03	<10	19	16	<10	42	17
Granite	GT	BHK 49-R9-90	463.75	467.5	3.75	<2	0.09	34	1495	2	<0.1	0.05	<5	2	27	47	0.01	26	24	24	<10	26	33
Granite	GT	BHK 49-R9-90	1015.5	1017	1.50	<2	0.09	32	212	<2	<0.1	0.03	<5	1	<1	19	0.03	<10	<10	10	<10	21	4
Granite	GT	BHK 49-R9-90	833.2	835	1.80	<2	0.22	2036	223	<2	<0.1	0.14	<5	1	<1	14	0.03	<10	12	11	<10	27	6
Granite	GT	BHK 52-90	817	820	3.00	2	0.08	409	34	5	<0.1	0.02	<5	1	<1	12	0.01	<10	42	3	<10	24	10
Granite	GT	BHK 52-90	856.5	865	8.50	2	0.07	61	133	3	<0.1	0.01	<5	1	<1	15	0.04	<10	17	8	<10	22	12
Granite	GT	BHK 52-90	865	870	5.00	<2	0.31	1150	184	<2	<0.1	0.01	<5	1	<1	13	0.01	<10	10	10	<10	23	5
Granite	GT	BHK 52-90	1126	1133	7.00	<2	0.31	1150	184	<2	<0.1	0.01	<5	1	<1	13	0.01	<10	10	10	<10	23	5
Granite	GT	N0702	162.4	163.7	1.30	<2	0.4	1931	86	<2	0.4	0.01	<5	1	<1	14	0.01	<10	39	12	<10	18	5
Granite	GT	N0705	107.35	108.35	1.00	<2	0.04	52	537	<2	<0.1	0.15	5	2	<1	15	0.04	12	36	18	<10	49	25
Granite	GT	N0706	102.5	103.25	0.75	<2	0.17	1884	754	<2	<0.1	0.11	<5	2	12	27	0.05	<10	39	22	<10	40	43
Granite	GT	N0706	178.3	179.7	1.40	2	0.06	15	557	4	<0.1	0.36	8	2	<1	10	0.06	<10	38	19	<10	42	15
Granite	GT	N0707	109.3	110.6	1.30	<2	0.11	369	779	<2	<0.1	0.06	<5	1	<1	24	0.02	<10	20	15	<10	44	35
Granite	GT	N0710	312.3	312.9	0.60	<2	0.5	995	39	<2	1.6	0.04	<5	2	<1	7	0.02	<10	31	21	<10	19	5
Granite	GT	N0713	203.2	204.7	1.50	<2	0.16	179	390	<2	<0.1	0.04	<5	1	<1	22	0.03	<10	49	14	<10	23	11
Granite	GT	N0713	436.3	437.27	0.97	<2	0.05	37	212	5	1.7	0.02	<5	1	<1	19	0.04	<10	29	11	<10	24	22
Granite	GT	N0724	171.18	171.96	0.78	<2	0.08	110	442	<2	<0.1	0.14	19	10	1	<5	0.18	<10	32	119	<10	41	10
Granite	GT	N0725	138.64	139.56	0.92	<2	0.2	122	529	<2	2.5	0.05	6	1	<1	28	0.02	<10	31	21	<10	43	15
Granite	GT	N0726	215.81	218	2.19	<2	0.22	381	376	<2	<0.1	0.23	<5	3	1	10	0.01	17	30	14	<10	10	8
Granite	GT	N0733	164	165	1.00	<2	0.56	322	177	<2	<0.1	0.01	5	1	<1	6	0.01	<10	21	10	<10	15	10
Granite	GT	258554	485.00	495.50	10.50	2	0.06	16	820	3	<0.1	0.02	<5	1	<1	27	0.03	11	<10	19	<10	54	25
<b>Minimum</b>						<2	0.04	9	34	2	<0.1	0.01	<5	1	<1	5	0.01	<10	<10	3.00	<10	10	4
<b>Average</b>						1.21	0.18	449.64	437.29	2.61	0.28	0.06	3.84	1.75	3.75	18.16	0.04	3.23	23.82	18.36	5.00	31	16
<b>Maximum</b>						2	0.69	2036	1846	9	2.5	0	19	10	38	47	0	26	49	119	<10	54	43
Mafic Dike	MD	N0705	101.6	102.6	1.00	<2	0.09	34	1495	2	2.9	0.05	<5	2	27	47	0.01	26	24	24	<10	26	33
Mafic Dike	MD	N0730	141	143	2.00	<2	0.59	219	430	<2	<0.1	0.03	12	23	<1	<5	0.12	<10	33	178	<10	31	8
<b>Minimum</b>						<2	0.09	34	430	<2	<0.1	0.03	<5	2	<1	<5	0.01	<10	24	24	<10	26	8
<b>Maximum</b>						<1	0.34	126.5	962.5	1.5	1.475	0.04	7.25	12.5	13.75	24.75	0.065	13.25	28.5	101	5	28.5	20.5
						<2	0.59	219	1495	2	2.9	0.05	12	23	27	47	0.12	26	33	178	<10	31	33
Mafic Metavolcanic	MMV	N0712	249.5	251	1.50	<2	0.06	136	872	5	2.1	0.47	12	3	<1	13	0.14	<10	24	34	<10	42	12
Metasediment	MSD	N0701	173.45	174.9	1.45	<2	0.09	198	574	<2	<0.1	0.18	9	8	<1	7	0.08	<10	20	80	<10	105	12
Metasediment	MSD	N0705	99.5	100.8	1.30	<2	0.04	401	145	<2	<0.1	0.17	7	2	<1	11	0.03	<10	14	20	<10	37	13
Metasediment	MSD	N0710	135.4	136.2	0.80	15	0.09	93	450	8	2.4	4.75	10	7	8	8	0.15	<10	40	140	15	75	29
Metasediment	MSD	N0712	197	198.5	1.50	<2	0.1	3586	35	5	2.3	0.34	10	4	2	<5	0.02	<10	38	8	<10	11	4
<b>Minimum</b>						<1	0.08	1069.5	301	3.75	1.2	1.36	9	5.25	2.75	7.125	0.07	<10	28	62	7.5	57	14.5
<b>Average</b>						<1	0.08	1069.5	301	3.75	1.2	1.36	9	5.25	2.75	7.125	0.07	<10	28	62	7.5	57	14.5
<b>Maximum</b>						<1	0.08	1069.5	301	3.75	1.2	1.36	9	5.25	2.75	7.125	0.07	<10	28	62	7.5	57	14.5
Regolith	R	N0730	94.53	95.23	0.70	<2	0.05	1258	31	4	3	0.19	5	2	86	6	0.01	<10	47	10	<10	9	4

**Table A2.8.5 (Cont.'d)**  
**Total Metal Concentrations**  
**Phase II Static Testing**  
**Minago Project**

Rock Type	Rock Code	Drill Hole #	From (ft)	To (ft)	Length (ft)	Mo ppm	Na %	Ni ppm	P ppm	Pb ppm	Se ppm	S %	Sb ppm	Sc ppm	Sr ppm	Th ppm	Ti %	Tl ppm	U ppm	V ppm	W ppm	Zn ppm	Zr ppm
Serpentinite	SPT	BHK 41-R1-90	1051.5	1056.2	4.70	<2	0.05	>10000	67	19	0.3	0.72	<5	5	<1	<5	0.01	<10	15	9	<10	4	3
Serpentinite	SPT	BHK 49-R9-90	746.5	749.9	3.40	<2	0.05	3459	102	9	<0.1	0.02	6	5	<1	13	0.02	15	24	11	<10	22	3
Serpentinite	SPT	N0707	257	258.5	1.50	<2	0.06	853	53	<2	1.2	0.09	5	3	<1	5	0.01	<10	42	7	<10	8	9
Serpentinite	SPT	BHK 49-R9-90	818.5	821.5	3.00	<2	0.05	>110000	66	15	<0.1	0.76	<5	4	<1	6	0.01	<10	15	9	<10	7	3
Serpentinite	SPT	BHK 52-90	744	749	5.00	<2	0.19	1565	167	10	<0.1	0.01	17	6	224	23	0.04	15	26	27	<10	14	4
Serpentinite	SPT	BHK 52-90	801	806	5.00	<2	0.1	4118	62	7	<0.1	0.01	15	6	164	<5	0.03	<10	15	20	<10	18	3
Serpentinite	SPT	BHK 52-90	811	815	4.00	<2	0.09	6863	48	8	<0.1	0.03	11	5	<1	<5	0.02	10	17	18	<10	19	3
Serpentinite	SPT	BHK 52-90	1110	1115.5	5.50	<2	0.12	869	62	<2	<0.1	0.04	13	2	<1	6	0.02	<10	24	11	<10	29	6
Serpentinite	SPT	N0707	233	243.2	10.20	<2	0.08	2979	51	7	<0.1	0.17	7	5	<1	7	0.01	<10	30	9	<10	9	3
Serpentinite	SPT	N0712	214.5	215.45	0.95	<2	0.21	968	119	<2	<0.1	0.05	<5	2	3	11	0.08	<10	32	21	<10	35	19
Serpentinite	SPT	N0713	371.04	371.7	0.66	<2	0.1	5462	54	7	4.6	0.29	13	6	1	<5	0.02	<10	30	19	<10	11	3
Serpentinite	SPT	N0720	254.84	256.33	1.49	<2	0.13	2416	35	4	2.4	0.1	8	3	1	<5	0.01	<10	38	6	<10	13	3
Serpentinite	SPT	N0726	133.69	134.54	0.85	<2	0.16	1295	39	7	4	0.37	24	4	4	<5	0.03	<10	27	37	<10	5	5
Serpentinite	SPT	N0730	104.25	105.25	1.00	<2	0.1	1612	34	<2	<0.1	0.02	12	2	<1	<5	0.01	11	10	6	<10	18	2
<b>Minimum</b>						<2	0.05	853	34	<2	<0.1	0.01	<5	2	<1	<5	0.01	<10	10	6	<10	4	2
<b>Average</b>						<b>1.0</b>	<b>0.1</b>	<b>&gt;3266.1</b>	<b>68.5</b>	<b>6.9</b>	<b>0.9</b>	<b>0.2</b>	<b>9.9</b>	<b>4.1</b>	<b>28.6</b>	<b>6.3</b>	<b>0.02</b>	<b>4.0</b>	<b>24.6</b>	<b>15.0</b>	<b>5.0</b>	<b>15.1</b>	<b>4.9</b>
<b>Maximum</b>						<2	0.21	> 110000	167	19	4.6	0.76	24	6	224	23	0.08	15	42	37	<10	35	19
<b>Serp/Gran</b>	<b>SPT/GT</b>	<b>N0702</b>	<b>161.6</b>	<b>162.4</b>	<b>0.80</b>	<2	<b>0.11</b>	<b>1731</b>	<b>32</b>	<2	<0.1	<b>0.02</b>	<5	<b>4</b>	<1	<5	<b>0.02</b>	<10	<b>14</b>	<b>15</b>	<10	<b>31</b>	<b>2</b>

CLIENT : David Machaina  
 PROJECT : Minago (Nuinsco Resources Ltd.)  
 CEMI Project # : 0714  
 Test : Modified Acid-Base Accounting  
 Date : Sept 18, 2007

Sample ID	Paste pH	TIC %	CaCO3 NP	S(T) %	S(SO4) %	S(S-2) %	AP	NP	Net NP	Fizz Test
49092	8.77			0.03			0.9	11.1	10.2	none
49125	9.38			0.02			0.6	19.2	18.6	none
49427	9.38			0.04			1.3	14.2	12.9	none
49809	9.35			0.09			2.8	28.7	25.9	none
49816	8.87			0.02			0.6	167.7	167.1	none
49828	8.95			0.03			0.9	154.9	154.0	slight
49830	8.96			0.04			1.3	153.0	151.8	none
49832	9.18			0.02			0.6	10.4	9.8	none
49842	9.26			0.02			0.6	11.8	11.2	none
49843	9.25			0.02			0.6	36.4	35.7	none
49904	8.83			0.06			1.9	33.4	31.5	none
49907	9.25			0.03			0.9	15.1	14.2	none
258551	8.85			0.07			2.2	20.3	18.1	none
258554	9.02			0.03			0.9	13.0	12.1	none
258612	8.55	1.09	90.8	0.03	<0.01	0.03	0.9	151.1	150.1	none
258637	8.95			0.04			1.3	87.2	85.9	none
258774	7.10			0.74			23.1	86.3	63.2	none
258779	7.99			0.14			4.4	28.0	23.6	none
365507	9.45			0.05			1.6	28.3	26.7	none
365525	9.35			0.05			1.6	17.9	16.3	none
365627	7.17	0.06	5.0	0.8	0.22	0.58	18.1	54.8	36.7	none
365663	9.25			0.04			1.3	47.2	46.0	none
924159	8.63			0.17			5.3	28.3	23.0	none
924234	9.17	<0.01	<0.8	0.03	<0.01	0.03	0.9	56.9	56.0	none
924235	9.02			0.02			0.6	66.0	65.3	none
924350	8.77			0.13			4.1	44.6	40.5	none
924424	8.28			0.39			12.2	9.7	-2.5	none
924548	7.89			0.17			5.3	6.8	1.5	none
924551	8.30			0.2			6.3	28.2	22.0	none
924558	8.35			0.16			5.0	62.9	57.9	none
924591	9.27			0.07			2.2	29.6	27.5	none
924686	8.20			0.19			5.9	133.9	127.9	none
924724	8.95	3.57	297.5	0.1	<0.01	0.10	3.1	272.4	269.3	slight
924738	7.69			5.12			160.0	9.0	-151.0	none
924890	9.30			0.05			1.6	58.8	57.2	none
924964	9.47			0.05			1.6	22.6	21.1	none
925017	8.80			0.3			9.4	81.0	71.7	none
925132	9.66			0.03			0.9	10.7	9.7	none
925273	9.72	0.07	5.8	0.04	<0.01	0.04	1.3	10.9	9.7	none
925276	9.18			0.11			3.4	100.6	97.2	none
925315	8.98			0.06			1.9	20.7	18.9	none
925841	8.35			0.37			11.6	89.3	77.8	none
925856	9.16			0.07			2.2	48.9	46.7	none
925884	9.25			0.46			14.4	21.0	6.6	none
926243	9.27			0.38			11.9	94.0	82.1	none
926297	8.99			0.24			7.5	28.0	20.5	none
926397	8.95			0.16			5.0	549.1	544.1	moderate
929308	9.28			0.16			5.0	48.4	43.4	slight
929318	9.68			0.12			3.8	19.0	15.2	none
929407	8.95			0.04			1.3	61.9	60.7	none
929437	9.40			0.05			1.6	53.9	52.3	none
929488	9.23	0.03	2.5	0.04	<0.01	0.04	1.3	72.2	71.0	none
929497	9.18			0.02			0.6	47.4	46.7	none
<b>Duplicates</b>										
49092	8.76							11.0		none
924234	9.16							57.3		none
924738	7.70							8.9		none
926243	9.28			0.4				94.1		none
926297	8.95							28.1		none
258612		1.12		0.03	<0.01					
49843				0.02						
365525				0.07						
924235				0.03						
924724		3.59			<0.01					
924890				0.05						
929407				0.03						
929488		0.04			<0.01					

**Note:**

AP = Acid potential in tonnes CaCO3 equivalent per 1000 tonnes of material. AP is determined from calculated sulphide sulphur content: S(T) - S(SO4) unless SO4-S not determined.

NP = Neutralization potential in tonnes CaCO3 equivalent per 1000 tonnes of material.

NET NP = NP - AP

Carbonate NP is calculated from TIC originating from carbonates and is expressed in kg CaCO3/tonne.

**CLIENT** : David Machaina  
**PROJECT** : Minago (Nuinsco Resources Ltd.)  
**CEMI Project #** : 0714  
**Test** : Metals by Aqua Regia Digestion with ICP Finish  
**Date** : Sept 18, 2007

Sample ID	Ag ppm	Al %	As ppm	Ba ppm	Be ppm	Bi ppm	Ca %	Cd ppm	Co ppm	Cr ppm
49092	<0.2	0.89	<5	65	0.7	♁	0.19	<1	4	132
49125	<0.2	0.5	<5	108	0.6	♁	0.29	<1	2	143
49427	<0.2	1.3	<5	74	0.9	♁	0.1	1	11	211
49809	<0.2	3.16	<5	76	2.1	♁	0.36	1	16	213
49816	<0.2	0.97	8	417	0.6	♁	2.27	2	66	565
49828	<0.2	0.59	5	202	<0.5	♁	1.7	2	79	557
49830	0.2	0.44	<5	30	<0.5	♁	1.63	2	93	495
49832	0.4	0.79	<5	60	0.7	♁	0.03	<1	3	152
49842	<0.2	0.51	<5	376	<0.5	♁	0.05	<1	2	143
49843	<0.2	2.18	<5	44	0.8	♁	0.08	<1	4	82
49904	<0.2	1.45	<5	242	1.6	♁	0.22	1	38	467
49907	<0.2	0.78	5	109	0.5	♁	0.12	<1	4	130
258551	<0.2	1.27	10	89	1.2	♁	0.42	<1	5	89
258554	<0.2	0.99	5	111	0.7	♁	0.26	<1	6	144
258612	<0.2	0.53	<5	116	0.8	♁	1.78	1	112	284
258637	<0.2	3.15	<5	286	1.3	♁	0.26	<1	3	40
258774	0.6	0.66	<5	170	0.6	♁	0.81	1	158	250
258779	0.6	2.13	<5	66	0.9	♁	0.15	1	24	79
365507	<0.2	1.33	<5	223	0.5	♁	0.76	1	14	124
365525	<0.2	0.56	<5	132	0.5	♁	0.35	<1	3	127
365627	<0.2	0.48	<5	194	<0.5	♁	0.16	2	170	302
365633	<0.2	0.98	5	126	0.7	♁	0.76	<1	6	129
924159	0.3	2.02	<5	198	1.9	♁	0.72	2	27	148
924234	0.4	0.82	5	50	0.5	♁	0.02	1	42	317
924235	0.8	4.26	<5	36	2.2	♁	0.08	1	30	53
924350	<0.2	4.53	<5	138	2.2	♁	0.58	1	10	66
924424	<0.2	0.82	<5	117	<0.5	♁	0.15	1	5	104
924551	0.4	2.26	<5	199	2	♁	0.73	2	27	161
924558	0.3	1.15	<5	77	0.7	♁	0.21	<1	12	115
924591	<0.2	1.39	6	79	0.7	♁	0.88	<1	4	68
924686	<0.2	0.21	<5	72	<0.5	♁	1.17	2	56	230
924724	<0.2	0.74	<5	57	1.1	♁	5.58	<1	97	202
924738	0.9	3.13	<5	62	1.4	♁	0.1	4	18	140
924890	<0.2	4.77	<5	224	2.5	♁	0.1	1	15	64
924964	0.2	1.48	<5	196	0.7	♁	0.13	<1	7	101
925017	0.9	0.56	6	91	<0.5	♁	0.3	2	79	512
925132	<0.2	0.66	<5	118	0.5	♁	0.09	<1	3	105
925273	<0.2	0.75	<5	204	0.5	♁	0.18	<1	6	173
925276	0.6	0.56	<5	66	1.2	♁	1.54	1	146	191
925315	<0.2	1.99	6	79	1	♁	0.12	<1	7	80
925841	1	0.9	<5	127	<0.5	♁	0.68	2	106	380
925856	0.7	3.65	<5	630	1.6	♁	0.08	1	18	96
925884	0.8	1.12	<5	181	<0.5	♁	0.42	1	17	216
926243	1.3	0.99	7	17	<0.5	♁	1.42	1	79	887
926297	1.5	2.32	<5	85	2	♁	0.13	1	5	149
926397	1.3	0.56	5	30	0.5	♁	12.33	1	97	170
929308	0.6	2.26	<5	11	0.7	♁	1.56	2	23	291
929318	0.8	1.18	<5	166	<0.5	♁	0.66	1	31	308
929407	<0.2	0.76	<5	36	0.7	♁	0.05	1	69	222
929437	<0.2	3.54	<5	38	1	♁	0.46	2	35	96
929488	<0.2	4.09	<5	22	1.2	♁	0.18	1	7	23
929497	<0.2	2.68	<5	40	2	♁	0.1	<1	4	66
924548	<0.2	1.08	<5	53	0.9	♁	0.12	<1	27	122

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Sample ID	Cu ppm	Fe %	Hg ppm	K %	La ppm	Mg %	Mn ppm	Mo ppm	Na %	Ni ppm
49092	7	0.86	<1	0.35	40	0.94	86	<2	0.04	51
49125	<1	0.79	<1	0.28	60	0.87	102	2	0.07	9
49427	2	1.79	<1	0.52	29	2.48	91	<2	0.09	261
49809	75	2.69	<1	0.78	61	4.39	147	<2	0.3	128
49816	<1	5.48	<1	0.41	210	>15.00	682	<2	0.19	1565
49828	3	5	<1	0.15	75	>15.00	631	<2	0.1	4118
49830	3	5.33	<1	0.05	54	>15.00	604	<2	0.09	6863
49832	14	0.8	<1	0.21	10	1.18	81	2	0.08	409
49842	4	0.86	<1	0.23	37	0.56	69	2	0.07	61
49843	8	1.18	<1	0.23	54	4.77	77	<2	0.31	1150
49904	14	2.27	<1	0.84	65	5.74	157	<2	0.12	869
49907	3	1.27	<1	0.36	93	0.98	113	<2	0.07	40
258551	4	1.59	<1	0.56	292	1.46	124	<2	0.09	34
258554	2	1.34	<1	0.57	136	0.95	167	2	0.06	16
258612	11	3.75	<1	0.28	120	>15.00	468	<2	0.05	3459
258637	18	1.19	<1	0.27	48	9.99	858	<2	0.09	32
258774	835	3.17	<1	0.44	58	>15.00	383	<2	0.05	>10000
258779	112	2.4	<1	0.25	18	7.56	263	<2	0.22	2036
365507	3	2.27	1	0.91	84	1.81	250	<2	0.09	38
365525	13	1.18	<1	0.33	94	0.74	125	<2	0.05	25
365627	479	5.65	<1	0.44	53	>15.00	451	<2	0.05	>10000
365633	39	1.37	<1	0.2	154	2.75	111	<2	0.11	258
924159	64	4.61	<1	1.36	39	2.09	414	<2	0.09	198
924234	<1	2.99	<1	0.15	15	>15.00	284	<2	0.11	1731
924235	5	2.6	<1	0.15	16	8.45	297	<2	0.4	1931
924350	36	4.06	<1	0.39	63	8.32	173	<2	0.17	1884
924424	26	2.16	<1	0.41	36	0.48	247	2	0.06	15
924551	61	4.84	<1	1.46	37	2.17	421	<2	0.09	189
924558	323	1.39	<1	0.54	41	0.73	185	<2	0.04	52
924591	15	1.11	<1	0.74	143	1.44	119	<2	0.11	369
924686	<1	5.21	<1	0.2	90	>15.00	605	<2	0.08	2979
924724	7	1.8	<1	0.43	29	6.1	412	<2	0.06	853
924738	58	9.15	<1	1.14	45	2.3	520	15	0.09	93
924890	<1	2.19	<1	0.31	58	12.49	338	<2	0.5	995
924964	6	1.12	<1	0.32	46	2.42	93	<2	0.16	179
925017	<1	4.44	<1	0.3	24	>15.00	364	<2	0.1	5462
925132	1	0.86	<1	0.34	119	0.86	81	<2	0.05	37
925273	6	0.9	<1	0.64	79	1.12	110	2	0.05	267
925276	1	3.23	<1	0.27	23	11.94	283	<2	0.13	2416
925315	3	1.23	<1	0.73	119	2.49	126	<2	0.2	122
925841	47	4.38	<1	0.58	<10	>15.00	364	<2	0.1	3586
925856	23	2.36	<1	1.23	60	9.08	327	<2	0.21	968
925884	54	2.2	<1	0.83	38	1.45	221	<2	0.06	136
926243	157	3.83	<1	0.15	18	9.66	326	<2	0.16	1295
926297	19	1.79	<1	0.22	27	4.65	75	<2	0.22	381
926397	24	2.73	<1	0.01	22	8.57	583	<2	0.05	1258
929308	32	4.46	<1	0.11	14	2.68	558	<2	0.08	110
929318	75	2.22	<1	0.72	<10	1.7	215	4	0.11	199
929407	9	3.22	<1	0.15	19	>15.00	455	<2	0.1	1612
929437	201	5.51	<1	0.1	18	10.22	350	<2	0.59	219
929488	34	2.01	<1	0.19	23	13.7	176	<2	0.69	396
929497	4	1.5	<1	0.2	38	7.37	146	<2	0.56	322
924548	254	1.19	1	0.7	61	0.69	133	<2	0.04	401

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Sample ID	P ppm	Pb ppm	Se ppm	S %	Sb ppm	Sc ppm	Sr ppm	Th ppm	Ti %	Tl ppm
49092	274	<2	<0.1	0.02	<5	1	<1	11	0.02	<10
49125	245	6	<0.1	0.01	<5	1	15	22	0.02	<10
49427	348	5	<0.1	0.03	<5	2	<1	20	0.03	<10
49809	717	<2	<0.1	0.09	8	12	<1	27	0.05	<10
49816	167	10	<0.1	0.01	17	6	224	23	0.04	15
49828	62	7	<0.1	0.01	15	6	164	<5	0.03	<10
49830	48	8	<0.1	0.03	11	5	<1	<5	0.02	10
49832	34	5	<0.1	0.02	<5	1	<1	12	0.01	<10
49842	133	3	<0.1	0.01	<5	1	<1	15	0.04	<10
49843	184	<2	<0.1	0.01	<5	1	<1	13	0.01	<10
49904	62	<2	<0.1	0.04	13	2	<1	6	0.02	<10
49907	487	<2	<0.1	0.02	5	1	<1	21	0.04	<10
258551	1495	2	<0.1	0.05	<5	2	27	47	0.01	26
258554	820	3	<0.1	0.02	<5	1	<1	27	0.03	11
258612	102	9	<0.1	0.02	6	5	<1	13	0.02	15
258637	212	<2	<0.1	0.03	<5	1	<1	19	0.03	<10
258774	66	15	<0.1	0.76	<5	4	<1	6	0.01	<10
258779	223	<2	<0.1	0.14	<5	1	<1	14	0.03	<10
365507	1846	<2	<0.1	0.04	7	5	<1	18	0.1	13
365525	534	9	<0.1	0.05	<5	1	<1	33	0.04	<10
365627	67	19	0.3	0.72	<5	5	<1	<5	0.01	<10
365633	615	6	<0.1	0.03	<5	1	38	34	0.06	<10
924159	574	<2	<0.1	0.18	9	8	<1	7	0.08	<10
924234	32	<2	<0.1	0.02	<5	4	<1	<5	0.02	<10
924235	86	<2	0.4	0.01	<5	1	<1	14	0.01	<10
924350	754	<2	<0.1	0.11	<5	2	12	27	0.05	<10
924424	557	4	<0.1	0.36	8	2	<1	10	0.06	<10
924551	577	<2	2.9	0.18	9	9	<1	6	0.08	<10
924558	537	<2	<0.1	0.15	5	2	<1	15	0.04	12
924591	779	<2	<0.1	0.06	<5	1	<1	24	0.02	<10
924686	51	7	<0.1	0.17	7	5	<1	7	0.01	<10
924724	53	<2	1.2	0.09	5	3	<1	5	0.01	<10
924738	450	8	2.4	4.75	10	7	8	8	0.15	<10
924890	39	<2	1.6	0.04	<5	2	<1	7	0.02	<10
924964	390	<2	<0.1	0.04	<5	1	<1	22	0.03	<10
925017	54	7	4.6	0.29	13	6	1	<5	0.02	<10
925132	212	5	1.7	0.02	<5	1	<1	19	0.04	<10
925273	111	8	0.4	0.02	5	1	<1	20	0.04	<10
925276	35	4	2.4	0.1	8	3	1	<5	0.01	<10
925315	529	<2	2.5	0.05	6	1	<1	28	0.02	<10
925841	35	5	2.3	0.34	10	4	2	<5	0.02	<10
925856	119	<2	<0.1	0.05	<5	2	3	11	0.08	<10
925884	872	5	2.1	0.47	12	3	<1	13	0.14	<10
926243	39	7	4	0.37	24	4	4	<5	0.03	<10
926297	376	<2	3	0.23	<5	3	1	10	0.01	17
926397	31	4	3.7	0.19	5	2	86	6	0.01	<10
929308	442	<2	<0.1	0.14	19	10	1	<5	0.18	<10
929318	430	<2	<0.1	0.12	20	3	3	<5	0.21	<10
929407	34	<2	<0.1	0.02	12	2	<1	<5	0.01	11
929437	430	<2	<0.1	0.03	12	23	<1	<5	0.12	<10
929488	108	<2	<0.1	0.03	<5	1	<1	6	0.02	<10
929497	177	<2	<0.1	0.01	5	1	<1	6	0.01	<10
924548	145	<2	<0.1	0.17	7	2	<1	11	0.03	<10

CLIENT  
PROJECT  
CEMI Project #  
Test  
Date

Sample ID	U ppm	V ppm	W ppm	Zn ppm	Zr ppm
49092	13	7	<10	23	12
49125	18	7	<10	31	19
49427	19	16	<10	42	17
49809	18	93	<10	34	12
49816	26	27	<10	14	4
49828	15	20	<10	18	3
49830	17	18	<10	19	3
49832	42	3	<10	24	10
49842	17	8	<10	22	12
49843	10	10	<10	23	5
49904	24	11	<10	29	6
49907	17	17	<10	37	13
258551	24	24	<10	26	33
258554	<10	19	<10	54	25
258612	24	11	<10	22	3
258637	<10	10	<10	21	4
258774	15	9	<10	7	3
258779	12	11	<10	27	6
365507	11	53	<10	54	12
365525	20	12	<10	51	15
365627	15	9	<10	4	3
365633	15	14	<10	26	18
924159	20	80	<10	105	12
924234	14	15	<10	31	2
924235	39	12	<10	18	5
924350	39	22	<10	40	43
924424	38	19	<10	42	15
924551	34	84	<10	101	12
924558	36	18	<10	49	25
924591	20	15	<10	44	35
924686	30	9	<10	9	3
924724	42	7	<10	8	9
924738	40	140	15	75	29
924890	31	21	<10	19	5
924964	49	14	<10	23	11
925017	30	19	<10	11	3
925132	29	11	<10	24	22
925273	35	7	<10	28	37
925276	38	6	<10	13	3
925315	31	21	<10	43	15
925841	38	8	<10	11	4
925856	32	21	<10	35	19
925884	24	34	<10	42	12
926243	27	37	<10	5	5
926297	30	14	<10	10	8
926397	47	10	<10	9	4
929308	32	119	<10	41	10
929318	24	57	<10	27	3
929407	10	6	<10	18	2
929437	33	178	<10	31	8
929488	25	7	<10	19	7
929497	21	10	<10	15	10
924548	14	20	<10	37	13



## **APPENDIX 2.8-A3**

### **Shake Flask Extraction Results**

<b>Phase I – Shake Flask Extraction Results</b>
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**CLIENT** : David Machaina  
**PROJECT** : Minago (Nuinsco Resources Ltd.)  
**CEMI Project #** : 0714  
**Test** : 24 Hour NanoPure Water Leach Extraction Test at 3:1 Liquid to Solid Ratio  
**Date** : June 12, 2007

**Leachate Analysis**

Sample ID			#1-NO727-OB/AR	#2-NO729-FS/AR	#10-NO727-FS	#10-NO729-FS	Blank
<b>Parameter</b>	<b>Method</b>	<b>Units</b>					
Volume Nanopure water		mL	750	750	750	750	750
Sample Weight		g	250	250	250	250	250
pH	meter		8.15	8.52	7.88	7.90	6.26
Redox	meter	mV	313	292	314	322	333
Conductivity	meter	uS/cm	328	266	123	169	<1
Acidity (to pH 4.5)	titration	mg CaCO3/L	#N/A	#N/A	#N/A	#N/A	#N/A
Total Acidity (to pH 8.3)	titration	mg CaCO3/L	1.4	#N/A	1.7	1.8	1.4
Alkalinity	titration	mg CaCO3/L	81.2	100.4	42.5	46.7	1.1
Sulphate	Turbidity	mg/L	125	27	21	37	<1
<b>Ion Balance</b>							
Major Anions	Calc	meq/L	4.23	2.57	1.29	1.71	#N/A
Major Cations	Calc	meq/L	4.16	3.06	1.31	1.86	#N/A
Difference	Calc	meq/L	0.07	-0.49	-0.03	-0.16	#N/A
Balance (%)	Calc	%	0.9%	-8.7%	-1.0%	-4.5%	#N/A
<b>Dissolved Metals</b>							
Hardness CaCO3		mg/L	93.4	7	52.2	75.4	<0.5
Aluminum Al	ICP-MS	mg/L	0.115	0.53	0.0235	0.0207	<0.0002
Antimony Sb	ICP-MS	mg/L	0.00034	0.00014	0.00299	0.00025	<0.00005
Arsenic As	ICP-MS	mg/L	0.0009	0.001	0.0011	0.0006	<0.0001
Barium Ba	ICP-MS	mg/L	0.0357	0.00213	0.0193	0.0315	0.00004
Beryllium Be	ICP-MS	mg/L	0.00007	0.00007	<0.00005	<0.00005	<0.00005
Bismuth Bi	ICP-MS	mg/L	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Boron B	ICP-MS	mg/L	0.461	0.804	0.03	0.047	<0.008
Cadmium Cd	ICP-MS	mg/L	0.00004	0.00001	0.00003	0.00003	<0.00001
Calcium Ca	ICP-MS	mg/L	24.1	1.69	10.9	16	<0.05
Chromium Cr	ICP-MS	mg/L	<0.0002	0.002	<0.0002	0.0004	0.0002
Cobalt Co	ICP-MS	mg/L	0.00044	0.0001	0.00129	0.00124	<0.00002
Copper Cu	ICP-MS	mg/L	0.0044	0.0018	0.0024	0.0009	0.0002
Iron Fe	ICP-MS	mg/L	0.062	0.128	0.007	<0.005	<0.005
Lead Pb	ICP-MS	mg/L	0.0002	0.00011	0.00033	0.00003	0.00003
Lithium Li	ICP-MS	mg/L	0.0235	0.0599	0.0062	0.008	<0.0002
Magnesium Mg	ICP-MS	mg/L	8.07	0.68	6.04	8.62	<0.05
Manganese Mn	ICP-MS	mg/L	0.0268	0.00158	0.0062	0.00562	0.00005
Mercury Hg	CVAA	ug/L	<0.05	<0.05	<0.05	<0.05	<0.05
Molybdenum Mo	ICP-MS	mg/L	0.0114	0.00469	0.0091	0.0102	<0.00002
Nickel Ni	ICP-MS	mg/L	0.005	0.002	0.0284	0.0096	<0.0005
Phosphorus P	ICP-MS	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Potassium K	ICP-MS	mg/L	10.6	10.9	2.84	4.03	<0.05
Selenium Se	ICP-MS	mg/L	0.0013	0.0006	0.0057	0.0009	<0.0005
Silicon Si	ICP-MS	mg/L	1.57	4.11	0.62	0.79	<0.05
Silver Ag	ICP-MS	mg/L	<0.00001	0.00003	<0.00001	0.00006	<0.00001
Sodium Na	ICP-MS	mg/L	46.4	60.7	4.59	5.83	<0.05
Strontium Sr	ICP-MS	mg/L	0.148	0.0248	0.0733	0.115	0.00004
Sulphur (S)	ICP-MS	mg/L	36.1	7.6	4.9	10.5	<0.1
Thallium Tl	ICP-MS	mg/L	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Tin Sn	ICP-MS	mg/L	<0.00005	<0.00005	0.00006	<0.00005	<0.00005
Titanium Ti	ICP-MS	mg/L	0.0051	0.0062	0.0013	0.0025	<0.0005
Uranium U	ICP-MS	mg/L	0.00261	0.00109	0.00432	0.00346	<0.00001
Vanadium V	ICP-MS	mg/L	0.00175	0.00904	0.00031	0.00063	<0.00005
Zinc Zn	ICP-MS	mg/L	0.0009	0.0007	<0.0005	<0.0005	<0.0005
Zirconium Zr	ICP-MS	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005

<b>Phase II – Shake Flask Extraction Results</b>
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**CLIENT** : Nuinsco Resources Ltd.  
**PROJECT** : Minago (Nuinsco Resources Ltd.)  
**CEMI Project #** : 0714  
**Test** : 24 Hour NanoPure Water Leach Extraction Test at 3:1 Liquid to Solid Ratio  
**Date** : August 27, 2008

**Leachate Analysis**

Sample ID			HC #1	HC #2	HC #3	HC #4
Parameter	Method	Units				
Volume Nanopure water		mL	3000	3000	3000	3000
Sample Weight		g	977.56	984.02	978.7	980.09
pH	meter		7.9	7.96	7.97	7.97
Redox	meter	mV	340	342	348	357
Conductivity	meter	uS/cm	90	89	72	92
Acidity (to pH 4.5)	titration	mg CaCO3/L	na	na	na	na
Total Acidity (to pH 8.3)	titration	mg CaCO3/L	1.8	1.6	1.4	1.5
Alkalinity	titration	mg CaCO3/L	45.2	43.7	38.4	42.9
Sulphate	Turbidity	mg/L	4	5	3	6
<b>Dissolved Metals</b>						
Hardness CaCO3		mg/L	39.5	31.1	31.2	39.8
Aluminum Al	ICP-MS	ug/L	22.9	33.9	76.6	175
Antimony Sb	ICP-MS	ug/L	0.13	0.04	0.04	0.05
Arsenic As	ICP-MS	ug/L	0.49	0.27	0.4	0.64
Barium Ba	ICP-MS	ug/L	7.86	4.49	6.15	8.44
Beryllium Be	ICP-MS	ug/L	<0.01	<0.01	<0.01	0.01
Bismuth Bi	ICP-MS	ug/L	<0.005	<0.005	0.008	0.007
Boron B	ICP-MS	ug/L	<50	205	78	111
Cadmium Cd	ICP-MS	ug/L	0.024	0.021	0.027	0.026
Calcium Ca	ICP-MS	ug/L	10300	5830	5420	8830
Chromium Cr	ICP-MS	ug/L	0.2	0.2	0.4	0.6
Cobalt Co	ICP-MS	ug/L	0.113	0.112	0.216	0.378
Copper Cu	ICP-MS	ug/L	1.65	0.35	1.73	4.71
Iron Fe	ICP-MS	ug/L	5	29	72	147
Lead Pb	ICP-MS	ug/L	0.086	0.083	0.166	0.214
Lithium Li	ICP-MS	ug/L	14.7	17.2	9.1	12.5
Magnesium Mg	ICP-MS	ug/L	3350	4020	4300	4310
Manganese Mn	ICP-MS	ug/L	0.98	0.93	0.94	2.01
Mercury Hg	CVAA	ug/L	<0.01	<0.01	<0.01	<0.01
Molybdenum Mo	ICP-MS	ug/L	0.34	0.13	0.17	0.44
Nickel Ni	ICP-MS	ug/L	2.8	9.26	7.85	17.4
Phosphorus P	ICP-MS	ug/L	2	<2	3	4
Potassium K	ICP-MS	ug/L	6420	6720	3510	6360
Selenium Se	ICP-MS	ug/L	0.11	0.8	0.4	0.3
Silicon Si	ICP-MS	ug/L	1560	3190	1860	2860
Silver Ag	ICP-MS	ug/L	<0.005	<0.005	<0.005	<0.005
Sodium Na	ICP-MS	ug/L	390	3790	2290	910
Strontium Sr	ICP-MS	ug/L	115	68.2	42.2	67.9
Sulphur (S)	ICP-MS	ug/L	<3000	<3000	<3000	<3000
Thallium Tl	ICP-MS	ug/L	0.03	0.037	0.023	0.026
Tin Sn	ICP-MS	ug/L	0.01	0.02	0.01	0.01
Titanium Ti	ICP-MS	ug/L	2.2	<0.5	1.9	4.5
Uranium U	ICP-MS	ug/L	0.098	0.05	0.283	0.592
Vanadium V	ICP-MS	ug/L	1.6	1.4	1	1.5
Zinc Zn	ICP-MS	ug/L	0.3	0.3	1	1.1
Zirconium Zr	ICP-MS	ug/L	<0.1	<0.1	<0.1	<0.2

HC #1 = AR Composite (N0727+N0728+N0729+N0736)

HC #2 = ORE/AR Composite (N0727+N0728+N0729+N0736)

HC #3 = ORE/LS Composite (N0727+N0728+N0729+N0736)

HC #4 = OB/LS/FS/AR/ORE Composite (N0727+N0728+N0729+N0736)

# **APPENDIX 2.8-A4**

## **Kinetic Test Results for Waste Rock**



## HC 1

Sample = AR Composite

Date	Cycle No.	Volume mL		pH	ORP mV	Cond. umhos/cm	Acidity (pH 4.5) mgCaCO3/L	Acidity (pH 8.3) mgCaCO3/L	Alkalinity mgCaCO3/L	Sulphate mg/L	Hardness CaCO3 mg/L
		Input	Output								
12-Jun-07	1	750	520	7.72	374	611	#N/A	2.3	40.5	262	88.3
20-Jun-07	2	500	405	7.62	364	832	#N/A	2.6	30.2	341	
27-Jun-07	3	500	425	7.63	380	647	#N/A	2.4	28.8	255	72.3
4-Jul-07	4	500	480	7.88	358	463	#N/A	2.3	37.9	161	
11-Jul-07	5	500	415	7.77	359	405	#N/A	2.9	36.0	161	30.4
18-Jul-07	6	500	430	7.93	366	430	#N/A	2.4	45.7	181	
25-Jul-07	7	500	460	8.09	370	302	#N/A	2.4	47.8	96	14.5
1-Aug-07	8	500	470	7.82	366	266	#N/A	2.4	46.1	42	
8-Aug-07	9	500	465	8.08	317	230	#N/A	1.2	42.4	50	8.8
15-Aug-07	10	500	455	8.02	370	24	#N/A	2.4	41.5	54	
22-Aug-07	11	500	435	7.88	379	187	#N/A	3.1	38.1	55	10.3
29-Aug-07	12	500	445	8.09	363	148	#N/A	3.6	32.8	40	
5-Sep-07	13	500	430	7.84	394	168	#N/A	2.3	34.8	47	10.6
12-Sep-07	14	500	435	8.08	380	140	#N/A	3.2	38.4	40	
19-Sep-07	15	500	445	8.05	376	144	#N/A	#N/A	39.5	44	8.8
26-Sep-07	16	500	455	7.97	394	137	#N/A	3.2	27.7	28	
3-Oct-07	17	500	460	7.89	391	150	#N/A	3.9	31.4	34	8.9
10-Oct-07	18	500	470	7.56	431	148	#N/A	2.8	30.6	29	
17-Oct-07	19	500	430	7.44	415	106	#N/A	2.7	22.9	22	7.8
24-Oct-07	20	500	465	7.64	428	113	#N/A	2.4	28.5	23	
31-Oct-07	21	500	470	7.78	378	121	#N/A	3.4	32.4	21	16.3
7-Nov-07	22	500	465	7.62	423	124	#N/A	2.7	27.4	21	
14-Nov-07	23	500	460	7.62	424	131	#N/A	2.8	31.6	27	13.2
21-Nov-07	24	500	475	7.43	476	99	#N/A	3.1	23.7	20	
28-Nov-07	25	500	465	7.43	424	84	#N/A	3.2	24.4	13	9.9
5-Dec-07	26	500	465	7.57	449	89	#N/A	3.1	26.4	17	
12-Dec-07	27	500	490	7.68	396	79	#N/A	2.3	21.9	14	11.7
19-Dec-07	28	500	470	7.55	458	78	#N/A	2.3	22.2	13	
26-Dec-07	29	500	465	7.56	398	80	#N/A	2.0	22.0	18	13.3
2-Jan-08	30	500	470	7.44	458	72	#N/A	2.4	17.6	15	
9-Jan-08	31	500	500	7.48	399	82	#N/A	#N/A	#N/A	14	17
16-Jan-08	32	500	465	7.30	481	79	#N/A	3.7	20.9	16	
23-Jan-08	33	500	480	7.36	403	76	#N/A	3.6	20.8	13	15.5
30-Jan-08	34	500	450	7.32	434	86	#N/A	4.2	22.9	17	
6-Feb-08	35	500	440	7.41	459	73	#N/A	2.9	20.3	15	16.8
13-Feb-08	36	500	445	7.33	448	71	#N/A	4.2	18.2	17	
20-Feb-08	37	500	455	7.52	443	73	#N/A	3.2	18.1	12	17.9
27-Feb-08	38	500	445	7.41	429	73	#N/A	3.8	18.3	14	
5-Mar-08	39	500	450	7.50	423	85	#N/A	3.8	22.2	20	22
12-Mar-08	40	500	455	7.46	431	114	#N/A	3.2	30.2	21	
19-Mar-08	41	500	465	7.61	426	101	#N/A	3.2	32.7	15	26.7
26-Mar-08	42	500	470	7.55	423	114	#N/A	3.6	41.4	16	
2-Apr-08	43	500	415	7.71	430	101	#N/A	2.6	39.2	13	32
9-Apr-08	44	500	415	7.59	424	117	#N/A	2.8	39.3	16	
16-Apr-08	45	500	405	7.57	422	106	#N/A	3.1	35.2	15	29.7
23-Apr-08	46	500	400	7.61	434	116	#N/A	3.3	39.9	16	
30-Apr-08	47	500	400	7.71	417	121	#N/A	2.4	40.2	16	37.2
7-May-08	48	500	400	7.70	398	120	#N/A	3.0	39.7	15	
14-May-08	49	500	415	7.75	382	111	#N/A	2.8	39.2	10	37.6
21-May-08	50	500	395	7.57	378	86	#N/A	3.1	29.1	8	
28-May-08	51	500	460	7.64	395	83	#N/A	3.2	34.4	9	30
4-Jun-08	52	500	460	8.17	370	49	#N/A	2.8	23.3	6	
11-Jun-08	53	500	460	7.60	419	60	#N/A	3.0	27.3	9	25.7
18-Jun-08	54	500	475	7.47	389	57	#N/A	3.7	29.2	8	
25-Jun-08	55	500	465	7.51	393	71	#N/A	4.4	29.5	7	26.3
2-Jul-08	56	500	455	7.50	397	67	#N/A	2.6	22.7	9	
9-Jul-08	57	500	470	7.62	388	85	#N/A	2.5	28.5	13	31.8
16-Jul-08	58	500	475	7.39	402	59	#N/A	2.9	21.9	8	
23-Jul-08	59	500	465	7.45	419	68	#N/A	2.9	25.2	9	26.4
30-Jul-08	60	500	480	7.54	403	71	#N/A	2.3	29.6	9	
6-Aug-08	61	500	485	7.61	394	81	#N/A	2.7	32.6	9	31.4
13-Aug-08	62	500	470	7.52	369	71	#N/A	2.6	25.8	5	
20-Aug-08	63	500	470	7.52	324	70	#N/A	2.5	27.0	9	29

## Cell Terminated

Sept 19/07 Acidity 9.4 Suspect titrator error.

Jan 9/08 Acidity 5.3, Alkalinity 126.2. Suspect instrument error, not repeated.

## HC 1

Sample = AR Compo

Date	Cycle No.	Al mg/L	Sb mg/L	As mg/L	Ba mg/L	Be mg/L	Bi mg/L	B mg/L	Cd mg/L	Ca mg/L	Cr mg/L	Co mg/L	Cu mg/L	Fe mg/L	Pb mg/L
12-Jun-07	1	0.174	0.00015	0.0005	0.0141	<0.00005	<0.00005	0.452	0.00005	20.8	0.0005	0.00334	0.0016	0.072	0.00004
20-Jun-07	2														
27-Jun-07	3	0.0439	0.0001	0.0007	0.00832	<0.00005	<0.00005	0.403	0.00004	19.8	<0.0002	0.00117	0.0036	0.017	0.00004
4-Jul-07	4														
11-Jul-07	5	0.109	0.00013	0.0006	0.0045	<0.00005	<0.00005	0.405	0.00003	8.11	0.0007	0.00045	0.0012	0.088	0.00017
18-Jul-07	6														
25-Jul-07	7	0.112	0.00014	0.0004	0.00265	<0.00005	<0.00005	0.441	0.00003	3.58	0.0005	0.00024	0.0015	0.024	0.00003
1-Aug-07	8														
8-Aug-07	9	0.0317	0.00018	0.0012	0.00202	<0.00005	<0.00005	0.34	0.00002	2.19	0.0003	0.00009	0.0019	0.01	0.00005
15-Aug-07	10														
22-Aug-07	11	0.0745	0.00013	0.0006	0.00259	<0.00005	<0.00005	0.325	0.00001	2.5	0.0009	0.00025	0.0006	0.051	0.00013
29-Aug-07	12														
5-Sep-07	13	0.152	0.00013	0.0006	0.00321	<0.00005	<0.00005	0.309	0.00003	2.63	0.0011	0.00025	0.0013	0.065	0.00014
12-Sep-07	14														
19-Sep-07	15	0.054	0.00018	0.0007	0.00299	<0.00005	<0.00005	0.296	0.00001	2.14	<0.0002	0.00015	0.0003	0.013	0.00614
26-Sep-07	16														
3-Oct-07	17	0.0428	0.00014	0.0005	0.0027	<0.00005	<0.00005	0.178	0.00001	2.21	0.0003	0.00015	0.0007	0.028	0.00003
10-Oct-07	18														
17-Oct-07	19	0.0543	0.00009	0.0009	0.00282	<0.00001	<0.000005	0.135	0.000017	2.04	0.0004	0.00011	0.00111	0.016	0.000308
24-Oct-07	20														
31-Oct-07	21	0.0178	0.00057	0.0014	0.00242	<0.00001	<0.000005	0.122	<0.000005	3.93	0.0001	0.00006	0.00009	0.005	0.000008
7-Nov-07	22														
14-Nov-07	23	0.0147	0.00011	0.0003	0.00438	<0.00001	<0.000005	0.161	<0.000005	3.47	0.0001	0.00012	0.00299	0.005	0.000016
21-Nov-07	24														
28-Nov-07	25	0.0395	0.00009	0.0003	0.00306	<0.00001	<0.000005	0.09	<0.000005	2.51	0.0004	0.00018	0.0014	0.021	0.000049
5-Dec-07	26														
12-Dec-07	27	0.0435	0.0001	0.0002	0.0033	<0.00001	<0.000005	0.072	<0.000005	3.12	0.0004	0.00012	0.00044	0.013	0.000208
19-Dec-07	28														
26-Dec-07	29	0.0165	0.00009	0.0002	0.00366	<0.00001	<0.000005	0.074	0.000028	3.42	0.0002	0.00012	0.00068	0.007	0.0145
2-Jan-08	30														
9-Jan-08	31	0.0125	0.00008	0.0002	0.00423	<0.00001	<0.000005	0.079	<0.000005	4.48	0.0001	0.00013	0.00026	0.004	0.000005
16-Jan-08	32														
23-Jan-08	33	0.016	0.00007	0.0002	0.00382	<0.00001	<0.000005	0.054	<0.000005	3.97	0.0001	0.00013	0.00061	0.006	0.00149
30-Jan-08	34														
6-Feb-08	35	0.0314	0.00008	0.0002	0.00438	<0.00001	<0.000005	0.061	<0.000005	4.42	0.0003	0.00016	0.00184	0.014	0.0085
13-Feb-08	36														
20-Feb-08	37	0.0181	0.00006	0.0002	0.00421	<0.00001	<0.000005	0.073	<0.000005	4.53	<0.0001	0.00022	0.0004	0.005	0.00001
27-Feb-08	38														
5-Mar-08	39	0.0187	0.00007	0.0002	0.00494	<0.00001	0.000006	0.074	<0.000005	5.72	0.0002	0.00012	0.00071	0.006	0.000337
12-Mar-08	40														
19-Mar-08	41	0.0132	0.0001	0.0005	0.00545	<0.00001	<0.000005	0.106	0.000006	6.64	<0.0001	0.00014	0.00067	0.003	0.000014
26-Mar-08	42														
2-Apr-08	43	0.0349	0.00011	0.0003	0.00636	<0.00001	<0.000005	0.113	<0.000005	7.86	0.0003	0.00015	0.00058	0.007	0.000026
9-Apr-08	44														
16-Apr-08	45	0.0197	0.00012	0.0003	0.00687	<0.00001	<0.000005	0.132	0.000008	7.45	0.0002	0.00019	0.00097	0.006	0.000184
23-Apr-08	46														
30-Apr-08	47	0.0176	0.00013	0.0003	0.0088	<0.00001	<0.000005	0.118	<0.000005	9.13	0.0002	0.00014	0.0007	0.007	0.000011
7-May-08	48														
14-May-08	49	0.017	0.00012	0.0003	0.00881	<0.00001	<0.000005	0.107	<0.000005	8.84	0.0002	0.00015	0.00069	0.004	<0.000005
21-May-08	50														
28-May-08	51	0.018	0.0001	0.0002	0.00716	<0.00001	<0.000005	0.074	<0.000005	7.16	0.0001	0.00012	0.00186	0.004	0.000013
4-Jun-08	52														
11-Jun-08	53	0.018	0.00012	0.0002	0.00584	<0.00001	<0.000005	<0.05	0.00002	6.45	0.0002	0.00016	0.00271	0.008	0.0191
18-Jun-08	54														
25-Jun-08	55	0.0138	0.00007	0.0002	0.00595	<0.00001	<0.000005	0.051	<0.000005	6.38	0.0003	0.00011	0.00064	0.004	0.000013
2-Jul-08	56														
9-Jul-08	57	0.025	0.00007	0.0002	0.00723	<0.00001	<0.000005	0.06	<0.000005	8.23	0.0002	0.00013	0.00203	0.015	0.000091
16-Jul-08	58														
23-Jul-08	59	0.0179	0.00006	0.0002	0.00546	<0.00001	<0.000005	<0.05	<0.000005	6.75	0.0002	0.00011	0.00072	0.006	0.000015
30-Jul-08	60														
6-Aug-08	61	0.0105	0.00008	0.0002	0.00626	<0.00001	0.000044	<0.05	0.000015	7.81	<0.0001	0.00012	0.00047	0.003	0.000086
13-Aug-08	62														
20-Aug-08	63	0.0119	0.00006	0.0001	0.00557	<0.00001	<0.000005	<0.05	0.000013	7.11	<0.0001	9.7E-05	0.0005	0.002	0.00004

Cell Terminated

Sept 19/07 Acidity 9.4

Jan 9/08 Acidity 5.3, A

## HC 1

Sample = AR Compo

Date	Cycle No.	Li mg/L	Mg mg/L	Mn mg/L	Hg ug/L	Mo mg/L	Ni mg/L	P mg/L	K mg/L	Se mg/L	Si mg/L	Ag mg/L	Na mg/L	Sr mg/L	S mg/L
12-Jun-07	1	0.0583	8.85	0.003	<0.05	0.0208	0.23	<0.1	13.4	0.0095	1.49	<0.00001	108	0.329	97.8
20-Jun-07	2														
27-Jun-07	3	0.0485	5.55	0.0018	<0.05	0.0284	0.028	<0.1	8.44	0.0092	1.07	<0.00001	98.7	0.297	83.3
4-Jul-07	4														
11-Jul-07	5	0.0372	2.46	0.0011	<0.05	0.0211	0.0106	<0.1	8.64	0.0072	1.47	<0.00001	66.6	0.126	47.9
18-Jul-07	6														
25-Jul-07	7	0.0319	1.34	0.0005	<0.05	0.0138	0.0065	<0.1	7.24	0.0045	1.46	<0.00001	57.4	0.0528	30.3
1-Aug-07	8														
8-Aug-07	9	0.0268	0.8	0.0004	<0.05	0.00858	0.0028	<0.1	6.37	0.003	1.25	<0.00001	40.2	0.0344	19.4
15-Aug-07	10														
22-Aug-07	11	0.0216	0.98	0.0005	<0.05	0.00632	0.0052	<0.1	5.54	0.0026	1.43	0.00002	40.5	0.0339	20.1
29-Aug-07	12														
5-Sep-07	13	0.0288	0.97	0.0007	<0.05	0.00627	0.0055	<0.1	6.83	0.0024	1.33	0.00001	37.8	0.0402	20.5
12-Sep-07	14														
19-Sep-07	15	0.0273	0.83	0.0004	<0.05	0.00432	0.0036	<0.1	7.35	0.0013	1.27	<0.00001	34	0.0335	15.4
26-Sep-07	16														
3-Oct-07	17	0.024	0.81	0.0003	<0.05	0.00296	0.0034	<0.1	6.05	0.0013	1.05	<0.00001	22.3	0.0353	11.7
10-Oct-07	18														
17-Oct-07	19	0.0184	0.65	0.0004	<0.01	0.0018	0.0025		5.79	0.00066	0.922	<0.000005	15.4	0.0264	7
24-Oct-07	20														
31-Oct-07	21	0.0202	1.57	0.0002	<0.01	0.00229	0.002	<0.002	6.8	0.00065	1	<0.000005	15	0.0386	9
7-Nov-07	22														
14-Nov-07	23	0.0287	1.12	0.0004	<0.01	0.00199	0.0032	<0.002	7.86	0.00075	0.968	<0.000005	17.2	0.0494	10
21-Nov-07	24														
28-Nov-07	25	0.0199	0.89	0.0004	<0.01	0.00111	0.0038	<0.002	6.1	0.00048	1.26	0.000005	9.28	0.0381	4
5-Dec-07	26														
12-Dec-07	27	0.018	0.94	0.0004	<0.01	0.00098	0.0031	<0.002	6.14	0.00045	0.765	<0.000005	6.69	0.0433	6
19-Dec-07	28														
26-Dec-07	29	0.0181	1.15	0.0005	<0.01	0.00095	0.0034	<0.002	6.19	0.00034	0.729	0.000055	7.14	0.0478	5
2-Jan-08	30														
9-Jan-08	31	0.0199	1.41	0.0004	<0.01	0.00114	0.0039	<0.002	6.63	0.00052	0.739	<0.000005	6.65	0.0568	7
16-Jan-08	32														
23-Jan-08	33	0.0183	1.37	0.0004	<0.01	0.00091	0.0036	<0.002	5.67	0.00025	0.691	<0.000005	4.74	0.0546	5
30-Jan-08	34														
6-Feb-08	35	0.0181	1.41	0.0006	0.02	0.00088	0.0042	<0.002	6.38	0.00026	0.766	0.000006	4.95	0.0595	6
13-Feb-08	36														
20-Feb-08	37	0.0191	1.61	0.0008	<0.01	<0.00005	0.0118	<0.002	6.24	0.00026	0.765	<0.000005	5.05	0.0626	7
27-Feb-08	38														
5-Mar-08	39	0.0214	1.89	0.0006	<0.01	0.00115	0.0033	<0.002	7.11	0.00023	0.808	<0.000005	4.37	0.0768	7
12-Mar-08	40														
19-Mar-08	41	0.0277	2.46	0.0006	<0.01	0.00122	0.0032	<0.002	8.36	0.00026	1.42	<0.000005	4.85	0.0942	6
26-Mar-08	42														
2-Apr-08	43	0.0336	3.01	0.0008	<0.01	0.00114	0.0045	<0.002	10.9	0.00032	1.36	<0.000005	4.73	0.106	6
9-Apr-08	44														
16-Apr-08	45	0.032	2.7	0.0005	<0.01	0.00114	0.0037	<0.002	11.2	0.00039	1.51	<0.000005	3.87	0.103	6
23-Apr-08	46														
30-Apr-08	47	0.0364	3.5	0.0005	0.01	0.00118	0.004	<0.002	11.7	0.00034	1.55	0.000008	2.85	0.134	6
7-May-08	48														
14-May-08	49	0.0311	3.76	0.0004	<0.01	0.00087	0.0041	<0.002	10.8	0.0003	1.51	<0.000005	1.85	0.127	5
21-May-08	50														
28-May-08	51	0.0249	2.95	0.0004	<0.01	0.0007	0.0032	<0.002	8.24	0.00045	1.16	<0.000005	1.11	0.105	3
4-Jun-08	52														
11-Jun-08	53	0.0159	2.34	0.0007	<0.01	0.00052	0.004	<0.002	6.24	0.00029	0.948	<0.000005	0.72	0.0826	<3
18-Jun-08	54														
25-Jun-08	55	0.018	2.52	0.0005	<0.01	0.00052	0.0029	<0.002	5.65	0.00036	1.01	0.000012	0.56	0.0845	3
2-Jul-08	56														
9-Jul-08	57	0.0194	2.73	0.0006	<0.01	0.00066	0.0034	<0.002	6.28	0.00039	1.06	0.000012	0.53	0.106	4
16-Jul-08	58														
23-Jul-08	59	0.0152	2.32	0.0005	<0.01	0.00049	0.0031	0.002	5.09	0.00033	0.741	<0.000005	0.43	0.0846	3
30-Jul-08	60														
6-Aug-08	61	0.0184	2.9	0.0005	<0.01	0.00063	0.003	<0.002	5.84	0.00012	1.03	<0.000005	0.43	0.102	3
13-Aug-08	62														
20-Aug-08	63	0.0167	2.74	0.0003	<0.01	0.00053	0.0025	<0.002	5.37	0.00016	0.895	<0.000005	0.37	0.0928	4

Cell Terminated

Sept 19/07 Acidity 9.4

Jan 9/08 Acidity 5.3, A



HC 1

Sample = AR Compo

Date	Cycle No.	Tl mg/L	Sn mg/L	Ti mg/L	U mg/L	V mg/L	Zn mg/L	Zr mg/L	Major Anions	Major Cations	Diff	Diff (%)
12-Jun-07	1	0.00007	<0.00005	0.0064	0.00213	0.0018	<0.0005	<0.005	6.27	6.80	0.54	4.1%
20-Jun-07	2											
27-Jun-07	3	<0.00005	<0.00005	0.0013	0.00146	0.0021	0.0019	<0.005	5.89	5.95	0.06	0.5%
4-Jul-07	4											
11-Jul-07	5	<0.00005	0.00035	0.0028	0.00113	0.0036	0.0019	<0.005	4.07	3.72	-0.35	-4.5%
18-Jul-07	6											
25-Jul-07	7	<0.00005	<0.00005	0.0013	0.00146	0.0048	0.0006	<0.005	2.96	2.97	0.01	0.2%
1-Aug-07	8											
8-Aug-07	9	<0.00005	0.00005	<0.0005	0.00081	0.0043	0.001	<0.005	1.89	2.09	0.20	5.0%
15-Aug-07	10											
22-Aug-07	11	<0.00005	<0.00005	0.0013	0.00083	0.0032	<0.0005	<0.005	1.91	2.11	0.20	5.0%
29-Aug-07	12											
5-Sep-07	13	<0.00005	0.00007	0.0059	0.0007	0.0032	0.0013	<0.005	1.67	2.03	0.35	9.6%
12-Sep-07	14											
19-Sep-07	15	<0.00005	0.00007	0.0005	0.00055	0.002	<0.0005	<0.005	1.71	1.84	0.13	3.8%
26-Sep-07	16											
3-Oct-07	17	<0.00005	<0.00005	0.0007	0.00059	0.0027	<0.0005	<0.005	1.34	1.30	-0.03	-1.3%
10-Oct-07	18											
17-Oct-07	19	0.000018	0.00003	<0.0005	0.00023	0.0022	0.0013	<0.0001	0.92	0.97	0.06	3.0%
24-Oct-07	20											
31-Oct-07	21	0.000019	0.00003	<0.0005	0.00032	0.0015	0.0007	<0.0001	1.09	1.15	0.07	2.9%
7-Nov-07	22											
14-Nov-07	23	0.000025	0.00003	<0.0005	0.00051	0.002	0.0007	<0.0001	1.19	1.21	0.02	0.8%
21-Nov-07	24											
28-Nov-07	25	0.000023	0.00002	<0.0005	0.00026	0.0018	0.0004	<0.0001	0.76	0.76	0.00	-0.1%
5-Dec-07	26											
12-Dec-07	27	0.000017	0.00002	0.0007	0.00029	0.0013	0.0008	<0.0001	0.73	0.68	-0.05	-3.5%
19-Dec-07	28											
26-Dec-07	29	0.000026	0.00001	<0.0005	0.00027	0.001	0.0009	<0.0001	0.81	0.73	-0.08	-5.2%
2-Jan-08	30											
9-Jan-08	31	0.000022	<0.00001	<0.0005	0.00031	0.0008	0.0004	<0.0001	#N/A	0.80	#N/A	#N/A
16-Jan-08	32											
23-Jan-08	33	0.000022	<0.00001	<0.0005	0.00024	0.0007	0.0007	<0.0001	0.69	0.66	-0.03	-1.9%
30-Jan-08	34											
6-Feb-08	35	0.000024	<0.00001	<0.0005	0.00024	0.0008	0.0012	<0.0001	0.72	0.71	0.00	-0.3%
13-Feb-08	36											
20-Feb-08	37	0.000025	<0.00001	0.0006	0.00026	0.0006	0.0007	<0.0001	0.61	0.74	0.13	9.3%
27-Feb-08	38											
5-Mar-08	39	0.000027	<0.00001	<0.0005	0.00026	0.0007	0.0004	<0.0001	0.86	0.81	-0.05	-2.9%
12-Mar-08	40											
19-Mar-08	41	0.000031	<0.00001	<0.0005	0.00072	0.0013	0.0005	<0.0001	0.97	0.96	-0.01	-0.4%
26-Mar-08	42											
2-Apr-08	43	0.000031	0.00001	0.0013	0.0005	0.0015	0.0007	<0.0001	1.05	1.12	0.07	3.2%
9-Apr-08	44											
16-Apr-08	45	0.00004	<0.00001	<0.0005	0.00044	0.0016	0.0017	<0.0001	1.02	1.05	0.03	1.6%
23-Apr-08	46											
30-Apr-08	47	0.000042	<0.00001	<0.0005	0.00063	0.0017	0.0002	<0.0001	1.14	1.17	0.03	1.3%
7-May-08	48											
14-May-08	49	0.000037	<0.00001	<0.0005	0.00059	0.0016	0.0005	<0.0001	0.99	1.11	0.12	5.5%
21-May-08	50											
28-May-08	51	0.000026	<0.00001	<0.0005	0.00051	0.001	0.0002	<0.0001	0.88	0.86	-0.02	-0.9%
4-Jun-08	52											
11-Jun-08	53	0.000024	<0.00001	<0.0005	0.00027	<0.0002	0.0021	<0.0001	0.73	0.71	-0.03	-1.9%
18-Jun-08	54											
25-Jun-08	55	0.000022	<0.00001	<0.0005	0.0004	0.0009	0.0007	<0.0001	0.74	0.69	-0.04	-2.8%
2-Jul-08	56											
9-Jul-08	57	0.000027	0.00001	<0.0005	0.00048	0.001	0.0028	<0.0001	0.84	0.82	-0.02	-1.3%
16-Jul-08	58											
23-Jul-08	59	0.00002	<0.00001	<0.0005	0.00027	0.0008	0.0004	<0.0001	0.69	0.68	-0.01	-1.1%
30-Jul-08	60											
6-Aug-08	61	0.000023	<0.00001	<0.0005	0.00039	0.0009	0.0006	<0.0001	0.84	0.80	-0.04	-2.6%
13-Aug-08	62											
20-Aug-08	63	0.000029	<0.00001	<0.0005	0.00042	0.0007	0.0002	<0.0001	0.73	0.73	0.01	0.5%

Cell Terminated

Sept 19/07 Acidity 9.4  
Jan 9/08 Acidity 5.3, A

## HC 2

Sample = ORE/AR Composite

Date	Cycle	Volume mL		pH	ORP mV	Cond. umhos/cm	Acidity (pH 4.5) mgCaCO3/L	Acidity (pH 8.3) mgCaCO3/L	Alkalinity mgCaCO3/L	Sulphate mg/L	Hardness CaCO3 mg/L
	No.	Input	Output								
12-Jun-07	1	750	605	9.22	275	323	#N/A	#N/A	71.5	80	5.7
20-Jun-07	2	500	395	8.91	296	536	#N/A	#N/A	78.8	87	
27-Jun-07	3	500	415	8.72	330	462	#N/A	#N/A	60.9	190	8.8
4-Jul-07	4	500	475	8.34	327	379	#N/A	#N/A	45.9	129	
11-Jul-07	5	500	415	8.59	323	483	#N/A	#N/A	53.8	188	13.3
18-Jul-07	6	500	435	8.54	333	501	#N/A	#N/A	62.0	159	
25-Jul-07	7	500	450	8.49	349	264	#N/A	#N/A	39.5	87	6.3
1-Aug-07	8	500	450	8.14	345	252	#N/A	1.7	38.0	48	
8-Aug-07	9	500	460	8.35	302	232	#N/A	#N/A	36.8	70	5.6
15-Aug-07	10	500	435	8.42	355	24	#N/A	#N/A	37.3	47	
22-Aug-07	11	500	430	8.43	354	176	#N/A	#N/A	37.1	38	4.9
29-Aug-07	12	500	445	8.52	345	149	#N/A	#N/A	34.5	39	
5-Sep-07	13	500	435	8.24	366	135	#N/A	0.9	31.5	42	3.9
12-Sep-07	14	500	495	8.15	377	108	#N/A	2.3	34.8	34	
19-Sep-07	15	500	450	8.26	352	103	#N/A	#N/A	31.3	34	3.9
26-Sep-07	16	500	440	8.30	384	149	#N/A	#N/A	29.4	27	
3-Oct-07	17	500	440	8.13	378	137	#N/A	2.4	29.0	27	4.5
10-Oct-07	18	500	465	8.22	396	123	#N/A	1.1	27.9	21	
17-Oct-07	19	500	415	7.57	403	118	#N/A	2.6	26.5	22	3.9
24-Oct-07	20	500	460	8.15	402	113	#N/A	1.5	31.3	23	
31-Oct-07	21	500	450	7.71	383	105	#N/A	3.0	23.4	17	3.1
7-Nov-07	22	500	460	7.90	399	99	#N/A	1.9	28.1	14	
14-Nov-07	23	500	450	7.81	410	99	#N/A	2.4	27.5	16	3.5
21-Nov-07	24	500	435	7.79	455	96	#N/A	2.5	23.6	21	
28-Nov-07	25	500	480	7.75	413	103	#N/A	2.9	29.7	16	3.6
5-Dec-07	26	500	460	7.72	436	84	#N/A	2.8	23.9	13	
12-Dec-07	27	500	515	7.76	404	84	#N/A	2.1	26.8	12	3.4
19-Dec-07	28	500	455	7.71	443	79	#N/A	1.8	23.9	11	
26-Dec-07	29	500	510	7.71	396	77	#N/A	1.8	24.2	19	3.4
2-Jan-08	30	500	465	7.72	440	71	#N/A	2.0	21.1	10	
9-Jan-08	31	500	510	7.61	410	76	#N/A	2.3	26.0	16	4.3
16-Jan-08	32	500	475	7.67	463	92	#N/A	3.2	26.9	15	
23-Jan-08	33	500	465	7.59	397	73	#N/A	3.3	21.8	9	3.8
30-Jan-08	34	500	445	7.72	417	71	#N/A	3.3	20.9	15	
6-Feb-08	35	500	435	7.69	444	70	#N/A	2.5	20.2	13	5.7
13-Feb-08	36	500	455	7.72	429	64	#N/A	3.3	20.3	13	
20-Feb-08	37	500	490	7.60	436	67	#N/A	3.1	20.9	12	5.6
27-Feb-08	38	500	450	7.70	407	59	#N/A	4.3	15.9	9	
5-Mar-08	39	500	450	7.63	411	55	#N/A	3.1	15.6	8	4.5
12-Mar-08	40	500	455	7.67	414	67	#N/A	2.5	18.2	13	
19-Mar-08	41	500	465	7.80	410	66	#N/A	2.7	21.2	10	5.6
26-Mar-08	42	500	455	7.64	406	61	#N/A	2.9	17.7	9	
2-Apr-08	43	500	425	7.67	419	56	#N/A	2.2	17.8	8	6.8
9-Apr-08	44	500	410	7.41	416	62	#N/A	2.6	17.8	12	
16-Apr-08	45	500	420	7.43	417	72	#N/A	2.7	15.3	14	9.9
23-Apr-08	46	500	425	7.47	431	87	#N/A	2.7	14.6	20	
30-Apr-08	47	500	410	7.43	404	88	#N/A	2.3	13.1	21	15.2
7-May-08	48	500	420	7.62	387	97	#N/A	2.8	14.1	21	
14-May-08	49	500	410	7.52	374	91	#N/A	2.4	13.0	24	19.7
21-May-08	50	500	400	7.63	372	106	#N/A	2.7	18.3	21	
28-May-08	51	500	460	7.45	389	74	#N/A	3.0	11.3	20	18.8
4-Jun-08	52	500	450	7.64	399	61	#N/A	2.7	11.0	16	
11-Jun-08	53	500	475	7.51	415	54	#N/A	2.5	11.1	15	13.9
18-Jun-08	54	500	475	7.62	377	44	#N/A	3.4	11.4	13	
25-Jun-08	55	500	470	7.61	382	58	#N/A	3.5	12.3	10	13.8
2-Jul-08	56	500	465	7.49	386	50	#N/A	2.4	8.8	12	
9-Jul-08	57	500	470	7.46	378	55	#N/A	2.4	10.4	12	12.9
16-Jul-08	58	500	460	7.44	393	47	#N/A	2.8	9.9	11	
23-Jul-08	59	500	465	7.38	412	54	#N/A	2.7	11.4	11	13.8
30-Jul-08	60	500	490	7.41	398	52	#N/A	2.3	14.7	8	
6-Aug-08	61	500	465	7.42	386	47	#N/A	2.6	16.1	7	12
13-Aug-08	62	500	480	7.38	363	48	#N/A	2.3	11.1	8	
20-Aug-08	63	500	455	7.37	319	44	#N/A	2.6	11.7	7	12.8

Cell Terminated

Sept 19/07 Acidity 6.6 Suspect titrator error.

## HC 2

Sample = ORE/AR C

Date	Cycle No.	Al mg/L	Sb mg/L	As mg/L	Ba mg/L	Be mg/L	Bi mg/L	B mg/L	Cd mg/L	Ca mg/L	Cr mg/L	Co mg/L	Cu mg/L	Fe mg/L	Pb mg/L
12-Jun-07	1	0.287	0.00017	0.0019	0.00143	<0.00005	<0.00005	1.99	0.00004	1.19	0.0003	0.00009	0.0018	0.18	0.00006
20-Jun-07	2														
27-Jun-07	3	0.452	0.0001	0.0012	0.00175	0.00008	<0.00005	1.9	0.00002	1.88	0.0007	0.00025	0.0018	0.26	0.00012
4-Jul-07	4														
11-Jul-07	5	0.52	0.00009	0.0015	0.00296	<0.00005	<0.00005	1.65	<0.00001	2.58	0.0019	0.00053	0.0013	0.343	0.00013
18-Jul-07	6														
25-Jul-07	7	0.214	0.00006	0.0002	0.00144	<0.00005	<0.00005	1.13	<0.00001	1.41	0.0005	0.0002	0.0029	0.101	0.00168
1-Aug-07	8														
8-Aug-07	9	0.23	0.00006	0.0009	0.00147	<0.00005	<0.00005	1.04	<0.00001	1.1	0.0011	0.00024	0.0002	0.124	0.00008
15-Aug-07	10														
22-Aug-07	11	0.0959	0.00005	0.0008	0.00136	<0.00005	<0.00005	0.946	<0.00001	1	0.0007	0.00015	0.0004	0.08	0.00005
29-Aug-07	12														
5-Sep-07	13	0.284	<0.00005	0.0007	0.00126	0.00009	<0.00005	0.794	<0.00001	0.63	0.0012	0.00026	0.0008	0.142	0.00011
12-Sep-07	14														
19-Sep-07	15	0.0842	<0.00005	0.0003	0.0009	<0.00005	<0.00005	0.708	<0.00001	0.85	<0.0002	0.00013	0.0001	0.044	0.00004
26-Sep-07	16														
3-Oct-07	17	0.118	0.00011	0.0083	0.00092	<0.00005	<0.00005	0.596	<0.00001	0.66	0.0006	0.00052	0.0023	0.181	0.00988
10-Oct-07	18														
17-Oct-07	19	0.214	0.00008	0.0019	0.00106	0.00001	<0.000005	0.54	<0.000005	0.56	0.0011	0.000384	0.0014	0.157	0.000185
24-Oct-07	20														
31-Oct-07	21	0.0655	0.00006	0.0009	0.00055	<0.00001	<0.000005	0.497	<0.000005	0.65	0.0004	0.00013	0.0002	0.054	0.000063
7-Nov-07	22														
14-Nov-07	23	0.0621	0.00005	0.0006	0.00052	<0.00001	<0.000005	0.41	<0.000005	0.74	0.0004	0.00017	0.0011	0.054	0.000051
21-Nov-07	24														
28-Nov-07	25	0.0774	0.00005	0.0003	0.00079	<0.00001	<0.000005	0.388	<0.000005	0.57	0.0005	0.000217	0.0007	0.065	0.000046
5-Dec-07	26														
12-Dec-07	27	0.043	0.00006	0.0003	0.00063	<0.00001	<0.000005	0.283	<0.000005	0.68	0.0005	0.000081	0.0002	0.03	0.00084
19-Dec-07	28														
26-Dec-07	29	0.0158	0.00003	0.0002	0.00055	<0.00001	<0.000005	0.267	<0.000005	0.68	<0.0001	0.000031	0.0003	0.011	0.000078
2-Jan-08	30														
9-Jan-08	31	0.0174	0.00003	0.0002	0.0009	<0.00001	<0.000005	0.308	<0.000005	0.93	0.0001	0.000049	0.0002	0.016	0.000012
16-Jan-08	32														
23-Jan-08	33	0.0491	0.00003	0.0003	0.00074	<0.00001	<0.000005	0.269	0.000013	0.69	0.0004	0.000132	0.0004	0.042	0.000075
30-Jan-08	34														
6-Feb-08	35	0.123	0.00003	0.0001	0.0015	<0.00001	<0.000005	0.285	0.000013	0.89	0.0008	0.000539	0.0018	0.158	0.000393
13-Feb-08	36														
20-Feb-08	37	0.0187	0.00003	0.0001	0.00083	<0.00001	<0.000005	0.269	<0.000005	1.06	<0.0001	0.000081	0.0003	0.013	0.000017
27-Feb-08	38														
5-Mar-08	39	0.0303	<0.00002	6E-05	0.00082	<0.00001	0.000025	0.22	<0.000005	0.84	0.0002	0.0001	0.0005	0.025	0.000023
12-Mar-08	40														
19-Mar-08	41	0.0236	0.00003	0.0001	0.00086	<0.00001	<0.000005	0.256	<0.000005	1.05	0.0003	0.000062	0.0004	0.015	0.000607
26-Mar-08	42														
2-Apr-08	43	0.0806	0.00003	0.0002	0.001	0.00001	<0.000005	0.222	<0.000005	1.24	0.0005	0.000235	0.0004	0.065	0.000038
9-Apr-08	44														
16-Apr-08	45	0.0755	0.00004	0.0029	0.00178	<0.00001	<0.000005	0.205	<0.000005	1.86	0.0006	0.00035	0.0009	0.08	0.000027
23-Apr-08	46														
30-Apr-08	47	0.0314	0.00003	0.0002	0.00219	<0.00001	<0.000005	0.18	<0.000005	2.84	0.0002	0.000206	0.0003	0.031	0.000011
7-May-08	48														
14-May-08	49	0.0512	0.00002	5E-05	0.00262	0.00001	<0.000005	0.212	0.000014	3.44	0.0003	0.000321	0.0008	0.041	0.000364
21-May-08	50														
28-May-08	51	0.0227	0.00002	2E-05	0.00245	<0.00001	<0.000005	0.145	<0.000005	3.19	0.0001	0.000151	0.0008	0.021	0.000021
4-Jun-08	52														
11-Jun-08	53	0.0121	0.00002	2E-05	0.00233	<0.00001	<0.000005	0.163	0.000041	2.49	<0.0001	0.00009	0.0014	0.009	0.00485
18-Jun-08	54														
25-Jun-08	55	0.0115	<0.00002	4E-05	0.00183	<0.00001	<0.000005	0.156	<0.000005	2.35	0.0003	0.000072	0.0007	0.03	0.000007
2-Jul-08	56														
9-Jul-08	57	0.0271	0.00002	4E-05	0.00211	<0.00001	<0.000005	0.151	<0.000005	2.36	0.0002	0.000101	0.0007	0.027	0.000081
16-Jul-08	58														
23-Jul-08	59	0.0125	<0.00002	0.0001	0.00191	<0.00001	<0.000005	0.152	<0.000005	2.56	0.0002	0.000065	0.0003	0.008	0.000021
30-Jul-08	60														
6-Aug-08	61	0.0122	0.00003	<0.00002	0.00171	<0.00001	<0.000005	0.14	0.00002	2.13	<0.0001	0.000061	0.0006	0.009	0.0199
13-Aug-08	62														
20-Aug-08	63	0.0108	<0.00002	9E-05	0.00165	<0.00001	<0.000005	0.127	0.000026	2.28	0.0002	0.000082	0.0005	0.008	0.000259

Cell Terminated

Sept 19/07 Acidity 6.6

## HC 2

Sample = ORE/AR C

Date	Cycle No.	Li mg/L	Mg mg/L	Mn mg/L	Hg ug/L	Mo mg/L	Ni mg/L	P mg/L	K mg/L	Se mg/L	Si mg/L	Ag mg/L	Na mg/L
12-Jun-07	1	0.0088	0.67	0.0009	<0.05	0.0187	0.0031	<0.1	4.44	0.0032	2.78	<0.00001	76.1
20-Jun-07	2												
27-Jun-07	3	0.0084	1	0.0017	<0.05	0.0121	0.007	<0.1	4.23	0.0088	2.97	0.00002	91.8
4-Jul-07	4												
11-Jul-07	5	0.0107	1.67	0.0024	<0.05	0.0048	0.015	<0.1	6.01	0.0097	3.56	0.00001	92.5
18-Jul-07	6												
25-Jul-07	7	0.006	0.67	0.0008	<0.05	0.0017	0.006	<0.1	3.56	0.0071	1.93	<0.00001	51.6
1-Aug-07	8												
8-Aug-07	9	0.0059	0.68	0.001	<0.05	0.0012	0.0074	<0.1	3.4	0.0068	2.05	<0.00001	45.2
15-Aug-07	10												
22-Aug-07	11	0.005	0.58	0.0005	<0.05	0.001	0.0047	<0.1	2.73	0.0058	1.88	<0.00001	41.9
29-Aug-07	12												
5-Sep-07	13	0.006	0.58	0.0009	<0.05	0.0009	0.0084	<0.1	3.03	0.0056	2.1	<0.00001	33.5
12-Sep-07	14												
19-Sep-07	15	0.005	0.42	0.0005	<0.05	0.0007	0.004	<0.1	2.81	0.0043	1.49	<0.00001	29.9
26-Sep-07	16												
3-Oct-07	17	0.0058	0.7	0.0011	<0.05	0.0006	0.0148	<0.1	2.36	0.0037	2.02	<0.00001	24.5
10-Oct-07	18												
17-Oct-07	19	0.0056	0.6	0.0009	<0.01	0.0005	0.0107		2.5	0.003	2.08	<0.000005	22.4
24-Oct-07	20												
31-Oct-07	21	0.005	0.37	0.0005	<0.01	0.0004	0.0039	<0.002	2.37	0.0023	1.5	<0.000005	19.9
7-Nov-07	22												
14-Nov-07	23	0.0055	0.4	0.0005	0.01	0.0004	0.0045	0.003	2.61	0.002	1.41	<0.000005	18.5
21-Nov-07	24												
28-Nov-07	25	0.0068	0.52	0.0005	<0.01	0.0004	0.0078	<0.002	2.76	0.002	1.61	<0.000005	19
5-Dec-07	26												
12-Dec-07	27	0.006	0.41	0.0004	<0.01	0.0003	0.0033	<0.002	2.65	0.0015	1.25	<0.000005	13.4
19-Dec-07	28												
26-Dec-07	29	0.0055	0.4	0.0003	<0.01	0.0003	0.0018	<0.002	2.62	0.0014	1.14	<0.000005	13.2
2-Jan-08	30												
9-Jan-08	31	0.0065	0.47	0.0004	<0.01	0.0004	0.0028	<0.002	3.07	0.0014	1.14	<0.000005	13.1
16-Jan-08	32												
23-Jan-08	33	0.0061	0.51	0.0005	<0.01	0.0003	0.005	<0.002	2.98	0.0014	1.28	<0.000005	11.9
30-Jan-08	34												
6-Feb-08	35	0.0081	0.85	0.0012	<0.01	0.0002	0.0155	<0.002	3.04	0.0013	1.83	0.000008	12.2
13-Feb-08	36												
20-Feb-08	37	0.0078	0.71	0.0005	<0.01	<0.00005	0.006	<0.002	3.31	0.0013	1.3	<0.000005	12
27-Feb-08	38												
5-Mar-08	39	0.0064	0.59	0.0004	<0.01	0.0002	0.0055	<0.002	2.89	0.0011	0.98	<0.000005	8.68
12-Mar-08	40												
19-Mar-08	41	0.0082	0.73	0.0004	<0.01	0.0003	0.0034	<0.002	3.45	0.0012	1.63	<0.000005	9.83
26-Mar-08	42												
2-Apr-08	43	0.0106	0.89	0.0008	0.02	0.0002	0.0117	0.005	4.07	0.0011	1.31	0.000007	7.66
9-Apr-08	44												
16-Apr-08	45	0.0133	1.29	0.0008	<0.01	0.0002	0.0214	<0.002	5.02	0.0012	1.54	<0.000005	8.4
23-Apr-08	46												
30-Apr-08	47	0.0177	1.96	0.0009	0.02	0.0002	0.0407	<0.002	5.59	0.0014	1.25	0.000006	7.51
7-May-08	48												
14-May-08	49	0.0197	2.69	0.001	0.01	0.0002	0.0608	0.003	6.15	0.0015	1.34	<0.000005	7.33
21-May-08	50												
28-May-08	51	0.015	2.62	0.0008	<0.01	0.0002	0.0319	<0.002	5.08	0.0014	1.15	<0.000005	5.24
4-Jun-08	52												
11-Jun-08	53	0.0115	1.88	0.0007	<0.01	0.0001	0.0195	<0.002	4.32	0.0009	1.04	<0.000005	4.13
18-Jun-08	54												
25-Jun-08	55	0.0119	1.93	0.0006	<0.01	0.0001	0.0132	<0.002	3.79	0.001	1.17	0.000012	3.23
2-Jul-08	56												
9-Jul-08	57	0.0108	1.69	0.0008	<0.01	0.0001	0.0111	<0.002	3.61	0.0009	1.1	0.000006	2.83
16-Jul-08	58												
23-Jul-08	59	0.0108	1.8	0.0005	<0.01	0.0001	0.01	<0.002	3.73	0.0009	0.959	<0.000005	2.95
30-Jul-08	60												
6-Aug-08	61	0.0101	1.63	0.0006	<0.01	9E-05	0.0105	<0.002	3.35	0.0007	1.12	<0.000005	2.41
13-Aug-08	62												
20-Aug-08	63	0.01	1.72	0.0006	<0.01	9E-05	0.0108	<0.002	3.39	0.0007	1	<0.000005	2.21

Cell Terminated

Sept 19/07 Acidity 6.6

HC 2

Sample = ORE/AR C

Date	Cycle No.	Sr mg/L	S mg/L	Tl mg/L	Sn mg/L	Ti mg/L	U mg/L	V mg/L	Zn mg/L	Zr mg/L	Major Anions	Major Cations	Diff	Diff (%)
12-Jun-07	1	0.0123	27.7	<0.00005	0.00005	0.0018	0.0003	0.013	0.0006	<0.005	3.10	3.54	0.44	6.6%
20-Jun-07	2													
27-Jun-07	3	0.0223	93.5	<0.00005	0.00007	0.0054	0.0016	0.0117	0.0032	<0.005	5.18	4.28	-0.90	-9.5%
4-Jul-07	4													
11-Jul-07	5	0.0365	63	<0.00005	0.00015	0.0053	0.0011	0.0089	0.0017	<0.005	4.99	4.44	-0.55	-5.8%
18-Jul-07	6													
25-Jul-07	7	0.0149	25.9	<0.00005	0.00006	0.002	0.0005	0.0071	0.0008	<0.005	2.60	2.46	-0.14	-2.8%
1-Aug-07	8													
8-Aug-07	9	0.0123	23	<0.00005	0.0001	0.0022	0.0004	0.0067	0.001	<0.005	2.20	2.16	-0.03	-0.7%
15-Aug-07	10													
22-Aug-07	11	0.0091	19.8	<0.00005	<0.00005	0.0015	0.0004	0.0052	0.0016	<0.005	1.53	1.99	0.46	12.9%
29-Aug-07	12													
5-Sep-07	13	0.0077	15.1	<0.00005	0.00008	0.0028	0.0004	0.0064	0.0011	<0.005	1.50	1.61	0.11	3.5%
12-Sep-07	14													
19-Sep-07	15	0.0081	12.6	<0.00005	<0.00005	0.0012	0.0003	0.0054	<0.0005	<0.005	1.33	1.45	0.11	4.1%
26-Sep-07	16													
3-Oct-07	17	0.0074	11.2	<0.00005	<0.00005	0.0011	0.0004	0.0049	<0.0005	<0.005	1.14	1.22	0.07	3.1%
10-Oct-07	18													
17-Oct-07	19	0.006	9	0.00001	0.00014	0.0021	0.0003	0.0049	0.0012	0.0005	0.99	1.12	0.13	6.0%
24-Oct-07	20													
31-Oct-07	21	0.0061	7	0.000008	0.00002	<0.0005	0.0003	0.0037	0.0008	0.0001	0.82	0.99	0.17	9.3%
7-Nov-07	22													
14-Nov-07	23	0.0062	8	0.000006	0.00001	0.0007	0.0003	0.0034	0.0004	0.0002	0.88	0.94	0.06	3.2%
21-Nov-07	24													
28-Nov-07	25	0.0075	6	0.000012	0.00002	<0.0005	0.0003	0.0036	0.0002	0.0002	0.93	0.97	0.04	2.2%
5-Dec-07	26													
12-Dec-07	27	0.0078	6	0.000008	0.00001	0.0005	0.0002	0.0023	0.0004	<0.0001	0.79	0.72	-0.07	-4.5%
19-Dec-07	28													
26-Dec-07	29	0.0076	5	0.000012	<0.00001	<0.0005	0.0002	0.0022	0.0004	<0.0001	0.88	0.71	-0.17	-10.8%
2-Jan-08	30													
9-Jan-08	31	0.0092	5	0.000012	<0.00001	<0.0005	0.0002	0.0022	0.0008	<0.0001	0.85	0.73	-0.12	-7.6%
16-Jan-08	32													
23-Jan-08	33	0.0082	5	0.000011	<0.00001	<0.0005	0.0002	0.0023	0.0016	<0.0001	0.62	0.67	0.05	3.5%
30-Jan-08	34													
6-Feb-08	35	0.0107	6	0.000014	0.00001	0.0013	0.0002	0.0022	0.002	0.0002	0.67	0.72	0.05	3.4%
13-Feb-08	36													
20-Feb-08	37	0.012	5	0.000014	<0.00001	<0.0005	0.0002	0.0017	0.0016	<0.0001	0.67	0.72	0.05	3.6%
27-Feb-08	38													
5-Mar-08	39	0.0102	4	0.000013	<0.00001	<0.0005	0.0002	0.0015	0.0007	<0.0001	0.48	0.54	0.06	6.3%
12-Mar-08	40													
19-Mar-08	41	0.0131	4	0.000015	<0.00001	<0.0005	0.0002	0.0019	0.0003	<0.0001	0.63	0.63	0.00	-0.4%
26-Mar-08	42													
2-Apr-08	43	0.0147	5	0.000017	0.00001	0.0008	0.0001	0.0022	0.0005	0.0001	0.52	0.57	0.05	4.5%
9-Apr-08	44													
16-Apr-08	45	0.0231	7	0.000022	0.00001	0.0009	0.0002	0.0016	0.0009	<0.0001	0.60	0.69	0.10	7.4%
23-Apr-08	46													
30-Apr-08	47	0.0352	9	0.000031	<0.00001	<0.0005	0.0002	0.0011	0.0005	<0.0001	0.70	0.77	0.07	5.0%
7-May-08	48													
14-May-08	49	0.0445	10	0.000033	<0.00001	<0.0005	0.0002	0.0014	0.0015	<0.0001	0.76	0.87	0.11	6.7%
21-May-08	50													
28-May-08	51	0.043	9	0.000024	<0.00001	<0.0005	0.0003	0.001	0.0007	<0.0001	0.64	0.73	0.09	6.5%
4-Jun-08	52													
11-Jun-08	53	0.0333	6	0.000022	<0.00001	<0.0005	0.0002	0.0007	0.0054	<0.0001	0.54	0.57	0.03	3.1%
18-Jun-08	54													
25-Jun-08	55	0.0295	5	0.00002	<0.00001	<0.0005	0.0002	0.0011	0.0002	<0.0001	0.45	0.51	0.06	6.2%
2-Jul-08	56													
9-Jul-08	57	0.0309	5	0.000022	<0.00001	<0.0005	0.0002	0.001	0.0016	<0.0001	0.46	0.47	0.01	1.5%
16-Jul-08	58													
23-Jul-08	59	0.03	5	0.00002	<0.00001	<0.0005	0.0002	0.001	0.0002	<0.0001	0.46	0.50	0.04	4.5%
30-Jul-08	60													
6-Aug-08	61	0.0275	4	0.00002	<0.00001	<0.0005	0.0002	0.001	0.0006	<0.0001	0.47	0.43	-0.04	-4.0%
13-Aug-08	62													
20-Aug-08	63	0.0266	4	0.000026	<0.00001	<0.0005	0.0002	0.0009	0.0014	<0.0001	0.38	0.44	0.06	7.1%

Cell Terminated

Sept 19/07 Acidity 6.6

## HC 3

Sample = ORE/LS Composite

Date	Cycle No.	Volume mL		pH	ORP mV	Cond. umhos/cm	Acidity (pH 4.5) mgCaCO3/L	Acidity (pH 8.3) mgCaCO3/L	Alkalinity mgCaCO3/L	Sulphate mg/L	Hardness CaCO3 mg/L
		Input	Output								
12-Jun-07	1	750	625	9.13	271	344	#N/A	#N/A	62.2	130	13.3
20-Jun-07	2	500	405	9.11	286	487	#N/A	#N/A	83.8	92	
27-Jun-07	3	500	410	9.08	307	308	#N/A	#N/A	70.6	90	7.6
4-Jul-07	4	500	495	8.32	332	326	#N/A	#N/A	56.3	93	
11-Jul-07	5	500	420	8.43	327	311	#N/A	#N/A	62.0	110	13.9
18-Jul-07	6	500	410	8.72	326	282	#N/A	#N/A	81.1	66	
25-Jul-07	7	500	440	8.66	342	172	#N/A	#N/A	43.0	39	11.5
1-Aug-07	8	500	440	8.2	349	176	#N/A	1.4	39.4	29	
8-Aug-07	9	500	445	8.42	305	161	#N/A	#N/A	34.7	28	10.5
15-Aug-07	10	500	440	8.27	369	24	#N/A	0.7	34.5	29	
22-Aug-07	11	500	415	8.42	361	134	#N/A	#N/A	36.5	29	10.5
29-Aug-07	12	500	425	8.29	364	120	#N/A	1.7	36.2	26	
5-Sep-07	13	500	430	8.31	371	110	#N/A	#N/A	36.3	25	9.3
12-Sep-07	14	500	440	8.24	379	93	#N/A	1.9	36.4	21	
19-Sep-07	15	500	435	8.17	368	76	#N/A	1.4	36.0	14	11.2
26-Sep-07	16	500	435	8.22	389	120	#N/A	1.9	32.6	14	
3-Oct-07	17	500	445	7.91	386	106	#N/A	3.1	31.7	14	11.1
10-Oct-07	18	500	450	7.98	406	101	#N/A	1.6	27.2	13	
17-Oct-07	19	500	420	7.50	407	96	#N/A	2.9	29.5	11	11.1
24-Oct-07	20	500	460	7.93	416	89	#N/A	1.6	28.2	11	
31-Oct-07	21	500	445	7.63	396	84	#N/A	2.8	25.5	13	12.4
7-Nov-07	22	500	445	7.64	414	79	#N/A	2.1	26.1	9	
14-Nov-07	23	500	455	7.54	423	71	#N/A	2.5	23.3	10	12.7
21-Nov-07	24	500	445	7.55	461	80	#N/A	2.6	22.6	14	
28-Nov-07	25	500	455	7.64	413	85	#N/A	3.0	29.3	11	14.9
5-Dec-07	26	500	460	7.65	438	71	#N/A	2.7	27.0	9	
12-Dec-07	27	500	460	7.66	411	68	#N/A	2.1	26.0	7	13.2
19-Dec-07	28	500	455	7.75	445	65	#N/A	1.9	25.7	6	
26-Dec-07	29	500	455	7.36	405	52	#N/A	1.7	22.3	8	11.6
2-Jan-08	30	500	450	7.53	445	52	#N/A	2.0	20.3	8	
9-Jan-08	31	500	515	7.53	405	66	#N/A	2.2	26.7	6	17.2
16-Jan-08	32	500	460	7.43	467	48	#N/A	3.2	17.7	5	
23-Jan-08	33	500	470	7.38	408	60	#N/A	3.4	21.5	7	15.3
30-Jan-08	34	500	435	7.37	428	58	#N/A	3.4	21.5	9	
6-Feb-08	35	500	440	7.53	447	57	#N/A	2.6	20.7	7	15.3
13-Feb-08	36	500	450	7.40	440	57	#N/A	3.4	21.2	11	
20-Feb-08	37	500	450	7.44	442	58	#N/A	3.1	16.7	9	16.6
27-Feb-08	38	500	455	7.38	425	50	#N/A	3.2	16.2	6	
5-Mar-08	39	500	450	7.41	422	49	#N/A	3.4	18.5	8	15.9
12-Mar-08	40	500	445	7.50	417	52	#N/A	2.5	18.4	5	
19-Mar-08	41	500	460	7.62	414	53	#N/A	2.6	21.1	6	16.3
26-Mar-08	42	500	465	7.43	415	49	#N/A	2.9	17.5	5	
2-Apr-08	43	500	450	7.46	428	45	#N/A	2.2	17.7	2	16.1
9-Apr-08	44	500	435	7.46	416	42	#N/A	2.3	24.9	7	
16-Apr-08	45	500	440	7.46	413	50	#N/A	2.7	17.1	6	17.1
23-Apr-08	46	500	435	7.53	425	54	#N/A	2.4	17.5	6	
30-Apr-08	47	500	445	7.52	400	58	#N/A	2.2	17.6	8	19.8
7-May-08	48	500	480	7.64	382	55	#N/A	2.4	16.5	10	
14-May-08	49	500	480	7.56	375	51	#N/A	2.1	14.0	7	19.3
21-May-08	50	500	460	7.61	364	47	#N/A	2.6	15.2	6	
28-May-08	51	500	455	7.50	385	38	#N/A	2.9	14.6	6	14.6
4-Jun-08	52	500	460	7.63	404	34	#N/A	2.8	13.5	6	
11-Jun-08	53	500	465	7.61	406	34	#N/A	2.4	14.5	8	14.4
18-Jun-08	54	500	470	7.63	375	29	#N/A	3.0	14.0	5	
25-Jun-08	55	500	470	7.58	381	37	#N/A	3.3	14.9	5	14.2
2-Jul-08	56	500	475	7.58	385	36	#N/A	2.1	13.1	5	
9-Jul-08	57	500	465	7.50	382	41	#N/A	2.2	13.7	8	14.1
16-Jul-08	58	500	470	7.47	394	36	#N/A	2.5	14.2	6	
23-Jul-08	59	500	465	7.48	409	41	#N/A	2.4	14.3	5	15.4
30-Jul-08	60	500	480	7.45	401	39	#N/A	1.9	17.7	5	
6-Aug-08	61	500	465	7.52	388	41	#N/A	2.3	21.4	4	15.6
13-Aug-08	62	500	460	7.45	366	39	#N/A	2.1	13.7	3	
20-Aug-08	63	500	465	7.51	326	37	#N/A	2.2	15.3	3	15.1

Cell Terminated

April 2, 2008 Pb 0.00363. Repeat = 0.00329, suspect contamination.

## HC 3

Sample = ORE/LS Co

Date	Cycle No.	Al mg/L	Sb mg/L	As mg/L	Ba mg/L	Be mg/L	Bi mg/L	B mg/L	Cd mg/L	Ca mg/L	Cr mg/L	Co mg/L	Cu mg/L	Fe mg/L
12-Jun-07	1	0.0757	0.00022	0.001	0.00455	<0.00005	<0.00005	0.973	0.00003	2.53	<0.0002	0.00007	0.0011	0.058
20-Jun-07	2													
27-Jun-07	3	0.171	0.00025	0.0021	0.00186	<0.00005	<0.00005	0.932	0.00001	1.27	<0.0002	0.00018	0.0022	0.162
4-Jul-07	4													
11-Jul-07	5	0.229	0.00022	0.0014	0.00339	<0.00005	<0.00005	0.834	<0.00001	1.92	0.001	0.00053	0.0028	0.303
18-Jul-07	6													
25-Jul-07	7	0.144	0.00009	0.0007	0.00238	<0.00005	<0.00005	0.462	<0.00001	1.96	0.0004	0.00027	0.0005	0.129
1-Aug-07	8													
8-Aug-07	9	0.328	0.00008	0.001	0.0027	<0.00005	<0.00005	0.392	<0.00001	1.65	0.0009	0.00045	0.0016	0.186
15-Aug-07	10													
22-Aug-07	11	0.058	0.00007	0.0008	0.00222	<0.00005	<0.00005	0.386	<0.00001	1.79	0.0006	0.00017	0.0005	0.078
29-Aug-07	12													
5-Sep-07	13	0.062	0.00008	0.0007	0.00187	<0.00005	<0.00005	0.337	<0.00001	1.57	<0.0002	0.00014	0.0007	0.051
12-Sep-07	14													
19-Sep-07	15	0.0953	0.00008	0.0007	0.00202	<0.00005	<0.00005	0.281	<0.00001	1.76	<0.0002	0.0003	0.0007	0.109
26-Sep-07	16													
3-Oct-07	17	0.0901	0.0001	0.0008	0.00208	<0.00005	0.00025	0.241	<0.00001	1.81	0.0004	0.00047	0.0011	0.099
10-Oct-07	18													
17-Oct-07	19	0.073	0.00007	0.0007	0.00195	<0.00001	<0.00005	0.225	<0.00005	1.88	0.0003	0.000187	0.0007	0.058
24-Oct-07	20													
31-Oct-07	21	0.0414	0.00005	0.0006	0.00214	<0.00001	<0.00005	0.207	<0.00005	2.19	0.0002	0.000132	0.0003	0.043
7-Nov-07	22													
14-Nov-07	23	0.0368	0.00004	0.0004	0.00224	<0.00001	<0.00005	0.144	<0.00005	2.29	0.0002	0.000178	0.0007	0.046
21-Nov-07	24													
28-Nov-07	25	0.0691	0.00006	0.0003	0.00314	<0.00001	<0.00005	0.178	<0.00005	2.36	0.0004	0.000456	0.0005	0.08
5-Dec-07	26													
12-Dec-07	27	0.0758	0.00006	0.0006	0.00243	<0.00001	<0.00005	0.129	<0.00005	2.2	0.0006	0.000303	0.0004	0.073
19-Dec-07	28													
26-Dec-07	29	0.0217	0.00003	0.0002	0.00224	0.00002	<0.00005	0.093	0.000011	2.06	<0.0001	0.000106	0.0005	0.02
2-Jan-08	30													
9-Jan-08	31	0.0125	0.00004	0.0002	0.00319	<0.00001	<0.00005	0.111	<0.00005	3.1	<0.0001	0.000069	0.0004	0.01
16-Jan-08	32													
23-Jan-08	33	0.0331	0.00003	0.0002	0.00281	<0.00001	<0.00005	0.103	<0.00005	2.56	0.0002	0.000163	0.0005	0.034
30-Jan-08	34													
6-Feb-08	35	0.0339	0.00003	0.0002	0.003	<0.00001	<0.00005	0.094	<0.00005	2.67	0.0002	0.000111	0.0013	0.032
13-Feb-08	36													
20-Feb-08	37	0.0387	0.00003	0.0002	0.00329	<0.00001	<0.00005	0.094	<0.00005	2.82	0.0001	0.000158	0.0007	0.033
27-Feb-08	38													
5-Mar-08	39	0.0292	0.00002	0.0001	0.00295	<0.00001	<0.00005	0.079	<0.00005	2.75	0.0001	0.000149	0.0006	0.03
12-Mar-08	40													
19-Mar-08	41	0.0306	0.00002	0.0001	0.00297	<0.00001	<0.00005	0.086	<0.00005	2.73	0.0002	0.000117	0.0003	0.021
26-Mar-08	42													
2-Apr-08	43	0.0605	0.00004	0.0002	0.003	<0.00001	<0.00005	0.071	0.000059	2.7	0.0008	0.00012	0.0011	0.027
9-Apr-08	44													
16-Apr-08	45	0.021	0.00003	0.0002	0.0032	<0.00001	<0.00005	0.073	0.00005	2.94	<0.0001	0.0001	0.0004	0.02
23-Apr-08	46													
30-Apr-08	47	0.0206	0.00003	0.0001	0.00389	<0.00001	<0.00005	0.074	<0.00005	3.47	<0.0001	0.000114	0.0005	0.018
7-May-08	48													
14-May-08	49	0.0162	<0.00002	0.0002	0.00355	<0.00001	<0.00005	0.064	<0.00005	3.24	<0.0001	0.000077	<0.00005	0.011
21-May-08	50													
28-May-08	51	0.019	0.00002	8E-05	0.00277	<0.00001	<0.00005	0.053	<0.00005	2.46	<0.0001	0.000081	0.0011	0.013
4-Jun-08	52													
11-Jun-08	53	0.023	<0.00002	9E-05	0.00301	<0.00001	<0.00005	<0.05	<0.00005	2.53	<0.0001	0.000074	0.0022	0.016
18-Jun-08	54													
25-Jun-08	55	0.0167	<0.00002	0.0001	0.00268	<0.00001	<0.00005	0.051	<0.00005	2.42	0.0005	0.000068	0.0005	0.012
2-Jul-08	56													
9-Jul-08	57	0.0195	0.00002	9E-05	0.00293	<0.00001	<0.00005	0.062	<0.00005	2.57	0.0002	0.000095	0.001	0.019
16-Jul-08	58													
23-Jul-08	59	0.0149	0.00002	0.0002	0.00273	<0.00001	<0.00005	<0.05	<0.00005	2.81	<0.0001	0.000059	0.0004	0.009
30-Jul-08	60													
6-Aug-08	61	0.0144	0.00002	8E-05	0.00282	<0.00001	<0.00005	0.051	0.000016	2.76	<0.0001	0.000061	0.0004	0.009
13-Aug-08	62													
20-Aug-08	63	0.0163	<0.00002	7E-05	0.00262	0.00001	0.00005	<0.05	0.000012	2.63	<0.0001	0.000059	0.0003	0.008

Cell Terminated

April 2, 2008 Pb 0.003

## HC 3

Sample = ORE/LS Co

Date	Cycle No.	Pb mg/L	Li mg/L	Mg mg/L	Mn mg/L	Hg ug/L	Mo mg/L	Ni mg/L	P mg/L	K mg/L	Se mg/L	Si mg/L	Ag mg/L	Na mg/L	Sr mg/L
12-Jun-07	1	0.00002	0.0089	1.69	0.0005	<0.05	0.0114	0.0049	<0.1	4.5	0.0027	1.47	<0.00001	77.5	0.0215
20-Jun-07	2														
27-Jun-07	3	0.00007	0.0059	1.07	0.0007	<0.05	0.0085	0.008	<0.1	2.53	0.0028	2.31	0.00002	64.8	0.0123
4-Jul-07	4														
11-Jul-07	5	0.00015	0.0101	2.2	0.0021	<0.05	0.0041	0.0209	<0.1	3.77	0.0037	3.06	<0.00001	62.2	0.019
18-Jul-07	6														
25-Jul-07	7	0.00007	0.0051	1.59	0.0018	<0.05	0.0011	0.011	<0.1	2.24	0.0024	1.33	<0.00001	32.2	0.011
1-Aug-07	8														
8-Aug-07	9	0.00012	0.0066	1.55	0.0012	<0.05	0.0008	0.0163	<0.1	2.51	0.0022	1.9	<0.00001	29.2	0.0129
15-Aug-07	10														
22-Aug-07	11	0.00005	0.0048	1.45	0.0006	<0.05	0.0007	0.0078	<0.1	2.19	0.0017	1.32	<0.00001	29.9	0.0128
29-Aug-07	12														
5-Sep-07	13	0.00008	0.0067	1.3	0.0005	<0.05	0.0007	0.0053	<0.1	2.72	0.0012	1.23	<0.00001	23.9	0.0145
12-Sep-07	14														
19-Sep-07	15	0.00006	0.0082	1.66	0.0008	<0.05	0.0005	0.0128	<0.1	2.68	0.0011	1.25	<0.00001	20.6	0.0145
26-Sep-07	16														
3-Oct-07	17	0.00017	0.0084	1.59	0.001	<0.05	0.0005	0.0141	<0.1	2.32	0.0008	1.16	<0.00001	16.5	0.0148
10-Oct-07	18														
17-Oct-07	19	0.0013	0.008	1.55	0.0006	<0.01	0.0004	0.0068		2.77	0.0009	1.15	<0.000005	14.9	0.0171
24-Oct-07	20														
31-Oct-07	21	0.000054	0.0072	1.68	0.0005	<0.01	0.0003	0.0051	<0.002	2.58	0.0007	0.999	<0.000005	11.7	0.0191
7-Nov-07	22														
14-Nov-07	23	0.000131	0.0062	1.69	0.0008	<0.01	0.0003	0.0077	0.003	2.41	0.0006	0.839	<0.000005	9.06	0.0168
21-Nov-07	24														
28-Nov-07	25	0.000089	0.0085	2.19	0.001	<0.01	0.0003	0.0137	<0.002	2.73	0.0008	1.16	0.000012	10.8	0.0219
5-Dec-07	26														
12-Dec-07	27	0.000086	0.0072	1.87	0.0008	<0.01	0.0002	0.0102	0.002	2.59	0.0007	1.05	<0.000005	6.78	0.0186
19-Dec-07	28														
26-Dec-07	29	0.000067	0.0051	1.56	0.0006	<0.01	0.0002	0.0033	<0.002	2.02	0.0005	0.643	<0.000005	5.09	0.0168
2-Jan-08	30														
9-Jan-08	31	0.000052	0.0071	2.3	0.0007	<0.01	0.0004	0.0029	<0.002	2.68	0.0008	0.742	<0.000005	5.85	0.0225
16-Jan-08	32														
23-Jan-08	33	0.000037	0.0058	2.16	0.0008	<0.01	0.0003	0.0054	<0.002	2.26	0.0008	0.756	<0.000005	5.06	0.0197
30-Jan-08	34														
6-Feb-08	35	0.00005	0.0077	2.1	0.0007	0.01	0.0002	0.0059	<0.002	2.41	0.0005	0.812	<0.000005	4.77	0.0215
13-Feb-08	36														
20-Feb-08	37	0.000036	0.0069	2.33	0.0009	<0.01	0.0003	0.0065	0.002	2.4	0.0005	0.803	<0.000005	4.52	0.0213
27-Feb-08	38														
5-Mar-08	39	0.000037	0.0061	2.18	0.0009	<0.01	0.0002	0.006	<0.002	2.2	0.0005	0.622	<0.000005	3.3	0.02
12-Mar-08	40														
19-Mar-08	41	0.000035	0.0063	2.3	0.0008	<0.01	0.0002	0.005	<0.002	2.06	0.0005	0.841	<0.000005	3.04	0.0198
26-Mar-08	42														
2-Apr-08	43	#N/A	0.0072	2.27	0.0007	<0.01	0.0002	0.0053	0.004	2.4	0.0005	0.697	<0.000005	2.7	0.0206
9-Apr-08	44														
16-Apr-08	45	0.000013	0.0077	2.36	0.0007	<0.01	0.0002	0.0055	<0.002	2.33	0.0004	0.731	<0.000005	2.67	0.0212
23-Apr-08	46														
30-Apr-08	47	0.00002	0.0086	2.71	0.0007	0.01	0.0003	0.0061	<0.002	2.39	0.0004	0.755	<0.000005	2.36	0.0263
7-May-08	48														
14-May-08	49	0.000026	0.006	2.72	0.0008	<0.01	0.0003	0.0049	<0.002	1.96	0.0004	0.661	<0.000005	2.29	0.0232
21-May-08	50														
28-May-08	51	0.000048	0.0048	2.04	0.0007	<0.01	0.0001	0.0043	<0.002	1.53	0.0003	0.557	<0.000005	1.84	0.0173
4-Jun-08	52														
11-Jun-08	53	0.000067	0.0044	1.96	0.0008	<0.01	0.0001	0.0038	<0.002	1.6	0.0004	0.56	<0.000005	2.11	0.0175
18-Jun-08	54														
25-Jun-08	55	0.000042	0.0049	1.97	0.0007	<0.01	0.0001	0.0033	<0.002	1.51	0.0004	0.527	0.000007	1.54	0.016
2-Jul-08	56														
9-Jul-08	57	0.000095	0.0051	1.87	0.0008	<0.01	0.0001	0.0044	<0.002	1.7	0.0005	0.608	<0.000005	1.6	0.018
16-Jul-08	58														
23-Jul-08	59	0.0023	0.0048	2.04	0.0007	<0.01	0.0001	0.0029	<0.002	1.72	0.0005	0.49	<0.000005	1.61	0.0178
30-Jul-08	60														
6-Aug-08	61	0.00695	0.0051	2.13	0.0007	<0.01	0.0001	0.0033	<0.002	1.71	0.0004	0.591	<0.000005	1.51	0.0177
13-Aug-08	62														
20-Aug-08	63	0.000072	0.0046	2.08	0.0006	<0.01	0.0001	0.0029	<0.002	1.51	0.0004	0.513	0.000006	1.29	0.0169

Cell Terminated

April 2, 2008 Pb 0.003



## HC 3

Sample = ORE/LS Co

Date	Cycle No.	S mg/L	Tl mg/L	Sn mg/L	Ti mg/L	U mg/L	V mg/L	Zn mg/L	Zr mg/L	Major Anions	Major Cations	Diff	Diff (%)
12-Jun-07	1	43.5	<0.00005	<0.00005	0.0011	0.00046	0.0053	<0.0005	<0.005	3.95	3.75	-0.20	-2.6%
20-Jun-07	2												
27-Jun-07	3	48.3	<0.00005	0.00005	0.0027	0.00214	0.0055	0.0008	<0.005	3.29	3.03	-0.25	-4.0%
4-Jul-07	4												
11-Jul-07	5	28.5	<0.00005	0.00014	0.0033	0.00353	0.0042	0.0017	<0.005	3.53	3.08	-0.45	-6.9%
18-Jul-07	6												
25-Jul-07	7	11.5	<0.00005	<0.00005	0.0031	0.00129	0.003	0.0005	<0.005	1.67	1.69	0.01	0.4%
1-Aug-07	8												
8-Aug-07	9	12.7	<0.00005	0.00005	0.0055	0.00101	0.0027	0.0006	<0.005	1.28	1.54	0.27	9.5%
15-Aug-07	10												
22-Aug-07	11	13.6	<0.00005	<0.00005	0.0011	0.00092	0.002	<0.0005	<0.005	1.33	1.56	0.23	7.9%
29-Aug-07	12												
5-Sep-07	13	9.7	<0.00005	0.00006	0.0011	0.00103	0.0022	<0.0005	<0.005	1.25	1.29	0.05	1.9%
12-Sep-07	14												
19-Sep-07	15	6.4	<0.00005	<0.00005	0.0008	0.00099	0.0017	<0.0005	<0.005	1.01	1.19	0.18	8.1%
26-Sep-07	16												
3-Oct-07	17	5.8	<0.00005	0.00019	0.0013	0.00119	0.0016	0.001	<0.005	0.93	1.00	0.07	3.8%
10-Oct-07	18												
17-Oct-07	19	5	0.000013	0.00007	0.0009	0.00098	0.0017	0.0004	0.0001	0.82	0.94	0.12	6.9%
24-Oct-07	20												
31-Oct-07	21	4	0.000013	0.00005	<0.0005	0.00072	0.0011	0.0004	<0.0001	0.78	0.82	0.04	2.6%
7-Nov-07	22												
14-Nov-07	23	6	0.00001	0.00006	0.0006	0.00065	0.0011	0.0004	<0.0001	0.67	0.71	0.04	2.5%
21-Nov-07	24												
28-Nov-07	25	4	0.000015	0.00003	0.0007	0.00086	0.0016	0.0003	<0.0001	0.82	0.84	0.02	1.3%
5-Dec-07	26												
12-Dec-07	27	4	0.000011	0.00001	0.0015	0.00061	0.0012	0.0003	0.0001	0.67	0.62	-0.04	-3.2%
19-Dec-07	28												
26-Dec-07	29	<3	0.000015	0.00001	<0.0005	0.0005	0.0009	0.0008	<0.0001	0.61	0.50	-0.11	-9.7%
2-Jan-08	30												
9-Jan-08	31	4	0.000015	<0.00001	<0.0005	0.00086	0.0007	0.0006	<0.0001	0.66	0.67	0.01	0.5%
16-Jan-08	32												
23-Jan-08	33	3	0.000013	<0.00001	0.0007	0.00051	0.0008	0.0006	<0.0001	0.58	0.58	0.01	0.7%
30-Jan-08	34												
6-Feb-08	35	3	0.000017	<0.00001	<0.0005	0.00073	0.0007	0.0015	<0.0001	0.56	0.58	0.01	1.3%
13-Feb-08	36												
20-Feb-08	37	4	0.000016	<0.00001	0.001	0.0005	0.0008	0.0005	<0.0001	0.52	0.59	0.07	6.3%
27-Feb-08	38												
5-Mar-08	39	3	0.000012	<0.00001	<0.0005	0.00045	0.0006	0.0002	<0.0001	0.54	0.52	-0.02	-1.9%
12-Mar-08	40												
19-Mar-08	41	<3	0.000013	<0.00001	0.0006	0.00044	0.0008	0.0004	<0.0001	0.55	0.51	-0.04	-3.4%
26-Mar-08	42												
2-Apr-08	43	3	0.000015	<0.00001	0.0007	0.00046	0.0008	0.0061	<0.0001	0.40	0.50	0.11	11.8%
9-Apr-08	44												
16-Apr-08	45	3	0.000016	<0.00001	<0.0005	0.00056	0.0007	0.0004	<0.0001	0.47	0.52	0.05	5.1%
23-Apr-08	46												
30-Apr-08	47	3	0.000021	<0.00001	<0.0005	0.00061	0.0007	0.0003	<0.0001	0.52	0.56	0.04	3.9%
7-May-08	48												
14-May-08	49	4	0.000014	<0.00001	<0.0005	0.0008	0.0007	0.0002	<0.0001	0.43	0.54	0.11	11.5%
21-May-08	50												
28-May-08	51	<3	0.00001	<0.00001	<0.0005	0.00053	0.0006	0.0002	<0.0001	0.42	0.41	-0.01	-0.8%
4-Jun-08	52												
11-Jun-08	53	<3	0.000011	<0.00001	<0.0005	0.00061	0.0004	0.0015	<0.0001	0.46	0.42	-0.04	-4.2%
18-Jun-08	54												
25-Jun-08	55	<3	0.000012	<0.00001	<0.0005	0.00059	0.0007	0.0008	<0.0001	0.40	0.39	-0.01	-1.7%
2-Jul-08	56												
9-Jul-08	57	<3	0.000014	0.00001	<0.0005	0.00053	0.0007	0.0015	<0.0001	0.44	0.40	-0.05	-5.4%
16-Jul-08	58												
23-Jul-08	59	<3	0.000012	<0.00001	<0.0005	0.0005	0.0007	0.0004	<0.0001	0.39	0.42	0.03	3.9%
30-Jul-08	60												
6-Aug-08	61	<3	0.000012	<0.00001	<0.0005	0.00054	0.0006	0.0005	<0.0001	0.51	0.42	-0.09	-9.5%
13-Aug-08	62												
20-Aug-08	63	<3	0.000018	<0.00001	<0.0005	0.00048	0.0004	0.0003	<0.0001	0.37	0.40	0.03	3.9%

Cell Terminated

April 2, 2008 Pb 0.003

## HC 4

Sample = OB/LS/FS/AR/ORE Composite

Date	Cycle No.	Volume mL		pH	ORP mV	Cond. umhos/cm	Acidity (pH 4.5) mgCaCO3/L	Acidity (pH 8.3) mgCaCO3/L	Alkalinity mgCaCO3/L	Sulphate mg/L	Hardness CaCO3 mg/L
		Input	Output								
12-Jun-07	1	750	600	8.96	272	319	#N/A	#N/A	61.2	90	12.8
20-Jun-07	2	500	405	8.38	313	662	#N/A	#N/A	53.3	175	
27-Jun-07	3	500	435	8.49	337	590	#N/A	#N/A	48.3	221	20.5
4-Jul-07	4	500	495	8.60	326	422	#N/A	#N/A	48.9	144	
11-Jul-07	5	500	425	8.04	351	485	#N/A	1.9	42.5	174	20.5
18-Jul-07	6	500	435	8.50	344	398	#N/A	#N/A	45.0	147	
25-Jul-07	7	500	465	8.63	351	267	#N/A	#N/A	42.6	85	12.8
1-Aug-07	8	500	470	8.41	343	276	#N/A	#N/A	42.7	61	
8-Aug-07	9	500	470	8.61	299	260	#N/A	#N/A	43.9	70	9.4
15-Aug-07	10	500	460	8.35	366	24	#N/A	#N/A	39.9	57	
22-Aug-07	11	500	440	8.51	356	179	#N/A	#N/A	39.6	49	9.3
29-Aug-07	12	500	440	8.38	364	157	#N/A	#N/A	35.2	39	
5-Sep-07	13	500	435	8.52	362	150	#N/A	#N/A	36.1	47	9.7
12-Sep-07	14	500	435	8.40	369	129	#N/A	#N/A	36.4	37	
19-Sep-07	15	500	455	8.53	361	118	#N/A	#N/A	39.0	39	8.5
26-Sep-07	16	500	445	8.52	375	174	#N/A	#N/A	34.6	30	
3-Oct-07	17	500	455	8.26	377	161	#N/A	1.9	35.6	34	8
10-Oct-07	18	500	480	8.45	388	150	#N/A	#N/A	36.0	24	
17-Oct-07	19	500	435	7.57	412	147	#N/A	3.1	34.7	23	7.6
24-Oct-07	20	500	465	8.26	405	120	#N/A	1.1	35.8	24	
31-Oct-07	21	500	460	7.71	401	121	#N/A	3.0	28.5	20	8.6
7-Nov-07	22	500	460	7.89	411	113	#N/A	2.3	29.8	21	
14-Nov-07	23	500	465	7.76	431	115	#N/A	2.4	28.4	21	8.7
21-Nov-07	24	500	455	7.78	458	106	#N/A	2.7	24.4	19	
28-Nov-07	25	500	475	7.81	417	113	#N/A	2.8	30.0	23	11
5-Dec-07	26	500	475	7.73	436	105	#N/A	2.9	28.1	21	
12-Dec-07	27	500	485	7.66	417	92	#N/A	2.2	25.2	16	10.9
19-Dec-07	28	500	460	7.69	452	94	#N/A	1.9	24.6	16	
26-Dec-07	29	500	470	7.42	417	96	#N/A	2.0	24.5	20	12.4
2-Jan-08	30	500	470	7.63	448	87	#N/A	2.3	23.9	14	
9-Jan-08	31	500	495	7.70	408	104	#N/A	2.4	30.5	20	18.1
16-Jan-08	32	500	470	7.50	471	78	#N/A	3.2	20.5	14	
23-Jan-08	33	500	460	7.48	413	85	#N/A	4.0	22.6	15	16.3
30-Jan-08	34	500	450	7.57	427	92	#N/A	3.7	24.6	19	
6-Feb-08	35	500	445	7.70	445	90	#N/A	2.8	24.2	19	18.7
13-Feb-08	36	500	435	7.62	438	78	#N/A	3.9	22.8	12	
20-Feb-08	37	500	465	7.48	442	71	#N/A	3.2	18.2	14	16.9
27-Feb-08	38	500	455	7.54	421	71	#N/A	3.4	20.1	12	
5-Mar-08	39	500	445	7.47	421	69	#N/A	4.0	17.7	12	18.5
12-Mar-08	40	500	435	7.56	419	78	#N/A	2.5	20.9	14	
19-Mar-08	41	500	460	7.66	416	75	#N/A	2.8	22.3	13	21.5
26-Mar-08	42	500	480	7.46	419	69	#N/A	3.1	20.2	12	
2-Apr-08	43	500	470	7.47	429	60	#N/A	2.6	18.3	12	20.3
9-Apr-08	44	500	475	7.48	413	72	#N/A	2.5	17.0	10	
16-Apr-08	45	500	470	7.50	418	81	#N/A	3.1	21.5	16	25.9
23-Apr-08	46	500	465	7.53	430	81	#N/A	2.8	21.8	15	
30-Apr-08	47	500	470	7.53	405	80	#N/A	2.4	20.5	14	25.6
7-May-08	48	500	470	7.66	391	82	#N/A	2.8	23.0	14	
14-May-08	49	500	475	7.57	380	68	#N/A	2.4	18.1	10	24.6
21-May-08	50	500	455	7.66	374	95	#N/A	3.0	26.8	16	
28-May-08	51	500	470	7.58	393	64	#N/A	3.1	22.5	11	23.6
4-Jun-08	52	500	465	7.62	415	60	#N/A	3.3	21.5	10	
11-Jun-08	53	500	480	7.67	413	62	#N/A	2.8	26.0	11	27.7
18-Jun-08	54	500	470	7.64	383	62	#N/A	3.6	27.4	12	
25-Jun-08	55	500	475	7.61	390	76	#N/A	3.8	26.0	11	27.1
2-Jul-08	56	500	465	7.60	393	64	#N/A	2.3	16.1	10	
9-Jul-08	57	500	480	7.57	389	81	#N/A	2.6	22.2	16	27.3
16-Jul-08	58	500	470	7.52	399	64	#N/A	2.7	20.3	13	
23-Jul-08	59	500	475	7.49	414	73	#N/A	2.9	17.9	13	26.1
30-Jul-08	60	500	490	7.43	409	59	#N/A	2.3	16.2	9	
6-Aug-08	61	500	485	7.52	395	66	#N/A	2.4	22.0	11	23.8
13-Aug-08	62	500	480	7.45	375	68	#N/A	2.4	15.6	9	
20-Aug-08	63	500	485	7.36	338	62	#N/A	2.6	15.9	9	23.3

Cell Terminated

April 2, 2008 Pb 0.0103. Repeat = 0.00940. Suspect contamination.

## HC 4

Sample = OB/LS/FS/A

Date	Cycle No.	Al mg/L	Sb mg/L	As mg/L	Ba mg/L	Be mg/L	Bi mg/L	B mg/L	Cd mg/L	Ca mg/L	Cr mg/L	Co mg/L	Cu mg/L	Fe mg/L
12-Jun-07	1	0.497	0.00016	0.0008	0.00436	0.00007	<0.00005	1.05	0.00002	2.45	0.001	0.00027	0.0032	0.336
20-Jun-07	2													
27-Jun-07	3	0.244	0.00011	0.0012	0.00483	<0.00005	<0.00005	1.08	0.00002	4.92	<0.0002	0.00035	0.0037	0.19
4-Jul-07	4													
11-Jul-07	5	0.453	0.0001	0.0008	0.00586	0.00013	<0.00005	0.986	0.00001	4.59	0.0007	0.00041	0.0012	0.378
18-Jul-07	6													
25-Jul-07	7	0.341	0.00006	0.0005	0.00408	<0.00005	<0.00005	0.729	<0.00001	2.79	0.0008	0.00036	0.0015	0.242
1-Aug-07	8													
8-Aug-07	9	0.186	0.00008	0.0006	0.00255	<0.00005	<0.00005	0.74	<0.00001	2.3	0.0004	0.00013	0.0007	0.103
15-Aug-07	10													
22-Aug-07	11	0.0647	0.00005	0.0005	0.00194	<0.00005	<0.00005	0.632	<0.00001	2.29	0.0005	0.00012	0.0005	0.081
29-Aug-07	12													
5-Sep-07	13	0.215	0.00007	0.0008	0.00215	<0.00005	<0.00005	0.571	<0.00001	2.33	0.0003	0.00021	0.0012	0.15
12-Sep-07	14													
19-Sep-07	15	0.13	0.00006	0.0008	0.00184	<0.00005	<0.00005	0.517	<0.00001	2.05	<0.0002	0.00019	0.0011	0.082
26-Sep-07	16													
3-Oct-07	17	0.0631	0.00022	0.0017	0.00161	<0.00005	<0.00005	0.465	<0.00001	1.95	<0.0002	0.00015	0.0025	0.073
10-Oct-07	18													
17-Oct-07	19	0.104	0.00005	0.0008	0.00177	<0.00001	<0.00005	0.43	<0.00005	1.77	0.0003	0.000166	0.001	0.098
24-Oct-07	20													
31-Oct-07	21	0.062	0.00006	0.0007	0.00172	<0.00001	<0.00005	0.388	<0.00005	2.09	0.0002	0.00013	0.001	0.055
7-Nov-07	22													
14-Nov-07	23	0.0478	0.00005	0.0003	0.00169	<0.00001	<0.00005	0.32	<0.00005	2.11	0.0002	0.000102	0.0013	0.042
21-Nov-07	24													
28-Nov-07	25	0.128	0.00005	0.0002	0.00314	<0.00001	<0.00005	0.266	<0.00005	2.4	0.0006	0.000339	0.0007	0.132
5-Dec-07	26													
12-Dec-07	27	0.0792	0.00006	0.0002	0.00275	<0.00001	<0.00005	0.201	<0.00005	2.55	0.0003	0.000175	0.0009	0.071
19-Dec-07	28													
26-Dec-07	29	0.0364	0.00006	0.0003	0.00256	<0.00001	<0.00005	0.229	0.000045	2.8	0.0001	0.00009	0.0009	0.031
2-Jan-08	30													
9-Jan-08	31	0.0283	0.00005	0.0003	0.00337	<0.00001	<0.00005	0.266	<0.00005	4.21	0.0001	0.000074	0.0007	0.023
16-Jan-08	32													
23-Jan-08	33	0.0297	0.00004	0.0001	0.00301	<0.00001	<0.00005	0.187	<0.00005	3.48	0.0002	0.000092	0.001	0.027
30-Jan-08	34													
6-Feb-08	35	0.0694	0.00004	0.0001	0.00419	<0.00001	0.00006	0.228	<0.00005	4.17	0.0002	0.000205	0.0013	0.102
13-Feb-08	36													
20-Feb-08	37	0.033	0.00003	0.0001	0.00302	<0.00001	<0.00005	0.192	<0.00005	3.67	<0.0001	0.000092	0.0006	0.026
27-Feb-08	38													
5-Mar-08	39	0.0266	0.00003	0.0001	0.00323	<0.00001	<0.00005	0.169	<0.00005	4.12	<0.0001	0.000077	0.0004	0.02
12-Mar-08	40													
19-Mar-08	41	0.0211	0.00005	0.0001	0.00351	<0.00001	<0.00005	0.215	<0.00005	4.48	0.0004	0.00007	0.0006	0.014
26-Mar-08	42													
2-Apr-08	43	0.0476	0.00004	0.0001	0.00357	<0.00001	<0.00005	0.143	0.000028	4.31	0.0003	0.000101	0.0008	0.031
9-Apr-08	44													
16-Apr-08	45	0.0267	0.00003	0.0001	0.00463	<0.00001	<0.00005	0.175	<0.00005	5.71	<0.0001	0.000103	0.001	0.021
23-Apr-08	46													
30-Apr-08	47	0.0193	0.00004	0.0002	0.00457	<0.00001	<0.00005	0.154	<0.00005	5.47	<0.0001	0.000079	0.0009	0.016
7-May-08	48													
14-May-08	49	0.0203	0.00004	9E-05	0.00432	<0.00001	<0.00005	0.15	<0.00005	5.15	<0.0001	0.000066	0.0003	0.013
21-May-08	50													
28-May-08	51	0.0249	0.00004	0.0002	0.00455	<0.00001	<0.00005	0.125	<0.00005	4.85	<0.0001	0.000083	0.0013	0.017
4-Jun-08	52													
11-Jun-08	53	0.0304	0.00004	0.0001	0.00489	<0.00001	<0.00005	0.141	<0.00005	5.89	<0.0001	0.000111	0.0018	0.027
18-Jun-08	54													
25-Jun-08	55	0.0311	0.00003	0.0001	0.00515	<0.00001	<0.00005	0.147	0.00005	5.67	0.0003	0.000092	0.0012	0.044
2-Jul-08	56													
9-Jul-08	57	0.0635	0.00003	0.0001	0.00584	<0.00001	<0.00005	0.115	<0.00005	6.07	0.0002	0.000125	0.0027	0.048
16-Jul-08	58													
23-Jul-08	59	0.0182	0.00003	0.0001	0.00486	<0.00001	<0.00005	0.097	<0.00005	5.8	0.0001	0.000054	0.0004	0.011
30-Jul-08	60													
6-Aug-08	61	0.0164	0.00003	4E-05	0.00428	<0.00001	<0.00005	0.081	0.000016	5.17	0.0001	0.000067	0.0006	0.012
13-Aug-08	62													
20-Aug-08	63	0.0183	0.00002	5E-05	0.00426	<0.00001	<0.00005	0.074	0.000014	4.96	<0.0001	0.000059	0.001	0.013

Cell Terminated

April 2, 2008 Pb 0.010

## HC 4

Sample = OB/LS/FS/A

Date	Cycle No.	Pb mg/L	Li mg/L	Mg mg/L	Mn mg/L	Hg ug/L	Mo mg/L	Ni mg/L	P mg/L	K mg/L	Se mg/L	Si mg/L	Ag mg/L
12-Jun-07	1	0.00012	0.0112	1.63	0.0033	<0.05	0.0104	0.0086	<0.1	5.51	0.0009	2.59	<0.00001
20-Jun-07	2												
27-Jun-07	3	0.00009	0.0096	2	0.0035	<0.05	0.013	0.0248	<0.1	5.67	0.002	1.78	<0.00001
4-Jul-07	4												
11-Jul-07	5	0.0002	0.0102	2.19	0.0032	<0.05	0.0062	0.0163	<0.1	6.55	0.0034	2.86	0.00002
18-Jul-07	6												
25-Jul-07	7	0.00022	0.007	1.42	0.0031	<0.05	0.0027	0.0165	<0.1	4.27	0.0021	1.78	<0.00001
1-Aug-07	8												
8-Aug-07	9	0.00007	0.0071	0.89	0.0011	<0.05	0.0023	0.0073	<0.1	4.67	0.0023	1.65	<0.00001
15-Aug-07	10												
22-Aug-07	11	0.00007	0.005	0.87	0.0008	<0.05	0.0017	0.0059	<0.1	3.42	0.0019	1.41	<0.00001
29-Aug-07	12												
5-Sep-07	13	0.00009	0.0073	0.96	0.0013	<0.05	0.0019	0.0097	<0.1	4.43	0.002	1.72	<0.00001
12-Sep-07	14												
19-Sep-07	15	0.00008	0.0062	0.82	0.0011	<0.05	0.0014	0.0082	<0.1	4.31	0.0011	1.34	<0.00001
26-Sep-07	16												
3-Oct-07	17	0.00015	0.0067	0.77	0.0008	<0.05	0.0014	0.0069	<0.1	3.6	0.0017	1.31	<0.00001
10-Oct-07	18												
17-Oct-07	19	0.000058	0.007	0.77	0.001	<0.01	0.001	0.0074		4.26	0.00084	1.44	<0.000005
24-Oct-07	20												
31-Oct-07	21	0.000046	0.0075	0.82	0.0009	<0.01	0.0008	0.0063	<0.002	4.24	0.0004	1.3	<0.000005
7-Nov-07	22												
14-Nov-07	23	0.000338	0.008	0.84	0.0008	<0.01	0.0009	0.0051	0.003	4.83	0.00027	1.15	0.00001
21-Nov-07	24												
28-Nov-07	25	0.000612	0.0091	1.23	0.0015	<0.01	0.0008	0.0149	<0.002	4.6	0.0003	1.49	<0.000005
5-Dec-07	26												
12-Dec-07	27	0.000103	0.0082	1.1	0.0012	<0.01	0.0006	0.0085	0.003	4.79	0.00021	1.11	<0.000005
19-Dec-07	28												
26-Dec-07	29	0.00114	0.0089	1.3	0.0009	<0.01	0.0006	0.005	<0.002	5.23	0.00013	1.13	<0.000005
2-Jan-08	30												
9-Jan-08	31	0.000019	0.0111	1.85	0.0008	<0.01	0.0008	0.0053	<0.002	6.44	0.0003	1.13	<0.000005
16-Jan-08	32												
23-Jan-08	33	0.000034	0.0087	1.86	0.0011	<0.01	0.0005	0.0061	<0.002	5.16	0.00014	1.02	<0.000005
30-Jan-08	34												
6-Feb-08	35	0.000054	0.0114	2.01	0.0014	0.03	0.0006	0.01	<0.002	6.55	0.00014	1.32	0.000007
13-Feb-08	36												
20-Feb-08	37	0.000255	0.0093	1.88	0.001	<0.01	0.0005	0.0053	<0.002	5.09	0.00015	1.02	<0.000005
27-Feb-08	38												
5-Mar-08	39	0.00003	0.0089	1.99	0.0009	<0.01	0.0005	0.0047	<0.002	4.79	0.00009	0.876	<0.000005
12-Mar-08	40												
19-Mar-08	41	0.0004	0.01	2.49	0.0008	<0.01	0.0005	0.0049	<0.002	6.67	0.00015	1.07	<0.000005
26-Mar-08	42												
2-Apr-08	43	#N/A	0.0099	2.31	0.0009	<0.01	0.0004	0.0061	0.004	5.16	0.00012	0.943	<0.000005
9-Apr-08	44												
16-Apr-08	45	0.000053	0.0112	2.83	0.0012	<0.01	0.0005	0.0068	<0.002	6.29	0.00012	1.19	<0.000005
23-Apr-08	46												
30-Apr-08	47	0.000401	0.0118	2.9	0.0009	0.01	0.0005	0.0056	<0.002	5.75	0.00015	1.13	<0.000005
7-May-08	48												
14-May-08	49	0.00473	0.0105	2.85	0.0011	<0.01	0.0004	0.0054	0.002	5.51	0.00012	1.12	<0.000005
21-May-08	50												
28-May-08	51	0.000024	0.0105	2.78	0.0009	<0.01	0.0005	0.0059	<0.002	5.25	0.00011	1.2	<0.000005
4-Jun-08	52												
11-Jun-08	53	0.000028	0.0114	3.14	0.0012	<0.01	0.0004	0.0072	<0.002	6.13	0.00013	1.52	<0.000005
18-Jun-08	54												
25-Jun-08	55	0.000017	0.013	3.14	0.001	<0.01	0.0004	0.0066	<0.002	5.51	0.00026	1.45	0.000011
2-Jul-08	56												
9-Jul-08	57	0.000132	0.0109	2.95	0.0011	<0.01	0.0006	0.0075	0.003	5.17	0.00014	1.38	<0.000005
16-Jul-08	58												
23-Jul-08	59	0.000018	0.0099	2.83	0.0009	<0.01	0.0004	0.0052	0.002	4.86	0.00018	0.967	<0.000005
30-Jul-08	60												
6-Aug-08	61	0.000855	0.0083	2.65	0.0009	<0.01	0.0004	0.0056	<0.002	4.24	0.00005	0.973	<0.000005
13-Aug-08	62												
20-Aug-08	63	0.000061	0.0088	2.65	0.0008	<0.01	0.0004	0.0049	<0.002	4.06	0.0001	0.883	<0.000005

Cell Terminated

April 2, 2008 Pb 0.010

**HC 4**

Sample = OB/LS/FS/A

Date	Cycle No.	Na mg/L	Sr mg/L	S mg/L	Tl mg/L	Sn mg/L	Ti mg/L	U mg/L	V mg/L	Zn mg/L	Zr mg/L	Major Anions	Major Cations	Diff	Diff (%)
12-Jun-07	1	72.5	0.0191	30.8	<0.00005	<0.00005	0.0087	0.00087	0.0116	0.0009	<0.005	3.10	3.55	0.45	6.8%
20-Jun-07	2														
27-Jun-07	3	104	0.0509	65.9	<0.00005	0.00007	0.0064	0.00184	0.0072	0.0039	<0.005	5.57	5.08	-0.49	-4.6%
4-Jul-07	4														
11-Jul-07	5	87.2	0.0509	55.5	<0.00005	0.0001	0.0131	0.00128	0.0068	0.0016	<0.005	4.47	4.37	-0.11	-1.2%
18-Jul-07	6														
25-Jul-07	7	51	0.02	25.9	<0.00005	0.00005	0.0092	0.00135	0.006	0.0018	<0.005	2.62	2.58	-0.04	-0.8%
1-Aug-07	8														
8-Aug-07	9	48.5	0.0188	23.8	<0.00005	0.00017	0.0039	0.00128	0.0061	0.0013	<0.005	2.34	2.42	0.08	1.7%
15-Aug-07	10														
22-Aug-07	11	41	0.0145	18.9	<0.00005	<0.00005	0.0022	0.00093	0.0043	0.0008	<0.005	1.81	2.06	0.24	6.3%
29-Aug-07	12														
5-Sep-07	13	34.9	0.0169	17.6	<0.00005	0.00006	0.0055	0.00086	0.0047	0.0009	<0.005	1.70	1.83	0.13	3.5%
12-Sep-07	14														
19-Sep-07	15	31.1	0.0148	13	<0.00005	<0.00005	0.0032	0.00097	0.0045	<0.0005	<0.005	1.59	1.63	0.04	1.2%
26-Sep-07	16														
3-Oct-07	17	26.7	0.0149	12.2	<0.00005	<0.00005	0.0019	0.00104	0.0042	0.002	<0.005	1.42	1.41	-0.01	-0.3%
10-Oct-07	18														
17-Oct-07	19	25.3	0.0129	10	0.000007	0.00012	0.0025	0.00093	0.0041	0.0011	0.0002	1.17	1.36	0.19	7.4%
24-Oct-07	20														
31-Oct-07	21	20	0.015	7	0.000009	0.00003	0.0015	0.00093	0.0028	0.0014	<0.0001	0.99	1.15	0.16	7.6%
7-Nov-07	22														
14-Nov-07	23	18	0.016	10	0.000005	0.00006	0.0016	0.00092	0.0025	0.0006	0.0002	1.00	1.08	0.08	3.6%
21-Nov-07	24														
28-Nov-07	25	15.6	0.0206	7	0.000011	0.00002	0.0037	0.00097	0.0025	0.0002	0.0002	1.08	1.02	-0.06	-3.0%
5-Dec-07	26														
12-Dec-07	27	10.1	0.0213	7	0.000008	0.00002	0.003	0.00082	0.0019	0.0004	0.0001	0.84	0.78	-0.06	-3.6%
19-Dec-07	28														
26-Dec-07	29	11.6	0.0248	8	0.000013	0.00001	0.0007	0.00071	0.0018	0.004	<0.0001	0.91	0.88	-0.02	-1.3%
2-Jan-08	30														
9-Jan-08	31	10.7	0.0327	9	0.000013	<0.00001	<0.0005	0.00097	0.0015	0.0003	<0.0001	1.03	0.99	-0.03	-1.7%
16-Jan-08	32														
23-Jan-08	33	6.96	0.0294	6	0.000011	<0.00001	0.0009	0.00056	0.0013	0.0013	<0.0001	0.76	0.76	0.00	-0.2%
30-Jan-08	34														
6-Feb-08	35	7.48	0.0356	7	0.000015	<0.00001	0.0019	0.00057	0.0015	0.0009	<0.0001	0.88	0.87	-0.01	-0.8%
13-Feb-08	36														
20-Feb-08	37	5.4	0.0296	6	0.000011	<0.00001	0.0009	0.00046	0.0013	0.001	<0.0001	0.66	0.70	0.05	3.5%
27-Feb-08	38														
5-Mar-08	39	3.71	0.0311	6	0.000011	<0.00001	0.0007	0.00037	0.0011	0.0005	<0.0001	0.60	0.65	0.05	3.9%
12-Mar-08	40														
19-Mar-08	41	3.31	0.0375	6	0.000013	<0.00001	0.0013	0.00046	0.0008	0.0007	<0.0001	0.72	0.74	0.03	1.8%
26-Mar-08	42														
2-Apr-08	43	2.27	0.0365	5	0.000014	<0.00001	0.0019	0.00049	0.0011	0.0027	<0.0001	0.62	0.64	0.02	1.7%
9-Apr-08	44														
16-Apr-08	45	2.5	0.045	6	0.000017	<0.00001	0.0007	0.00047	0.0011	0.0009	<0.0001	0.76	0.79	0.02	1.6%
23-Apr-08	46														
30-Apr-08	47	1.89	0.0457	5	0.000018	<0.00001	0.0006	0.00053	0.0012	0.0006	<0.0001	0.70	0.74	0.04	2.8%
7-May-08	48														
14-May-08	49	1.75	0.0422	6	0.000016	<0.00001	0.0006	0.00059	0.0012	0.0004	<0.0001	0.57	0.71	0.14	10.8%
21-May-08	50														
28-May-08	51	1.27	0.0424	4	0.000014	<0.00001	0.0005	0.00074	0.0011	0.0004	<0.0001	0.68	0.66	-0.02	-1.3%
4-Jun-08	52														
11-Jun-08	53	1.38	0.0493	4	0.000018	<0.00001	0.001	0.0008	0.001	0.0007	<0.0001	0.75	0.77	0.02	1.3%
18-Jun-08	54														
25-Jun-08	55	1	0.0461	4	0.000017	<0.00001	0.0008	0.00079	0.0013	0.0011	<0.0001	0.75	0.73	-0.02	-1.6%
2-Jul-08	56														
9-Jul-08	57	1	0.0522	5	0.000017	0.00001	0.0014	0.00066	0.001	0.0029	<0.0001	0.78	0.72	-0.06	-3.8%
16-Jul-08	58														
23-Jul-08	59	0.7	0.046	5	0.000016	<0.00001	0.0006	0.00057	0.0009	0.0006	<0.0001	0.63	0.68	0.05	3.7%
30-Jul-08	60														
6-Aug-08	61	0.6	0.0404	4	0.000017	<0.00001	<0.0005	0.00048	0.0008	0.0003	<0.0001	0.67	0.61	-0.06	-4.5%
13-Aug-08	62														
20-Aug-08	63	0.6	0.04	5	0.000019	<0.00001	<0.0005	0.00045	0.0007	0.0004	<0.0001	0.50	0.60	0.09	8.2%

Cell Terminated

April 2, 2008 Pb 0.010

**HUMIDITY CELL HC-1  
CALCULATED LOADING RATES**

**2.8-68**

**(mg/kg/wk)**

**MINAGO PROJECT**

Date	Cycle No.	Volume		pH	ORP mV	Cond. umhos/cm	Acidity (pH 4.5) mgCaCO3/L	Acidity (pH 8.3) mg/kg/wk	Alkalinity mg/kg/wk	Sulphate	Hardness
		Input mL	Output L							mg/kg/wk	CaCO3 mg/L
12-Jun-07	1	750	0.52	7.72	374	611	#N/A	1.2	21.1	136	88.3
20-Jun-07	2	500	0.41	7.62	364	832	#N/A	1.1	12.2	138	
27-Jun-07	3	500	0.43	7.63	380	647	#N/A	1.0	12.2	108	72.3
4-Jul-07	4	500	0.48	7.88	358	463	#N/A	1.1	18.2	77	
11-Jul-07	5	500	0.42	7.77	359	405	#N/A	1.2	14.9	67	30.4
18-Jul-07	6	500	0.43	7.93	366	430	#N/A	1.0	19.6	78	
25-Jul-07	7	500	0.46	8.09	370	302	#N/A	1.1	22.0	44	14.5
1-Aug-07	8	500	0.47	7.82	366	266	#N/A	1.1	21.7	20	
8-Aug-07	9	500	0.47	8.08	317	230	#N/A	0.5	19.7	23	8.8
15-Aug-07	10	500	0.46	8.35	366	24	#N/A	1.1	18.9	25	
22-Aug-07	11	500	0.44	8.51	356	179	#N/A	1.4	16.6	24	10.3
29-Aug-07	12	500	0.44	8.38	364	157	#N/A	1.6	14.6	18	
5-Sep-07	13	500	0.44	8.52	362	150	#N/A	1.0	15.0	20	10.6
12-Sep-07	14	500	0.44	8.40	369	129	#N/A	1.4	16.7	17	
19-Sep-07	15	500	0.46	8.53	361	118	#N/A	1.4	17.6	20	8.8
26-Sep-07	16	500	0.45	8.52	375	174	#N/A	1.4	12.6	13	
3-Oct-07	17	500	0.46	8.26	377	161	#N/A	1.8	14.4	16	8.9
10-Oct-07	18	500	0.48	8.45	388	150	#N/A	1.3	14.4	14	
17-Oct-07	19	500	0.44	7.57	412	147	#N/A	1.2	9.8	9	7.8
24-Oct-07	20	500	0.47	8.26	405	120	#N/A	1.1	13.3	11	
31-Oct-07	21	500	0.45	7.71	401	121	#N/A	1.6	15.2	10	16.3
7-Nov-07	22	500	0.47	7.62	423	124	#N/A	1.3	12.8	10	
14-Nov-07	23	500	0.46	7.62	424	131	#N/A	1.3	14.5	12	13.2
21-Nov-07	24	500	0.48	7.43	476	99	#N/A	1.5	11.2	10	
28-Nov-07	25	500	0.47	7.43	424	84	#N/A	1.5	11.4	6	9.9
5-Dec-07	26	500	0.47	7.57	449	89	#N/A	1.4	12.3	8	
12-Dec-07	27	500	0.49	7.68	396	79	#N/A	1.1	10.7	7	11.7
19-Dec-07	28	500	0.47	7.55	458	78	#N/A	1.1	10.4	6	
26-Dec-07	29	500	0.47	7.56	398	80	#N/A	0.9	10.2	8	13.3
2-Jan-08	30	500	0.47	7.44	458	72	#N/A	1.1	8.3	7	
9-Jan-08	31	500	0.50	7.48	399	82	#N/A			7	17
16-Jan-08	32	500	0.47	7.30	481	79	#N/A	1.7	9.7	7	
23-Jan-08	33	500	0.48	7.36	403	76	#N/A	1.7	10.0	6	15.5
30-Jan-08	34	500	0.45	7.32	434	86	#N/A	1.9	10.3	8	
6-Feb-08	35	500	0.44	7.41	459	73	#N/A	1.3	8.9	7	16.8
13-Feb-08	36	500	0.45	7.33	448	71	#N/A	1.9	8.1	8	
20-Feb-08	37	500	0.46	7.52	443	73	#N/A	1.5	8.2	5	17.9
27-Feb-08	38	500	0.45	7.41	429	73	#N/A	1.7	8.1	6	
5-Mar-08	39	500	0.45	7.50	423	85	#N/A	1.7	10.0	9	22
12-Mar-08	40	500	0.46	7.46	431	114	#N/A	1.5	13.7	10	
19-Mar-08	41	500	0.47	7.61	426	101	#N/A	1.5	15.2	7	26.7
26-Mar-08	42	500	0.47	7.55	423	114	#N/A	3.6	41.4	8	
2-Apr-08	43	500	0.42	7.71	430	101	#N/A	2.6	39.2	5	32
9-Apr-08	44	500	0.42	7.59	424	117	#N/A	2.8	39.3	7	
16-Apr-08	45	500	0.41	7.57	422	106	#N/A	3.1	35.2	6	29.7
23-Apr-08	46	500	0.40	7.61	434	116	#N/A	3.3	39.9	6	
30-Apr-08	47	500	0.40	7.71	417	121	#N/A	2.4	40.2	6	37.2
7-May-08	48	500	0.40	7.70	398	120	#N/A	3.0	39.7	6	
14-May-08	49	500	0.42	7.75	382	111	#N/A	2.8	39.2	4	37.6
21-May-08	50	500	0.40	7.57	378	86	#N/A	3.1	29.1	3	
28-May-08	51	500	0.46	7.64	395	83	#N/A	3.2	34.4	4	30
4-Jun-08	52	500	0.46	8.17	370	49	#N/A	2.8	23.3	3	
11-Jun-08	53	500	0.46	7.60	419	60	#N/A	3.0	27.3	4	25.7
18-Jun-08	54	500	0.475	7.47	389	57	#N/A	3.7	29.2	4	
25-Jun-08	55	500	0.465	7.51	393	71	#N/A	4.4	29.5	3	26.3
2-Jul-08	56	500	0.455	7.5	397	67	#N/A	2.6	22.7	4	
9-Jul-08	57	500	0.47	7.62	388	85	#N/A	2.5	28.5	6	31.8
16-Jul-08	58	500	0.475	7.39	402	59	#N/A	2.9	21.9	4	
23-Jul-08	59	500	0.465	7.45	419	68	#N/A	2.9	25.2	4	26.4
30-Jul-08	60	500	0.48	7.54	403	71	#N/A	2.3	29.6	4	
6-Aug-08	61	500	0.485	7.61	394	81	#N/A	2.7	32.6	4	31.4
13-Aug-08	62	500	0.47	7.52	369	71	#N/A	2.6	25.8	2	
20-Aug-08	63	500	0.47	7.52	324	70	#N/A	2.5	27.0	4	29

**HUMIDITY CELL HC-1  
CALCULATED LOADING RATES**

**2.8-69**

(mg/kg/wk)

**MINAGO PROJECT**

Date	Cycle No.	Al	Sb	As	Ba	Be	Bi	B	Cd	Ca	Cr	Co	Cu
		mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk
12-Jun-07	1	0.090	0.0001	0.0003	0.007	0.00003	0.00003	0.235	0.000026	10.816	0.00026	0.002	0.001
20-Jun-07	2	0.0546						0.2032		9.6155	0.000173	0.00112	0.0012
27-Jun-07	3	0.019	0.0000	0.0003	0.004	0.00002	0.00002	0.171	0.000017	8.415	0.00009	0.000	0.002
4-Jul-07	4	0.0319						0.1697		5.8903	0.000188	0.00034	0.001
11-Jul-07	5	0.045	0.0001	0.0002	0.002	0.00002	0.00002	0.168	0.000012	3.366	0.00029	0.00019	0.000
18-Jul-07	6	0.0484						0.1855		2.5062	0.00026	0.00015	0.0006
25-Jul-07	7	0.052	0.0001	0.0002	0.001	0.00002	0.00002	0.203	0.000014	1.647	0.00023	0.00011	0.001
1-Aug-07	8	0.0331						0.1805		1.3326	0.000185	0.00008	0.0008
8-Aug-07	9	0.015	0.0001	0.0006	0.001	0.00002	0.00002	0.158	0.000009	1.018	0.00014	0.00004	0.001
15-Aug-07	10	0.0236						0.1497		1.0529	0.000266	0.00008	0.0006
22-Aug-07	11	0.032	0.0001	0.0003	0.001	0.00002	0.00002	0.141	0.000004	1.088	0.00039	0.00011	0.00026
29-Aug-07	12	0.0489						0.1371		1.1092	0.000432	0.00011	0.0004
5-Sep-07	13	0.065	0.0001	0.0003	0.001	0.00002	0.00002	0.133	0.000013	1.131	0.00047	0.00011	0.001
12-Sep-07	14	0.0447						0.1323		1.0416	0.000281	0.00009	0.0003
19-Sep-07	15	0.024	0.0001	0.0003	0.001	0.00002	0.00002	0.132	0.000004	0.952	0.00009	0.00007	0.000
26-Sep-07	16	0.0219						0.1068		0.9845	0.000114	0.00007	0.0002
3-Oct-07	17	0.020	0.0001	0.0002	0.001	0.00002	0.00002	0.082	0.000005	1.017	0.00014	0.00007	0.00032
10-Oct-07	18	0.0215						0.07		0.9469	0.000155	0.00006	0.0004
17-Oct-07	19	0.023	0.0000	0.0004	0.001	0.00000	0.00000	0.058	0.000007	0.877	0.00017	0.00005	0.00048
24-Oct-07	20	0.0159						0.0577		1.3622	0.00011	0.00004	0.0003
31-Oct-07	21	0.008	0.0003	0.0007	0.001	0.00000	0.00000	0.057	0.000002	1.847	0.00005	0.00003	0.00004
7-Nov-07	22	0.0076						0.0657		1.7217	4.65E-05	0.00004	0.0007
14-Nov-07	23	0.007	0.0001	0.0002	0.002	0.00000	0.00000	0.074	0.000002	1.596	0.00005	0.00006	0.00138
21-Nov-07	24	0.0126						0.058		1.3817	0.000116	0.00007	0.001
28-Nov-07	25	0.018	0.0000	0.0001	0.001	0.00000	0.00000	0.042	0.000002	1.167	0.00019	0.00008	0.001
5-Dec-07	26	0.0198						0.0386		1.348	0.000191	0.00007	0.0004
12-Dec-07	27	0.021	0.0000	0.0001	0.002	0.00000	0.00000	0.035	0.000002	1.529	0.00020	0.00006	0.000
19-Dec-07	28	0.0145						0.0348		1.5596	0.000145	0.00006	0.0003
26-Dec-07	29	0.008	0.0000	0.0001	0.002	0.00000	0.00000	0.034	0.000013	1.590	0.00009	0.00006	0.000
2-Jan-08	30	0.007						0.037		1.9152	0.00007	0.00006	0.0002
9-Jan-08	31	0.006	0.0000	0.0001	0.002	0.00001	0.00000	0.040	0.000003	2.240	0.00005	0.00007	0.000
16-Jan-08	32	0.007						0.0327		2.0728	0.000049	0.00006	0.0002
23-Jan-08	33	0.008	0.0000	0.0001	0.002	0.00000	0.00000	0.026	0.000002	1.906	0.00005	0.00006	0.000
30-Jan-08	34	0.0107						0.0264		1.9252	0.00009	0.00007	0.0006
6-Feb-08	35	0.014	0.0000	0.0001	0.002	0.00000	0.00000	0.027	0.000002	1.945	0.00013	0.00007	0.001
13-Feb-08	36	0.011						0.03		2.003	8.88E-05	0.00008	0.0005
20-Feb-08	37	0.008	0.0000	0.0001	0.002	0.00000	0.00000	0.033	0.000002	2.061	0.00005	0.00010	0.000
27-Feb-08	38	0.0083						0.0333		2.3176	6.78E-05	0.00008	0.0003
5-Mar-08	39	0.008	0.0000	0.0001	0.002	0.00000	0.00000	0.033	0.000002	2.574	0.00009	0.00006	0.000
12-Mar-08	40	0.0073						0.0413		2.8308	0.00007	0.00006	0.0003
19-Mar-08	41	0.006	0.0000	0.0002	0.003	0.00000	0.00000	0.049	0.000003	3.088	0.00005	0.00006	0.000
26-Mar-08	42	0.0103						0.0481		3.1748	0.00009	0.00006	0.0003
2-Apr-08	43	0.014	0.0000	0.0001	0.003	0.00000	0.00000	0.047	0.000002	3.262	0.00012	0.00006	0.000
9-Apr-08	44	0.0112						0.0502		3.1396	0.000103	0.00007	0.0003
16-Apr-08	45	0.008	0.0000	0.0001	0.003	0.00000	0.00000	0.053	0.000003	3.017	0.00008	0.00008	0.000
23-Apr-08	46	0.0075						0.0503		3.3346	0.00008	0.00007	0.0003
30-Apr-08	47	0.007	0.0001	0.0001	0.004	0.00000	0.00000	0.047	0.000002	3.652	0.00008	0.00006	0.000
7-May-08	48	0.007						0.0458		3.6603	0.00008	0.00006	0.0003
14-May-08	49	0.007	0.0000	0.0001	0.004	0.00000	0.00000	0.044	0.000002	3.669	0.00008	0.00006	0.000
21-May-08	50	0.0077						0.0392		3.4811	0.00006	0.00006	0.0006
28-May-08	51	0.008	0.0000	0.0001	0.003	0.00000	0.00000	0.034	0.000002	3.294	0.00005	0.00005	0.001
4-Jun-08	52	0.0083						0.0285		3.1303	0.000069	0.00006	0.0011
11-Jun-08	53	0.008	0.0001	0.0001	0.003	0.00000	0.00000	0.023	0.000009	2.967	0.00009	0.00007	0.001
18-Jun-08	54	0.0073						0.0234		2.9669	0.000116	0.00006	0.0008
25-Jun-08	55	0.006	0.0000	0.0001	0.003	0.00000	0.00000	0.024	0.000002	2.967	0.00014	0.00005	0.000
2-Jul-08	56	0.0091						0.026		3.4174	0.000117	0.00005	0.0006
9-Jul-08	57	0.012	0.0000	0.0001	0.003	0.00000	0.00000	0.028	0.000002	3.868	0.00009	0.00006	0.001
16-Jul-08	58	0.01						0.0257		3.5034	0.00009	0.00006	0.0006
23-Jul-08	59	0.008	0.0000	0.0001	0.003	0.00000	0.00000	0.023	0.000002	3.139	0.00009	0.00005	0.000
30-Jul-08	60	0.0067						0.0238		3.4633	0.00007	0.00005	0.0003
6-Aug-08	61	0.005	0.0000	0.0001	0.003	0.00000	0.00002	0.024	0.000007	3.788	0.00005	0.00006	0.000
13-Aug-08	62	0.0053						0.0239		3.5648	0.00005	0.00005	0.0002
20-Aug-08	63	0.006	0.0000	0.0001	0.003	0.00000	0.00000	0.024	0.000006	3.342	0.00005	0.00005	0.000

**HUMIDITY CELL HC-1  
CALCULATED LOADING RATES  
(mg/kg/wk)**

**2.8-70**

**MINAGO PROJECT**

Date	Cycle No.	Fe	Pb	Li	Mg	Mn	Hg	Mo	Ni	P	K	Se	Si	Ag
		mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk
12-Jun-07	1	0.037	0.00002	0.030	4.602	0.0016	0.026	0.011	0.120	0.052	6.968	0.005	0.775	0.000005
20-Jun-07	2	0.02233		0.0255	3.4804			0.01144	0.0658			0.0044		
27-Jun-07	3	0.007	0.00002	0.021	2.359	0.0008	0.021	0.012	0.012	0.043	3.587	0.004	0.455	0.000004
4-Jul-07	4	0.02187		0.018	1.6898			0.01041	0.0081			0.0034		
11-Jul-07	5	0.037	0.00007	0.015	1.021	0.0004	0.021	0.009	0.004	0.042	3.586	0.003	0.610	0.000004
18-Jul-07	6	0.02378		0.0151	0.8187			0.00755	0.0037			0.0025		
25-Jul-07	7	0.011	0.00001	0.015	0.616	0.0002	0.023	0.006	0.003	0.046	3.330	0.002	0.672	0.000005
1-Aug-07	8	0.00785		0.0136	0.4942			0.00517	0.0021			0.0017		
8-Aug-07	9	0.005	0.00002	0.012	0.372	0.0002	0.023	0.004	0.001	0.047	2.962	0.001	0.581	0.000005
15-Aug-07	10	0.01342		0.0109	0.3992			0.00337	0.0018			0.0013		
22-Aug-07	11	0.022	0.00006	0.009	0.426	0.0002	0.022	0.003	0.002	0.044	2.410	0.001	0.622	0.000009
29-Aug-07	12	0.02507		0.0109	0.4217			0.00272	0.0023			0.0011		
5-Sep-07	13	0.028	0.00006	0.012	0.417	0.0003	0.022	0.003	0.002	0.043	2.937	0.001	0.572	0.000004
12-Sep-07	14	0.01687		0.0123	0.3932			0.00231	0.002			0.0008		
19-Sep-07	15	0.006	0.00273	0.012	0.369	0.0002	0.022	0.002	0.002	0.045	3.271	0.001	0.565	0.000004
26-Sep-07	16	0.00933		0.0116	0.371			0.00164	0.0016			0.0006		
3-Oct-07	17	0.013	0.00001	0.011	0.373	0.0002	0.023	0.001	0.002	0.046	2.783	0.001	0.483	0.000005
10-Oct-07	18	0.00988		0.0095	0.3261			0.00107	0.0013			0.0004		
17-Oct-07	19	0.007	0.00013	0.008	0.280	0.0002	0.022	0.001	0.001	0.000	2.490	0.0003	0.396	0.000002
24-Oct-07	20	0.00462		0.0087	0.5087			0.00093	0.001			0.0003		
31-Oct-07	21	0.002	0.00000	0.009	0.738	0.0001	0.005	0.001	0.001	0.001	3.196	0.0003	0.470	0.000002
7-Nov-07	22	0.00233		0.0113	0.6266			0.001	0.0012			0.0003		
14-Nov-07	23	0.002	0.00001	0.013	0.515	0.0002	0.005	0.001	0.001	0.001	3.616	0.0003	0.445	0.000002
21-Nov-07	24	0.00603		0.0112	0.4645			0.00072	0.0016			0.0003		
28-Nov-07	25	0.010	0.00002	0.009	0.414	0.0002	0.005	0.001	0.002	0.001	2.837	0.0002	0.586	0.000002
5-Dec-07	26	0.00807		0.009	0.4372			0.0005	0.0017			0.0002		
12-Dec-07	27	0.006	0.00010	0.009	0.461	0.0002	0.005	0.000	0.002	0.001	3.009	0.0002	0.375	0.000002
19-Dec-07	28	0.00481		0.0086	0.4977			0.00046	0.0016			0.0002		
26-Dec-07	29	0.003	0.00674	0.008	0.535	0.0002	0.005	0.000	0.002	0.001	2.878	0.0002	0.339	0.000026
2-Jan-08	30	0.00263		0.0092	0.6199			0.00051	0.0018			0.0002		
9-Jan-08	31	0.002	0.00000	0.010	0.705	0.0002	0.005	0.001	0.002	0.001	3.315	0.0003	0.370	0.000003
16-Jan-08	32	0.00244		0.0094	0.6813			0.0005	0.0018			0.0002		
23-Jan-08	33	0.003	0.00072	0.009	0.658	0.0002	0.005	0.000	0.002	0.001	2.722	0.0001	0.332	0.000002
30-Jan-08	34	0.00452		0.0084	0.639			0.00041	0.0018			0.0001		
6-Feb-08	35	0.006	0.00374	0.008	0.620	0.0003	0.009	0.000	0.002	0.001	2.807	0.0001	0.337	0.000003
13-Feb-08	36	0.00422		0.0083	0.6765			0.0002	0.0036			0.0001		
20-Feb-08	37	0.002	0.00000	0.009	0.733	0.0004	0.005	0.000	0.005	0.001	2.839	0.0001	0.348	0.000002
27-Feb-08	38	0.00249		0.0092	0.7915			0.00027	0.0034			0.0001		
5-Mar-08	39	0.003	0.00015	0.010	0.851	0.0003	0.005	0.001	0.001	0.001	3.200	0.0001	0.364	0.000002
12-Mar-08	40	0.00205		0.0113	0.9972			0.00054	0.0015			0.0001		
19-Mar-08	41	0.001	0.00001	0.013	1.144	0.0003	0.005	0.001	0.002	0.001	3.887	0.0001	0.660	0.000002
26-Mar-08	42	0.00215		0.0134	1.1965			0.00052	0.0017			0.0001		
2-Apr-08	43	0.003	0.00001	0.014	1.249	0.0003	0.004	0.000	0.002	0.001	4.524	0.0001	0.564	0.000002
9-Apr-08	44	0.00267		0.0135	1.1713			0.00047	0.0017			0.0001		
16-Apr-08	45	0.002	0.00007	0.013	1.094	0.0002	0.004	0.000	0.001	0.001	4.536	0.0002	0.612	0.000002
23-Apr-08	46	0.00262		0.0138	1.2468			0.00047	0.0015			0.0001		
30-Apr-08	47	0.003	0.00000	0.015	1.400	0.0002	0.004	0.000	0.002	0.001	4.680	0.0001	0.620	0.000003
7-May-08	48	0.00223		0.0137	1.4802			0.00042	0.0017			0.0001		
14-May-08	49	0.002	0.00000	0.013	1.560	0.0002	0.004	0.000	0.002	0.001	4.482	0.0001	0.627	0.000002
21-May-08	50	0.00175		0.0122	1.4587			0.00034	0.0016			0.0002		
28-May-08	51	0.002	0.00001	0.011	1.357	0.0002	0.005	0.000	0.001	0.001	3.790	0.0002	0.534	0.000002
4-Jun-08	52	0.00276		0.0094	1.2167			0.00028	0.0017			0.0002		
11-Jun-08	53	0.004	0.00879	0.007	1.076	0.0003	0.005	0.000	0.002	0.001	2.870	0.0001	0.436	0.000002
18-Jun-08	54	0.00277		0.0078	1.1241			0.00024	0.0016			0.0002		
25-Jun-08	55	0.002	0.00001	0.008	1.172	0.0002	0.005	0.000	0.001	0.001	2.627	0.000	0.470	0.000006
2-Jul-08	56	0.00446		0.0087	1.2275			0.00028	0.0015			0.0002		
9-Jul-08	57	0.007	0.00004	0.009	1.283	0.0003	0.005	0.000	0.002	0.001	2.952	0.0002	0.498	0.000006
16-Jul-08	58	0.00492		0.0081	1.181			0.00027	0.0015			0.0002		
23-Jul-08	59	0.003	0.00001	0.007	1.079	0.0002	0.005	0.000	0.001	0.001	2.367	0.000	0.345	0.000002
30-Jul-08	60	0.00212		0.008	1.2427			0.00027	0.0015			0.0001		
6-Aug-08	61	0.001	0.00004	0.009	1.407	0.0002	0.005	0.000	0.001	0.001	2.832	0.0001	0.500	0.000002
13-Aug-08	62	0.0012		0.0084	1.3472			0.00028	0.0013			0.0001		
20-Aug-08	63	0.001	0.00002	0.008	1.288	0.0001	0.005	0.000	0.001	0.001	2.524	0.0001	0.421	0.000002



**HUMIDITY CELL HC-1**  
**CALCULATED LOADING RATES**  
**(mg/kg/wk)**  
**MINAGO PROJECT**

**2.8-71**

Date	Cycle No.	Na mg/kg/wk	Sr mg/kg/wk	S mg/kg/wk	Tl mg/kg/wk	Sn mg/kg/wk	Ti mg/kg/wk	U mg/kg/wk	V mg/kg/wk	Zn mg/kg/wk	Zr mg/kg/wk
12-Jun-07	1	56.160	0.171	50.856	0.00004	0.00003	0.0033	0.0011	0.0010	0.0003	0.00260
20-Jun-07	2		0.1487								
27-Jun-07	3	41.948	0.126	35.403	0.00002	0.00002	0.0006	0.0006	0.0009	0.0008	0.00213
4-Jul-07	4		0.0893								
11-Jul-07	5	27.639	0.052	19.879	0.00002	0.00015	0.0012	0.0005	0.0015	0.0008	0.00208
18-Jul-07	6		0.0383								
25-Jul-07	7	26.404	0.024	13.938	0.00002	0.00002	0.0006	0.0007	0.0022	0.0003	0.00230
1-Aug-07	8		0.0201								
8-Aug-07	9	18.693	0.016	9.021	0.00002	0.00002	0.0002	0.0004	0.0020	0.0005	0.00233
15-Aug-07	10		0.0154								
22-Aug-07	11	17.618	0.015	8.744	0.00002	0.00002	0.0006	0.0004	0.0014	0.0002	0.00218
29-Aug-07	12		0.016								
5-Sep-07	13	16.254	0.017	8.815	0.00002	0.00003	0.0025	0.0003	0.0014	0.0006	0.00215
12-Sep-07	14		0.0161								
19-Sep-07	15	15.130	0.015	6.853	0.00002	0.00003	0.0002	0.0002	0.0009	0.0002	0.00223
26-Sep-07	16		0.0156								
3-Oct-07	17	10.258	0.016	5.382	0.00002	0.00002	0.0003	0.0003	0.0012	0.0002	0.00230
10-Oct-07	18		0.0138								
17-Oct-07	19	6.622	0.011	3.010	0.00001	0.00001	0.0002	0.0001	0.0009	0.0006	0.00004
24-Oct-07	20		0.0147								
31-Oct-07	21	7.050	0.018	4.230	0.00001	0.00001	0.0002	0.0001	0.0007	0.0003	0.00005
7-Nov-07	22		0.0204								
14-Nov-07	23	7.912	0.023	4.600	0.00001	0.00001	0.0002	0.0002	0.0009	0.0003	0.00005
21-Nov-07	24		0.0202								
28-Nov-07	25	4.315	0.018	1.860	0.00001	0.00001	0.0002	0.0001	0.0008	0.0002	0.00005
5-Dec-07	26		0.0195								
12-Dec-07	27	3.278	0.021	2.940	0.00001	0.00001	0.0003	0.0001	0.0006	0.0004	0.00005
19-Dec-07	28		0.0217								
26-Dec-07	29	3.320	0.022	2.325	0.00001	0.00000	0.0002	0.0001	0.0005	0.0004	0.00005
2-Jan-08	30		0.0253								
9-Jan-08	31	3.325	0.028	3.500	0.00001	0.00001	0.0003	0.0002	0.0004	0.0002	0.00005
16-Jan-08	32		0.0273								
23-Jan-08	33	2.275	0.026	2.400	0.00001	0.00000	0.0002	0.0001	0.0003	0.0003	0.00005
30-Jan-08	34		0.0262								
6-Feb-08	35	2.178	0.026	2.640	0.00001	0.00000	0.0002	0.0001	0.0004	0.0005	0.00004
13-Feb-08	36		0.0273								
20-Feb-08	37	2.298	0.028	3.185	0.00001	0.00000	0.0003	0.0001	0.0003	0.0003	0.00005
27-Feb-08	38		0.0315								
5-Mar-08	39	1.967	0.035	3.150	0.00001	0.00000	0.0002	0.0001	0.0003	0.0002	0.00005
12-Mar-08	40		0.0392								
19-Mar-08	41	2.255	0.044	2.790	0.00001	0.00000	0.0002	0.0003	0.0006	0.0002	0.00005
26-Mar-08	42		0.0439								
2-Apr-08	43	1.963	0.044	2.490	0.00001	0.00000	0.0005	0.0002	0.0006	0.0003	0.00004
9-Apr-08	44		0.0429								
16-Apr-08	45	1.567	0.042	2.430	0.00002	0.00000	0.0002	0.0002	0.0006	0.0007	0.00004
23-Apr-08	46		0.0477								
30-Apr-08	47	1.140	0.054	2.400	0.00002	0.00000	0.0002	0.0003	0.0007	0.0001	0.00004
7-May-08	48		0.0532								
14-May-08	49	0.768	0.053	2.075	0.00002	0.00000	0.0002	0.0002	0.0007	0.0002	0.00004
21-May-08	50		0.0505								
28-May-08	51	0.511	0.048	1.380	0.00001	0.00000	0.0002	0.0002	0.0005	0.0001	0.00005
4-Jun-08	52		0.0431								
11-Jun-08	53	0.331	0.038	1.380	0.00001	0.00000	0.0002	0.0001	0.0001	0.0010	0.00005
18-Jun-08	54		0.0386								
25-Jun-08	55	0.260	0.039	1.395	0.00001	0.00000	0.0002	0.0002	0.0004	0.0003	0.00005
2-Jul-08	56		0.0446								
9-Jul-08	57	0.249	0.050	1.880	0.00001	0.00000	0.0002	0.0002	0.0005	0.0013	0.00005
16-Jul-08	58		0.0446								
23-Jul-08	59	0.200	0.039	1.395	0.00001	0.00000	0.0002	0.0001	0.0004	0.0002	0.00005
30-Jul-08	60		0.0444								
6-Aug-08	61	0.209	0.049	1.455	0.00001	0.00000	0.0002	0.0002	0.0004	0.0003	0.00005
13-Aug-08	62		0.0465								
20-Aug-08	63	0.174	0.044	1.880	0.00001	0.00000	0.0002	0.0002	0.0003	0.0001	0.00005

**HUMIDITY CELL HC-2**  
**CALCULATED LOADING RATES**  
(mg/kg/wk)  
**MINAGO PROJECT**

**2.8-72**

HC 2

Sample = ORE/AR Composite

Date	Cycle No.	Volume		pH	ORP mV	Cond. umhos/cm	Acidity (pH 4.5) mgCaCO3/L	Acidity (pH 8.3) mg/kg/wk	Alkalinity mg/kg/wk	Sulphate	Hardness	Al
		Input mL	Output L							mg/kg/wk	CaCO3 mg/L	mg/kg/wk
12-Jun-07	1	750	0.605	9.22	275	323	#N/A	0.0	43.2	48	5.7	0.174
20-Jun-07	2	500	0.395	8.91	296	536	#N/A	0.0	31.1	34		0.1806
27-Jun-07	3	500	0.415	8.72	330	462	#N/A	0.0	25.3	79	8.8	0.188
4-Jul-07	4	500	0.475	8.34	327	379	#N/A	0.0	21.8	61		0.2017
11-Jul-07	5	500	0.415	8.59	323	483	#N/A	0.0	22.3	78	13.3	0.216
18-Jul-07	6	500	0.435	8.54	333	501	#N/A	0.0	27.0	69		0.1561
25-Jul-07	7	500	0.45	8.49	349	264	#N/A	0.0	17.8	39	6.3	0.096
1-Aug-07	8	500	0.45	8.14	345	252	#N/A	0.8	17.1	22		0.1011
8-Aug-07	9	500	0.46	8.35	302	232	#N/A	0.0	16.9	32	5.6	0.106
15-Aug-07	10	500	0.435	8.42	355	24	#N/A	0.0	16.2	20		0.0735
22-Aug-07	11	500	0.43	8.43	354	176	#N/A	0.2	16.0	16	4.9	0.041
29-Aug-07	12	500	0.445	8.52	345	149	#N/A	0.0	15.4	17		0.0824
5-Sep-07	13	500	0.435	8.24	366	135	#N/A	0.4	13.7	18	3.9	0.124
12-Sep-07	14	500	0.495	8.15	377	108	#N/A	1.1	17.2	17		0.0807
19-Sep-07	15	500	0.45	8.26	352	103	#N/A	0.0	14.1	15	3.9	0.038
26-Sep-07	16	500	0.44	8.30	384	149	#N/A	0.0	12.9	12		0.0449
3-Oct-07	17	500	0.44	8.13	378	137	#N/A	1.0	12.8	12	4.5	0.052
10-Oct-07	18	500	0.465	8.22	396	123	#N/A	0.5	13.0	10		0.0704
17-Oct-07	19	500	0.415	7.57	403	118	#N/A	1.1	11.0	9	3.9	0.089
24-Oct-07	20	500	0.46	8.15	402	113	#N/A	0.7	14.4	11		0.0591
31-Oct-07	21	500	0.45	7.71	383	105	#N/A	1.4	10.5	8	3.1	0.029
7-Nov-07	22	500	0.46	7.90	399	99	#N/A	0.9	12.9	6		0.0287
14-Nov-07	23	500	0.45	7.81	410	99	#N/A	1.1	12.4	7	3.5	0.028
21-Nov-07	24	500	0.435	7.79	455	96	#N/A	1.1	10.3	9		0.0325
28-Nov-07	25	500	0.48	7.75	413	103	#N/A	1.4	14.2	8	3.6	0.037
5-Dec-07	26	500	0.46	7.72	436	84	#N/A	1.3	11.0	6		0.0296
12-Dec-07	27	500	0.515	7.76	404	84	#N/A	1.1	13.8	6	3.4	0.022
19-Dec-07	28	500	0.455	7.71	443	79	#N/A	0.8	10.9	5		0.0151
26-Dec-07	29	500	0.51	7.71	396	77	#N/A	0.9	12.3	10	3.4	0.008
2-Jan-08	30	500	0.465	7.72	440	71	#N/A	0.9	9.8	5		0.0085
9-Jan-08	31	500	0.51	7.61	410	76	#N/A	1.2	13.3	8	4.3	0.009
16-Jan-08	32	500	0.475	7.67	463	92	#N/A	1.5	12.8	7		0.0159
23-Jan-08	33	500	0.465	7.59	397	73	#N/A	1.5	10.2	4	3.8	0.023
30-Jan-08	34	500	0.445	7.72	417	71	#N/A	1.5	9.3	7		0.0382
6-Feb-08	35	500	0.435	7.69	444	70	#N/A	1.1	8.8	6	5.7	0.054
13-Feb-08	36	500	0.455	7.72	429	64	#N/A	1.5	9.2	6		0.0313
20-Feb-08	37	500	0.49	7.60	436	67	#N/A	1.5	10.2	6	5.6	0.009
27-Feb-08	38	500	0.45	7.70	407	59	#N/A	1.9	7.2	4		0.0114
5-Mar-08	39	500	0.45	7.63	411	55	#N/A	1.4	7.0	4	4.5	0.014
12-Mar-08	40	500	0.455	7.67	414	67	#N/A	1.2	8.3	6		0.0123
19-Mar-08	41	500	0.465	7.80	410	66	#N/A	1.2	9.9	5	5.6	0.011
26-Mar-08	42	500	0.455	7.64	406	61	#N/A	2.9	17.7	4		0.0226
2-Apr-08	43	500	0.425	7.67	419	56	#N/A	2.2	17.8	3	6.8	0.034
9-Apr-08	44	500	0.41	7.41	416	62	#N/A	2.6	18	5		0.033
16-Apr-08	45	500	0.42	7.43	417	72	#N/A	2.7	15	6	9.9	0.032
23-Apr-08	46	500	0.425	7.47	431	87	#N/A	2.7	15	9		0.0223
30-Apr-08	47	500	0.41	7.43	404	88	#N/A	2.3	13	9	15.2	0.013
7-May-08	48	500	0.42	7.62	387	97	#N/A	2.8	14	9		0.0169
14-May-08	49	500	0.41	7.52	374	91	#N/A	2.4	13	10	19.7	0.021
21-May-08	50	500	0.4	7.63	372	106	#N/A	2.7	18	8		0.0157
28-May-08	51	500	0.46	7.45	389	74	#N/A	3.0	11	9	18.8	0.010
4-Jun-08	52	500	0.45	7.64	399	61	#N/A	2.7	11	7		0.0081
11-Jun-08	53	500	0.475	7.51	415	54	#N/A	2.5	11	7	13.9	0.006
18-Jun-08	54	500	0.475	7.62	377	44	#N/A	3.4	11.4	6		0.0056
25-Jun-08	55	500	0.47	7.61	382	58	#N/A	3.5	12.3	5	13.8	0.005
2-Jul-08	56	500	0.465	7.49	386	50	#N/A	2.4	8.8	6		0.0091
9-Jul-08	57	500	0.47	7.46	378	55	#N/A	2.4	10.4	6	12.9	0.013
16-Jul-08	58	500	0.46	7.44	393	47	#N/A	2.8	9.9	5		0.0093
23-Jul-08	59	500	0.465	7.38	412	54	#N/A	2.7	11.4	5	13.8	0.006
30-Jul-08	60	500	0.49	7.41	398	52	#N/A	2.3	14.7	4		0.0057
6-Aug-08	61	500	0.465	7.42	386	47	#N/A	2.6	16.1	3	12	0.006
13-Aug-08	62	500	0.48	7.38	363	48	#N/A	2.3	11.1	4		0.0053
20-Aug-08	63	500	0.455	7.37	319	44	#N/A	2.6	11.7	3	12.8	0.005

**HUMIDITY CELL HC-2**  
**CALCULATED LOADING RATES**  
**(mg/kg/wk)**  
**MINAGO PROJECT**

**2.8-73**

HC 2  
Sample = ORE/AR C

Date	Cycle No.	Sb	As	Ba	Be	Bi	B	Cd	Ca	Cr	Co	Cu	Fe
		mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk
12-Jun-07	1	0.00010	0.0011	0.0009	0.000030	0.000030	1.204	0.000024	0.720	0.0002	0.0001	0.0011	0.1089
20-Jun-07	2						0.996225		0.750075	0.00024	0.00008	0.0009	0.1084
27-Jun-07	3	0.00004	0.0005	0.0007	0.000033	0.000021	0.789	0.000008	0.780	0.0003	0.0001	0.0007	0.1079
4-Jul-07	4						0.736625		0.92545	0.00054	0.0002	0.0006	0.125123
11-Jul-07	5	0.00004	0.0006	0.0012	0.000021	0.000021	0.685	0.000004	1.071	0.0008	0.0002	0.0005	0.1423
18-Jul-07	6						0.596625		0.8526	0.00051	0.0002	0.0009	0.093898
25-Jul-07	7	0.00003	0.0001	0.0006	0.000023	0.000023	0.509	0.000005	0.635	0.0002	0.0001	0.0013	0.0455
1-Aug-07	8						0.49345		0.57025	0.00037	0.0001	0.0007	0.051245
8-Aug-07	9	0.00003	0.0004	0.0007	0.000023	0.000023	0.478	0.000005	0.506	0.0005	0.0001	0.0001	0.0570
15-Aug-07	10						0.44259		0.468	0.0004	0.00009	0.0001	0.04572
22-Aug-07	11	0.00002	0.0003	0.0006	0.000022	0.000022	0.407	0.000004	0.430	0.0003	0.0001	0.0002	0.0344
29-Aug-07	12						0.376085		0.352025	0.00041	0.00009	0.0003	0.048085
5-Sep-07	13	0.00002	0.0003	0.0005	0.000039	0.000022	0.345	0.000004	0.274	0.0005	0.0001	0.0003	0.0618
12-Sep-07	14						0.331995		0.328275	0.00031	0.00009	0.0002	0.040785
19-Sep-07	15	0.00002	0.0001	0.0004	0.000023	0.000023	0.319	0.000005	0.383	0.0001	0.0001	0.0000	0.0198
26-Sep-07	16						0.29042		0.33645	0.00018	0.0001	0.0005	0.04972
3-Oct-07	17	0.00005	0.0037	0.0004	0.000022	0.000022	0.262	0.000004	0.290	0.0003	0.0002	0.0010	0.0796
10-Oct-07	18						0.24317		0.2614	0.00036	0.0002	0.0008	0.072398
17-Oct-07	19	0.00003	0.0008	0.0004	0.000004	0.000002	0.224	0.000002	0.232	0.0005	0.0002	0.0006	0.0652
24-Oct-07	20						0.224		0.262	0.0003	0.0001	0.0003	0.0447
31-Oct-07	21	0.00003	0.0004	0.0002	0.000005	0.000002	0.224	0.000002	0.293	0.0002	0.0001	0.0001	0.0243
7-Nov-07	22						0.204		0.313	0.0002	0.00007	0.0003	0.0243
14-Nov-07	23	0.00002	0.0003	0.0002	0.000005	0.000002	0.185	0.000002	0.333	0.0002	0.0001	0.0005	0.0243
21-Nov-07	24						0.185		0.303	0.0002	0.00009	0.0004	0.0278
28-Nov-07	25	0.00002	0.0001	0.0004	0.000005	0.000002	0.186	0.000002	0.274	0.0002	0.00010	0.0003	0.0312
5-Dec-07	26						0.166		0.312	0.0002	0.00007	0.0002	0.0233
12-Dec-07	27	0.00003	0.0001	0.0003	0.000005	0.000003	0.146	0.000003	0.350	0.0003	0.00004	0.0001	0.0155
19-Dec-07	28						0.141		0.349	0.0002	0.00003	0.0001	0.0105
26-Dec-07	29	0.00002	0.0001	0.0003	0.000005	0.000003	0.136	0.000003	0.347	0.0001	0.00002	0.0001	0.0056
2-Jan-08	30						0.147		0.411	0.0001	0.00002	0.0001	0.0069
9-Jan-08	31	0.00002	0.0001	0.0005	0.000005	0.000003	0.157	0.000003	0.474	0.0001	0.00002	0.0001	0.0082
16-Jan-08	32						0.141		0.398	0.0001	0.00004	0.0001	0.0138
23-Jan-08	33	0.00001	0.0001	0.0003	0.000005	0.000002	0.125	0.000006	0.321	0.0002	0.00006	0.0002	0.0195
30-Jan-08	34						0.125		0.354	0.0003	0.0001	0.0005	0.0441
6-Feb-08	35	0.00001	0.0001	0.0007	0.000004	0.000002	0.124	0.000006	0.387	0.0003	0.00023	0.0008	0.0687
13-Feb-08	36						0.128		0.453	0.0002	0.0001	0.0004	0.0376
20-Feb-08	37	0.00001	0.0000	0.0004	0.000005	0.000002	0.132	0.000002	0.519	0.0000	0.00004	0.0001	0.0064
27-Feb-08	38						0.115		0.449	0.0001	0.00004	0.0002	0.0088
5-Mar-08	39	0.00001	0.0000	0.0004	0.000005	0.000011	0.099	0.000002	0.378	0.0001	0.00005	0.0002	0.0113
12-Mar-08	40						0.109		0.433	0.0001	0.00004	0.0002	0.0091
19-Mar-08	41	0.00001	0.0001	0.0004	0.000005	0.000002	0.119	0.000002	0.488	0.0001	0.00003	0.0002	0.0070
26-Mar-08	42						0.107		0.508	0.0002	0.00006	0.0002	0.0173
2-Apr-08	43	0.00001	0.0001	0.0004	0.000004	0.000002	0.094	0.000002	0.527	0.0002	0.00010	0.0002	0.0276
9-Apr-08	44						0.090		0.654	0.0002	0.0001	0.0003	0.0306
16-Apr-08	45	0.00002	0.0012	0.0007	0.000004	0.000002	0.086	0.000002	0.781	0.0003	0.00015	0.0004	0.0336
23-Apr-08	46						0.080		0.973	0.0002	0.0001	0.0003	0.0232
30-Apr-08	47	0.00001	0.0001	0.0009	0.000004	0.000002	0.074	0.000002	1.164	0.0001	0.00008	0.0001	0.0127
7-May-08	48						0.080		1.287	0.0001	0.0001	0.0002	0.0148
14-May-08	49	0.00001	0.0000	0.0011	0.000004	0.000002	0.087	0.000006	1.410	0.0001	0.00013	0.0003	0.0168
21-May-08	50						0.077		1.439	0.0001	0.0001	0.0003	0.0132
28-May-08	51	0.00001	0.0000	0.0011	0.000005	0.000002	0.067	0.000002	1.467	0.0000	0.00007	0.0004	0.0097
4-Jun-08	52						0.072		1.325	0.0000	0.00006	0.0005	0.0070
11-Jun-08	53	0.00001	0.0000	0.0011	0.000005	0.000002	0.077	0.000019	1.183	0.0000	0.00004	0.0006	0.0043
18-Jun-08	54						0.075		1.144	0.0001	0.00004	0.0005	0.0092
25-Jun-08	55	0.00001	0.0000	0.0009	0.000005	0.000002	0.073	0.000002	1.105	0.0001	0.00003	0.0003	0.0141
2-Jul-08	56						0.072		1.107	0.0001	0.00004	0.0003	0.0134
9-Jul-08	57	0.00001	0.0000	0.0010	0.000005	0.000002	0.071	0.000002	1.109	0.0001	0.00005	0.0003	0.0127
16-Jul-08	58						0.071		1.150	0.0001	0.00004	0.0002	0.0082
23-Jul-08	59	0.00001	0.0000	0.0009	0.000005	0.000002	0.071	0.000002	1.190	0.0001	0.00003	0.0001	0.0037
30-Jul-08	60						0.068		1.090	0.0001	0.00003	0.0002	0.0040
6-Aug-08	61	0.00001	0.0000	0.0008	0.000005	0.000002	0.065	0.000009	0.990	0.0000	0.00003	0.0003	0.0042
13-Aug-08	62						0.061		1.014	0.0001	0.00003	0.0003	0.0039
20-Aug-08	63	0.00001	0.0000	0.0008	0.000005	0.000002	0.058	0.000012	1.037	0.0001	0.00004	0.0002	0.0036

**HUMIDITY CELL HC-2**  
**CALCULATED LOADING RATES**  
**(mg/kg/wk)**  
**MINAGO PROJECT**

**2.8-74**

**HC 2**  
**Sample = ORE/AR C**

Date	Cycle No.	Pb	Li	Mg	Mn	Hg	Mo	Ni	P	K	Se	Si	Ag	Na
		mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk
12-Jun-07	1	0.00004	0.0053	0.4054	0.0005	0.0303	0.0113	0.0019	0.061	2.69	0.0019	1.68	0.000006	46.04
20-Jun-07	2		0.0044	0.410175			0.0082	0.0024			0.0028			
27-Jun-07	3	0.00005	0.0035	0.4150	0.0007	0.0208	0.0050	0.0029	0.042	1.76	0.0037	1.23	0.000008	38.10
4-Jul-07	4		0.004	0.554025			0.0035	0.0046			0.0038			
11-Jul-07	5	0.00005	0.0044	0.6931	0.0010	0.0208	0.0020	0.0062	0.042	2.49	0.0040	1.48	0.000004	38.39
18-Jul-07	6		0.0036	0.497275			0.0014	0.0045			0.0036			
25-Jul-07	7	0.00076	0.0027	0.3015	0.0004	0.0225	0.0008	0.0027	0.045	1.60	0.0032	0.87	0.000005	23.22
1-Aug-07	8		0.0027	0.30715			0.0007	0.0031			0.0032			
8-Aug-07	9	0.00004	0.0027	0.3128	0.0005	0.0230	0.0006	0.0034	0.046	1.56	0.0031	0.94	0.000005	20.79
15-Aug-07	10		0.0024	0.2811			0.0005	0.0027			0.0028			
22-Aug-07	11	0.00002	0.0022	0.2494	0.0002	0.0215	0.0004	0.0020	0.043	1.17	0.0025	0.81	0.000004	18.02
29-Aug-07	12		0.0024	0.25085			0.0004	0.0028			0.0025			
5-Sep-07	13	0.00005	0.0026	0.2523	0.0004	0.0218	0.0004	0.0037	0.044	1.32	0.0024	0.91	0.000004	14.57
12-Sep-07	14		0.0024	0.22065			0.0004	0.0027			0.0022			
19-Sep-07	15	0.00002	0.0023	0.1890	0.0002	0.0225	0.0003	0.0018	0.045	1.26	0.0019	0.67	0.000005	13.46
26-Sep-07	16		0.0024	0.2485			0.0003	0.0042			0.0018			
3-Oct-07	17	0.00435	0.0026	0.3080	0.0005	0.0220	0.0003	0.0065	0.044	1.04	0.0016	0.89	0.000004	10.78
10-Oct-07	18		0.0024	0.2785			0.0002	0.0055			0.0014			
17-Oct-07	19	0.00008	0.0023	0.2490	0.0004	0.0042	0.0002	0.0044	0.000	1.04	0.0013	0.86	0.000002	9.30
24-Oct-07	20		0.0023	0.2078			0.0002	0.0031			0.0011			
31-Oct-07	21	0.00003	0.0023	0.1665	0.0002	0.0045	0.0002	0.0018	0.001	1.07	0.0010	0.68	0.000002	8.96
7-Nov-07	22		0.0024	0.1733			0.0002	0.0019			0.001			
14-Nov-07	23	0.00002	0.0025	0.1800	0.0002	0.0045	0.0002	0.0020	0.001	1.17	0.0009	0.63	0.000002	8.33
21-Nov-07	24		0.0029	0.2148			0.0002	0.0029			0.0009			
28-Nov-07	25	0.00002	0.0033	0.2496	0.0003	0.0048	0.0002	0.0038	0.001	1.32	0.0010	0.77	0.000002	9.12
5-Dec-07	26		0.0032	0.2304			0.0002	0.0027			0.0009			
12-Dec-07	27	0.00043	0.0031	0.2112	0.0002	0.0052	0.0001	0.0017	0.001	1.36	0.0008	0.64	0.000003	6.90
19-Dec-07	28		0.0029	0.2076			0.0001	0.0013			0.0007			
26-Dec-07	29	0.00004	0.0028	0.2040	0.0001	0.0051	0.0001	0.0009	0.001	1.34	0.0007	0.58	0.000003	6.73
2-Jan-08	30		0.0031	0.2219			0.0002	0.0012			0.0007			
9-Jan-08	31	0.00001	0.0033	0.2397	0.0002	0.0051	0.0002	0.0014	0.001	1.57	0.0007	0.58	0.000003	6.68
16-Jan-08	32		0.0031	0.2384			0.0002	0.0019			0.0007			
23-Jan-08	33	0.00003	0.0028	0.2372	0.0002	0.0047	0.0001	0.0023	0.001	1.39	0.0006	0.60	0.000002	5.53
30-Jan-08	34		0.0032	0.3035			0.0001	0.0045			0.0006			
6-Feb-08	35	0.00017	0.0035	0.3698	0.0005	0.0044	0.0001	0.0067	0.001	1.32	0.0006	0.80	0.000003	5.31
13-Feb-08	36		0.0037	0.3588			0.00006	0.0048			0.0006			
20-Feb-08	37	0.00001	0.0038	0.3479	0.0003	0.0049	0.0000	0.0029	0.001	1.62	0.0006	0.64	0.000002	5.88
27-Feb-08	38		0.0034	0.3067			0.00005	0.0027			0.0006			
5-Mar-08	39	0.00001	0.0029	0.2655	0.0002	0.0045	0.0001	0.0025	0.001	1.30	0.0005	0.44	0.000002	3.91
12-Mar-08	40		0.0033	0.3025			0.0001	0.0020			0.0005			
19-Mar-08	41	0.00028	0.0038	0.3395	0.0002	0.0047	0.0001	0.0016	0.001	1.60	0.0006	0.76	0.000002	4.57
26-Mar-08	42		0.0042	0.3589			0.0001	0.0033			0.0005			
2-Apr-08	43	0.00002	0.0045	0.3783	0.0003	0.0085	0.0001	0.0050	0.002	1.73	0.0005	0.56	0.000003	3.26
9-Apr-08	44		0.005	0.4600			0.00008	0.0070			0.0005			
16-Apr-08	45	0.00001	0.0056	0.5418	0.0003	0.0042	0.0001	0.0090	0.001	2.11	0.0005	0.65	0.000002	3.53
23-Apr-08	46		0.0064	0.6727			0.00008	0.0128			0.0005			
30-Apr-08	47	0.00000	0.0073	0.8036	0.0004	0.0082	0.0001	0.0167	0.001	2.29	0.0006	0.51	0.000002	3.08
7-May-08	48		0.0077	0.9533			0.00007	0.0208			0.0006			
14-May-08	49	0.00015	0.0081	1.1029	0.0004	0.0041	0.0001	0.0249	0.001	2.52	0.0006	0.55	0.000002	3.01
21-May-08	50		0.0075	1.1541			0.00007	0.0198			0.0006			
28-May-08	51	0.00001	0.0069	1.2052	0.0004	0.0046	0.0001	0.0147	0.001	2.34	0.0006	0.53	0.000002	2.41
4-Jun-08	52		0.0062	1.0491			0.00006	0.0120			0.0005			
11-Jun-08	53	0.00230	0.0055	0.8930	0.0003	0.0048	0.0001	0.0093	0.001	2.05	0.0004	0.49	0.000002	1.96
18-Jun-08	54		0.0055	0.9001			0.00005	0.0077			0.0005			
25-Jun-08	55	0.00000	0.0056	0.9071	0.0003	0.0047	0.0001	0.0062	0.001	1.78	0.0005	0.55	0.000006	1.52
2-Jul-08	56		0.0053	0.8507			0.00006	0.0057			0.0004			
9-Jul-08	57	0.00004	0.0051	0.7943	0.0004	0.0047	0.0001	0.0052	0.001	1.70	0.0004	0.52	0.000003	1.33
16-Jul-08	58		0.005	0.8157			0.00006	0.0049			0.0004			
23-Jul-08	59	0.00001	0.0050	0.8370	0.0002	0.0047	0.0001	0.0047	0.001	1.73	0.0004	0.45	0.000002	1.37
30-Jul-08	60		0.0049	0.7975			0.00005	0.0048			0.0004			
6-Aug-08	61	0.00925	0.0047	0.7580	0.0003	0.0047	0.0000	0.0049	0.001	1.56	0.0003	0.52	0.000002	1.12
13-Aug-08	62		0.0046	0.7703			0.00004	0.0049			0.0003			
20-Aug-08	63	0.00012	0.0046	0.7826	0.0003	0.0046	0.0000	0.0049	0.001	1.54	0.0003	0.46	0.000002	1.01

**HUMIDITY CELL HC-2**  
**CALCULATED LOADING RATES**  
**(mg/kg/wk)**  
**MINAGO PROJECT**

**2.8-75**

**HC 2**

**Sample = ORE/AR C**

Date	Cycle No.	Sr	S	Tl	Sn	Ti	U	V	Zn	Zr
		mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk
12-Jun-07	1	0.0074	16.76	0.000030	0.000030	0.0011	0.0002	0.0079	0.0004	0.0030
20-Jun-07	2	0.0083								
27-Jun-07	3	0.0093	38.80	0.000021	0.000029	0.0022	0.0007	0.0049	0.0013	0.0021
4-Jul-07	4	0.0122								
11-Jul-07	5	0.0151	26.15	0.000021	0.000062	0.0022	0.0005	0.0037	0.0007	0.0021
18-Jul-07	6	0.0109								
25-Jul-07	7	0.0067	11.66	0.000023	0.000027	0.0009	0.0002	0.0032	0.0004	0.0023
1-Aug-07	8	0.0062								
8-Aug-07	9	0.0057	10.58	0.000023	0.000046	0.0010	0.0002	0.0031	0.0005	0.0023
15-Aug-07	10	0.0048								
22-Aug-07	11	0.0039	8.51	0.000022	0.000022	0.0006	0.0002	0.0022	0.0007	0.0022
29-Aug-07	12	0.0036								
5-Sep-07	13	0.0034	6.57	0.000022	0.000035	0.0012	0.0002	0.0028	0.0005	0.0022
12-Sep-07	14	0.0035								
19-Sep-07	15	0.0036	5.67	0.000023	0.000023	0.0005	0.0002	0.0024	0.0002	0.0023
26-Sep-07	16	0.0034								
3-Oct-07	17	0.0033	4.93	0.000022	0.000022	0.0005	0.0002	0.0021	0.0002	0.0022
10-Oct-07	18	0.0029								
17-Oct-07	19	0.0025	3.74	0.000004	0.000058	0.0009	0.0001	0.0020	0.0005	0.0002
24-Oct-07	20	0.0026								
31-Oct-07	21	0.0028	3.15	0.000004	0.000009	0.0002	0.0001	0.0017	0.0004	0.0000
7-Nov-07	22	0.0028								
14-Nov-07	23	0.0028	3.60	0.000003	0.000005	0.0003	0.0001	0.0015	0.0002	0.0001
21-Nov-07	24	0.0032								
28-Nov-07	25	0.0036	2.88	0.000006	0.000010	0.0002	0.0002	0.0017	0.0001	0.0001
5-Dec-07	26	0.0038								
12-Dec-07	27	0.0040	3.09	0.000004	0.000005	0.0003	0.0001	0.0012	0.0002	0.0001
19-Dec-07	28	0.004								
26-Dec-07	29	0.0039	2.55	0.000006	0.000005	0.0003	0.0001	0.0011	0.0002	0.0001
2-Jan-08	30	0.0043								
9-Jan-08	31	0.0047	2.55	0.000006	0.000005	0.0003	0.0001	0.0011	0.0004	0.0001
16-Jan-08	32	0.0042								
23-Jan-08	33	0.0038	2.33	0.000005	0.000005	0.0002	0.0001	0.0011	0.0007	0.0000
30-Jan-08	34	0.0042								
6-Feb-08	35	0.0047	2.61	0.000006	0.000004	0.0006	0.0001	0.0010	0.0009	0.0001
13-Feb-08	36	0.0053								
20-Feb-08	37	0.0059	2.45	0.000007	0.000005	0.0002	0.0001	0.0008	0.0008	0.0000
27-Feb-08	38	0.0052								
5-Mar-08	39	0.0046	1.80	0.000006	0.000005	0.0002	0.0001	0.0007	0.0003	0.0000
12-Mar-08	40	0.0053								
19-Mar-08	41	0.0061	1.86	0.000007	0.000005	0.0002	0.0001	0.0009	0.0001	0.0000
26-Mar-08	42	0.0062								
2-Apr-08	43	0.0062	2.13	0.000007	0.000004	0.0003	0.0001	0.0009	0.0002	0.0000
9-Apr-08	44	0.008								
16-Apr-08	45	0.0097	2.94	0.000009	0.000004	0.0004	0.0001	0.0007	0.0004	0.0000
23-Apr-08	46	0.0121								
30-Apr-08	47	0.0144	3.69	0.000013	0.000004	0.0002	0.0001	0.0005	0.0002	0.0000
7-May-08	48	0.0163								
14-May-08	49	0.0182	4.10	0.000014	0.000004	0.0002	0.0001	0.0006	0.0006	0.0000
21-May-08	50	0.019								
28-May-08	51	0.0198	4.14	0.000011	0.000005	0.0002	0.0001	0.0005	0.0003	0.0000
4-Jun-08	52	0.0178								
11-Jun-08	53	0.0158	2.85	0.000010	0.000005	0.0002	0.0001	0.0003	0.0026	0.0000
18-Jun-08	54	0.0148								
25-Jun-08	55	0.0139	2.35	0.000009	0.000005	0.0002	0.0001	0.0005	0.0001	0.0000
2-Jul-08	56	0.0142								
9-Jul-08	57	0.0145	2.35	0.000010	0.000005	0.0002	0.0001	0.0005	0.0008	0.0000
16-Jul-08	58	0.0142								
23-Jul-08	59	0.0140	2.33	0.000009	0.000005	0.0002	0.0001	0.0005	0.0001	0.0000
30-Jul-08	60	0.0134								
6-Aug-08	61	0.0128	1.86	0.000009	0.000005	0.0002	0.0001	0.0005	0.0003	0.0000
13-Aug-08	62	0.0124								
20-Aug-08	63	0.0121	1.82	0.000012	0.000005	0.0002	0.0001	0.0004	0.0006	0.0000

**HUMIDITY CELL HC-3  
CALCULATED LOADING RATES  
(mg/kg/wk)**

**2.8-76**

**MINAGO PROJECT**

Date	Cycle No.	Volume		pH	ORP mV	Cond. umhos/cm	Acidity (pH 4.5) mg/kg/wk	Acidity (pH 8.3) mg/kg/wk	Alkalinity mg/kg/wk	Sulphate mg/l
		Input mL	Output L							
12-Jun-07	1	750	0.625	9.13	271	344	#N/A	0.00	39	81
20-Jun-07	2	500	0.405	9.11	286	487	#N/A	0.00	34	37
27-Jun-07	3	500	0.41	9.08	307	308	#N/A	0.00	29	37
4-Jul-07	4	500	0.495	8.32	332	326	#N/A	0.00	28	46
11-Jul-07	5	500	0.42	8.43	327	311	#N/A	0.00	26	46
18-Jul-07	6	500	0.41	8.72	326	282	#N/A	0.00	33	27
25-Jul-07	7	500	0.44	8.66	342	172	#N/A	0.00	19	17
1-Aug-07	8	500	0.44	8.2	349	176	#N/A	0.62	17	13
8-Aug-07	9	500	0.445	8.42	305	161	#N/A	0.00	15	12
15-Aug-07	10	500	0.44	8.27	369	24	#N/A	0.29	15	13
22-Aug-07	11	500	0.415	8.42	361	134	#N/A	0.00	15	12
29-Aug-07	12	500	0.425	8.29	364	120	#N/A	0.73	15	11
5-Sep-07	13	500	0.43	8.31	371	110	#N/A	0.00	16	11
12-Sep-07	14	500	0.44	8.24	379	93	#N/A	0.85	16	9
19-Sep-07	15	500	0.435	8.17	368	76	#N/A	0.62	16	6
26-Sep-07	16	500	0.435	8.22	389	120	#N/A	0.83	14	6
3-Oct-07	17	500	0.445	7.91	386	106	#N/A	1.39	14	6
10-Oct-07	18	500	0.45	7.98	406	101	#N/A	0.74	12	6
17-Oct-07	19	500	0.42	7.50	407	96	#N/A	1.23	12	5
24-Oct-07	20	500	0.46	7.93	416	89	#N/A	0.74	13	5
31-Oct-07	21	500	0.445	7.63	396	84	#N/A	1.25	11	6
7-Nov-07	22	500	0.445	7.64	414	79	#N/A	0.95	12	4
14-Nov-07	23	500	0.455	7.54	423	71	#N/A	1.15	11	5
21-Nov-07	24	500	0.445	7.55	461	80	#N/A	1.16	10	6
28-Nov-07	25	500	0.455	7.64	413	85	#N/A	1.36	13	5
5-Dec-07	26	500	0.46	7.65	438	71	#N/A	1.24	12	4
12-Dec-07	27	500	0.46	7.66	411	68	#N/A	0.94	12	3
19-Dec-07	28	500	0.455	7.75	445	65	#N/A	0.85	12	3
26-Dec-07	29	500	0.455	7.36	405	52	#N/A	0.79	10	4
2-Jan-08	30	500	0.45	7.53	445	52	#N/A	0.90	9	4
9-Jan-08	31	500	0.515	7.53	405	66	#N/A	1.12	14	3
16-Jan-08	32	500	0.46	7.43	467	48	#N/A	1.46	8	2
23-Jan-08	33	500	0.47	7.38	408	60	#N/A	1.62	10	3
30-Jan-08	34	500	0.435	7.37	428	58	#N/A	1.49	9	4
6-Feb-08	35	500	0.44	7.53	447	57	#N/A	1.16	9	3
13-Feb-08	36	500	0.45	7.40	440	57	#N/A	1.52	10	5
20-Feb-08	37	500	0.45	7.44	442	58	#N/A	1.40	7	4
27-Feb-08	38	500	0.455	7.38	425	50	#N/A	1.46	7	3
5-Mar-08	39	500	0.45	7.41	422	49	#N/A	1.51	8	4
12-Mar-08	40	500	0.445	7.50	417	52	#N/A	1.12	8	2
19-Mar-08	41	500	0.46	7.62	414	53	#N/A	1.21	10	3
26-Mar-08	42	500	0.465	7.43	415	49	#N/A	2.91	18	2
2-Apr-08	43	500	0.45	7.46	428	45	#N/A	2.18	18	1
9-Apr-08	44	500	0.435	7.46	416	42	#N/A	2.28	25	3
16-Apr-08	45	500	0.44	7.46	413	50	#N/A	2.69	17	3
23-Apr-08	46	500	0.435	7.53	425	54	#N/A	2.41	17	3
30-Apr-08	47	500	0.445	7.52	400	58	#N/A	2.2	18	4
7-May-08	48	500	0.48	7.64	382	55	#N/A	2.4	16	5
14-May-08	49	500	0.48	7.56	375	51	#N/A	2.1	14	3
21-May-08	50	500	0.46	7.61	364	47	#N/A	2.6	15	3
28-May-08	51	500	0.455	7.50	385	38	#N/A	2.9	15	3
4-Jun-08	52	500	0.46	7.63	404	34	#N/A	2.8	14	3
11-Jun-08	53	500	0.465	7.61	406	34	#N/A	2.4	15	4
18-Jun-08	54	500	0.47	7.63	375	29	#N/A	3.0	14.0	2
25-Jun-08	55	500	0.47	7.58	381	37	#N/A	3.3	14.9	2
2-Jul-08	56	500	0.475	7.58	385	36	#N/A	2.1	13.1	2
9-Jul-08	57	500	0.465	7.50	382	41	#N/A	2.2	13.7	4
16-Jul-08	58	500	0.47	7.47	394	36	#N/A	2.5	14.2	3
23-Jul-08	59	500	0.465	7.48	409	41	#N/A	2.4	14.3	2
30-Jul-08	60	500	0.48	7.45	401	39	#N/A	1.9	17.7	2
6-Aug-08	61	500	0.465	7.52	388	41	#N/A	2.3	21.4	2
13-Aug-08	62	500	0.46	7.45	366	39	#N/A	2.1	13.7	1
20-Aug-08	63	500	0.465	7.51	326	37	#N/A	2.2	15.3	1

**HUMIDITY CELL HC-3  
CALCULATED LOADING RATES  
(mg/kg/wk)**

**2.8-77**

**MINAGO PROJECT**

Date	Cycle No.	Hardness CaCO3 mg/kg/wk	Al mg/kg/wk	Sb mg/kg/wk	As mg/kg/wk	Ba mg/kg/wk	Be mg/kg/wk	Bi mg/kg/wk	B mg/kg/wk	Cd mg/kg/wk	Ca mg/kg/wk
12-Jun-07	1	13.3	0.047	0.000138	0.00063	0.00284	0.000031	0.000031	0.608	0.000019	1.581
20-Jun-07	2		0.0587						0.495123		1.051
27-Jun-07	3	7.6	0.070	0.000103	0.00086	0.00076	0.000021	0.000021	0.382	0.000004	0.521
4-Jul-07	4		0.0831						0.3662		0.6636
11-Jul-07	5	13.9	0.096	0.000092	0.00059	0.00142	0.000021	0.000021	0.350	0.000004	0.806
18-Jul-07	6		0.0798						0.27678		0.8344
25-Jul-07	7	11.5	0.063	0.000040	0.00031	0.00105	0.000022	0.000022	0.203	0.000004	0.862
1-Aug-07	8		0.1047						0.18886		0.7983
8-Aug-07	9	10.5	0.146	0.000036	0.00045	0.00120	0.000022	0.000022	0.174	0.000004	0.734
15-Aug-07	10		0.085						0.167315		0.7386
22-Aug-07	11	10.5	0.024	0.000029	0.00033	0.00092	0.000021	0.000021	0.160	0.000004	0.743
29-Aug-07	12		0.0254						0.15255		0.709
5-Sep-07	13	9.3	0.027	0.000034	0.00030	0.00080	0.000022	0.000022	0.145	0.000004	0.675
12-Sep-07	14		0.0341						0.133573		0.7204
19-Sep-07	15	11.2	0.041	0.000035	0.00030	0.00088	0.000022	0.000022	0.122	0.000004	0.766
26-Sep-07	16		0.0408						0.11474		0.7855
3-Oct-07	17	11.1	0.040	0.000045	0.00036	0.00093	0.000022	0.000111	0.107	0.000004	0.805
10-Oct-07	18		0.0354						0.100873		0.7975
17-Oct-07	19	11.1	0.031	0.000029	0.00028	0.00082	0.000004	0.000002	0.095	0.000002	0.790
24-Oct-07	20		0.025						0.0933		0.882
31-Oct-07	21	12.4	0.018	0.000022	0.00027	0.00095	0.000004	0.000002	0.092	0.000002	0.975
7-Nov-07	22		0.018						0.0788		1.008
14-Nov-07	23	13	0.017	0.000018	0.00019	0.00102	0.000005	0.000002	0.066	0.000002	1.042
21-Nov-07	24		0.024						0.0733		1.058
28-Nov-07	25	15	0.031	0.000027	0.00014	0.00143	0.000005	0.000002	0.081	0.000002	1.074
5-Dec-07	26		0.033						0.0702		1.043
12-Dec-07	27	13	0.035	0.000028	0.00026	0.00112	0.000005	0.000002	0.059	0.000002	1.012
19-Dec-07	28		0.022						0.0508		0.975
26-Dec-07	29	12	0.010	0.000014	0.00009	0.00102	0.000009	0.000002	0.042	0.000005	0.937
2-Jan-08	30		0.008						0.0497		1.267
9-Jan-08	31	17	0.006	0.000021	0.00011	0.00164	0.000005	0.000003	0.057	0.000003	1.597
16-Jan-08	32		0.011						0.0528		1.400
23-Jan-08	33	15	0.016	0.000014	0.00009	0.00132	0.000005	0.000002	0.048	0.000002	1.203
30-Jan-08	34		0.015						0.0449		1.189
6-Feb-08	35	15.3	0.015	0.000013	0.00007	0.00132	0.000004	0.000002	0.041	0.000002	1.175
13-Feb-08	36		0.016						0.0418		1.222
20-Feb-08	37	16.6	0.017	0.000014	0.00007	0.00148	0.000005	0.000002	0.042	0.000002	1.269
27-Feb-08	38		0.015						0.0389		1.253
5-Mar-08	39	15.9	0.013	0.000009	0.00006	0.00133	0.000005	0.000002	0.036	0.000002	1.238
12-Mar-08	40		0.014						0.0376		1.247
19-Mar-08	41	16.3	0.014	0.000009	0.00006	0.00137	0.000005	0.000002	0.040	0.000002	1.256
26-Mar-08	42		0.021						0.0358		1.235
2-Apr-08	43	16.1	0.027	0.000018	0.00007	0.00135	0.000005	0.000002	0.032	0.000027	1.215
9-Apr-08	44		0.018						0.0320		1.254
16-Apr-08	45	17.1	0.009	0.000013	0.00007	0.00141	0.000004	0.000002	0.032	0.000002	1.294
23-Apr-08	46		0.009						0.0325		1.419
30-Apr-08	47	19.8	0.009	0.000013	0.00005	0.00173	0.000004	0.000002	0.033	0.000002	1.544
7-May-08	48		0.008						0.0318		1.550
14-May-08	49	19.3	0.008	0.000010	0.00011	0.00170	0.000005	0.000002	0.031	0.000002	1.555
21-May-08	50		0.008						0.0274		1.337
28-May-08	51	14.6	0.009	0.000009	0.00004	0.00126	0.000005	0.000002	0.024	0.000002	1.119
4-Jun-08	52		0.010						0.0237		1.148
11-Jun-08	53	14.4	0.011	0.000009	0.00004	0.00140	0.000005	0.000002	0.023	0.000002	1.176
18-Jun-08	54		0.009						0.0236		1.157
25-Jun-08	55	14.2	0.008	0.000009	0.00006	0.00126	0.000005	0.000002	0.024	0.000002	1.137
2-Jul-08	56		0.008						0.0264		1.166
9-Jul-08	57	14.1	0.009	0.000009	0.00004	0.00136	0.000005	0.000002	0.029	0.000002	1.195
16-Jul-08	58		0.008						0.0260		1.251
23-Jul-08	59	15.4	0.007	0.000009	0.00010	0.00127	0.000005	0.000002	0.023	0.000002	1.307
30-Jul-08	60		0.007						0.0235		1.295
6-Aug-08	61	15.6	0.007	0.000009	0.00004	0.00131	0.000005	0.000002	0.024	0.000007	1.283
13-Aug-08	62		0.007						0.0235		1.253
20-Aug-08	63	15.1	0.008	0.000009	0.00003	0.00122	0.000005	0.000002	0.023	0.000006	1.223

**HUMIDITY CELL HC-3  
CALCULATED LOADING RATES  
(mg/kg/wk)**

**2.8-78**

**MINAGO PROJECT**

Date	Cycle No.	Cr	Co	Cu	Fe	Pb	Li	Mg	Mn	Hg	Mo	Ni
		mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk
12-Jun-07	1	0.0001	0.00004	0.00069	0.036	0.00001	0.0056	1.06	0.0003	0.031	0.0071	0.0031
20-Jun-07	2	0.0001035	0.00006	0.00079	0.05134		0.004	0.7475			0.0053	0.0032
27-Jun-07	3	0.0001	0.00007	0.00090	0.066	0.00003	0.0024	0.44	0.0003	0.021	0.0035	0.0033
4-Jul-07	4	0.000251	0.0001	0.00104	0.09684		0.0033	0.6814			0.0026	0.006
11-Jul-07	5	0.0004	0.00022	0.00118	0.127	0.00006	0.0042	0.92	0.0009	0.021	0.0017	0.0088
18-Jul-07	6	0.000298	0.0002	0.0007	0.09201		0.0032	0.8118			0.0011	0.0068
25-Jul-07	7	0.0002	0.00012	0.00022	0.057	0.00003	0.0022	0.70	0.0008	0.022	0.0005	0.0048
1-Aug-07	8	0.0002883	0.0002	0.00047	0.06977		0.0026	0.6947			0.0004	0.006
8-Aug-07	9	0.0004	0.00020	0.00071	0.083	0.00005	0.0029	0.69	0.0006	0.022	0.0003	0.0073
15-Aug-07	10	0.0003248	0.0001	0.00046	0.05757		0.0025	0.6458			0.0003	0.0052
22-Aug-07	11	0.0002	0.00007	0.00021	0.032	0.00002	0.0020	0.60	0.0002	0.021	0.0003	0.0032
29-Aug-07	12	0.0001675	0.00007	0.00025	0.02715		0.0024	0.5804			0.0003	0.0028
5-Sep-07	13	0.0001	0.00006	0.00030	0.022	0.00003	0.0029	0.56	0.0002	0.022	0.0003	0.0023
12-Sep-07	14	0.00009	0.00010	0.0003	0.03467		0.0032	0.6406			0.0003	0.0039
19-Sep-07	15	0.0001	0.00013	0.00030	0.047	0.00003	0.0036	0.72	0.0004	0.022	0.0002	0.0056
26-Sep-07	16	0.00013	0.0002	0.0004	0.04574		0.0037	0.7148			0.0002	0.0059
3-Oct-07	17	0.0002	0.00021	0.00049	0.044	0.00008	0.0037	0.71	0.0005	0.022	0.0002	0.0063
10-Oct-07	18	0.00015	0.0001	0.00039	0.03421		0.0035	0.6793			0.0002	0.0046
17-Oct-07	19	0.0001	0.00008	0.00029	0.024	0.00055	0.0034	0.65	0.0002	0.004	0.0002	0.0028
24-Oct-07	20	0.00011	0.00007	0.0002	0.022		0.0033	0.70			0.0002	0.0025
31-Oct-07	21	0.0001	0.00006	0.00011	0.019	0.00002	0.0032	0.75	0.0002	0.004	0.0001	0.0023
7-Nov-07	22	0.00009	0.00007	0.00021	0.020		0.003	0.76			0.0001	0.0029
14-Nov-07	23	0.0001	0.00008	0.00031	0.021	0.00006	0.0028	0.77	0.0004	0.005	0.0001	0.0035
21-Nov-07	24	0.00014	0.00014	0.00026	0.029		0.0033	0.88			0.0001	0.0049
28-Nov-07	25	0.0002	0.00021	0.00021	0.036	0.00004	0.0039	1.00	0.0005	0.005	0.0002	0.0062
5-Dec-07	26	0.00023	0.00017	0.0002	0.035		0.0036	0.93			0.0001	0.0055
12-Dec-07	27	0.0003	0.00014	0.00019	0.034	0.00004	0.0033	0.86	0.0004	0.005	0.0001	0.0047
19-Dec-07	28	0.00016	0.00009	0.00021	0.021		0.0028	0.79			0.0001	0.0031
26-Dec-07	29	0.00005	0.00005	0.00022	0.009	0.00003	0.0023	0.71	0.0003	0.005	0.0001	0.0015
2-Jan-08	30	0.00005	0.00004	0.0002	0.007		0.003	0.95			0.0001	0.0015
9-Jan-08	31	0.0001	0.00004	0.00019	0.005	0.00003	0.0037	1.18	0.0004	0.005	0.0002	0.0015
16-Jan-08	32	0.00007	0.00006	0.00022	0.011		0.0032	1.10			0.0002	0.002
23-Jan-08	33	0.0001	0.00008	0.00025	0.016	0.00002	0.0027	1.02	0.0004	0.005	0.0001	0.0025
30-Jan-08	34	0.00009	0.00006	0.00042	0.015		0.0031	0.97			0.0001	0.0025
6-Feb-08	35	0.0001	0.00005	0.00058	0.014	0.00002	0.0034	0.92	0.0003	0.004	0.0001	0.0026
13-Feb-08	36	0.00007	0.00006	0.00045	0.014		0.0032	0.99			0.0001	0.0028
20-Feb-08	37	0.00005	0.00007	0.00032	0.015	0.00002	0.0031	1.05	0.0004	0.005	0.0001	0.0029
27-Feb-08	38	0.00005	0.00007	0.00028	0.014		0.0029	1.01			0.0001	0.0028
5-Mar-08	39	0.00005	0.00007	0.00025	0.014	0.00002	0.0027	0.98	0.0004	0.005	0.0001	0.0027
12-Mar-08	40	0.00007	0.00006	0.0002	0.012		0.0028	1.02			0.0001	0.0025
19-Mar-08	41	0.0001	0.00005	0.00016	0.010	0.00002	0.0029	1.06	0.0004	0.005	0.0001	0.0023
26-Mar-08	42	0.00023	0.00005	0.00031	0.011		0.0031	1.04			0.0001	0.0023
2-Apr-08	43	0.0004	0.00005	0.00047	0.012	-	0.0032	1.02	0.0003	0.005	0.0001	0.0024
9-Apr-08	44	0.00020	0.00005	0.00033	0.010		0.0033	1.03			0.0001	0.0024
16-Apr-08	45	0.00004	0.00004	0.00019	0.009	0.00001	0.0034	1.04	0.0003	0.004	0.0001	0.0024
23-Apr-08	46	0.00004	0.00005	0.0002	0.008		0.0036	1.12			0.0001	0.0026
30-Apr-08	47	0.00004	0.00005	0.00020	0.008	0.00001	0.0038	1.21	0.0003	0.004	0.0001	0.0027
7-May-08	48	0.00005	0.00004	0.00011	0.007		0.0034	1.26			0.0001	0.0025
14-May-08	49	0.00005	0.00004	0.00002	0.005	0.00001	0.0029	1.31	0.0004	0.005	0.0001	0.0023
21-May-08	50	0.00005	0.00004	0.00026	0.006		0.0025	1.12			0.0001	0.0022
28-May-08	51	0.00005	0.00004	0.00051	0.006	0.00002	0.0022	0.93	0.0003	0.005	0.0001	0.0020
4-Jun-08	52	0.00005	0.00004	0.00076	0.007		0.0021	0.92			0.0001	0.0019
11-Jun-08	53	0.00005	0.00003	0.00101	0.007	0.00003	0.0020	0.91	0.0004	0.005	0.0001	0.0018
18-Jun-08	54	0.00014	0.00003	0.00062	0.007		0.0022	0.92			0.0001	0.0017
25-Jun-08	55	0.00024	0.00003	0.00024	0.006	0.00002	0.0023	0.93	0.0003	0.005	0.0001	0.0015
2-Jul-08	56	0.00016	0.00004	0.00036	0.007		0.0023	0.90			0.0001	0.0018
9-Jul-08	57	0.00009	0.00004	0.00048	0.009	0.00004	0.0024	0.87	0.0004	0.005	0.0001	0.0020
16-Jul-08	58	0.00007	0.00004	0.00034	0.007		0.0023	0.91			0.0001	0.0017
23-Jul-08	59	0.00005	0.00003	0.00020	0.004	0.00107	0.0022	0.95	0.0003	0.005	0.0001	0.0014
30-Jul-08	60	0.00005	0.00003	0.0002	0.004		0.0023	0.97			0.0001	0.0015
6-Aug-08	61	0.00005	0.00003	0.00019	0.004	0.00323	0.0024	0.99	0.0003	0.005	0.0001	0.0016
13-Aug-08	62	0.00005	0.00003	0.00017	0.004		0.0023	0.98			0.0001	0.0015
20-Aug-08	63	0.00005	0.00003	0.00014	0.004	0.00003	0.0021	0.97	0.0003	0.005	0.0001	0.0013



**HUMIDITY CELL HC-3  
CALCULATED LOADING RATES  
(mg/kg/wk)**

**2.8-79**

**MINAGO PROJECT**

Date	Cycle No.	P mg/kg/wk	K mg/kg/wk	Se ng/kg/wk	Si mg/kg/wk	Ag mg/kg/wk	Na mg/kg/wk	Sr ng/kg/wk	S mg/kg/wk	Tl mg/kg/wk	Sn mg/kg/wk	Ti mg/kg/wk
12-Jun-07	1	0.063	2.81	0.0017	0.92	0.000006	48.4	0.0134	27.2	0.00003	0.000031	0.00069
20-Jun-07	2			0.0014				0.0092				
27-Jun-07	3	0.041	1.04	0.0011	0.95	0.000008	26.6	0.0050	19.8	0.00002	0.000021	0.00111
4-Jul-07	4			0.0014				0.0065				
11-Jul-07	5	0.042	1.58	0.0016	1.29	0.000004	26.1	0.0080	12.0	0.00002	0.000059	0.00139
18-Jul-07	6			0.0013				0.0064				
25-Jul-07	7	0.044	0.99	0.0011	0.59	0.000004	14.2	0.0048	5.1	0.00002	0.000022	0.00136
1-Aug-07	8			0.001				0.0053				
8-Aug-07	9	0.045	1.12	0.0010	0.85	0.000004	13.0	0.0057	5.7	0.00002	0.000022	0.00245
15-Aug-07	10			0.0008				0.0055				
22-Aug-07	11	0.042	0.91	0.0007	0.55	0.000004	12.4	0.0053	5.6	0.00002	0.000021	0.00046
29-Aug-07	12			0.0006				0.0058				
5-Sep-07	13	0.043	1.17	0.0005	0.53	0.000004	10.3	0.0062	4.2	0.00002	0.000026	0.00047
12-Sep-07	14			0.0005				0.0063				
19-Sep-07	15	0.044	1.17	0.0005	0.54	0.000004	9.0	0.0063	2.8	0.00002	0.000022	0.00035
26-Sep-07	16			0.0004				0.0064				
3-Oct-07	17	0.045	1.03	0.0004	0.52	0.000004	7.3	0.0066	2.6	0.00002	0.000085	0.00058
10-Oct-07	18			0.0004				0.0069				
17-Oct-07	19	0.000	1.16	0.0004	0.48	0.000002	6.3	0.0072	2.1	0.00001	0.000029	0.00038
24-Oct-07	20			0.0003				0.0078				
31-Oct-07	21	0.001	1.15	0.0003	0.44	0.000002	5.2	0.0085	1.8	0.00001	0.000022	0.00022
7-Nov-07	22			0.0003				0.0081				
14-Nov-07	23	0.001	1.10	0.0003	0.38	0.000002	4.1	0.0076	2.7	0.00000	0.000027	0.00027
21-Nov-07	24			0.0003				0.0088				
28-Nov-07	25	0.001	1.24	0.0004	0.53	0.000005	4.9	0.0100	1.8	0.00001	0.000014	0.00032
5-Dec-07	26			0.0003				0.0093				
12-Dec-07	27	0.001	1.19	0.0003	0.48	0.000002	3.1	0.0086	1.8	0.00001	0.000005	0.00069
19-Dec-07	28			0.0003				0.0081				
26-Dec-07	29	0.001	0.92	0.0002	0.29	0.000002	2.3	0.0076	1.4	0.00001	0.000005	0.00023
2-Jan-08	30			0.0003				0.0096				
9-Jan-08	31	0.001	1.38	0.0004	0.38	0.000003	3.0	0.0116	2.1	0.00001	0.000005	0.00026
16-Jan-08	32			0.0004				0.0104				
23-Jan-08	33	0.001	1.06	0.0004	0.36	0.000002	2.4	0.0093	1.4	0.00001	0.000005	0.00033
30-Jan-08	34			0.0003				0.0094				
6-Feb-08	35	0.001	1.06	0.0002	0.36	0.000002	2.1	0.0095	1.3	0.00001	0.000004	0.00022
13-Feb-08	36			0.0002				0.0095				
20-Feb-08	37	0.001	1.08	0.0002	0.36	0.000002	2.0	0.0096	1.8	0.00001	0.000005	0.00045
27-Feb-08	38			0.0002				0.0093				
5-Mar-08	39	0.001	0.99	0.0002	0.28	0.000002	1.5	0.0090	1.4	0.00001	0.000005	0.00023
12-Mar-08	40			0.0002				0.0091				
19-Mar-08	41	0.001	0.95	0.0002	0.39	0.000002	1.4	0.0091	1.4	0.00001	0.000005	0.00028
26-Mar-08	42			0.0002				0.0092				
2-Apr-08	43	0.002	1.08	0.0002	0.31	0.000002	1.2	0.0093	1.4	0.00001	0.000005	0.00032
9-Apr-08	44			0.0002				0.0093				
16-Apr-08	45	0.001	1.03	0.0002	0.32	0.000002	1.2	0.0093	1.3	0.00001	0.000004	0.00022
23-Apr-08	46			0.0002				0.0105				
30-Apr-08	47	0.001	1.06	0.0002	0.34	0.000002	1.1	0.0117	1.3	0.00001	0.000004	0.00022
7-May-08	48			0.0002				0.0114				
14-May-08	49	0.001	0.94	0.0002	0.32	0.000002	1.1	0.0111	1.9	0.00001	0.000005	0.00024
21-May-08	50			0.0002				0.0095				
28-May-08	51	0.001	0.70	0.0001	0.25	0.000002	0.8	0.0079	1.4	0.00000	0.000005	0.00023
4-Jun-08	52			0.0002				0.008				
11-Jun-08	53	0.001	0.74	0.0002	0.26	0.000002	1.0	0.0081	1.4	0.00001	0.000005	0.00023
18-Jun-08	54			0.0002				0.0078				
25-Jun-08	55	0.001	0.71	0.0002	0.25	0.000003	0.7	0.0075	1.4	0.00001	0.000005	0.00024
2-Jul-08	56			0.0002				0.0079				
9-Jul-08	57	0.001	0.79	0.0002	0.28	0.000002	0.7	0.0084	1.4	0.00001	0.000005	0.00023
16-Jul-08	58			0.0002				0.0083				
23-Jul-08	59	0.001	0.80	0.0002	0.23	0.000002	0.7	0.0083	1.4	0.00001	0.000005	0.00023
30-Jul-08	60			0.0002				0.0083				
6-Aug-08	61	0.001	0.80	0.0002	0.27	0.000002	0.7	0.0082	1.4	0.00001	0.000005	0.00023
13-Aug-08	62			0.0002				0.008				
20-Aug-08	63	0.001	0.70	0.0002	0.24	0.000003	0.6	0.0079	1.4	0.00001	0.000005	0.00023

**HUMIDITY CELL HC-3  
CALCULATED LOADING RATES  
(mg/kg/wk)**

**2.8-80**

**MINAGO PROJECT**

Date	Cycle No.	U	V	Zn	Zr
		mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/L
12-Jun-07	1	0.0003	0.0033	0.0003	0.00313
20-Jun-07	2				
27-Jun-07	3	0.0009	0.0023	0.0003	0.00205
4-Jul-07	4				
11-Jul-07	5	0.0015	0.0018	0.0007	0.00210
18-Jul-07	6				
25-Jul-07	7	0.0006	0.0013	0.0002	0.00220
1-Aug-07	8				
8-Aug-07	9	0.0004	0.0012	0.0003	0.00223
15-Aug-07	10				
22-Aug-07	11	0.0004	0.0008	0.0002	0.00208
29-Aug-07	12				
5-Sep-07	13	0.0004	0.0009	0.0002	0.00215
12-Sep-07	14				
19-Sep-07	15	0.0004	0.0008	0.0002	0.00218
26-Sep-07	16				
3-Oct-07	17	0.0005	0.0007	0.0004	0.00223
10-Oct-07	18				
17-Oct-07	19	0.0004	0.0007	0.0002	0.00004
24-Oct-07	20				
31-Oct-07	21	0.0003	0.0005	0.0002	0.00004
7-Nov-07	22				
14-Nov-07	23	0.0003	0.0005	0.0002	0.00005
21-Nov-07	24				
28-Nov-07	25	0.0004	0.0007	0.0001	0.00005
5-Dec-07	26				
12-Dec-07	27	0.0003	0.0006	0.0001	0.00005
19-Dec-07	28				
26-Dec-07	29	0.0002	0.0004	0.0004	0.00005
2-Jan-08	30				
9-Jan-08	31	0.0004	0.0004	0.0003	0.00005
16-Jan-08	32				
23-Jan-08	33	0.0002	0.0004	0.0003	0.00005
30-Jan-08	34				
6-Feb-08	35	0.0003	0.0003	0.0007	0.00004
13-Feb-08	36				
20-Feb-08	37	0.0002	0.0004	0.0002	0.00005
27-Feb-08	38				
5-Mar-08	39	0.0002	0.0003	0.0001	0.00005
12-Mar-08	40				
19-Mar-08	41	0.0002	0.0004	0.0002	0.00005
26-Mar-08	42				
2-Apr-08	43	0.0002	0.0004	0.0027	0.00005
9-Apr-08	44				
16-Apr-08	45	0.0002	0.0003	0.0002	0.00004
23-Apr-08	46				
30-Apr-08	47	0.0003	0.0003	0.0001	0.00004
7-May-08	48				
14-May-08	49	0.0004	0.0003	0.0001	0.00005
21-May-08	50				
28-May-08	51	0.0002	0.0003	0.0001	0.00005
4-Jun-08	52				
11-Jun-08	53	0.0003	0.0002	0.0007	0.00005
18-Jun-08	54				
25-Jun-08	55	0.0003	0.0003	0.0004	0.00005
2-Jul-08	56				
9-Jul-08	57	0.0002	0.0003	0.0007	0.00005
16-Jul-08	58				
23-Jul-08	59	0.0002	0.0003	0.0002	0.00005
30-Jul-08	60				
6-Aug-08	61	0.0003	0.0003	0.0002	0.00005
13-Aug-08	62				
20-Aug-08	63	0.0002	0.0002	0.0001	0.00005

**HUMIDITY CELL HC-4**  
**CALCULATED LOADING RATES**  
**(mg/kg/wk)**  
**MINAGO PROJECT**

**2.8-81**

**HC 4**

**Sample = OB/LS/FS/AR/ORE Composite**

Date	Cycle No.	Volume Input mL	Volume Output L	pH	ORP mV	Cond. umhos/cm	Acidity (pH 4.5) mg/kg/wk	Acidity (pH 8.3) mg/kg/wk	Alkalinity mg/kg/wk	Sulphate mg/L
12-Jun-07	1	750	0.600	8.96	272	319	#N/A	0	36.7	54
20-Jun-07	2	500	0.405	8.38	313	662	#N/A	0	21.6	71
27-Jun-07	3	500	0.435	8.49	337	590	#N/A	0	21.0	96
4-Jul-07	4	500	0.495	8.60	326	422	#N/A	0	24.2	71
11-Jul-07	5	500	0.425	8.04	351	485	#N/A	0.812	18.0	74
18-Jul-07	6	500	0.435	8.50	344	398	#N/A	0	19.6	64
25-Jul-07	7	500	0.465	8.63	351	267	#N/A	0	19.8	40
1-Aug-07	8	500	0.470	8.41	343	276	#N/A	0	20.1	29
8-Aug-07	9	500	0.470	8.61	299	260	#N/A	0	20.6	33
15-Aug-07	10	500	0.46	8.35	366	24	#N/A	0	18.4	26
22-Aug-07	11	500	0.44	8.51	356	179	#N/A	0	17.4	22
29-Aug-07	12	500	0.44	8.38	364	157	#N/A	0	15.5	17
5-Sep-07	13	500	0.435	8.52	362	150	#N/A	0	15.7	20
12-Sep-07	14	500	0.435	8.40	369	129	#N/A	0	15.8	16
19-Sep-07	15	500	0.455	8.53	361	118	#N/A	0	17.8	18
26-Sep-07	16	500	0.445	8.52	375	174	#N/A	0.000	15.4	13
3-Oct-07	17	500	0.455	8.26	377	161	#N/A	0.8645	16.2	15
10-Oct-07	18	500	0.48	8.45	388	150	#N/A	0	17.3	12
17-Oct-07	19	500	0.435	7.57	412	147	#N/A	1.3398	15.1	10
24-Oct-07	20	500	0.465	8.26	405	120	#N/A	0.5208	16.7	11
31-Oct-07	21	500	0.445	7.71	401	121	#N/A	1.32165	12.7	9
7-Nov-07	22	500	0.46	7.89	411	113	#N/A	1.0442	13.7	10
14-Nov-07	23	500	0.465	7.76	431	115	#N/A	1.0974	13.2	10
21-Nov-07	24	500	0.455	7.78	458	106	#N/A	1.20575	11.1	9
28-Nov-07	25	500	0.475	7.81	417	113	#N/A	1.311	14.3	11
5-Dec-07	26	500	0.475	7.73	436	105	#N/A	1.368	13.3	10
12-Dec-07	27	500	0.485	7.66	417	92	#N/A	1.08155	12.2	8
19-Dec-07	28	500	0.46	7.69	452	94	#N/A	0.8648	11.3	7
26-Dec-07	29	500	0.47	7.42	417	96	#N/A	0.9353	11.5	9
2-Jan-08	30	500	0.47	7.63	448	87	#N/A	1.0857	11.2	7
9-Jan-08	31	500	0.495	7.70	408	104	#N/A	1.17315	15.1	10
16-Jan-08	32	500	0.47	7.50	471	78	#N/A	1.4946	9.6	7
23-Jan-08	33	500	0.46	7.48	413	85	#N/A	1.817	10.4	7
30-Jan-08	34	500	0.45	7.57	427	92	#N/A	1.6605	11.1	9
6-Feb-08	35	500	0.445	7.70	445	90	#N/A	1.246	10.8	8
13-Feb-08	36	500	0.435	7.62	438	78	#N/A	1.6878	9.9	5
20-Feb-08	37	500	0.465	7.48	442	71	#N/A	1.488	8.5	7
27-Feb-08	38	500	0.455	7.54	421	71	#N/A	1.5561	9.2	5
5-Mar-08	39	500	0.445	7.47	421	69	#N/A	1.78	7.9	5
12-Mar-08	40	500	0.435	7.56	419	78	#N/A	1.1049	9.1	6
19-Mar-08	41	500	0.46	7.66	416	75	#N/A	1.2926	10.2	6
26-Mar-08	42	500	0.48	7.46	419	69	#N/A	3.13	20.2	6
2-Apr-08	43	500	0.47	7.47	429	60	#N/A	2.59	18.3	6
9-Apr-08	44	500	0.475	7.48	413.08	72.1	#N/A	2.5	17	5
16-Apr-08	45	500	0.47	7.50	417.96	81.2	#N/A	3.1	21	8
23-Apr-08	46	500	0.465	7.53	429.68	80.7	#N/A	2.8	22	7
30-Apr-08	47	500	0.47	7.53	404.78	79.6	#N/A	2.4	20	7
7-May-08	48	500	0.47	7.66	390.62	81.7	#N/A	2.8	23	7
14-May-08	49	500	0.475	7.57	379.88	68.1	#N/A	2.4	18	5
21-May-08	50	500	0.455	7.66	373.53	95.1	#N/A	3.0	27	7
28-May-08	51	500	0.47	7.58	392.57	63.8	#N/A	3.1	22	5
4-Jun-08	52	500	0.465	7.62	415.03	60.0	#N/A	3.3	21	5
11-Jun-08	53	500	0.48	7.67	413.08	62.2	#N/A	2.8	26	5
18-Jun-08	54	500	0.47	7.64	383	62	#N/A	3.6	27.4	6
25-Jun-08	55	500	0.475	7.61	390	76	#N/A	3.8	26.0	5
2-Jul-08	56	500	0.465	7.60	393	64	#N/A	2.3	16.1	5
9-Jul-08	57	500	0.48	7.57	389	81	#N/A	2.6	22.2	8
16-Jul-08	58	500	0.47	7.52	399	64	#N/A	2.7	20.3	6
23-Jul-08	59	500	0.475	7.49	414	73	#N/A	2.9	17.9	6
30-Jul-08	60	500	0.49	7.43	409	59	#N/A	2.3	16.2	4
6-Aug-08	61	500	0.485	7.52	395	66	#N/A	2.4	22.0	5
13-Aug-08	62	500	0.48	7.45	375	68	#N/A	2.4	15.6	4
20-Aug-08	63	500	0.485	7.36	338	62	#N/A	2.6	15.9	4

**HUMIDITY CELL HC-4**  
**CALCULATED LOADING RATES**  
**(mg/kg/wk)**  
**MINAGO PROJECT**

**2.8-82**

Hardness CaCO3 mg/kg/wk	Al mg/kg/wk	Sb mg/kg/wk	As mg/kg/wk	Ba mg/kg/wk	Be mg/kg/wk	Bi mg/kg/wk	B mg/kg/wk	Cd mg/kg/wk	Ca mg/kg/wk	Cr mg/kg/wk	Co mg/kg/wk	Cu mg/kg/wk
12.8	0.298	0.00010	0.0005	0.003	0.000042	0.000030	0.630	0.000012	1.470	0.001	0.000	0.002
	0.2022						0.5499		1.8051	0.00034	0.0002	0.0018
20.5	0.106	0.00005	0.0005	0.002	0.000022	0.000022	0.470	0.000009	2.140	0.000	0.000	0.002
	0.1493						0.444425		2.0455	0.00019	0.0002	0.0011
20.5	0.193	0.00004	0.0003	0.002	0.000055	0.000021	0.419	0.000004	1.951	0.000	0.000	0.001
	0.1755						0.379018		1.6241	0.00033	0.0002	0.0006
12.8	0.159	0.00003	0.0002	0.002	0.000023	0.000023	0.339	0.000005	1.297	0.000	0.000	0.001
	0.123						0.343393		1.1892	0.00028	0.0001	0.0005
9.4	0.087	0.00004	0.0003	0.001	0.000024	0.000024	0.348	0.000005	1.081	0.000	0.000	0.000
	0.0579						0.31294		1.0443	0.0002	0.00006	0.0003
9.3	0.028	0.00002	0.0002	0.001	0.000022	0.000022	0.278	0.000004	1.008	0.000	0.000	0.000
	0.061						0.263233		1.0106	0.00018	0.00007	0.0004
9.7	0.094	0.00003	0.0003	0.001	0.000022	0.000022	0.248	0.000004	1.014	0.000	0.000	0.001
	0.0763						0.24181		0.9732	0.00011	0.00009	0.0005
8.5	0.059	0.00003	0.0004	0.001	0.000023	0.000023	0.235	0.000005	0.933	0.000	0.000	0.001
	0.0439						0.223405		0.91	0.00009	0.00008	0.0008
8	0.029	0.00010	0.0008	0.001	0.000023	0.000023	0.212	0.000005	0.887	0.000	0.000	0.001
	0.037						0.199313		0.8286	0.00011	0.00007	0.0008
7.6	0.045	0.00002	0.0004	0.001	0.000004	0.000002	0.187	0.000002	0.770	0.000	0.000	0.000
	0.036						0.180		0.85	0.00011	0.0001	0.0005
8.6	0.028	0.00003	0.0003	0.001	0.000004	0.000002	0.173	0.000002	0.930	0.00009	0.00006	0.00046
	0.025						0.161		0.9556	0.0001	0.0001	0.0005
8.7	0.022	0.00002	0.0001	0.001	0.000005	0.000002	0.149	0.000002	0.981	0.00009	0.00005	0.001
	0.042						0.138		1.0606	0.00019	0.0001	0.0005
11	0.061	0.00002	0.0001	0.001	0.000005	0.000002	0.126	0.000002	1.140	0.00029	0.00016	0.00032
	0.050						0.112		1.1884	0.00022	0.0001	0.0004
10.9	0.038	0.00003	0.0001	0.001	0.000005	0.000002	0.097	0.000002	1.237	0.00015	0.00008	0.00044
	0.028						0.103		1.2764	0.0001	0.0001	0.0004
12.4	0.017	0.00003	0.0001	0.001	0.000005	0.000002	0.108	0.000021	1.316	0.00005	0.00004	0.00040
	0.016						0.120		1.7	0.00005	0.0000	0.0004
18.1	0.014	0.00002	0.0001	0.002	0.000005	0.000002	0.132	0.000002	2.084	0.00005	0.00004	0.00033
	0.014						0.109		1.8424	0.00007	0.0000	0.0004
16.3	0.014	0.00002	0.0001	0.001	0.000005	0.000002	0.086	0.000002	1.601	0.00009	0.00004	0.00046
	0.022						0.094		1.7282	0.00009	0.0001	0.0005
18.7	0.031	0.00002	0.0001	0.002	0.000004	0.000003	0.101	0.000002	1.856	0.00009	0.00009	0.001
	0.023						0.095		1.7811	0.00007	0.0001	0.0004
16.9	0.015	0.00001	0.0001	0.001	0.000005	0.000002	0.089	0.000002	1.707	0.00005	0.00004	0.00028
	0.014						0.082		1.77	0.00005	0.00004	0.0002
18.5	0.012	0.00001	0.0001	0.001	0.000004	0.000002	0.075	0.000002	1.833	0.00004	0.00003	0.00020
	0.011						0.087		1.9471	0.00011	0.00003	0.0002
21.5	0.010	0.00002	0.0001	0.002	0.000005	0.000002	0.099	0.000002	2.061	0.00018	0.00003	0.00027
	0.016						0.083		2.0433	0.00016	0.00004	0.0003
20.3	0.022	0.00002	0.0001	0.002	0.000005	0.000002	0.067	0.000013	2.026	0.00014	0.00005	0.00038
	0.017						0.075		2.3547	9.4E-05	0.00005	0.0004
25.9	0.013	0.00001	0.0001	0.002	0.000005	0.000002	0.082	0.000002	2.684	0.00005	0.00005	0.00048
	0.011						0.077		2.6273	4.7E-05	0.00004	0.0004
25.6	0.009	0.00002	0.0001	0.002	0.000005	0.000002	0.072	0.000002	2.571	0.00005	0.00004	0.00041
	0.009						0.072		2.5086	4.7E-05	0.00003	0.0003
24.6	0.010	0.00002	0.0000	0.002	0.000005	0.000002	0.071	0.000002	2.446	0.00005	0.00003	0.00015
	0.011						0.065		2.3629	4.7E-05	0.00004	0.0004
23.6	0.012	0.00002	0.0001	0.002	0.000005	0.000002	0.059	0.000002	2.280	0.00005	0.00004	0.00061
	0.013						0.063		2.5534	4.8E-05	0.00005	0.0007
27.7	0.015	0.00002	0.0001	0.002	0.000005	0.000002	0.068	0.000002	2.827	0.00005	0.00005	0.00084
	0.015						0.069		2.7602	9.5E-05	0.00005	0.0007
27.1	0.015	0.00001	0.0001	0.002	0.000005	0.000002	0.070	0.000002	2.693	0.00014	0.00004	0.00057
	0.023						0.063		2.8034	0.00012	0.00005	0.0009
27.3	0.030	0.00001	0.0001	0.003	0.000005	0.000002	0.055	0.000002	2.914	0.00010	0.00006	0.00130
	0.020						0.051		2.8343	7.2E-05	0.00004	0.0007
26.1	0.009	0.00001	0.0001	0.002	0.000005	0.000002	0.046	0.000002	2.755	0.00005	0.00003	0.00018
	0.008						0.043		2.6312	4.8E-05	0.00003	0.0002
23.8	0.008	0.00001	0.0000	0.002	0.000005	0.000002	0.039	0.000008	2.507	0.00005	0.00003	0.00031
	0.008						0.038		2.4565	4.9E-05	0.00003	0.0004
23.3	0.009	0.00001	0.0000	0.002	0.000005	0.000002	0.036	0.000007	2.406	0.00005	0.00003	0.00047

**HUMIDITY CELL HC-4**  
**CALCULATED LOADING RATES**  
**(mg/kg/wk)**  
**MINAGO PROJECT**

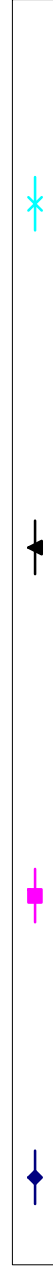
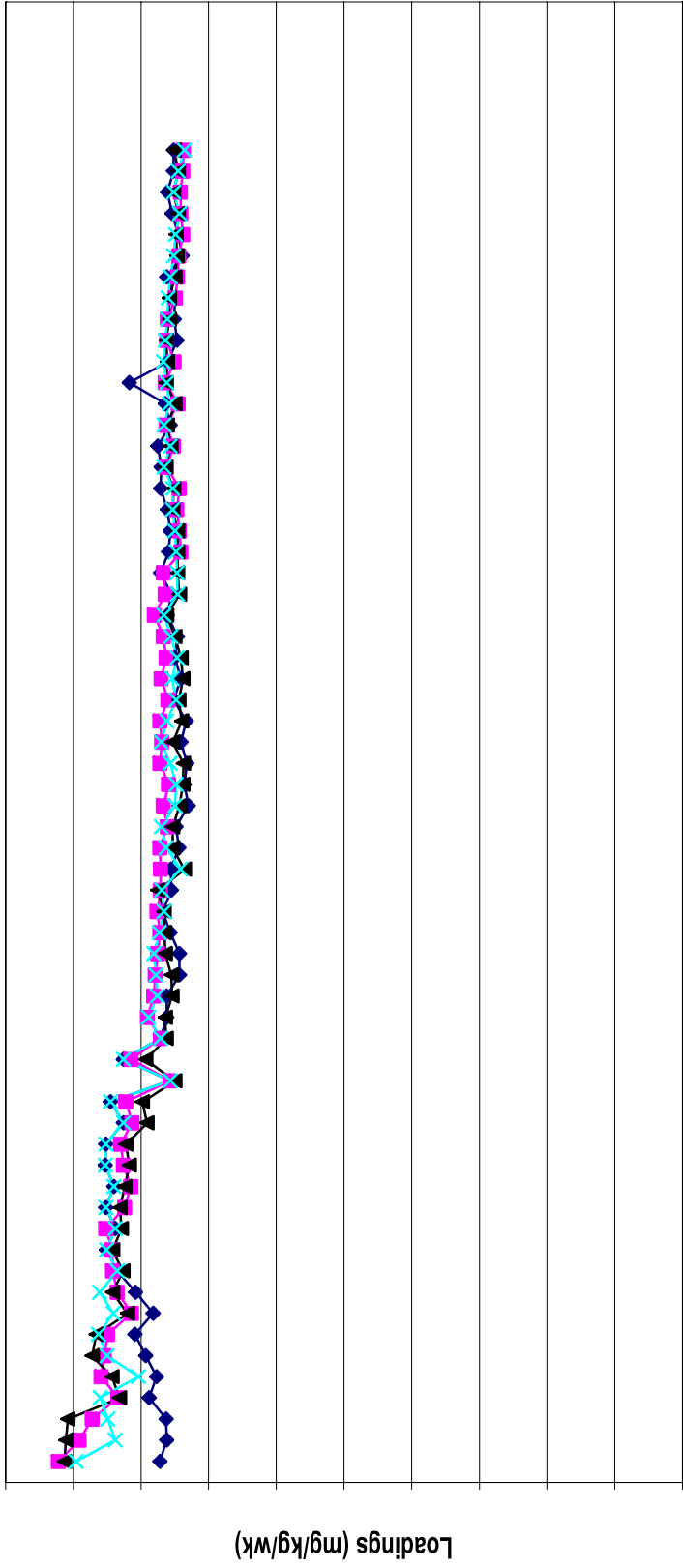
**2.8-83**

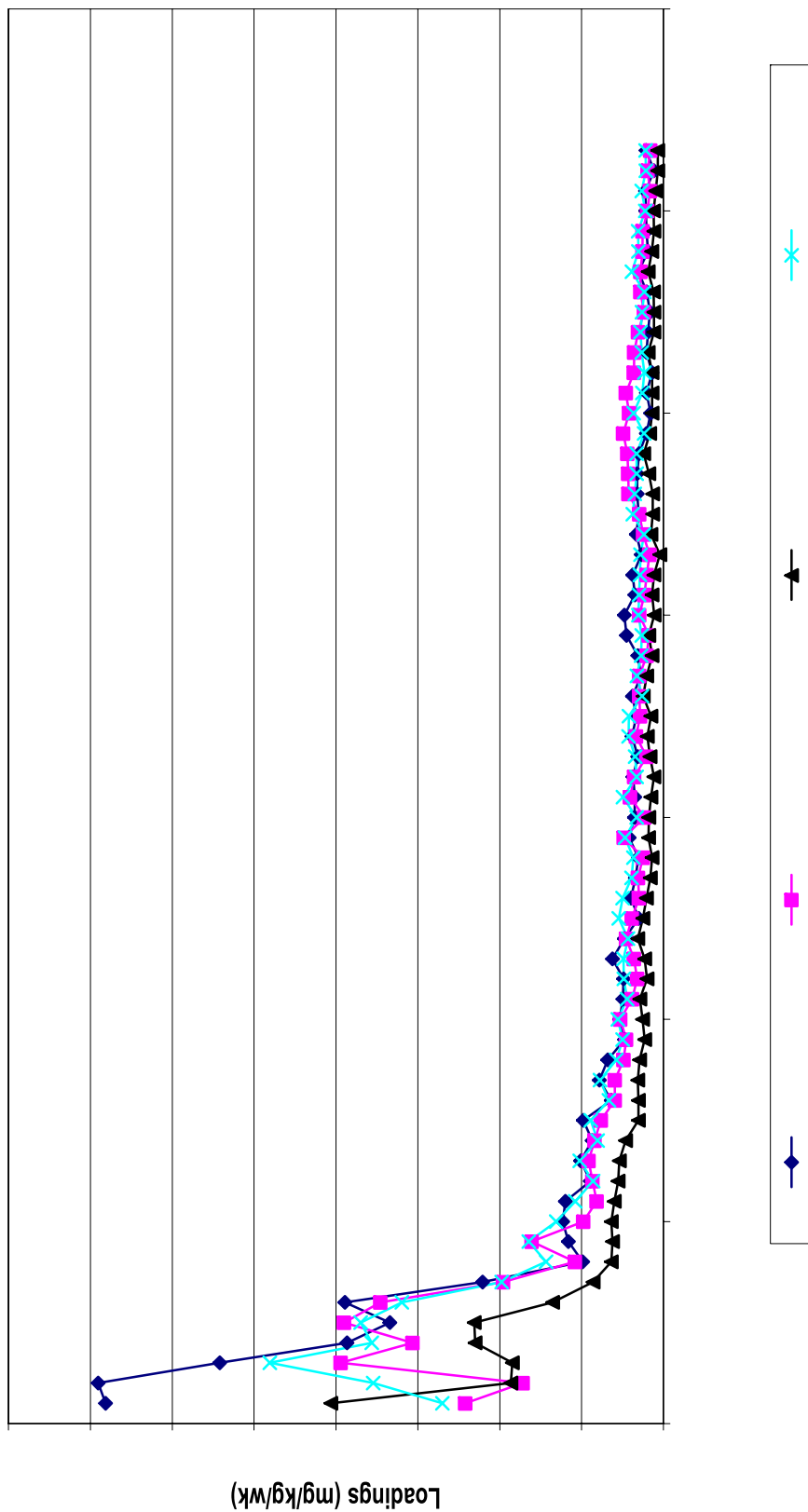
Fe	Pb	Li	Mg	Mn	Hg	Mo	Ni	P	K	Se	Si	Ag	Na
mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk
0.202	0.00007	0.007	0.978	0.0020	0.0300	0.006	0.005	0.060	3.306	0.001	1.554	0.000006	43.500
0.14213		0.0054	0.924			0.0059	0.008			0.0007			
0.083	0.00004	0.004	0.870	0.0015	0.0218	0.006	0.011	0.044	2.466	0.001	0.774	0.000004	45.240
0.12165		0.0043	0.9004			0.0041	0.0089			0.0012			
0.161	0.00009	0.004	0.931	0.0014	0.0213	0.003	0.007	0.043	2.784	0.001	1.216	0.000009	37.060
0.13659		0.0038	0.7955			0.0019	0.0073			0.0012			
0.113	0.00010	0.003	0.660	0.0014	0.0233	0.001	0.008	0.047	1.986	0.00098	0.828	0.000005	23.715
0.08047		0.0033	0.5393			0.0012	0.0056			0.001			
0.048	0.00003	0.003	0.418	0.0005	0.0235	0.001	0.003	0.047	2.195	0.00108	0.776	0.000005	22.795
0.04203		0.0028	0.4006			0.0009	0.003			0.001			
0.036	0.00003	0.002	0.383	0.0004	0.0220	0.001	0.003	0.044	1.505	0.00084	0.620	0.000004	18.040
0.05045		0.0027	0.4002			0.0008	0.0034			0.0009			
0.065	0.00004	0.003	0.418	0.0006	0.0218	0.001	0.004	0.044	1.927	0.00087	0.748	0.000004	15.182
0.05128		0.003	0.3954			0.0007	0.004			0.0007			
0.037	0.00004	0.003	0.373	0.0005	0.0228	0.001	0.004	0.046	1.961	0.00050	0.610	0.000005	14.151
0.03526		0.0029	0.3617			0.0006	0.0034			0.0006			
0.033	0.00007	0.003	0.350	0.0004	0.0228	0.001	0.003	0.046	1.638	0.00077	0.596	0.000005	12.149
0.03792		0.003	0.3427			0.0005	0.0032			0.0006			
0.043	0.00003	0.003	0.335	0.0004	0.0044	0.000	0.003	0.000	1.853	0.00037	0.626	0.000002	11.006
0.034		0.0032	0.350			0.0004	0.003			0.0003			
0.024	0.00002	0.003	0.365	0.0004	0.0045	0.000	0.003	0.001	1.887	0.00018	0.579	0.000002	8.900
0.022		0.0035	0.378			0.0004	0.0026			0.0002			
0.020	0.00016	0.004	0.391	0.0004	0.0047	0.000	0.002	0.001	2.246	0.00013	0.535	0.000005	8.370
0.041		0.004	0.487			0.0004	0.0047			0.0001			
0.063	0.00029	0.004	0.584	0.0007	0.0048	0.000	0.007	0.001	2.185	0.00014	0.708	0.000002	7.410
0.049		0.0041	0.559			0.0003	0.0056			0.0001			
0.034	0.00005	0.004	0.534	0.0006	0.0049	0.000	0.004	0.001	2.323	0.00010	0.538	0.000002	4.899
0.025		0.0041	0.572			0.0003	0.0032			0.0001			
0.015	0.00054	0.004	0.611	0.0004	0.0047	0.000	0.002	0.001	2.458	0.00006	0.531	0.000002	5.452
0.013		0.0048	0.763			0.0004	0.0025			0.0001			
0.011	0.00001	0.005	0.916	0.0004	0.0050	0.000	0.003	0.001	3.188	0.00015	0.559	0.000002	5.297
0.012		0.0047	0.886			0.0003	0.0027			0.0001			
0.012	0.00002	0.004	0.856	0.0005	0.0046	0.000	0.003	0.001	2.374	0.00006	0.469	0.000002	3.202
0.029		0.0045	0.875			0.0003	0.0036			0.0001			
0.045	0.00002	0.005	0.894	0.0006	0.0134	0.000	0.004	0.001	2.915	0.00006	0.587	0.000003	3.329
0.029		0.0047	0.884			0.0003	0.0035			0.0001			
0.012	0.00012	0.004	0.874	0.0005	0.0047	0.000	0.002	0.001	2.367	0.00007	0.474	0.000002	2.511
0.010		0.0041	0.880			0.0002	0.0023			0.0001			
0.009	0.00001	0.004	0.886	0.0004	0.0045	0.000	0.002	0.001	2.132	0.00004	0.390	0.000002	1.651
0.008		0.0043	1.015			0.0002	0.0022			0.0001			
0.006	0.00018	0.005	1.145	0.0004	0.0046	0.000	0.002	0.001	3.068	0.00007	0.492	0.000002	1.523
0.011		0.0046	1.116			0.0002	0.0025			0.0001			
0.015	0.00000	0.005	1.086	0.0004	0.0047	0.000	0.003	0.002	2.425	0.00006	0.443	0.000002	1.067
0.012		0.005	1.208			0.0002	0.003			0.0001			
0.010	0.00002	0.005	1.330	0.0006	0.0047	0.000	0.003	0.001	2.956	0.00006	0.559	0.000002	1.175
0.009		0.0054	1.347			0.0002	0.0029			0.0001			
0.008	0.00019	0.006	1.363	0.0004	0.0047	0.000	0.003	0.001	2.703	0.00007	0.531	0.000002	0.888
0.007		0.0053	1.358			0.0002	0.0026			0.0001			
0.006	0.00225	0.005	1.354	0.0005	0.0048	0.000	0.003	0.001	2.617	0.00006	0.532	0.000002	0.831
0.007		0.005	1.330			0.0002	0.0027			0.0001			
0.008	0.00001	0.005	1.307	0.0004	0.0047	0.000	0.003	0.001	2.468	0.00005	0.564	0.000002	0.597
0.010		0.0052	1.407			0.0002	0.0031			0.0001			
0.013	0.00001	0.005	1.507	0.0006	0.0048	0.000	0.003	0.001	2.942	0.00006	0.730	0.000002	0.662
0.017		0.0058	1.499			0.0002	0.0033			0.0001			
0.021	0.00001	0.006	1.492	0.0005	0.0048	0.000	0.003	0.001	2.617	0.00012	0.689	0.000005	0.475
0.022		0.0057	1.454			0.0002	0.0033			0.0001			
0.023	0.00006	0.005	1.416	0.0005	0.0048	0.000	0.004	0.001	2.482	0.00007	0.662	0.000002	0.480
0.014		0.005	1.380			0.0002	0.003			0.0001			
0.005	0.00001	0.005	1.344	0.0004	0.0048	0.000	0.002	0.001	2.309	0.00009	0.459	0.000002	0.333
0.006		0.0044	1.315			0.0002	0.0026			0.0001			
0.006	0.00041	0.004	1.285	0.0004	0.0049	0.000	0.003	0.001	2.056	0.00002	0.472	0.000002	0.291
0.006		0.0041	1.285			0.0002	0.0025			0.0000			
0.006	0.00003	0.004	1.285	0.0004	0.0049	0.000	0.002	0.001	1.969	0.00005	0.428	0.000002	0.291

**HUMIDITY CELL HC-4**  
**CALCULATED LOADING RATES**  
**(mg/kg/wk)**  
**MINAGO PROJECT**

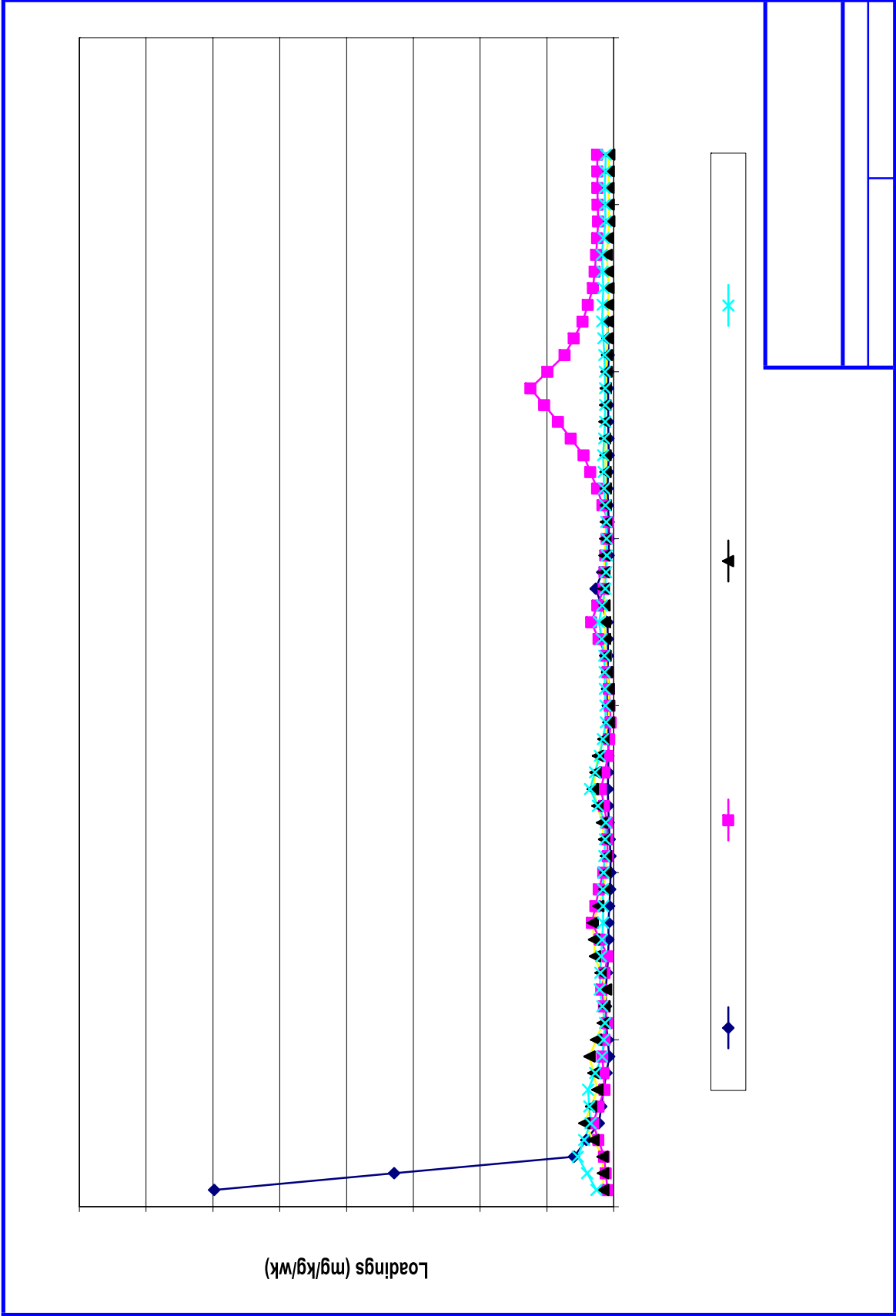
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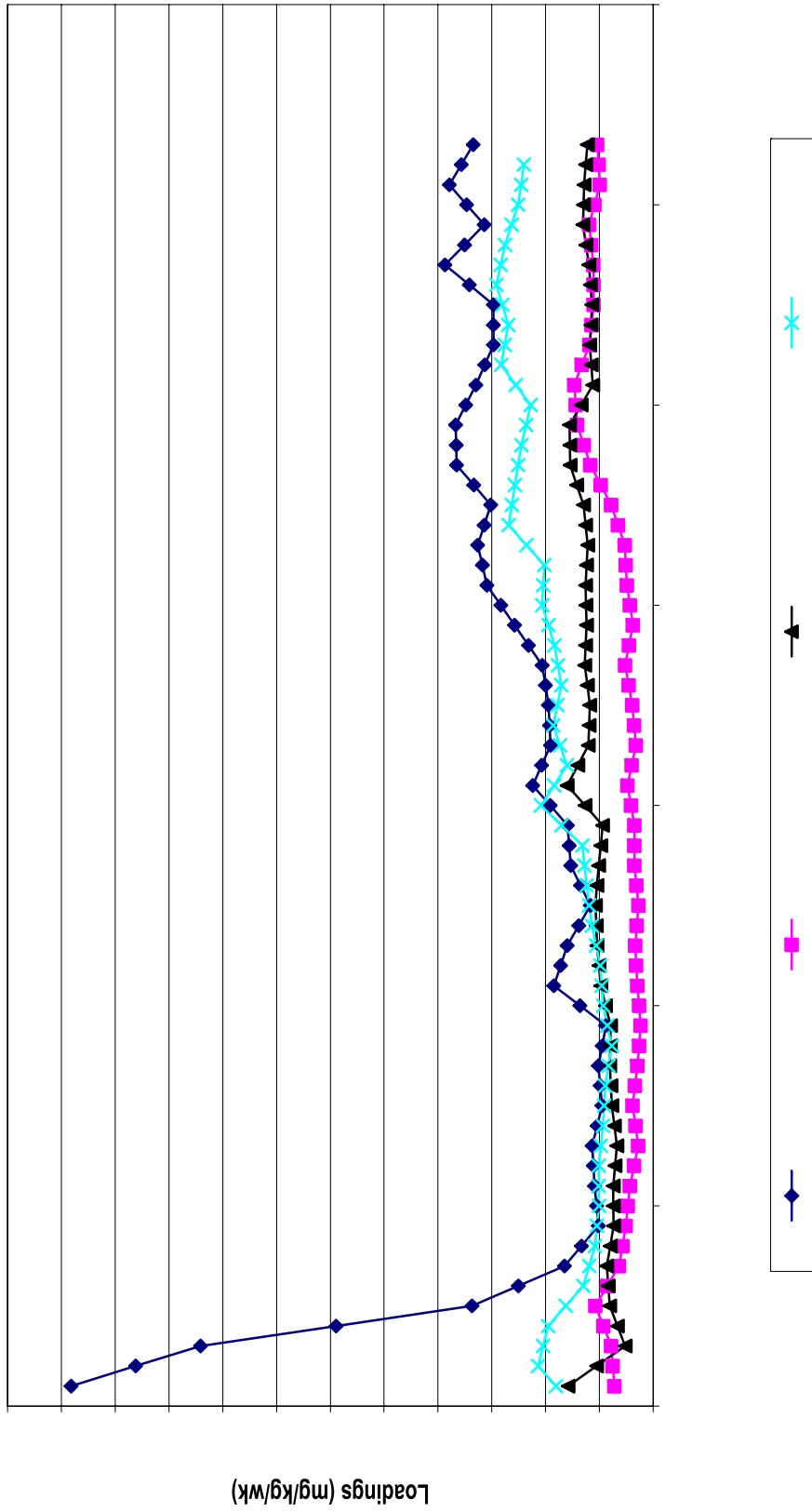
Sr	S	Ti	Sn	Ti	U	V	Zn	Zr
mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/L
0.011	18.480	0.000030	0.00003	0.00522	0.00052	0.00696	0.00054	0.00300
0.0168								
0.022	28.667	0.000022	0.00003	0.00278	0.00080	0.00314	0.00170	0.00218
0.0219								
0.022	23.588	0.000021	0.00004	0.00557	0.00054	0.00291	0.00068	0.00213
0.0155								
0.009	12.044	0.000023	0.00002	0.00428	0.00063	0.00278	0.00084	0.00233
0.0091								
0.009	11.186	0.000024	0.00008	0.00183	0.00060	0.00288	0.00061	0.00235
0.0076								
0.006	8.316	0.000022	0.00002	0.00097	0.00041	0.00189	0.00035	0.00220
0.0069								
0.007	7.656	0.000022	0.00003	0.00239	0.00037	0.00203	0.00039	0.00218
0.007								
0.007	5.915	0.000023	0.00002	0.00146	0.00044	0.00206	0.00023	0.00228
0.0068								
0.007	5.551	0.000023	0.00002	0.00086	0.00047	0.00192	0.00091	0.00228
0.0062								
0.006	4.350	0.000003	0.00005	0.00109	0.00040	0.00178	0.00048	0.00009
0.0061								
0.007	3.115	0.000004	0.00001	0.00067	0.00041	0.00125	0.00062	0.00004
0.0071								
0.007	4.650	0.000002	0.00003	0.00074	0.00043	0.00116	0.00028	0.00009
0.0086								
0.010	3.325	0.000005	0.00001	0.00176	0.00046	0.00119	0.00010	0.00010
0.0101								
0.010	3.395	0.000004	0.00001	0.00146	0.00040	0.00092	0.00019	0.00005
0.011								
0.012	3.760	0.000006	0.00000	0.00033	0.00034	0.00085	0.00188	0.00005
0.0139								
0.016	4.455	0.000006	0.00000	0.00025	0.00048	0.00074	0.00015	0.00005
0.0149								
0.014	2.760	0.000005	0.00000	0.00041	0.00026	0.00060	0.00060	0.00005
0.0147								
0.016	3.115	0.000007	0.00000	0.00085	0.00025	0.00067	0.00040	0.00004
0.0148								
0.014	2.790	0.000005	0.00000	0.00042	0.00021	0.00060	0.00047	0.00005
0.0138								
0.014	2.670	0.000005	0.00000	0.00031	0.00016	0.00049	0.00022	0.00004
0.0155								
0.017	2.760	0.000006	0.00000	0.00060	0.00021	0.00037	0.00032	0.00005
0.0172								
0.017	2.350	0.000007	0.00000	0.00089	0.00023	0.00052	0.00127	0.00005
0.0192								
0.021	2.820	0.000008	0.00000	0.00033	0.00022	0.00052	0.00042	0.00005
0.0213								
0.021	2.350	0.000008	0.00000	0.00028	0.00025	0.00056	0.00028	0.00005
0.0208								
0.020	2.850	0.000008	0.00000	0.00029	0.00028	0.00057	0.00019	0.00005
0.02								
0.020	1.880	0.000007	0.00000	0.00024	0.00035	0.00052	0.00019	0.00005
0.0218								
0.024	1.920	0.000009	0.00000	0.00048	0.00038	0.00048	0.00034	0.00024
0.0228								
0.022	1.900	0.000008	0.00000	0.00038	0.00037	0.00062	0.00052	0.00024
0.0235								
0.025	2.400	0.000008	0.00000	0.00067	0.00031	0.00048	0.00139	0.00024
0.0235								
0.022	2.375	0.000008	0.00000	0.00029	0.00027	0.00043	0.00029	0.00024
0.0207								
0.020	1.940	0.000008	0.00000	0.00024	0.00023	0.00039	0.00015	0.00024
0.0195								
0.019	2.425	0.000009	0.00000	0.00024	0.00022	0.00034	0.00019	0.00024

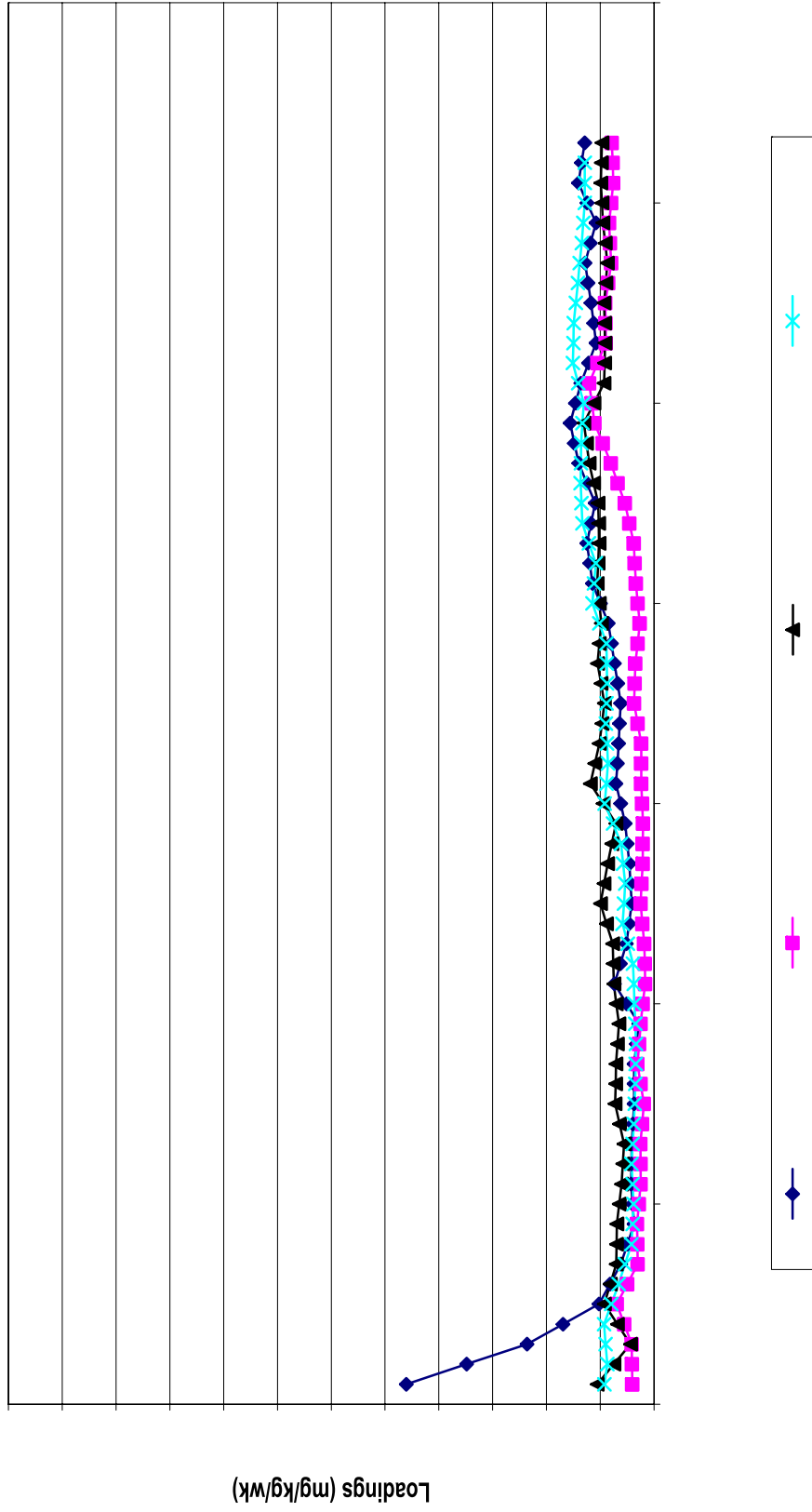


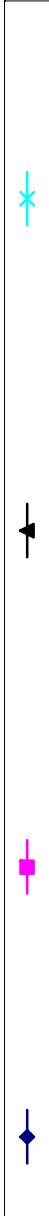
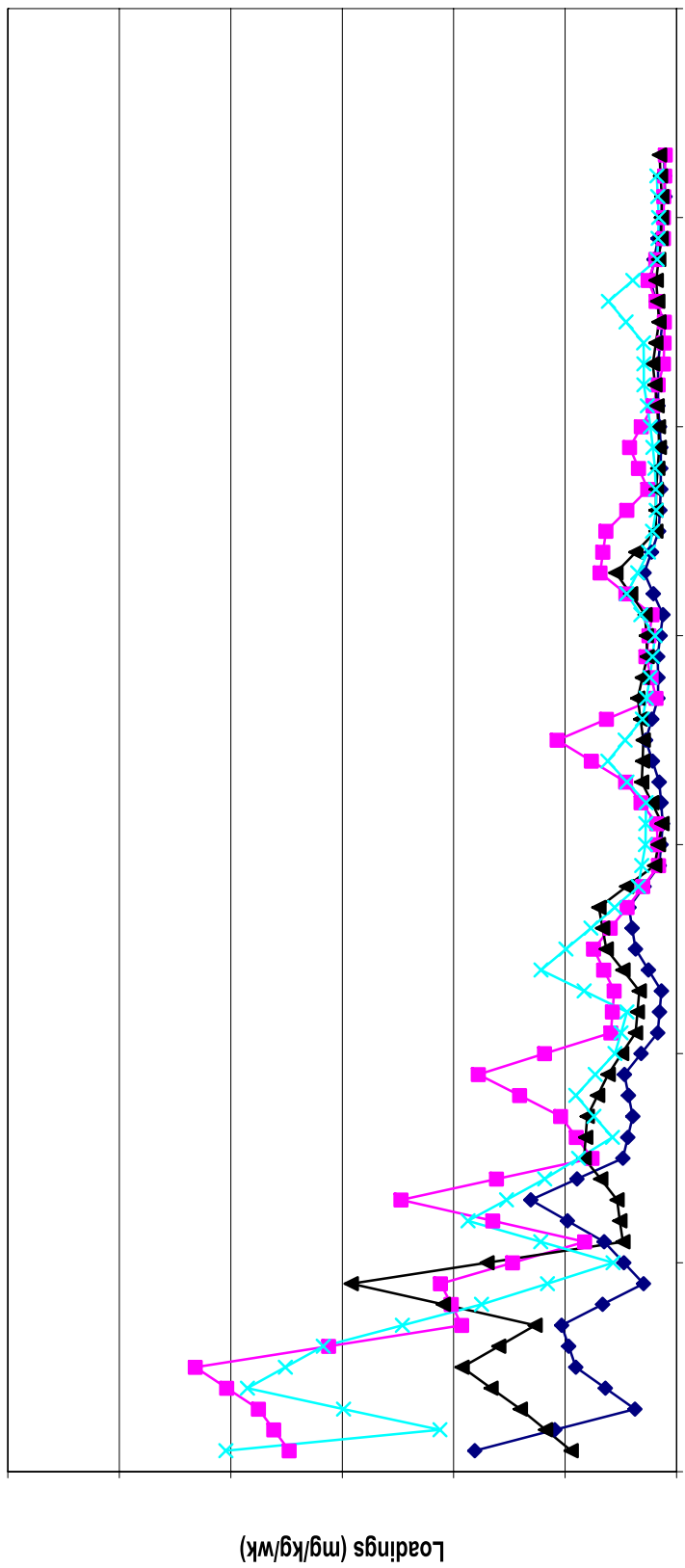


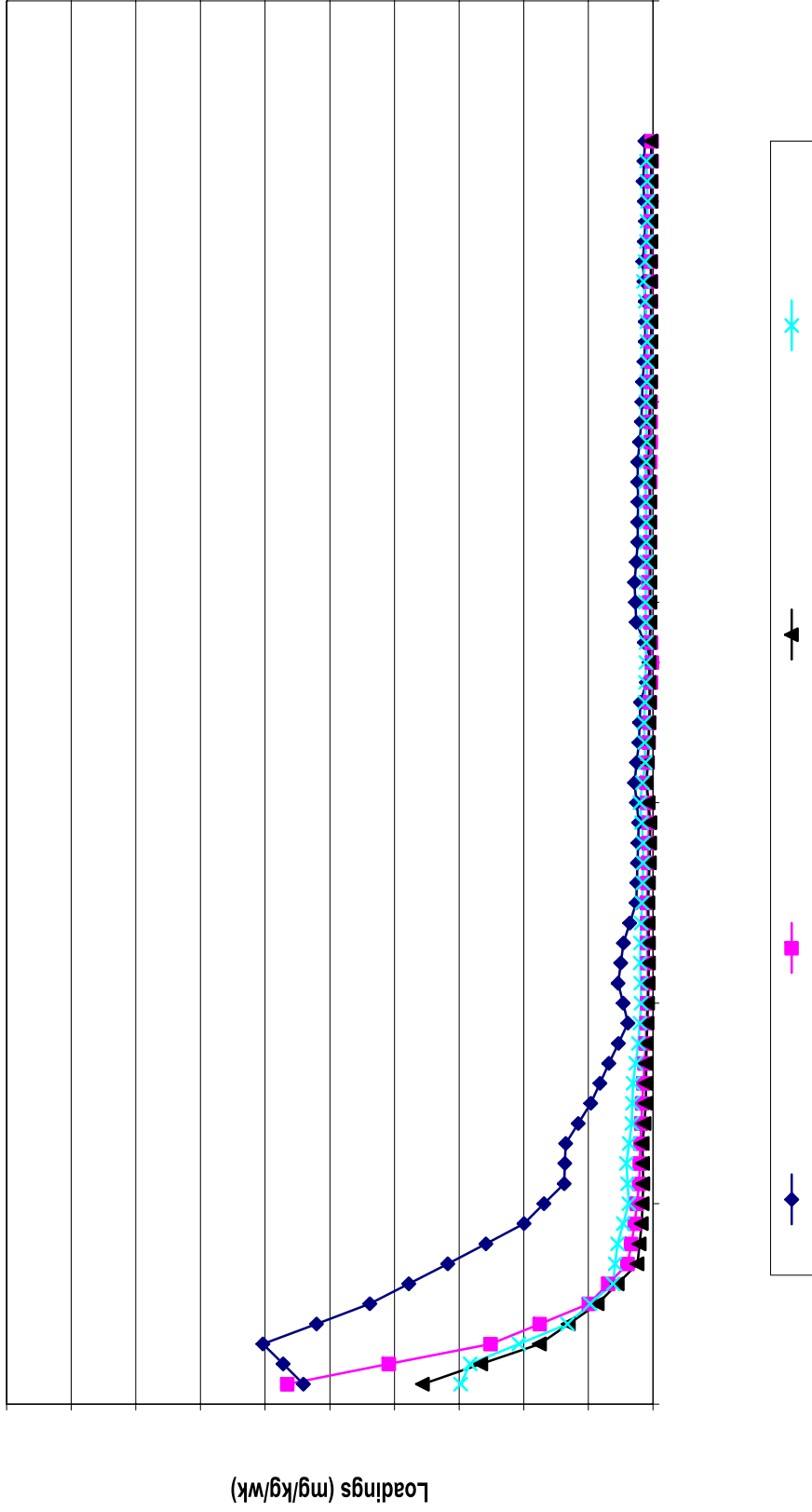


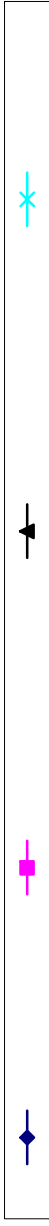
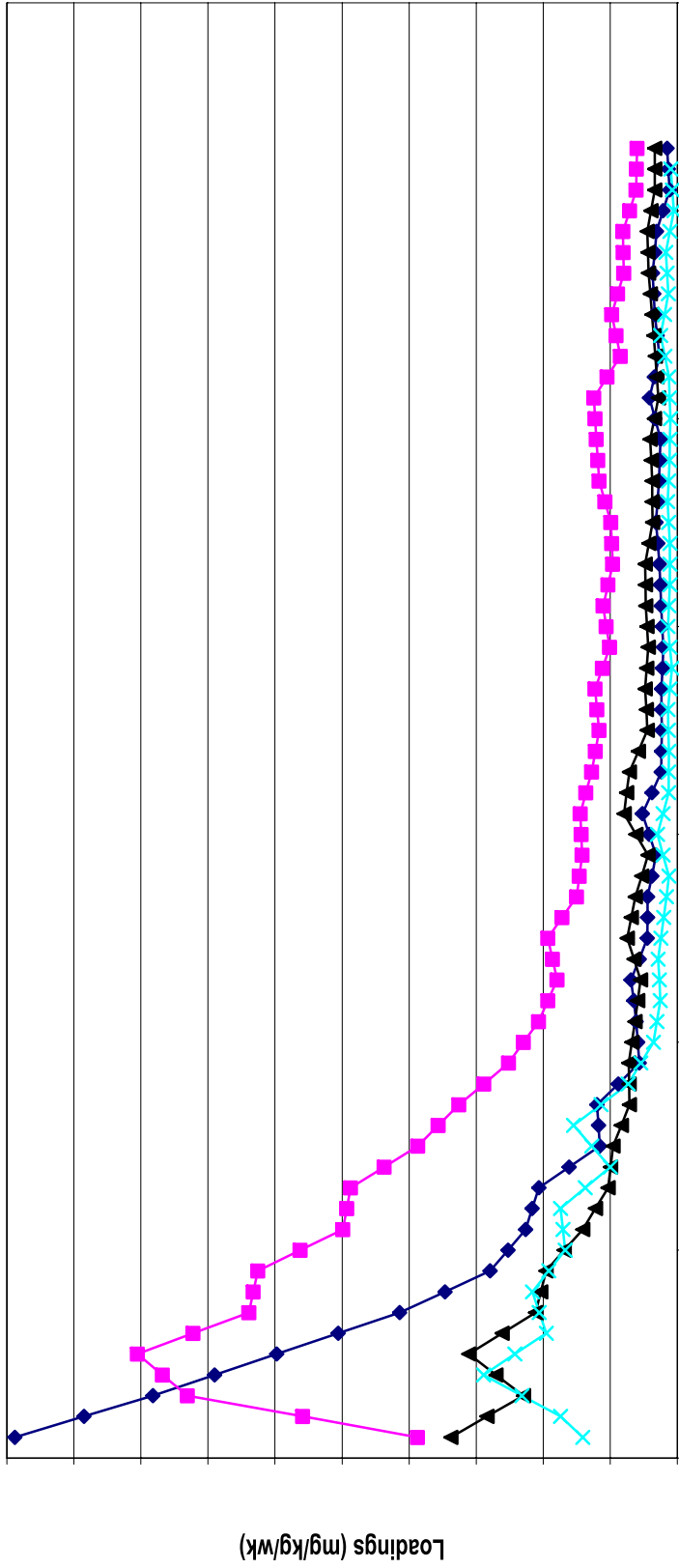




Source: URS (2009)







# APPENDIX 2.8-B

## Tailings

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<b>Appendix 2.8-B2:</b> 2006 SGS Lakefield Research Limited ABA Report	2.8-107
<b>Appendix 2.8-B3:</b> Kinetic Test Results	2.8-110

# **APPENDIX 2.8-B1**

**Static, Grainsize and Metal Results**



**2006 Metallurgical Tailings Samples  
Tailings Geochemical Characterization  
Minago Project**

Sample #	Sample ID				Sample Weight (g)	
1	11241-1	1st cl	Tail A	CCT3	485.0	
2	11241-1	1st cl	Tail B	CCT3	707.0	
3	11241-1	1st cl	Tail C	CCT3	737.0	
4	11241-1	1st cl	Tail D	CCT3	694.0	
5	11241-1	1st cl	Tail E	CCT3	745.0	
6	11241-1	1st cl	Tail F	CCT3	765.0	4133.0
7	11241-1	Ru	Tail A	CCT3	1330.0	
8	11241-1	Ru	Tail B	CCT3	1214.0	
9	11241-1	Ru	Tail C	CCT3	1199.0	
10	11241-1	Ru	Tail D	CCT3	1180.0	
11	11241-1	Ru	Tail E	CCT3	1199.0	
12	11241-1	Ru	Tail F	CCT3	1150.0	7272.0



CL : K : N  
 PF : N  
 CE : 0 : N  
 Te : N  
 Da : N

Sa	Aç pp	Al %	As pp	Ba pp	Be pp	Bi pp	Ca %	Cc pp	Cc pp	Cr pp	Cu pp	Fe %	Hç pp	ç %	La pp	Mç %	Mr pp
1st	<0	0.£		16	<0	<5	0.£		48	31	46	4.£	<1	0.£	40	>1	43

CL : K : N  
 PF : N  
 CE : O : N  
 Te : N  
 Da : N

Sa	Mic pp	Ne %	Ni pp	Pb pp	i %	Sb pp	Sc pp	Sr pp	Th pp	Ti %	Tl pp	J pp	I pp	Zn pp	Zr pp
1st	<2	0.0	22	11	0.1			11		0.0	<1	20	30	<1	22

**CLIENT** : Nuinsco Resources Ltd.  
**PROJECT** : Minago  
**CEMI Project #** : 0714  
**Test** : Screen Assay  
**Date** : November 22, 2007

**1st Cleaner Scavenger & Rougher Tails**

Sieve Designation	Aperture (mm)	Weight Retained		
		(g)	(%)	Cumulative (%)
+60	0.250	13.85	13.9%	13.9%
-60 + 100	0.150	6.48	6.5%	20.4%
-100 + 140	0.106	8.82	8.8%	29.2%
- 140 + 270	0.053	24.85	24.9%	54.1%
-270 + 325	0.045	10.38	10.4%	64.5%
-325	-0.045	35.40	35.5%	100.0%
TOTAL		99.78	100.0%	

CL : N  
 PR : N  
 CE : 0  
 Te : N  
 Da : N

Sa	Pa pH	Tik %	Ca NF	Sf %	Sf %	Sf %	Ins	AF	Mc	So %	Ne NP	Ne NP	Fiz NP
1st	8.2	0.2	38	0.1	0.0	0.0	<0	2.2	76	39	74	39	Nc
1st		0.2		0.1	0.0	0.0							

Nc  
 NE  
 Su  
 Ins  
 Su  
 NF  
 Ca  
 AF

Cl : A  
 PF : A  
 CE : A  
 Te : 0 : A  
 De : E : A

Sa	Al	Al	Aε	Ba	Be	Bi	Cε	Cc	Cr	Cl	Fe	Hε	ζ	La	MI	MI
pp	pp	%	pp	pp	pp	pp	%	pp	pp	pp	%	pp	%	pp	%	%
<0	<0	0.1	<5	19	0.1	<5	0.1	83	26		5.1	<1	0.1	59	>1	52

Cl  
PF CE  
Te  
De

Sa	Mi	Ns	Ni	Co	Fe	Si	Sc	Sr	Ti	V	Cr	Mn	Zn	W	Zn	Zr
	pp	%	pp	pp	pp	pp	pp	pp	pp	pp	pp	pp	pp	pp	pp	pp
	<2	0.1	24	66		0.1		29	<5	0.1		2.6	1.6	<1	60	









**CLIENT** : Nuinsco Resources Ltd.  
**PROJECT** : Minago (Nuinsco Resources Ltd.)  
**CEMI Project #** : 0714  
**Test** : Ra-226 Assay  
**Date** : May 23, 2008

Sample ID	Ra-226 Bq/L
1st Cleaner Scavenger + Rougher Tails (1-6)	0.04

## **APPENDIX 2.8-B2**

**2006 SGS Lakefield Research Limited ABA Report**



**SGS Lakefield Research Limited**  
P.O. Box 4300 - 185 Concession St.  
Lakefield - Ontario - KOL 2H0  
Phone: 705-652-2038 FAX: 705-652-6441

Modified ABA

**2.8-108**

Project : CALR-11241-001

**Environmental Met**

Attn : Rob Thorpe Project Manager

Copy brianr@tbaytel.net

Wednesday, October 25, 2006

Date Rec. : 23 October 2006  
LR Report: CA10415-OCT06

Copy: #1

## CERTIFICATE OF ANALYSIS Final Report

Analysis	3: Analysis Approval Date	4: Analysis Approval Time	5: Ro Tail F
Sample Date & Time			Date:NA
Paste pH [units]	25-Oct-06	14:50	9.78
Fizz Rate [---]	25-Oct-06	14:50	1
Sample [weight(g)]	25-Oct-06	14:50	1.97
HCl added [mL]	25-Oct-06	14:50	50.10
HCl [Normality]	25-Oct-06	14:50	0.10
NaOH [Normality]	25-Oct-06	14:50	0.10
NaOH to [pH=8.3 mL]	25-Oct-06	14:50	15.10
Final pH [units]	25-Oct-06	14:50	1.65
NP [t CaCO3/1000t]	25-Oct-06	14:50	88.8
AP [t CaCO3/1000 t]	25-Oct-06	09:41	0.31
Net NP [t CaCO3/1000 t]	25-Oct-06	14:51	88.5
NP/AP [ratio]	25-Oct-06	14:51	286
Total Sulphur [%]	25-Oct-06	09:23	0.066
Sulphide [%]	25-Oct-06	09:23	< 0.01
Sulphate [%]	25-Oct-06	14:34	< 0.4
Total Carbon [%]	25-Oct-06	09:23	0.36
Carbonate [%]	25-Oct-06	09:23	1.319

**SGS Lakefield Research Limited**

P.O. Box 4300 - 185 Concession St.

Lakefield - Ontario - KOL 2H0

Phone: 705-652-2038 FAX: 705-652-6441

**Project :** CALR-11241-001**LR Report :** CA10415-OCT06**\*NP (Neutralization Potential)**

$$= 50 \times (N \text{ of HCL} \times \text{Total HCL added} - N \text{ NaOH} \times \text{NaOH added})$$

-----  
Weight of Sample**\*AP (Acid Potential) = % Sulphide Sulphur x 31.25****\*Net NP (Net Neutralization Potential) = NP-AP****NP/AP Ratio = NP/AP****\*Results expressed as tonnes CaCO<sub>3</sub> equivalent/1000 tonnes of material****Samples with a % Sulphide value of <0.01 will be calculated using a 0.01 value.**\_\_\_\_\_  
*Brian Graham B.Sc.**Project Coordinator**Environmental Services, Analytical*

## **APPENDIX 2.8-B3**

Kinetic Test Results for Tailings







Subaqueous Column - Surface Water

Sample = 1st Cleaner + Rougher Tails

Date	Cycle No.	Volume		pH	ORP mV	Cond. umhos/cm	Acidity (pH 4.5) mgCaCO3/L	Acidity (pH 8.3) mgCaCO3/L	Alkalinity mgCaCO3/L	Sulphate mg/L	Dissolved Oxygen mg/L	Hardness CaCO3 mg/L	Al mg/L	Sb mg/L	As mg/L	Ba mg/L	Be mg/L	Bi mg/L	B mg/L	Cd mg/L	Ca mg/L	Cr mg/L	Co mg/L	Cu mg/L
		Input mL	Output L																					
31-Oct-07	1	160	0.16	6.90	258	754	#N/A	4.2	24.3	125	8.50	109	0.0054	0.0011	0.0021	0.0143	<0.00001	<0.000005	0.378	0.000486	23.3	0.0004	0.0001	0.0049
07-Nov-07	2	100	0.10	6.58	500	1351	#N/A			123	#NA	120	0.019	0.0019	0.0308	0.021	<0.0001	<0.001	0.51	0.00011	26.9	<0.001	<0.0005	0.0153
14-Nov-07	3	160	0.16	7.19	149	875	#N/A	3.5	47.6	133	#NA	123	0.0027	0.0004	0.0002	0.0258	<0.00001	<0.000005	0.676	0.00004	28.1	0.0002	0.0002	0.0019
21-Nov-07	4	100	0.10	7.44	397	572	#N/A			118	#NA	129	0.004	0.0006	0.0031	0.029	<0.0001	<0.001	0.671	0.00002	30.6	<0.001	<0.0005	0.0014
28-Nov-07	5	160	0.16	7.53	413	557	#N/A	4.7	54.8	129	8.90	121	0.0035	0.0007	0.0088	0.0332	<0.00001	<0.000005	0.73	0.000027	27.8	0.0001	0.0002	0.0018
05-Dec-07	6	100	0.10	7.36	323	613	#N/A			124		136	0.007	0.0006	0.001	0.032	<0.0001	<0.001	0.725	0.00003	32.5	<0.001	<0.0005	0.0012
12-Dec-07	7	160	0.16	7.35	378	605	#N/A	3.5	56.3	140	8.80	134	0.0053	0.0004	0.0007	0.0339	<0.00001	<0.000005	0.767	0.000029	32.1	0.0005	0.0002	0.0029
19-Dec-07	8	100	0.10	7.33	265	604	#N/A			114		132	0.004	<0.0005	0.0005	0.028	<0.0001	<0.001	0.684	0.00002	30.7	<0.001	<0.0005	0.0029
26-Dec-07	9	160	0.16	7.59	343	669	#N/A	2.6	59.3	140	6.50	137	0.0093	0.0003	0.0003	0.0375	<0.00001	<0.000005	0.807	0.000016	31.7	0.0003	0.0002	0.003
02-Jan-08	10	100	0.10	7.61	315	606	#N/A			110		151	0.004	0.0005	0.0036	0.035	<0.0001	<0.001	0.919	0.00003	34.8	<0.001	<0.0005	0.0023
09-Jan-08	11	160	0.16	7.59	280	575	#N/A	3.3	59.2	150	8.60	138	0.0032	0.0004	0.0007	0.0379	<0.00001	<0.000005	0.894	0.0000116	32.6	<0.0001	0.0001	0.0023
16-Jan-08	12	100	0.10	7.65	245	570	#N/A			119		136	0.003	<0.0005	0.0002	0.036	<0.0001	<0.001	0.799	<0.00001	31.7	<0.001	<0.0005	0.0009
23-Jan-08	13	160	0.16	7.37	335	555	#N/A	5.6	60.0	140	11.10	136	0.0019	0.0003	0.0002	0.0384	<0.00001	<0.000005	0.892	0.000008	30.9	<0.0001	0.0001	0.0014
30-Jan-08	14	100	0.10	7.83	269	515	#N/A			104		127	0.003	<0.0005	0.0008	0.041	<0.0001	<0.001	0.924	<0.00001	28.5	<0.001	<0.0005	0.0018
06-Feb-08	15	160	0.16	7.30	370	514	#N/A	4.2	60.0	130	6.80	130	0.0031	0.0003	0.0006	0.0389	<0.00001	<0.000005	0.916	0.0000026	30.1	<0.0001	0.0001	0.0028
13-Feb-08	16	100	0.10	6.45	487	374	#N/A			106		124	0.037	<0.0005	0.0028	0.038	<0.0001	<0.001	0.844	0.00002	29.3	<0.001	<0.0005	0.0046
20-Feb-08	17	160	0.16	7.79	382	492	#N/A	4.4	59.0	132	6.60	130	0.0043	0.0003	0.0012	0.0377	<0.00001	<0.000005	0.987	0.0000013	29.5	<0.0001	0.00008	0.0032
27-Feb-08	18	100	0.10	7.36	265	511	#N/A			87		125	0.004	<0.0005	0.0032	0.036	<0.0001	<0.001	0.872	<0.00001	29	<0.001	<0.0005	0.003
05-Mar-08	19	160	0.16	7.35	383	535	#N/A	6.0	58.6	110	10.10	124	0.0053	0.0004	0.0006	0.0374	<0.00001	<0.000005	0.933	0.0000011	28.7	<0.0001	0.00005	0.003
12-Mar-08	20	100	0.10	7.37	221	524	#N/A			93		121	0.003	<0.0005	0.0027	0.037	<0.0001	<0.001	0.869	<0.00001	27.7	<0.001	<0.0005	0.0009
19-Mar-08	21	160	0.16	7.54	419	519	#N/A	4.0	56.2	110	9.50	119	0.004	0.0003	0.0005	0.0365	<0.00001	<0.000005	0.928	0.0000079	27.2	0.0002	0.0004	0.0037
26-Mar-08	22	100	0.10	7.59	252	523	#N/A			92		123	0.013	<0.0005	0.0009	0.034	<0.0001	<0.001	0.814	0.00003	28.1	<0.001	<0.0005	0.0027
02-Apr-08	23	160	0.16	7.08	412	470	#N/A	3.8	55.5	97	8.25	112	0.0036	0.0004	0.001	0.0335	0.00003	<0.000005	0.826	0.0000013	26.3	0.0002	0.00003	0.0022
09-Apr-08	24	100	0.10	7.43	270	427	#N/A			81		113	0.004	<0.0005	0.0008	0.035	<0.0001	<0.001	0.851	0.00003	26.9	<0.001	<0.0005	0.002
16-Apr-08	25	160	0.16	7.63	364	432	#N/A	4.1	56.0	86	7.00	111	0.0049	0.0003	0.0002	0.0359	0.00003	<0.000005	0.798	0.0000012	25.6	<0.0001	0.00004	0.0019
23-Apr-08	26	100	0.10	8.15	390	448	#N/A			86		115	0.005	<0.0005	0.0002	0.04	<0.0001	<0.001	0.928	<0.00001	26.8	<0.001	<0.0005	0.0013
30-Apr-08	27	160	0.16	7.65	391	445	#N/A	3.1	55.2	84	8.20	102	0.0117	0.0003	0.0001	0.0354	0.00001	<0.000005	0.745	0.00002	24.2	0.0001	0.00004	0.0038
07-May-08	28	100	0.10	7.54	384	451	#N/A			81		101	0.007	<0.0005	0.0004	0.038	<0.0001	<0.001	0.762	0.00002	23.2	<0.001	<0.0005	0.0044
14-May-08	29	160	0.16	7.32	387	437	#N/A	3.9	53.6	100	8.20	113	0.0039	0.0003	0.0002	0.04	<0.00001	<0.000005	0.891	0.000001	25.5	0.0002	0.00006	0.0024
21-May-08	30	100	0.10	7.55	418	370	#N/A			61		105	0.001	<0.0005	0.0002	0.037	<0.0001	<0.001	0.716	<0.00001	24.1	<0.001	<0.0005	0.0012
28-May-08	31	160	0.16	7.16	410	361	#N/A	4.1	53.1	75	9.50	100	0.0024	0.0003	0.0001	0.0369	0.00001	<0.000005	0.653	0.0000008	22.7	<0.0001	0.00002	0.0046
04-Jun-08	32	100	0.10	7.32	419	371	#N/A			79		94.9	0.007	<0.0005	0.0005	0.037	<0.0001	<0.001	0.719	0.00001	21.9	<0.001	<0.0005	0.0084
11-Jun-08	33	160	0.16	7.45	416	345	#N/A	3.6	52.2	62	8.00	93.5	0.0036	0.0002	0.0001	0.0354	0.00001	<0.000005	0.79	<0.000005	21.9	0.0001	0.00002	0.007
18-Jun-08	34	100	0.10	7.71	312	355	#N/A			55		94.7	0.004	<0.0005	0.0003	0.032	0.00001	<0.001	0.8	<0.00001	22.1	<0.001	<0.0005	0.0046
25-Jun-08	35	160	0.16	7.34	445	331	#N/A	5.5	59.6	66	9.40	97.6	0.0023	0.0002	0.0001	0.0367	0.00002	<0.000005	0.692	0.0000015	22.8	0.0002	0.00003	0.0047
02-Jul-08	36	100	0.10	7.59	374	326	#N/A			59		96.7	0.006	<0.0005	0.0001	0.037	0.00001	<0.001	0.681	0.00001	22.7	<0.001	<0.0005	0.0039
09-Jul-08	37	160	0.16	7.59	388	321	#N/A	3.3	51.7	52	9.40	92.6	0.0035	0.0003	0.0001	0.0398	0.00001	<0.000005	0.68	0.0000015	22.3	0.0002	0.00003	0.0015
16-Jul-08	38	100	0.10	7.94	311	327	#N/A			57		93	0.006	<0.0005	0.0003	0.036	0.00001	<0.001	0.695	<0.00001	21.6	<0.001	<0.0005	0.0015
23-Jul-08	39	160	0.16	7.99	389	263	#N/A	4.1	56.0	56	8.60	90.7	0.0046	0.0002	0.0009	0.0358	0.00001	0.000032	0.689	0.0000023	21.5	<0.0001	0.00002	0.0023
30-Jul-08	40	100	0.10	7.27	375	311	#N/A			56		91.2	0.006	<0.0005	0.0001	0.038	0.00001	<0.001	0.671	<0.00001	21.4	<0.001	<0.0005	0.0011
06-Aug-08	41	160	0.16	7.86	412	308	#N/A	3.1	52.1	49	7.50	89.2	0.0039	0.0003	0.0001	0.0387	0.00001	<0.000005	0.639	0.000024	21.0	<0.0001	0.00002	0.0016
13-Aug-08	42	100	0.10	7.75	363	316	#N/A			48		92.7	0.067	<0.0005	0.0001	0.04	<0.0001	<0.001	0.75	<0.00001	21.5	<0.001	<0.0005	0.0018
20-Aug-08	43	160	0.16	8.08	333	313	#N/A	3.0	53.3	46	8.50	87.4	0.0031	0.0002	0.0009	0.0373	0.00001	<0.000005	0.598	0.0000028	20.2	0.0003	0.00002	0.0025
27-Aug-08	44	100	0.10	7.91	353	305	#N/A			50		86.1	0.004	<0.0005	0.0001	0.036	0.00001	<0.001	0.546	0.0001	20.2	<0.001	<0.0005	0.0032
03-Sep-08	45	160	0.16	7.65	252	319	#N/A	5.2	55.9	50	9.90	84.9	0.0125	0.0002	0.0004	0.039	0.00002	0.0000006	0.648	0.0000018	19.9	0.0001	0.00003	0.0061
10-Sep-08	46	100	0.10	7.50	213	351	#N/A			51		89.1	0.004	<0.0005	0.0002	0.037	0.00001	<0.001	0.587	0.00001	20.7	<0.001	<0.0005	0.0017
17-Sep-08	47	160	0.16	7.73	147	324	#N/A	3.5	51.3	48	9.10	84	0.005	0.0002	0.0001	0.0376	0.00002	<0.000005	0.595	0.0000014	19.8	<0.0001	0.00003	0.004
24-Sep-08	48	100	0.10	7.66	313	310	#N/A			53		84.4	0.002	<0.0005	0.0001	0.04	<0.0001	<0.001	0.688	0.00002	19.7	<0.001	<0.0005	0.0029
01-Oct-08	49	160	0.16	7.71	260	306	#N/A	3.7	50.1	45	9.00	79.6	0.045	0.0002	0.0002	0.0399	0.00001	<0.000005	0.61	0.000				

Subaqueous Column - Surface Water

Sample = 1st Cleaner + Rougher Tails

Date	Cycle No.	Fe	Pb	Li	Mg	Mn	Hg	Mo	Ni	P	K	Se	Si	Ag	Na	Sr	S	Tl	Sn	Ti	U	V	Zn	Zr
		mg/L	mg/L	mg/L	mg/L	mg/L	ug/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
31-Oct-07	1	0.003	0.00026	0.0095	12.3	0.0058	<0.01	0.0033	0.0139	<0.002	11.2	0.0012	0.454	0.000011	52.8	0.116	41	0.000152	0.0062	<0.0005	0.000032	<0.0002	0.0157	<0.0001
07-Nov-07	2	0.201	0.0034		12.9	0.003		0.004	0.023	<0.01	10.9	0.0019	0.834	0.00006	58	0.155	45	0.00022	0.016	<0.005	<0.0001	<0.005	0.007	<0.0005
14-Nov-07	3	0.002	0.00006	0.0134	12.9	0.0036	<0.01	0.005	0.023	0.003	11.1	0.0014	0.975	0.000005	58.1	0.161	44	0.000218	0.022	<0.0005	0.000057	<0.0002	0.0027	<0.0001
21-Nov-07	4	<0.005	<0.0002		12.8	0.003		0.005	0.024	<0.01	12.2	0.0014	1.16	0.00002	52.9	0.171	47	0.00024	0.024	<0.005	<0.0001	<0.005	<0.005	<0.0005
28-Nov-07	5	0.003	0.00017	0.0163	12.5	0.0032	<0.01	0.0059	0.0236	0.151	12.1	0.0013	1.33	0.000009	54.8	0.188	41	0.000302	0.0281	<0.0005	0.000083	<0.0002	0.0037	<0.0001
05-Dec-07	6	0.007	0.0005		13.2	0.002		0.006	0.026	0.05	14.2	0.0013	1.27	<0.00002	51.7	0.176	51	0.00031	0.026	<0.005	<0.0001	<0.005	<0.005	<0.0005
12-Dec-07	7	0.004	0.00005	0.0175	13	0.0044	<0.01	0.006	0.0259	0.004	12.9	0.0009	1.49	<0.000005	48.7	0.188	51	0.000307	0.0269	<0.0005	0.000132	0.0003	0.0267	0.0001
19-Dec-07	8	<0.005	<0.0002		13.4	0.003		0.005	0.027	<0.01	13.2	0.0008	1.38	<0.00002	50.8	0.172	48	0.00029	0.023	<0.005	0.0001	<0.005	<0.005	<0.0005
26-Dec-07	9	0.023	0.00018	0.0181	14.2	0.0029	<0.01	0.0063	0.0267	0.003	13.9	0.0007	1.57	<0.000005	50.8	0.207	49	0.000346	0.0251	<0.0005	0.000102	<0.0002	0.0014	<0.0001
02-Jan-08	10	<0.005	0.0005		15.6	0.004		0.006	0.026	<0.01	14.3	0.0007	2.02	<0.00002	52.2	0.204	56	0.00035	0.022	<0.005	0.0001	<0.005	<0.005	<0.0005
09-Jan-08	11	0.001	0.00006	0.0174	13.7	0.0029	<0.01	0.0061	0.0236	0.002	13.9	0.0007	1.55	<0.000005	45.8	0.194	51	0.000345	0.0216	<0.0005	0.000094	<0.0002	0.0022	<0.0001
16-Jan-08	12	0.007	<0.0002		13.9	0.003		0.006	0.024	<0.01	12.7	0.0006	1.53	<0.00002	45.5	0.182	47	0.00033	0.022	<0.005	<0.0001	<0.005	<0.005	<0.0005
23-Jan-08	13	0.001	0.00116	0.0197	14.3	0.0029	<0.01	0.006	0.0263	<0.002	13.6	0.0006	1.81	<0.000005	45.9	0.195	47	0.000355	0.022	<0.0005	0.000091	<0.0002	0.0022	<0.0001
30-Jan-08	14	0.013	<0.0002		13.5	0.003		0.006	0.026	<0.01	12.9	0.0006	2.02	<0.00002	43.9	0.203	44	0.00038	0.023	<0.005	0.0001	<0.005	<0.005	<0.0005
06-Feb-08	15	0.002	0.00107	0.0182	13.4	0.0028	0.02	0.006	0.0235	<0.002	13.5	0.0005	1.67	<0.000005	44	0.192	44	0.000344	0.0199	<0.0005	0.000095	<0.0002	0.0029	<0.0001
13-Feb-08	16	0.031	0.002		12.5	0.003		0.006	0.023	<0.01	13.5	0.0005	1.59	<0.00002	38.9	0.187	42	0.00033	0.016	<0.005	0.0001	<0.005	<0.005	<0.0005
20-Feb-08	17	0.003	0.00007	0.0181	13.7	0.0026	<0.01	0.0058	0.0232	0.002	13.7	0.0005	1.93	<0.000005	45	0.185	45	0.000342	0.0191	<0.0005	0.000091	<0.0002	0.0079	<0.0001
27-Feb-08	18	<0.005	<0.0002		12.7	0.002		0.006	0.022	<0.01	13.6	0.0005	1.62	<0.00002	36.7	0.182	43	0.00033	0.018	<0.005	<0.0001	<0.005	<0.005	<0.0005
05-Mar-08	19	0.013	0.00003	0.0175	12.6	0.0012	<0.01	0.0056	0.0202	0.002	12.8	0.0005	1.8	<0.000005	36.8	0.179	41	0.000335	0.0165	<0.0005	0.000104	<0.0002	0.0013	<0.0001
12-Mar-08	20	<0.005	<0.0002		12.6	0.002		0.006	0.019	<0.01	12.6	0.0004	2.15	<0.00002	34.9	0.186	39	0.00024	0.017	<0.005	<0.0001	<0.005	<0.005	<0.0005
19-Mar-08	21	0.004	0.00039	0.0201	12.4	0.0016	<0.01	0.0053	0.0193	0.004	16.9	0.0004	1.82	0.000005	34.2	0.173	40	0.000313	0.0152	0.0025	0.000077	<0.0002	0.0172	<0.0001
26-Mar-08	22	<0.005	0.0016		12.9	0.002		0.005	0.017	<0.01	13.3	0.0004	3.15	<0.00002	35.7	0.177	40	0.00022	0.014	<0.005	<0.0001	<0.005	<0.005	<0.0005
02-Apr-08	23	<0.001	0.00003	0.0171	11.4	0.0006	<0.01	0.0054	0.0172	0.008	12.5	0.0004	1.69	<0.000005	30.8	0.175	37	0.000314	0.0148	0.0014	0.000072	<0.0002	0.0048	<0.0001
09-Apr-08	24	<0.005	0.0017		11.2	0.002		0.005	0.015	<0.01	48.6	0.0004	1.84	0.00003	30.1	0.165	36	0.00015	0.012	<0.005	<0.0001	<0.005	<0.005	<0.0005
16-Apr-08	25	0.007	7.8E-05	0.0159	11.5	0.0008	<0.01	0.0048	0.0197	0.005	12.9	0.0003	1.95	<0.000005	31.4	0.156	34	0.000314	0.0136	<0.0005	0.000084	<0.0002	0.0021	<0.0001
23-Apr-08	26	<0.005	<0.0002		11.8	<0.001		0.005	0.018	<0.01	12.5	0.0003	1.86	<0.00002	27.3	0.163	33	0.00033	0.013	<0.005	<0.0001	<0.005	<0.005	<0.0005
30-Apr-08	27	0.01	0.00009	0.0173	10.2	0.0013	<0.01	0.0052	0.0158	0.069	11.6	0.0004	1.82	0.000007	25	0.16	30	0.000311	0.0126	<0.0005	0.000087	<0.0002	0.0021	<0.0001
07-May-08	28	0.006	<0.0002		10.4	0.003		0.005	0.015	0.105	11.4	0.0004	1.78	<0.00002	24.8	0.153	29	0.00031	0.013	<0.005	<0.0001	<0.005	<0.005	<0.0005
14-May-08	29	0.002	0.00219	0.0168	11.9	0.0073	<0.01	0.0048	0.0158	0.191	12.2	0.0003	2.05	<0.000005	28.2	0.156	34	0.000323	0.0129	<0.0005	0.000065	<0.0002	0.0038	<0.0001
21-May-08	30	<0.005	<0.0002		10.8	0.002		0.005	0.014	<0.01	11.1	0.0004	1.56	<0.00002	24.8	0.154	30	0.00029	0.012	<0.005	<0.0001	<0.005	<0.005	<0.0005
28-May-08	31	0.003	0.00319	0.0163	10.6	0.0008	<0.01	0.0045	0.0144	0.369	11.3	0.0003	1.89	<0.000005	24	0.144	29	0.000307	0.0112	<0.0005	0.000066	<0.0002	0.0022	<0.0001
04-Jun-08	32	<0.005	0.0003		9.77	<0.001		0.004	0.014	<0.01	9.75	0.0003	1.71	<0.00002	22.8	0.136	27	0.00029	0.009	<0.005	<0.0001	<0.005	<0.005	<0.0005
11-Jun-08	33	0.002	0.00004	0.0146	9.45	0.0003	<0.01	0.0042	0.0128	0.337	10.9	0.0002	1.89	<0.000005	22.1	0.13	27	0.000277	0.0089	<0.0005	0.000051	<0.0002	0.0038	<0.0001
18-Jun-08	34	0.006	<0.0002		9.59	0.001		0.004	0.011	0.066	9.91	0.0003	1.81	<0.00002	20.5	0.153	27	0.00015	0.009	<0.005	<0.0001	<0.005	<0.005	<0.0005
25-Jun-08	35	0.005	0.00015	0.0168	9.9	0.0007	<0.01	0.0041	0.0138	0.183	10.2	0.0003	1.89	0.000006	20.2	0.134	27	0.000293	0.009	<0.0005	0.000071	<0.0002	0.0041	<0.0001
02-Jul-08	36	<0.005	<0.0002		9.73	0.002		0.004	0.013	0.115	10.7	0.0003	1.83	<0.00002	20.2	0.142	27	0.00032	0.01	<0.005	<0.0001	<0.005	<0.005	<0.0005
09-Jul-08	37	0.005	0.00011	0.0157	8.97	0.0018	<0.01	0.0042	0.0119	0.084	10.2	0.0003	1.85	<0.000005	18	0.139	26	0.000317	0.0087	<0.0005	0.000058	<0.0002	0.0047	<0.0001
16-Jul-08	38	0.006	<0.0002		9.51	0.001		0.004	0.012	0.02	10.4	0.0002	1.75	<0.00002	19.1	0.144	25	0.00023	0.007	<0.005	<0.0001	<0.005	<0.005	<0.0005
23-Jul-08	39	0.003	0.00029	0.0149	8.99	0.0003	<0.01	0.0041	0.0115	0.109	10.5	0.0004	1.5	<0.000005	18.4	0.131	23	0.000266	0.0074	0.001	0.000052	0.0002	0.0027	<0.0001
30-Jul-08	40	0.018	<0.0002		9.15	<0.001		0.004	0.015	0.101	9.81	0.0002	1.83	<0.00002	17	0.13	24	0.00027	0.007	<0.005	<0.0001	<0.005	<0.005	<0.0005
06-Aug-08	41	0.008	0.00087	0.0153	8.93	0.0006	<0.01	0.0039	0.011	0.003	9.63	0.0002	1.77	<0.000005	16.7	0.127	23	0.000295	0.0068	<0.0005	0.000041	<0.0002	0.0024	<0.0001
13-Aug-08	42	0.01	0.0004		9.45	<0.001		0.004	0.012	0.067	10.1	0.0002	1.87	<0.00002	17.6	0.128	24	0.00028	0.006	<0.005	<0.0001	<0.005	<0.005	<0.0005
20-Aug-08	43	0.003	0.00013	0.0146	9	0.0004	<0.01	0.0038	0.0107	0.006	9.38	0.0002	1.61	<0.000005	16.3	0.126	22	0.000293	0.0075	<0.0005	0.000038	<0.0002	0.0015	<0.0001
27-Aug-08	44	0.007	0.0006		8.65	0.001		0.003	0.011	0.284	10.1	0.0002	1.67	<0.00002	15.5	0.121	20	0.00032	0.006	<0.005	<0.0001	<0.005	<0.005	<0.0005
03-Sep-08	45	0.012	0.00508	0.0143	8.55	0.0004	<0.01	0.0037	0.0117	0.022	9.62	0.0003	1.57	<0.000005	15.1	0.121	21	0.000264	0.0068	<0.0				

Subaqueous Column - Surface Water

Sample = 1st Cleaner + Rougher Tails

Date	Cycle No.	Volume Input mL	Volume Output L	pH	ORP mV	Cond. umhos/cm	Acidity (pH 4.5) mgCaCO3/L	Acidity (pH 8.3) mg/kg/wk	Alkalinity mg/kg/wk	Sulphate mg/kg/wk	Dissolved Oxygen mg/L	Hardness CaCO3 mg/L	Al mg/kg/wk	Sb mg/kg/wk	As mg/kg/wk	Ba mg/kg/wk	Be mg/kg/wk	Bi mg/kg/wk	B mg/kg/wk	Cd mg/kg/wk	Ca mg/kg/wk	Cr mg/kg/wk	Co mg/kg/wk	Cu mg/kg/wk	Fe mg/kg/wk	Pb mg/kg/wk
31-Oct-07	1	160	0.16	6.90	258	754	#N/A	0.1	0.8	4.00	8.50	109	0.00017	0.00003	0.00007	0.00046	0.00000	0.0000020	0.0121	0.000016	0.75	0.00001	0.00000	0.00016	0.0001	0.00008
07-Nov-07	2	100	0.10	6.58	500	1351	#N/A			2.46		120	0.00038	0.00004	0.00062	0.00042	0.00000	0.0000200	0.0102	0.000002	0.54	0.00002	0.00001	0.00031	0.0040	0.00068
14-Nov-07	3	160	0.16	7.19	149	875	#N/A	0.1	1.5	4.26		123	0.00009	0.00001	0.00006	0.00083	0.00000	0.0000002	0.0216	0.000001	0.90	0.00001	0.00000	0.00006	0.0001	0.00002
21-Nov-07	4	100	0.10	7.44	397	572	#N/A			2.36		129	0.00008	0.00001	0.00006	0.00058	0.00000	0.0000200	0.0134	0.000000	0.61	0.00002	0.00001	0.00003	0.0001	0.00004
28-Nov-07	5	160	0.16	7.53	413	557	#N/A	0.2	1.8	4.13	8.90	121	0.00011	0.00002	0.00028	0.00106	0.00000	0.0000002	0.0234	0.000001	0.89	0.00000	0.00001	0.00006	0.0001	0.00005
05-Dec-07	6	100	0.10	7.36	323	613	#N/A			2.48		136	0.00014	0.00001	0.00002	0.00064	0.00000	0.0000200	0.0145	0.000001	0.65	0.00002	0.00001	0.00002	0.0001	0.00010
12-Dec-07	7	160	0.16	7.35	378	605	#N/A	0.1	1.8	4.48	8.80	134	0.00017	0.00001	0.00002	0.00108	0.00000	0.0000002	0.0245	0.000001	1.03	0.00002	0.00001	0.00009	0.0001	0.00002
19-Dec-07	8	100	0.10	7.33	265	604	#N/A			2.28		132	0.00008	0.00001	0.00001	0.00056	0.00000	0.0000200	0.0137	0.000000	0.61	0.00002	0.00001	0.00006	0.0001	0.00004
26-Dec-07	9	160	0.16	7.59	343	669	#N/A	0.1	1.9	4.48	6.50	137	0.00030	0.00001	0.00001	0.00120	0.00000	0.0000002	0.0258	0.000001	1.01	0.00001	0.00000	0.00010	0.0007	0.00006
02-Jan-08	10	100	0.10	7.61	315	606	#N/A			2.20		151	0.00008	0.00001	0.00007	0.00070	0.00000	0.0000200	0.0184	0.000001	0.70	0.00002	0.00001	0.00005	0.0001	0.00010
09-Jan-08	11	160	0.16	7.59	280	575	#N/A	0.1	1.9	4.80	8.60	138	0.00010	0.00001	0.00002	0.00121	0.00000	0.0000002	0.0286	0.000004	1.04	0.00000	0.00000	0.00007	0.0000	0.00002
16-Jan-08	12	100	0.10	7.65	245	570	#N/A			2.38		136	0.00006	0.00001	0.00000	0.00072	0.00000	0.0000200	0.0160	0.000000	0.63	0.00002	0.00001	0.00002	0.0001	0.00004
23-Jan-08	13	160	0.16	7.37	335	555	#N/A	0.2	1.9	4.48	11.10	136	0.00006	0.00001	0.00001	0.00123	0.00000	0.0000002	0.0285	0.000000	0.99	0.00000	0.00000	0.00004	0.0000	0.00037
30-Jan-08	14	100	0.10	7.83	269	515	#N/A			2.08		127	0.00006	0.00001	0.00002	0.00082	0.00000	0.0000200	0.0185	0.000000	0.57	0.00002	0.00001	0.00004	0.0003	0.00004
06-Feb-08	15	160	0.16	7.30	370	514	#N/A	0.1	1.9	4.16	6.80	130	0.00010	0.00001	0.00002	0.00124	0.00000	0.0000002	0.0293	0.000001	0.96	0.00000	0.00000	0.00009	0.0001	0.00034
13-Feb-08	16	100	0.10	6.45	487	374	#N/A			2.12		124	0.00074	0.00001	0.00006	0.00076	0.00000	0.0000200	0.0169	0.000000	0.59	0.00002	0.00001	0.00009	0.0006	0.00040
20-Feb-08	17	160	0.16	7.79	382	492	#N/A	0.1	1.9	4.22	6.60	130	0.00014	0.00001	0.00004	0.00121	0.00000	0.0000002	0.0316	0.000000	0.94	0.00000	0.00000	0.00010	0.0001	0.00002
27-Feb-08	18	100	0.10	7.36	265	511	#N/A			1.74		125	0.00008	0.00001	0.00006	0.00072	0.00000	0.0000200	0.0174	0.000000	0.58	0.00002	0.00001	0.00006	0.0001	0.00004
05-Mar-08	19	160	0.16	7.35	383	535	#N/A	0.2	1.9	3.52	10.10	124	0.00017	0.00001	0.00002	0.00120	0.00000	0.0000002	0.0299	0.000000	0.92	0.00000	0.00000	0.00010	0.0004	0.00001
12-Mar-08	20	100	0.10	7.37	221	524	#N/A			1.86		121	0.00006	0.00001	0.00005	0.00074	0.00000	0.0000200	0.0174	0.000000	0.55	0.00002	0.00001	0.00002	0.0001	0.00004
19-Mar-08	21	160	0.16	7.54	419	519	#N/A	0.1	1.8	3.52	9.50	119	0.00013	0.00001	0.00001	0.00117	0.00000	0.0000002	0.0297	0.000003	0.87	0.00001	0.00001	0.00012	0.0001	0.00012
26-Mar-08	22	100	0.10	7.59	252	523	#N/A			1.84		123	0.00026	0.00001	0.00002	0.00068	0.00000	0.0000200	0.0163	0.000001	0.56	0.00002	0.00001	0.00004	0.0001	0.00032
02-Apr-08	23	160	0.16	7.08	412	470	#N/A	0.1	1.8	3.10	8.25	112	0.00012	0.00001	0.00003	0.00107	0.00000	0.0000002	0.0264	0.000000	0.84	0.00001	0.00000	0.00007	0.0000	0.00001
09-Apr-08	24	100	0.10	7.43	270	427	#N/A			1.62		113	0.00008	0.00001	0.00002	0.00070	0.00000	0.0000200	0.0170	0.000001	0.54	0.00002	0.00001	0.00004	0.0001	0.00034
16-Apr-08	25	160	0.16	7.63	364	432	#N/A	0.1	1.8	2.75	7.00	111	0.00016	0.00001	0.00001	0.00115	0.00000	0.0000002	0.0255	0.000000	0.82	0.00000	0.00000	0.00006	0.0002	0.00002
23-Apr-08	26	100	0.10	8.15	390	448	#N/A			1.72		115	0.00010	0.00001	0.00000	0.00080	0.00000	0.0000200	0.0186	0.000000	0.54	0.00002	0.00001	0.00003	0.0001	0.00004
30-Apr-08	27	160	0.16	7.65	391	445	#N/A	0.1	1.8	2.69	8.20	102	0.00037	0.00001	0.00000	0.00113	0.00000	0.0000002	0.0238	0.000001	0.77	0.00000	0.00000	0.00012	0.0003	0.00003
07-May-08	28	100	0.10	7.54	384	451	#N/A			1.62		101	0.00014	0.00001	0.00001	0.00076	0.00000	0.0000200	0.0152	0.000000	0.46	0.00002	0.00001	0.00009	0.0001	0.00004
14-May-08	29	160	0.16	7.32	387	437	#N/A	0.1	1.7	3.20	8.20	113	0.00012	0.00001	0.00001	0.00128	0.00000	0.0000002	0.0285	0.000000	0.82	0.00001	0.00000	0.00008	0.0001	0.00070
21-May-08	30	100	0.10	7.55	418	370	#N/A			1.22		105	0.00002	0.00001	0.00000	0.00074	0.00000	0.0000200	0.0143	0.000000	0.48	0.00002	0.00001	0.00002	0.0001	0.00004
28-May-08	31	160	0.16	7.16	410	361	#N/A	0.1	1.7	2.40	9.50	100	0.00008	0.00001	0.00000	0.00118	0.00000	0.0000002	0.0209	0.000000	0.73	0.00000	0.00000	0.00015	0.0001	0.00102
04-Jun-08	32	100	0.10	7.32	419	371	#N/A			1.58		94.9	0.00014	0.00001	0.00001	0.00074	0.00000	0.0000200	0.0144	0.000000	0.44	0.00002	0.00001	0.00017	0.0001	0.00006
11-Jun-08	33	160	0.16	7.45	416	345	#N/A	0.1	1.7	1.98	8.00	93.5	0.00012	0.00001	0.00000	0.00113	0.00000	0.0000002	0.0253	0.000000	0.70	0.00000	0.00000	0.00022	0.0001	0.00001
18-Jun-08	34	100	0.10	7.71	312	355	#N/A			1.10		94.7	0.00008	0.00001	0.00001	0.00064	0.00000	0.0000200	0.0160	0.000000	0.44	0.00002	0.00001	0.00009	0.0001	0.00004
25-Jun-08	35	160	0.16	7.34	445	331	#N/A	0.2	1.9	2.11	9.40	97.6	0.00007	0.00001	0.00000	0.00117	0.00000	0.0000002	0.0221	0.000000	0.73	0.00001	0.00000	0.00015	0.0002	0.00005
02-Jul-08	36	100	0.10	7.59	374	326	#N/A			1.18		96.7	0.00012	0.00001	0.00000	0.00074	0.00000	0.0000200	0.0136	0.000000	0.45	0.00002	0.00001	0.00008	0.0001	0.00004
09-Jul-08	37	160	0.16	7.59	388	321	#N/A	0.1	1.7	1.66	9.40	92.6	0.00011	0.00001	0.00000	0.00127	0.00000	0.0000002	0.0218	0.000000	0.71	0.00001	0.00000	0.00005	0.0002	0.00003
16-Jul-08	38	100	0.10	7.94	311	327	#N/A			1.14		93	0.00012	0.00001	0.00001	0.00072	0.00000	0.0000200	0.0139	0.000000	0.43	0.00002	0.00001	0.00003	0.0001	0.00004
23-Jul-08	39	160	0.16	7.99	389	263	#N/A	0.1	1.8	1.79	8.60	90.7	0.00015	0.00001	0.00003	0.00115	0.00000	0.0000010	0.0220	0.000001	0.69	0.00000	0.00000	0.00007	0.0001	0.00009
30-Jul-08	40	100	0.10	7.27	375	311	#N/A			1.12		91.2	0.00012	0.00001	0.00000	0.00076	0.00000	0.0000200	0.0134	0.000000	0.43	0.00002	0.00001	0.00002	0.0004	0.00004
06-Aug-08	41	160	0.16	7.86	412	308	#N/A	0.1	1.7	1.57	7.50	89.2	0.00012	0.00001	0.00000	0.00124	0.00000	0.0000002	0.0204	0.000008	0.67	0.00000	0.00000	0.00005	0.0003	0.00028
13-Aug-08	42	100	0.10	7.75	363	316	#N/A			0.96		92.7	0.00134	0.00001	0.00000	0.00080	0.00000	0.0000200	0.0150	0.000000	0.43	0.00002	0.00001	0.00004	0.0002	0.00008
20-Aug-08	43	160	0.16	8.08	333	313	#N/A	0.1	1.7	1.47	8.50	87.4	0.00010	0.00001	0.00000	0.00119	0.00000	0.0000002	0.0191	0.000001	0.65	0.00001	0.00000	0.00008	0.0001	0.00004
27-Aug-08	44	100	0.10	7.91	353	305	#N/A			1.00		86.1	0.00008	0.00001	0.00000	0.00072	0.00000	0.000020								

Subaqueous Column - Surface Water  
 Sample = 1st Cleaner + Rougher Tails

Date	Cycle No.	Li	Mg	Mn	Hg	Mo	Ni	P	K	Se	Si	Ag	Na	Sr	S	Tl	Sn	Ti	U	V	Zn	Zr
		mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk
31-Oct-07	1	0.000304	0.39	0.000186	0.000032	0.00010	0.00044	0.000064	0.36	0.0000371	0.015	0.0000004	1.69	0.003712	1.31	0.000005	0.000198	0.000016	0.000001	0.000006	0.000502	0.000032
07-Nov-07	2		0.26	0.000060		0.00008	0.00046	0.000200	0.22	0.0000380	0.02	0.0000012	1.16	0.003100	0.90	0.000004	0.000320	0.000100	0.000002	0.000100	0.000140	0.0000100
14-Nov-07	3	0.000429	0.41	0.000114	0.000032	0.00016	0.00074	0.000096	0.36	0.0000451	0.031	0.0000002	1.86	0.005152	1.41	0.000007	0.000704	0.000016	0.000002	0.000006	0.000086	0.0000032
21-Nov-07	4		0.26	0.000060		0.00010	0.00048	0.000200	0.24	0.0000280	0.02	0.0000004	1.06	0.003420	0.94	0.000005	0.000480	0.000100	0.000002	0.000100	0.000100	0.0000100
28-Nov-07	5	0.000522	0.40	0.000103	0.000032	0.00019	0.00076	0.000482	0.39	0.0000403	0.043	0.0000003	1.75	0.006016	1.31	0.000010	0.000899	0.000016	0.000003	0.000006	0.000118	0.0000032
05-Dec-07	6		0.26	0.000040		0.00012	0.00052	0.000100	0.28	0.0000260	0.03	0.0000004	1.03	0.003520	1.02	0.000006	0.000520	0.000100	0.000002	0.000100	0.000100	0.0000100
12-Dec-07	7	0.000560	0.42	0.000139	0.000032	0.00019	0.00083	0.000128	0.41	0.0000301	0.048	0.0000002	1.56	0.006016	1.63	0.000010	0.000861	0.000016	0.000004	0.000010	0.000854	0.0000032
19-Dec-07	8		0.27	0.000060		0.00010	0.00054	0.000200	0.26	0.0000160	0.03	0.0000004	1.02	0.003440	0.96	0.000006	0.000460	0.000100	0.000002	0.000100	0.000100	0.0000100
26-Dec-07	9	0.000579	0.45	0.000094	0.000032	0.00020	0.00085	0.000096	0.44	0.0000230	0.050	0.0000002	1.63	0.006624	1.57	0.000011	0.000803	0.000016	0.000003	0.000006	0.000045	0.0000032
02-Jan-08	10		0.31	0.000080		0.00012	0.00052	0.000200	0.29	0.0000140	0.04	0.0000004	1.04	0.004080	1.12	0.000007	0.000440	0.000100	0.000002	0.000100	0.000100	0.0000100
09-Jan-08	11	0.000557	0.44	0.000093	0.000032	0.00020	0.00076	0.000064	0.44	0.0000218	0.050	0.0000002	1.47	0.006208	1.63	0.000011	0.000691	0.000016	0.000003	0.000006	0.000070	0.0000032
16-Jan-08	12		0.28	0.000060		0.00012	0.00048	0.000200	0.25	0.0000120	0.03	0.0000004	0.91	0.003640	0.94	0.000007	0.000440	0.000100	0.000002	0.000100	0.000100	0.0000100
23-Jan-08	13	0.000630	0.46	0.000091	0.000032	0.00019	0.00084	0.000064	0.44	0.0000189	0.058	0.0000002	1.47	0.006240	1.50	0.000011	0.000704	0.000016	0.000003	0.000006	0.000070	0.0000032
30-Jan-08	14		0.27	0.000060		0.00012	0.00052	0.000200	0.26	0.0000120	0.04	0.0000004	0.88	0.004060	0.88	0.000008	0.000460	0.000100	0.000002	0.000100	0.000100	0.0000100
30-Jan-08	15	0.000582	0.43	0.000091	0.000064	0.00019	0.00075	0.000064	0.43	0.0000157	0.053	0.0000002	1.41	0.006144	1.41	0.000011	0.000637	0.000016	0.000003	0.000006	0.000093	0.0000032
13-Feb-08	16		0.25	0.000060		0.00012	0.00046	0.000200	0.27	0.0000100	0.03	0.0000004	0.78	0.003740	0.84	0.000007	0.000320	0.000100	0.000002	0.000100	0.000100	0.0000100
20-Feb-08	17	0.000579	0.44	0.000084	0.000032	0.00019	0.00074	0.000064	0.44	0.0000150	0.062	0.0000002	1.44	0.005920	1.44	0.000011	0.000611	0.000016	0.000003	0.000006	0.000253	0.0000032
27-Feb-08	18		0.25	0.000040		0.00012	0.00044	0.000200	0.27	0.0000100	0.03	0.0000004	0.73	0.003640	0.86	0.000007	0.000360	0.000100	0.000002	0.000100	0.000100	0.0000100
05-Mar-08	19	0.000560	0.40	0.000038	0.000032	0.00018	0.00065	0.000064	0.41	0.0000154	0.058	0.0000002	1.18	0.005728	1.31	0.000011	0.000528	0.000016	0.000003	0.000006	0.000042	0.0000032
12-Mar-08	20		0.25	0.000040		0.00012	0.00038	0.000200	0.25	0.0000080	0.04	0.0000004	0.70	0.003720	0.78	0.000005	0.000340	0.000100	0.000002	0.000100	0.000100	0.0000100
19-Mar-08	21	0.000643	0.40	0.000050	0.000032	0.00017	0.00062	0.000128	0.54	0.0000141	0.058	0.0000002	1.09	0.005536	1.28	0.000010	0.000486	0.000080	0.000002	0.000006	0.000550	0.0000032
26-Mar-08	22		0.26	0.000040		0.00010	0.00034	0.000200	0.27	0.0000080	0.06	0.0000004	0.71	0.003540	0.80	0.000004	0.000280	0.000100	0.000002	0.000100	0.000100	0.0000100
02-Apr-08	23	0.000547	0.36	0.000020	0.000032	0.00017	0.00055	0.000256	0.40	0.0000122	0.054	0.0000002	0.99	0.005600	1.18	0.000010	0.000474	0.000045	0.000002	0.000006	0.000154	0.0000032
09-Apr-08	24		0.22	0.000040		0.00010	0.00030	0.000200	0.97	0.0000080	0.04	0.0000006	0.60	0.003300	0.72	0.000003	0.000240	0.000100	0.000002	0.000100	0.000100	0.0000100
16-Apr-08	25	0.000509	0.37	0.000026	0.000032	0.00015	0.00063	0.000160	0.41	0.0000106	0.062	0.0000002	1.00	0.004992	1.09	0.000010	0.000435	0.000016	0.000003	0.000006	0.000067	0.0000032
23-Apr-08	26		0.24	0.000020		0.00010	0.00036	0.000200	0.25	0.0000060	0.04	0.0000004	0.55	0.003260	0.66	0.000007	0.000260	0.000100	0.000002	0.000100	0.000100	0.0000100
30-Apr-08	27	0.000554	0.33	0.000042	0.000032	0.00017	0.00051	0.000208	0.37	0.0000115	0.058	0.0000002	0.80	0.005120	0.96	0.000010	0.000403	0.000016	0.000003	0.000006	0.000067	0.0000032
07-May-08	28		0.21	0.000060		0.00010	0.00030	0.000200	0.23	0.0000080	0.04	0.0000004	0.50	0.003060	0.58	0.000006	0.000260	0.000100	0.000002	0.000100	0.000100	0.0000100
14-May-08	29	0.000538	0.38	0.000234	0.000032	0.00015	0.00051	0.000612	0.39	0.0000093	0.066	0.0000002	0.90	0.004992	1.09	0.000010	0.000413	0.000016	0.000002	0.000006	0.000122	0.0000032
21-May-08	30		0.22	0.000040		0.00010	0.00028	0.000200	0.22	0.0000080	0.03	0.0000004	0.50	0.003080	0.60	0.000006	0.000240	0.000100	0.000002	0.000100	0.000100	0.0000100
28-May-08	31	0.000522	0.34	0.000026	0.000032	0.00014	0.00046	0.011808	0.36	0.0000083	0.060	0.0000002	0.77	0.004608	0.93	0.000010	0.000358	0.000016	0.000002	0.000006	0.000070	0.0000032
04-Jun-08	32		0.20	0.000020		0.00008	0.00028	0.000200	0.20	0.0000060	0.03	0.0000004	0.46	0.002720	0.54	0.000006	0.000180	0.000100	0.000002	0.000100	0.000100	0.0000100
11-Jun-08	33	0.000467	0.30	0.000010	0.000032	0.00013	0.00041	0.010784	0.35	0.0000074	0.060	0.0000002	0.71	0.004160	0.86	0.000009	0.000285	0.000016	0.000002	0.000006	0.000122	0.0000032
18-Jun-08	34		0.19	0.000020		0.00008	0.00022	0.001320	0.20	0.0000060	0.04	0.0000004	0.41	0.003060	0.54	0.000003	0.000180	0.000100	0.000002	0.000100	0.000100	0.0000100
25-Jun-08	35	0.000538	0.32	0.000022	0.000032	0.00013	0.00044	0.005856	0.33	0.0000093	0.060	0.0000002	0.65	0.004288	0.86	0.000009	0.000288	0.000016	0.000002	0.000006	0.000131	0.0000032
02-Jul-08	36		0.19	0.000040		0.00008	0.00026	0.002300	0.21	0.0000060	0.04	0.0000004	0.40	0.002840	0.54	0.000006	0.000200	0.000100	0.000002	0.000100	0.000100	0.0000100
09-Jul-08	37	0.000502	0.29	0.000056	0.000032	0.00013	0.00038	0.002688	0.33	0.0000096	0.059	0.0000002	0.58	0.004448	0.83	0.000010	0.000279	0.000016	0.000002	0.000006	0.000150	0.0000032
16-Jul-08	38		0.19	0.000020		0.00008	0.00024	0.000400	0.21	0.0000040	0.04	0.0000004	0.38	0.002880	0.50	0.000005	0.000140	0.000100	0.000002	0.000100	0.000100	0.0000100
23-Jul-08	39	0.000477	0.29	0.000009	0.000032	0.00013	0.00037	0.003488	0.34	0.0000112	0.048	0.0000002	0.59	0.004192	0.74	0.000009	0.000236	0.000032	0.000002	0.000006	0.000086	0.0000032
30-Jul-08	40		0.18	0.000020		0.00008	0.00030	0.002020	0.20	0.0000040	0.04	0.0000004	0.34	0.002600	0.48	0.000005	0.000140	0.000100	0.000002	0.000100	0.000100	0.0000100
06-Aug-08	41	0.000490	0.29	0.000019	0.000032	0.00013	0.00035	0.000096	0.31	0.0000067	0.057	0.0000002	0.53	0.004064	0.74	0.000009	0.000218	0.000016	0.000001	0.000006	0.000078	0.0000032
13-Aug-08	42		0.19	0.000020		0.00008	0.00024	0.001340	0.20	0.0000040	0.04	0.0000004	0.35	0.002560	0.48	0.000006	0.000120	0.000100	0.000002	0.000100	0.000100	0.0000100
20-Aug-08	43	0.000467	0.29	0.000011	0.000032	0.00012	0.00034	0.000192	0.30	0.0000064	0.052	0.0000002	0.52	0.004032	0.70	0.000009	0.000240	0.000016	0.000001	0.000006	0.000048	0.0000032
27-Aug-08	44		0.17	0.000020		0.00006	0.00022	0.005680	0.20	0.0000040	0.03	0.0000004	0.31	0.002420	0.40	0.000006	0.000120	0.000100	0.000002	0.000100	0.000100	0.0000100
03-Sep-08	45	0.000458	0.27	0.000013	0.000032	0.00012	0															

Subaqueous Column - Pore Water

Sample = 1st Cleaner + Rougher Tails

Date	Cycle No.	Volume mL		pH	ORP mV	Cond. umhos/cm	Acidity (pH 4.5) mgCaCO3/L	Acidity (pH 8.3) mgCaCO3/L	Alkalinity mgCaCO3/L	Sulphate mg/L	Dissolved Oxygen mg/L	Hardness CaCO3 mg/L	Al mg/L	Sb mg/L	As mg/L	Ba mg/L	Be mg/L	Bi mg/L	B mg/L	Cd mg/L	Ca mg/L	Cr mg/L	Co mg/L	Cu mg/L
		Input	Output																					
31-Oct-07	1	160	160	7.56	259	408	#N/A	4.2	23.9	63	1.45	92.4	0.0097	0.0009	0.0013	0.0505	<0.00001	<0.000005	0.792	0.000067	29	0.0009	0.000045	0.00337
07-Nov-07	2	100	100	6.77	303	641	#N/A	#N/A	#N/A	103	#N/A	119	0.012	0.0014	0.0037	0.069	<0.0001	<0.001	1.01	0.00026	36.3	<0.001	<0.0005	0.0059
14-Nov-07	3	160	160	7.10	145	719	#N/A	3.8	25.1	144	2.25	148	0.0029	0.00097	0.0022	0.0791	<0.00001	<0.000005	1.49	0.000021	43.4	0.0001	0.000058	0.00096
21-Nov-07	4	100	100	7.15	180	488	#N/A	#N/A	#N/A	159	#N/A	170	0.016	0.0013	0.0054	0.085	<0.0001	<0.001	1.38	0.00003	49.6	<0.001	<0.0005	0.0016
28-Nov-07	5	160	160	6.77	275	564	#N/A	5.1	27.7	196	0.95	191	0.0046	0.327	0.027	0.0947	<0.00001	<0.000005	1.53	0.000141	53.3	0.0001	0.000056	0.00257
05-Dec-07	6	100	100	6.87	285	687	#N/A	#N/A	#N/A	223	#N/A	238	0.004	0.0013	0.0016	0.105	<0.0001	<0.001	1.55	0.00005	66.9	<0.001	<0.0005	0.0039
12-Dec-07	7	160	160	7.54	299	773	#N/A	4.0	28.0	261	2.15	243	0.0052	0.00475	0.002	0.113	<0.00001	<0.000005	1.7	0.000037	67	0.0001	0.000063	0.00308
19-Dec-07	8	100	100	7.47	285	861	#N/A	#N/A	#N/A	264	#N/A	264	0.008	0.006	0.0028	0.097	<0.0001	<0.001	1.65	0.00005	69.7	<0.001	<0.0005	0.0062
26-Dec-07	9	160	160	7.58	322	1023	#N/A	3.5	29.7	370	0.75	290	0.0042	0.00603	0.0023	0.119	<0.00001	<0.000005	1.98	0.000051	74.5	0.0001	0.00006	0.00416
02-Jan-08	10	100	100	8.02	134	1002	#N/A	#N/A	#N/A	358	#N/A	340	0.004	0.0051	0.0033	0.123	<0.0001	<0.001	2.51	0.00003	87.4	<0.001	<0.0005	0.0018
09-Jan-08	11	160	160	7.85	265	1152	#N/A	4.2	35.8	470	2.45	330	0.0055	0.0051	0.0032	0.128	<0.00001	<0.000005	2.67	0.000144	84.2	<0.001	0.000063	0.001
16-Jan-08	12	100	100	8.06	115	1280	#N/A	#N/A	#N/A	423	#N/A	358	0.004	0.0053	0.0024	0.125	<0.0001	<0.001	2.58	0.00007	89	<0.001	<0.0005	0.0027
23-Jan-08	13	160	160	7.46	195	1225	#N/A	6.9	40.3	475	2.25	355	0.0025	0.00153	0.0011	0.118	<0.00001	<0.000005	2.81	0.000041	85.7	0.0004	0.000077	0.00295
30-Jan-08	14	100	100	7.66	180	1240	#N/A	#N/A	#N/A	507	#N/A	340	0.005	0.0053	0.0029	0.122	<0.0001	<0.001	3.08	0.00003	77.8	<0.001	<0.0005	0.0038
06-Feb-08	15	160	160	7.82	260	1187	#N/A	5.2	43.4	452	1.90	345	0.004	0.0013	0.0014	0.11	<0.00001	<0.000005	3.17	0.000026	79.5	<0.0001	0.000064	0.00338
13-Feb-08	16	100	100	7.50	187	1199	#N/A	#N/A	#N/A	476	#N/A	332	0.007	<0.0005	0.0012	0.102	<0.0001	<0.001	3.04	0.00002	77	<0.001	<0.0005	0.0035
20-Feb-08	17	160	160	7.86	285	1219	#N/A	5.4	45.6	444	1.75	336	0.0045	0.00186	0.0037	0.094	0.00002	<0.000005	3.53	0.000021	73.2	<0.0001	0.00006	0.00203
27-Feb-08	18	100	100	7.36	202	1220	#N/A	#N/A	#N/A	513	#N/A	326	0.006	0.0006	0.0056	0.085	<0.0001	<0.001	3.28	0.00002	72.2	<0.001	<0.0005	0.0094
05-Mar-08	19	160	160	7.62	302	1286	#N/A	6.9	51.6	420	2.30	314	0.0045	0.0007	0.0011	0.083	0.00001	<0.000005	3.52	0.000013	67.9	<0.0001	0.000049	0.00201
12-Mar-08	20	100	100	7.49	160	1280	#N/A	#N/A	#N/A	392	#N/A	313	0.004	0.0015	0.0012	0.079	<0.0001	<0.001	3.36	0.00001	65	<0.001	<0.0005	0.0025
19-Mar-08	21	160	160	7.79	202	11265	#N/A	5.1	55.4	440	1.75	347	0.0071	0.00202	0.0011	0.0764	0.00002	<0.000005	3.77	0.000053	79.4	0.0002	0.000053	0.00348
26-Mar-08	22	100	100	7.82	146	1402	#N/A	#N/A	#N/A	369	#N/A	304	0.018	0.0012	0.0014	0.069	<0.0001	<0.001	3.53	0.00003	61.9	<0.001	<0.0005	0.0013
02-Apr-08	23	160	160	7.84	335	1127	#N/A	4.8	57.9	324	1.75	269	0.0069	0.00214	0.0008	0.0572	0.00013	<0.000005	3.66	0.000038	56	0.0002	0.000062	0.00513
09-Apr-08	24	100	100	7.96	240	1002	#N/A	#N/A	#N/A	348	#N/A	268	0.005	0.0009	0.0009	0.061	0.0001	<0.001	3.94	0.00001	55.6	<0.001	<0.0005	0.0012
16-Apr-08	25	160	160	7.87	301	998	#N/A	5.04	60.3	317	1.8	260	0.0078	0.00197	0.0007	0.0568	0.00012	<0.000005	3.96	0.000031	51.8	0.0001	0.000065	0.00327
23-Apr-08	26	100	100	8.39	337	1009	#N/A	#N/A	#N/A	312	#N/A	265	0.006	<0.0005	0.0004	0.059	0.0002	<0.001	4.56	0.00002	53.2	<0.001	<0.0005	0.0013
30-Apr-08	27	160	160	8.23	365	1000	#N/A	3.84	61.8	278	2.0	223	0.009	0.0008	0.0004	0.0541	0.00005	<0.00003	4.17	<0.00003	43.9	<0.0005	0.00003	0.0044
07-May-08	28	100	100	7.88	337	1018	#N/A	#N/A	#N/A	238	#N/A	219	0.011	0.0014	0.0006	0.051	<0.0001	<0.001	3.83	0.00004	42.5	<0.001	<0.0005	0.0044
14-May-08	29	160	160	6.97	315	956	#N/A	4.01	63.2	203	2.0	234	0.006	0.001	0.0005	0.049	0.00003	<0.000005	4.45	0.000012	42.7	0.0001	0.000046	0.00611
21-May-08	30	100	100	7.44	384	814	#N/A	#N/A	#N/A	237	#N/A	219	<0.001	0.0009	0.0004	0.049	<0.0001	<0.001	3.89	0.00001	39.9	<0.001	<0.0005	0.001
28-May-08	31	160	160	7.37	374	771	#N/A	3.97	64.0	234	2.5	214	0.0359	0.00054	0.0004	0.0444	0.00005	<0.000005	3.36	0.000021	38.7	0.0001	0.00131	0.00699
04-Jun-08	32	100	100	7.41	369	802	#N/A	#N/A	#N/A	226	#N/A	208	0.014	0.0008	0.0004	0.043	<0.0001	<0.001	3.68	<0.00002	38.9	<0.001	<0.0005	0.003
11-Jun-08	33	160	160	7.81	381	752	#N/A	2.49	65.1	219	2.6	194	0.0033	0.00054	0.0003	0.0419	0.00003	<0.000005	4.1	0.000006	35.9	0.0001	0.000029	0.00299
18-Jun-08	34	100	100	8.36	276	737	#N/A	#N/A	#N/A	212	#N/A	195	0.004	<0.0005	0.0004	0.04	<0.0001	<0.001	4.24	0.00001	36.5	<0.001	<0.0005	0.0015
25-Jun-08	35	160	160	7.82	406	691	#N/A	4.7	74.7	225	3.20	208	0.0043	0.00057	0.0004	0.0395	0.00013	<0.000005	3.91	0.000019	38.1	0.0001	0.000025	0.00422
02-Jul-08	36	100	100	7.84	326	687	#N/A	#N/A	#N/A	193	#N/A	236	0.007	0.0012	0.0004	0.048	<0.0001	<0.001	4.66	0.00001	43.1	<0.001	<0.0005	0.0032
09-Jul-08	37	160	160	8.25	325	676	#N/A	3.1	68.5	194	2.00	177	0.0076	0.00076	0.001	0.0397	0.00006	<0.000005	3.8	0.000014	33.9	<0.001	0.000077	0.00177
16-Jul-08	38	100	100	8.17	282	664	#N/A	#N/A	#N/A	202	#N/A	187	0.012	0.0009	0.0003	0.038	<0.0001	<0.001	3.74	<0.00001	33.8	<0.001	<0.0005	0.0036
23-Jul-08	39	160	160	7.80	369	528	#N/A	3.7	67.3	188	2.25	182	0.0055	0.00105	0.001	0.0354	0.00005	<0.000005	3.81	0.000022	33.6	<0.0001	0.00002	0.00228
30-Jul-08	40	100	100	7.50	208	639	#N/A	#N/A	#N/A	189	#N/A	179	0.004	0.0009	0.0003	0.037	<0.0001	<0.001	3.75	0.00001	31.7	<0.001	<0.0005	0.0025
06-Aug-08	41	160	160	8.14	256	623	#N/A	3.5	71.9	158	1.50	170	0.007	0.00098	0.0005	0.036	0.00003	<0.000005	3.62	0.000014	31.3	<0.0001	0.000017	0.00205
13-Aug-08	42	100	100	8.08	291	639	#N/A	#N/A	#N/A	156	#N/A	175	0.006	0.0009	0.0003	0.033	<0.0001	<0.001	3.42	0.00005	31.5	<0.001	<0.0005	0.0062
20-Aug-08	43	160	160	7.91	229	613	#N/A	3.2	74.9	136	1.90	169	0.0053	0.00098	0.0004	0.0322	0.00007	<0.000005	3.44	0.000041	29.4	<0.0001	0.000029	0.00543
27-Aug-08	44	100	100	7.54	292	602	#N/A	#N/A	#N/A	160	#N/A	164	0.006	<0.0005	0.0004	0.032	<0.0001	<0.001	3.31	0.00009	28.5	<0.001	<0.0005	0.0049
03-Sep-08	45	160	160	7.50	191	629	#N/A	4.9	76.3	149	2.75	160	0.0139	0.00107	0.0006	0.0315	0.00009	<0.000005	3.5	0.000056	28.6	0.0001	0.00003	0.0136
10-Sep-08	46	100	100	7.50	160	657	#N/A	#N/A	#N/A	153	#N/A	175	0.005	0.0007	0.0003	0.031	<0.0001	<0.001	3.39	0.00001	30.6	<0.001	<0.0005	0.0014
17-Sep-08	47	160	160	7.97	150	632	#N/A	3.8	71.9	151	3.10	158	0.0065	0.00086	0.0004	0.0323	0.00007	<0.000005	3.66	0.000019	28	<0.0001	0.000044	0.00474
24-Sep-08	48	100	100	7.60	101	642	#N/A	#N/A	#N/A	146	#N/A	163	0.004	<0.0005	0.0003	0.034	<0.0001	<0.001	4.14	0.00002	28.9	<0.001	<0.0005	0.0037
01-Oct-08	49	160	160	7.55	158	620																		

Subaqueous Column - Pore Water  
 Sample = 1st Cleaner + Rougher Tails

Date	Cycle No.	Fe	Pb	Li	Mg	Mn	Hg	Mo	Ni	P	K	Se	Si	Ag	Na	Sr	S	Tl	Sn	Ti	U	V	Zn	Zr
		mg/L	mg/L	mg/L	mg/L	mg/L	ug/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
31-Oct-07	1	0.004	0.00036	0.015	4.88	0.00179	<0.01	0.00888	0.00474	0.002	11	0.0009	1.78	0.000144	5.11	0.219	27	0.000213	0.00027	<0.0005	0.000024	<0.0002	0.0051	<0.0001
07-Nov-07	2	0.062	0.00260		6.75	0.002		0.012	0.011	<0.01	14.9	0.0012	1.94	0.00004	7.91	0.314	38	0.00025	<0.005	<0.005	<0.0001	<0.005	0.014	<0.0005
14-Nov-07	3	0.004	0.00008	0.0264	9.54	0.00443	<0.01	0.0154	0.00743	0.003	17.8	0.00063	2	0.000008	11.4	0.395	48	0.000193	<0.0002	<0.0005	0.000034	<0.0002	0.0028	<0.0001
21-Nov-07	4	0.019	0.00020		11.3	0.004		0.016	0.008	<0.01	19.2	0.0003	2.15	<0.00002	13.1	0.438	58	0.00021	<0.005	<0.005	<0.0001	<0.005	<0.005	<0.0005
28-Nov-07	5	0.005	0.00005	0.0329	14.2	0.00284	<0.01	0.0198	0.00769	0.004	21.3	0.00019	2.16	0.000191	20.2	0.55	65	0.000182	0.00716	<0.0005	0.000063	0.0003	0.0052	<0.0001
05-Dec-07	6	0.015	0.00030		17.1	0.002		0.021	0.009	<0.01	27.8	0.0002	1.92	0.00008	27	0.568	90	0.00015	<0.005	<0.005	<0.0001	<0.005	<0.005	<0.0005
12-Dec-07	7	0.006	0.00006	0.036	18.4	0.00369	0.01	0.0245	0.00857	0.003	28	0.00012	2.21	0.000096	34.3	0.647	101	0.000106	0.00252	<0.0005	0.000075	0.0003	0.0052	0.0001
19-Dec-07	8	0.008	0.00020		21.8	0.007		0.024	0.009	<0.01	31.4	0.0001	1.98	<0.00002	49.5	0.639	118	<0.00005	<0.005	<0.005	<0.0001	<0.005	0.006	<0.0005
26-Dec-07	9	0.003	0.00024	0.0398	25.3	0.00518		0.0282	0.00822	0.004	42.4	0.00012	2.3	0.000143	65	0.756	140	0.00003	0.00594	<0.0005	0.000112	<0.0002	0.0021	<0.0001
02-Jan-08	10	0.02	0.00020		29.7	0.005		0.03	0.009	<0.01	38.7	0.0001	2.87	<0.00002	76.7	0.821	170	<0.00005	0.005	<0.005	0.0002	<0.005	<0.005	<0.0005
09-Jan-08	11	0.006	0.00030	0.0451	29.1	0.00644	0.03	0.0321	0.00719	0.006	41.1	0.00013	2.31	0.000017	83.1	0.833	169	0.00001	0.00811	<0.0005	0.000146	<0.0002	0.0097	<0.0001
16-Jan-08	12	0.013	0.00050		32.8	0.007		0.033	0.007	<0.01	43.8	0.0002	2.27	<0.00002	96.5	0.832	183	<0.00005	<0.005	<0.005	0.0002	<0.005	<0.005	<0.0005
23-Jan-08	13	0.005	0.00002	0.0459	34.2	0.00727	0.02	0.0334	0.00717	0.003	41.2	0.00016	2.54	0.00006	98.5	0.846	176	0.000011	0.00617	<0.0005	0.000195	<0.0002	0.0043	<0.0001
30-Jan-08	14	0.009	0.00020		35.5	0.008		0.037	0.009	<0.01	40.7	0.0001	2.81	<0.00002	105	0.915	181	<0.00005	0.011	<0.005	0.0002	<0.005	<0.005	<0.0005
06-Feb-08	15	0.006	0.00001	0.0467	35.7	0.00796	0.02	0.0353	0.00681	0.005	43	0.00012	2.46	0.000105	109	0.868	185	0.000012	0.00159	<0.0005	0.000238	<0.0002	0.0015	<0.0001
13-Feb-08	16	0.018	0.00020		33.9	0.01		0.034	0.006	<0.01	43	0.0001	2.25	<0.00002	100	0.83	177	<0.00005	<0.005	<0.005	0.0002	<0.005	<0.005	<0.0005
20-Feb-08	17	0.007	0.00006	0.0449	37.2	0.00939	0.01	0.0348	0.0057	0.005	41.5	0.00013	2.7	0.00001	117	0.803	183	0.000013	0.00112	<0.0005	0.000242	<0.0002	0.0079	<0.0001
27-Feb-08	18	0.023	0.00001		35.3	0.009		0.033	0.005	<0.01	60.7	0.0002	2.34	<0.00002	97.1	0.798	176	<0.00005	<0.005	<0.005	0.0002	<0.005	<0.005	<0.0005
05-Mar-08	19	0.005	0.00030	0.0421	35.1	0.00839	0.02	0.0336	0.00497	0.005	38.4	0.00016	2.34	0.000065	96.4	0.75	164	0.000013	0.00337	<0.0005	0.000259	<0.0002	0.0011	<0.0001
12-Mar-08	20	0.015	0.00020		36.6	0.009		0.035	0.005	<0.01	38.7	0.0001	2.89	<0.00002	96	0.766	158	<0.00005	<0.005	<0.005	0.0003	<0.005	<0.005	<0.0005
19-Mar-08	21	0.021	0.00026	0.0479	36	0.00937	0.02	0.035	0.00463	0.008	46.7	0.00015	2.64	0.000076	94.3	0.758	165	0.000005	0.00466	0.0014	0.000236	<0.0002	0.012	<0.0001
26-Mar-08	22	0.015	0.00380		36.2	0.009		0.034	0.004	<0.01	83.2	<0.0001	4.66	<0.00002	97.4	0.702	152	<0.00005	<0.005	<0.005	0.0002	<0.005	<0.005	<0.0005
02-Apr-08	23	0.012	0.00007	0.0436	31.4	0.00854	0.02	0.0338	0.00371	0.011	38.3	0.00029	2.33	0.000164	81	0.684	138	0.000007	0.00391	0.0016	0.000231	<0.0002	0.0041	<0.0001
09-Apr-08	24	0.01	0.0003		31.4	0.008		0.031	0.004	<0.01	38.9	0.0001	2.54	<0.00002	81.8	0.619	132	<0.00005	<0.005	<0.005	0.0002	<0.005	<0.005	<0.0005
16-Apr-08	25	0.016	0.00031	0.0427	31.7	0.00878	0.02	0.0323	0.00666	0.01	37.2	0.0001	2.89	0.000064	84.4	0.605	121	0.000013	0.00218	<0.0005	0.000222	<0.0002	0.0039	<0.0001
23-Apr-08	26	0.007	<0.0002		32.2	0.008		0.032	0.005	<0.01	36.4	<0.0001	2.66	<0.00002	71.9	0.586	120	<0.00005	<0.005	<0.005	0.0002	<0.005	<0.005	<0.0005
30-Apr-08	27	0.024	0.00007	0.042	27.5	0.0083	<0.05	0.0289	0.0043	<0.01	34.3	<0.0002	2.41	0.00005	60.3	0.546	102	0.00001	0.00349	<0.003	0.0002	<0.001	0.002	<0.0005
07-May-08	28	0.023	<0.0002		27.3	0.011		0.027	0.003	0.013	29.4	0.0002	2.44	<0.00002	61.3	0.507	94	0.00005	<0.005	<0.005	0.0002	<0.005	<0.005	<0.0005
14-May-08	29	0.014	0.000116	0.0417	30.9	0.00969	0.01	0.0303	0.00281	0.159	30.7	0.00012	2.57	0.000054	67.7	0.515	104	0.000011	0.00429	<0.0005	0.000208	<0.0002	0.0039	<0.0001
21-May-08	30	0.02	<0.0002		29.1	0.009		0.028	0.002	0.012	29.8	0.0003	2.01	<0.00002	60	0.492	94	<0.00005	<0.005	<0.005	0.0002	<0.005	<0.005	<0.0005
28-May-08	31	0.018	0.000285	0.0404	28.4	0.00858	0.01	0.0307	0.00259	0.078	30.3	0.00008	2.41	0.000141	59.4	0.488	92	0.000016	0.00605	0.001	0.000191	<0.0002	0.0041	0.0002
04-Jun-08	32	0.021	0.0003		26.9	0.007		0.025	0.004	0.01	27	0.0004	2.2	0.00003	58.6	0.448	84	<0.00005	<0.005	<0.005	0.0002	<0.005	0.005	<0.0005
11-Jun-08	33	0.012	0.000032	0.0363	25.4	0.00662	0.03	0.0273	0.00198	0.267	27.9	0.00008	2.33	0.000018	55	0.416	78	0.000005	0.00398	<0.0005	0.000164	<0.0002	0.0022	<0.0001
18-Jun-08	34	0.016	<0.0002		25.2	0.007		0.027	0.002	0.017	26.2	0.0004	2.35	<0.00002	50.6	0.461	81	<0.00005	0.005	<0.005	0.0002	<0.005	0.005	<0.0005
25-Jun-08	35	0.041	0.00125	0.0413	27.5	0.00764	0.01	0.029	0.00202	0.084	27.9	0.00011	2.6	0.000017	53.2	0.438	86	0.000009	0.00352	<0.0005	0.000172	<0.0002	0.0025	<0.0001
02-Jul-08	36	0.057	<0.0002		31.1	0.011		0.029	0.003	0.013	33.5	<0.0001	3.02	<0.00002	58.2	0.505	90	<0.00005	<0.005	<0.005	0.0001	<0.005	0.005	<0.0005
09-Jul-08	37	0.019	0.000121	0.0393	22.5	0.00784	<0.01	0.0275	0.00197	0.007	26.9	0.00007	2.52	<0.00005	43.9	0.428	74	0.000022	0.00315	<0.0005	0.000166	<0.0002	0.0032	<0.0001
16-Jul-08	38	0.021	<0.0002		24.9	0.007		0.027	0.002	<0.01	26.9	<0.0001	2.52	<0.00002	48.5	0.434	73	<0.00005	<0.005	<0.005	0.0001	<0.005	0.005	<0.0005
23-Jul-08	39	0.03	0.00009	0.0366	23.8	0.00674	<0.01	0.0265	0.00182	0.161	26.6	0.00016	2.11	<0.00005	45.4	0.395	69	0.000007	0.00347	<0.0005	0.000119	<0.0002	0.0014	<0.0001
30-Jul-08	40	0.098	<0.0002		24.2	0.008		0.024	0.002	0.341	25.6	<0.0001	2.5	<0.00002	41.9	0.372	70	<0.00005	<0.005	<0.005	0.0001	<0.005	0.005	<0.0005
06-Aug-08	41	0.06	0.000234	0.0398	22.4	0.00699	<0.01	0.0261	0.00148	0.025	24.3	<0.00004	2.1	<0.00005	40.2	0.398	63	0.000005	0.00402	<0.0005	0.000111	<0.0002	0.0028	<0.0001
13-Aug-08	42	0.023	<0.0002		23.5	0.007		0.025	0.002	0.115	25.4	0.0001	2.46	<0.00002	40.8	0.381	63	<0.00005	<0.005	<0.005	0.0001	<0.005	0.005	<0.0005
20-Aug-08	43	0.018	0.000242	0.0358	23.2	0.00683	<0.01	0.0245	0.00153	0.051	23.7	0.00007	2.17	0.000023	40.6	0.356	60	0.000004	0.00407	0.0009	0.000106	0.0002	0.0032	<0.0001
27-Aug-08	44	0.027	0.0004		22.5	0.006		0.021	0.004	<0.01	23.7	0.0001	2.24	<0.00002	36.7	0.34	57	<0.00005	<0.005	<0.005	<0.0001	<0.005	0.005	<0.0005
03-Sep-08	45	0.014	0.000511	0.0354	21.6	0.00657	<0.01	0.024	0.0018	1.14	25.4	0.00013	2.13	0.000009	37.2	0.348	59	0.000014	0.00288	0.0006				



Subaqueous Column - Pore Water

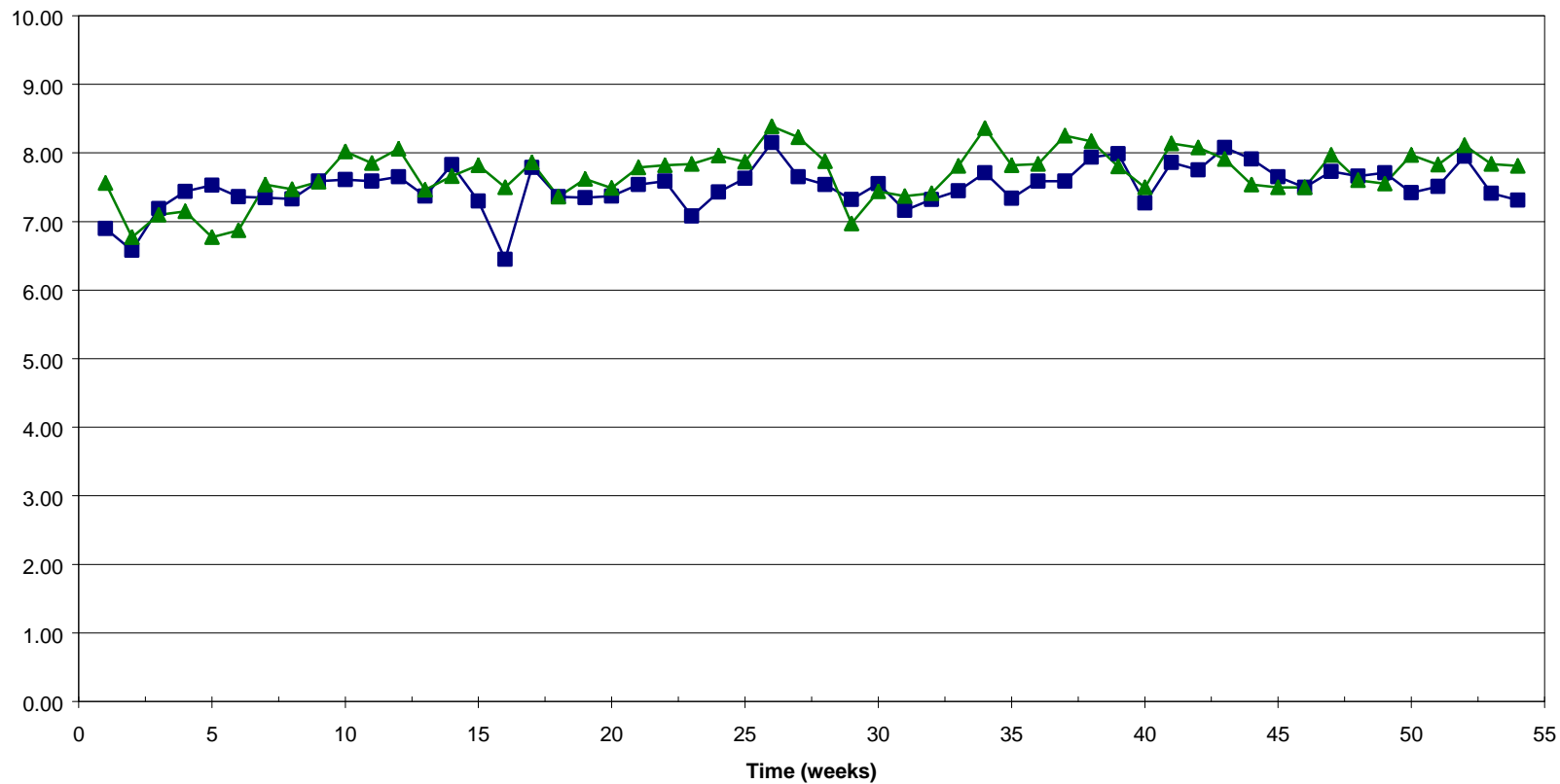
Sample = 1st Cleaner + Rougher Tails

Date	Cycle No.	Input L	Output L	pH/Vol	µmole ORP mV	Cond. umhos/cm	Acidity (pH 4.5) mgCaCO3/L	Acidity (pH 8.3) mg/kg/wk	Alkalinity mg/kg/wk	Sulphate mg/kg/wk	Dissolved Oxygen mg/L	Hardness CaCO3 mg/L	Al mg/kg/wk	Sb mg/kg/wk	As mg/kg/wk	Ba mg/kg/wk	Be mg/kg/wk	Bi mg/kg/wk	B mg/kg/wk	Cd mg/kg/wk	Ca mg/kg/wk	Cr mg/kg/wk	Co mg/kg/wk	Cu mg/kg/wk	Fe mg/kg/wk
31-Oct-07	1	0.16	0.16	7.56	259	408	#N/A	0.1347	0.7645	2.016	1.45	92.4	0.0003104	0.0000288	0.0000422	0.0016160	0.0000003	0.0000002	0.02534	0.0000021	0.93	0.0000288	0.0000014	0.0001078	0.0001280
07-Nov-07	2	0.10	0.10	6.77	303	641	#N/A			2.06		119	0.0002400	0.0000280	0.0000740	0.0013800	0.0000020	0.0000200	0.02020	0.0000052	0.73	0.0000200	0.0000010	0.0001180	0.0001240
14-Nov-07	3	0.16	0.16	7.1	145	719	#N/A	0.1210	0.8016	4.608	2.25	148	0.0000928	0.0000310	0.0000688	0.0025312	0.0000003	0.0000002	0.04768	0.0000007	1.39	0.0000032	0.0000019	0.0000307	0.0001280
21-Nov-07	4	0.10	0.10	7.15	180	488	#N/A			3.18		170	0.0003200	0.0000260	0.0001080	0.0017000	0.0000020	0.0000200	0.02760	0.0000006	0.99	0.0000200	0.0000100	0.0000320	0.0003800
28-Nov-07	5	0.16	0.16	6.77	275	564	#N/A	0.1645	0.8870	6.272	0.95	191	0.0001472	0.0104640	0.0000640	0.0030304	0.0000003	0.0000002	0.04896	0.0000045	1.71	0.0000032	0.0000018	0.0000822	0.0001600
05-Dec-07	6	0.10	0.10	6.87	285	687	#N/A			4.46		238	0.0000800	0.0000260	0.0000320	0.0021000	0.0000020	0.0000200	0.03100	0.0000010	1.34	0.0000200	0.0000100	0.0000780	0.0003000
12-Dec-07	7	0.16	0.16	7.54	299	773	#N/A	0.1267	0.8957	8.352	2.15	243	0.0001664	0.0001520	0.0000627	0.0036160	0.0000003	0.0000002	0.05440	0.0000012	2.14	0.0000032	0.0000020	0.0000986	0.0001920
19-Dec-07	8	0.10	0.10	7.47	285	861	#N/A			5.62		264	0.0001600	0.0001200	0.0000560	0.0019400	0.0000020	0.0000200	0.03300	0.0000010	1.39	0.0000200	0.0000100	0.0001240	0.0001600
26-Dec-07	9	0.16	0.16	7.58	322	1023	#N/A	0.1120	0.9507	11.84	0.75	290	0.0001344	0.0001930	0.0000720	0.0039800	0.0000003	0.0000002	0.06336	0.0000016	2.38	0.0000032	0.0000019	0.0001331	0.0000960
02-Jan-08	10	0.10	0.10	8.02	134	1002	#N/A			7.16		340	0.0000800	0.0001020	0.0000660	0.0024600	0.0000020	0.0000200	0.05920	0.0000006	1.75	0.0000200	0.0000100	0.0000360	0.0004000
09-Jan-08	11	0.16	0.16	7.85	265	1152	#N/A	0.1334	1.1462	15.04	2.45	330	0.0001760	0.0001632	0.0001008	0.0040960	0.0000003	0.0000002	0.08544	0.0000046	2.69	0.0000032	0.0000020	0.0000320	0.0001920
16-Jan-08	12	0.10	0.10	8.06	115	1280	#N/A			8.46		358	0.0000800	0.0001060	0.0000480	0.0025000	0.0000020	0.0000200	0.05160	0.0000014	1.78	0.0000200	0.0000100	0.0000280	0.0001280
23-Jan-08	13	0.16	0.16	7.46	195	1225	#N/A	0.2205	1.2890	15.2	2.25	355	0.0000800	0.0000490	0.0000339	0.0037760	0.0000003	0.0000002	0.08992	0.0000013	2.74	0.0000128	0.0000025	0.0000944	0.0001600
30-Jan-08	14	0.10	0.10	7.66	180	1240	#N/A			10.14		340	0.0001000	0.0001060	0.0000580	0.0024400	0.0000020	0.0000200	0.06160	0.0000006	1.56	0.0000200	0.0000100	0.0000760	0.0001920
06-Feb-08	15	0.16	0.16	7.82	260	1187	#N/A	0.1664	1.3901	14.464	1.90	345	0.0001280	0.0000416	0.0000432	0.0035200	0.0000003	0.0000002	0.10144	0.0000008	2.54	0.0000032	0.0000020	0.0001082	0.0001920
13-Feb-08	16	0.10	0.10	7.50	187	1199	#N/A			9.52		332	0.0001400	0.0000100	0.0000240	0.0020400	0.0000020	0.0000200	0.06080	0.0000004	1.54	0.0000032	0.0000100	0.0000700	0.0003600
20-Feb-08	17	0.16	0.16	7.86	285	1219	#N/A	0.1738	1.4579	14.208	1.75	336	0.0001440	0.0000595	0.0001197	0.0030800	0.0000006	0.0000002	0.11296	0.0000007	2.34	0.0000032	0.0000019	0.0000650	0.0002240
27-Feb-08	18	0.10	0.10	7.36	202	1220	#N/A			10.26		326	0.0001200	0.0000120	0.0001120	0.0017000	0.0000020	0.0000200	0.06560	0.0000004	1.44	0.0000032	0.0000010	0.0001880	0.0004600
05-Mar-08	19	0.16	0.16	7.62	302	1286	#N/A	0.2218	1.6518	13.44	2.30	314	0.0001440	0.0000224	0.0000362	0.0026560	0.0000003	0.0000002	0.11264	0.0000004	2.17	0.0000032	0.0000016	0.0000643	0.0001600
12-Mar-08	20	0.10	0.10	7.49	160	1280	#N/A			7.84		313	0.0000800	0.0000300	0.0000240	0.0015800	0.0000020	0.0000200	0.06720	0.0000002	1.30	0.0000200	0.0000100	0.0000500	0.0001800
19-Mar-08	21	0.16	0.16	7.79	202	11265	#N/A	0.1622	1.7722	14.08	1.75	347	0.0002272	0.0000646	0.0000342	0.0024480	0.0000006	0.0000002	0.12064	0.0000017	2.54	0.0000064	0.0000017	0.0001114	0.0006720
26-Mar-08	22	0.10	0.10	7.82	146	1402	#N/A			7.38		304	0.0003600	0.0000240	0.0000280	0.0013800	0.0000020	0.0000200	0.07060	0.0000006	1.24	0.0000020	0.0000010	0.0000260	0.0003000
02-Apr-08	23	0.16	0.16	7.84	335	1127	#N/A	0.1523	1.8515	10.368	1.75	269	0.0002208	0.0000685	0.0000259	0.0018304	0.0000042	0.0000002	0.11712	0.0000012	1.79	0.0000064	0.0000020	0.0001642	0.0003840
09-Apr-08	24	0.10	0.10	7.96	240	1002	#N/A			6.96		268	0.0001000	0.0000180	0.0000180	0.0011200	0.0000020	0.0000200	0.07880	0.0000002	1.11	0.0000020	0.0000010	0.0000240	0.0002000
16-Apr-08	25	0.16	0.16	7.87	301	998	#N/A	0.1613	1.9296	10.144	1.75	260	0.0002496	0.0000630	0.0000224	0.0018176	0.0000038	0.0000002	0.12672	0.0000010	1.66	0.0000032	0.0000021	0.0001046	0.0005120
23-Apr-08	26	0.10	0.10	8.39	337	1009	#N/A			6.24		265	0.0001200	0.0000100	0.0000080	0.0011800	0.0000004	0.0000200	0.09120	0.0000004	1.06	0.0000020	0.0000010	0.0000260	0.0001400
30-Apr-08	27	0.16	0.16	8.23	365	1000	#N/A	0.1229	1.9760	8.896	2	223	0.0002880	0.0000256	0.0000128	0.0017312	0.0000016	0.0000010	0.13344	0.0000010	1.40	0.0000160	0.0000010	0.0001408	0.0007680
07-May-08	28	0.10	0.10	7.88	337	1018	#N/A			4.76		219	0.0002200	0.0000320	0.0000120	0.0010200	0.0000020	0.0000200	0.07660	0.0000008	0.85	0.0000020	0.0000010	0.0000880	0.0004600
14-May-08	29	0.16	0.16	6.97	315	956	#N/A	0.1283	2.0208	6.496	1.95	234	0.0001920	0.0000320	0.0000144	0.0015680	0.0000010	0.0000002	0.14240	0.0000004	1.37	0.0000032	0.0000015	0.0001955	0.0004480
21-May-08	30	0.10	0.10	7.44	384	814	#N/A			4.74		219	0.0000200	0.0000180	0.0000080	0.0009800	0.0000020	0.0000200	0.07780	0.0000002	0.80	0.0000020	0.0000010	0.0000200	0.0004000
28-May-08	31	0.16	0.16	7.37	374	771	#N/A	0.1270	2.0493	7.488	2.5	214	0.0011488	0.0000173	0.0000118	0.0014208	0.0000016	0.0000002	0.10752	0.0000007	1.24	0.0000032	0.0000019	0.0002237	0.0005760
04-Jun-08	32	0.10	0.10	7.41	369	802	#N/A			4.52		208	0.0002800	0.0000160	0.0000080	0.0008600	0.0000020	0.0000200	0.07360	0.0000004	0.78	0.0000020	0.0000010	0.0000600	0.0004200
11-Jun-08	33	0.16	0.16	7.81	381	752	#N/A	0.0797	2.0829	7.008	2.6	194	0.0001056	0.0000173	0.0000086	0.0013408	0.0000010	0.0000002	0.13120	0.0000002	1.15	0.0000032	0.0000009	0.0000957	0.0003840
18-Jun-08	34	0.10	0.10	8.36	276	737	#N/A			4.24		195	0.0000800	0.0000100	0.0000080	0.0008000	0.0000020	0.0000200	0.08480	0.0000002	0.73	0.0000020	0.0000010	0.0000300	0.0003200
25-Jun-08	35	0.16	0.16	7.82	406	691	#N/A	0.1510	2.3894	7.2	3.2	208	0.0001376	0.0000182	0.0000115	0.0012640	0.0000042	0.0000002	0.12512	0.0000006	1.22	0.0000032	0.0000008	0.0001350	0.0001320
02-Jul-08	36	0.10	0.10	7.84	326	687	#N/A			3.86		236	0.0001400	0.0000240	0.0000080	0.0009600	0.0000020	0.0000200	0.09320	0.0000002	0.86	0.0000020	0.0000010	0.0000640	0.0011400
09-Jul-08	37	0.16	0.16	8.25	325	676	#N/A	0.0998	2.1930	6.208	2	177	0.0002432	0.0000243	0.0000304	0.0012704	0.0000019	0.0000002	0.12160	0.0000004	1.08	0.0000032	0.0000025	0.0000566	0.0006080
16-Jul-08	38	0.10	0.10	8.17	282	664	#N/A			4.04		187	0.0002400	0.0000180	0.0000060	0.0007600	0.0000020	0.0000200	0.07480	0.0000002	0.68	0.0000020	0.0000010	0.0000720	0.0004200
23-Jul-08	39	0.16	0.16	7.8	369	528	#N/A	0.1184	2.1533	6.016	2.25	182	0.0001760	0.0000336	0.0000320	0.0011328	0.0000016	0.0000002	0.12192	0.0000007	1.08	0.0000032	0.0000006	0.0000730	0.0009600
30-Jul-08	40	0.10	0.10	7.5	208	639	#N/A			3.78		179	0.0000800	0.0000180	0.0000060	0.0007400	0.0000020	0.0000200	0.07500	0.0000002	0.63	0.0000020	0.0000010	0.0000500	0.0019600
06-Aug-08	41	0.16	0.16	8.14	256	623	#N/A	0.1133	2.3005	5.056	1.5	170	0.0002240	0.0000314	0.0000144	0.0011520	0.0000010	0.0000002	0.11584	0.0000004	1.00	0.0000032	0.0000005	0.0000656	0.0001920
13-Aug-08	42	0.10	0.10	8.08	291	639	#N/A			3.12		175	0.0001200	0.0000180	0.0000060	0.0006600	0.0000								

Subaqueous Column - Pore Water

Sample = 1st Cleaner + Rougher Tails

Date	Cycle No.	Pb	Li	Mg	Mn	Hg	Mo	Ni	P	K	Se	Si	Ag	Na	Sr	S	Ti	Sn	Tl	U	V	Zn	Zr
		mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk
31-Oct-07	1	0.000115	0.0004800	0.16	0.0000573	0.0003200	0.0002842	0.0001517	0.0000640	0.35	0.000029	0.056960	0.0000046	0.16	0.007008	0.86	0.0000068	0.000009	0.000016	0.000001	0.0000064	0.000163	0.0000032
07-Nov-07	2	0.0000520		0.14	0.0000400		0.0002400	0.0002200	0.0002000	0.30	0.000024	0.038800	0.0000008	0.16	0.01	0.76	0.0000050	0.000100	0.000002	0.0001000	0.000280	0.0000100	0.0000100
14-Nov-07	3	0.0000024	0.0008448	0.31	0.0001418	0.0003200	0.0004928	0.0002378	0.0000960	0.57	0.000020	0.064000	0.0000003	0.36	0.01264	1.54	0.0000062	0.000006	0.000016	0.000001	0.0000064	0.000090	0.0000032
21-Nov-07	4	0.0000040		0.23	0.0000800		0.0003200	0.0001600	0.0002000	0.38	0.000006	0.043000	0.0000004	0.26	0.00876	1.16	0.0000042	0.000100	0.000002	0.0001000	0.000100	0.0000100	0.0000100
28-Nov-07	5	0.0000016	0.0010528	0.45	0.0000909	0.0003200	0.0006336	0.0002461	0.0001280	0.68	0.000006	0.069120	0.0000061	0.65	0.01760	2.08	0.0000058	0.000229	0.000016	0.000002	0.0000096	0.000166	0.0000032
05-Dec-07	6	0.0000060		0.34	0.0000400		0.0004800	0.0001800	0.0002000	0.56	0.000004	0.038400	0.0000016	0.54	0.01136	1.80	0.0000030	0.000100	0.000002	0.0001000	0.000100	0.0000100	0.0000100
12-Dec-07	7	0.0000018	0.0011520	0.59	0.0001181	0.0003200	0.0007840	0.0002742	0.0000960	0.90	0.000004	0.070720	0.0000031	1.10	0.02070	3.23	0.0000034	0.000081	0.000016	0.000002	0.0000096	0.000166	0.0000032
19-Dec-07	8	0.0000040		0.44	0.0001400		0.0004800	0.0001800	0.0002000	0.63	0.000002	0.039600	0.0000004	0.99	0.01278	2.36	0.0000010	0.000100	0.000002	0.0001000	0.000100	0.0000100	0.0000100
26-Dec-07	9	0.0000078	0.0012736	0.81	0.0001658	0.0000000	0.0009024	0.0002630	0.0001280	1.36	0.000004	0.073600	0.0000046	2.08	0.02419	4.48	0.0000010	0.000190	0.000016	0.000004	0.0000064	0.000067	0.0000032
02-Jan-08	10	0.0000040		0.59	0.0001000		0.0006000	0.0001800	0.0002000	0.77	0.000002	0.057400	0.0000004	1.53	0.01642	3.40	0.0000010	0.000100	0.000004	0.0001000	0.000100	0.0000100	0.0000100
09-Jan-08	11	0.0001056	0.0014432	0.93	0.0002061	0.0009600	0.0010272	0.0002301	0.0001920	1.32	0.000004	0.073920	0.0000005	2.66	0.02666	5.41	0.0000003	0.000260	0.000016	0.000005	0.0000064	0.000310	0.0000032
16-Jan-08	12	0.0000100		0.66	0.0001400		0.0006000	0.0001400	0.0002000	0.98	0.000004	0.045400	0.0000004	1.93	0.01664	3.66	0.0000010	0.000100	0.000004	0.0001000	0.000100	0.0000100	0.0000100
23-Jan-08	13	0.0000007	0.0014688	1.09	0.0002326	0.0006400	0.0010688	0.0002294	0.0000960	1.32	0.000005	0.081280	0.0000019	3.15	0.02707	5.63	0.0000004	0.000197	0.000016	0.000006	0.0000064	0.000138	0.0000032
30-Jan-08	14	0.0000040		0.71	0.0001600		0.0007400	0.0001800	0.0002000	0.81	0.000002	0.056200	0.0000004	2.10	0.01830	3.62	0.0000010	0.000220	0.000004	0.0001000	0.000100	0.0000100	0.0000100
06-Feb-08	15	0.0000004	0.0014944	1.14	0.0002547	0.0006400	0.0011296	0.0001179	0.0001600	1.38	0.000004	0.078720	0.0000003	3.49	0.02778	5.92	0.0000004	0.000051	0.000016	0.000008	0.0000064	0.000048	0.0000032
13-Feb-08	16	0.0000040		0.68	0.0002000		0.0006800	0.0001200	0.0002000	0.86	0.000002	0.045000	0.0000004	2.00	0.01660	3.54	0.0000010	0.000100	0.000004	0.0001000	0.000100	0.0000100	0.0000100
20-Feb-08	17	0.0000019	0.0014368	1.19	0.0003005	0.0003200	0.0011136	0.0001824	0.0001600	1.33	0.000004	0.086400	0.0000003	3.74	0.02570	5.86	0.0000004	0.000036	0.000016	0.000008	0.0000064	0.000253	0.0000032
27-Feb-08	18	0.0000060		0.71	0.0001800		0.0006800	0.0001000	0.0002000	1.21	0.000004	0.046800	0.0000004	1.94	0.01596	3.52	0.0000010	0.000100	0.000004	0.0001000	0.000100	0.0000100	0.0000100
05-Mar-08	19	0.0000004	0.0013472	1.12	0.0002685	0.0006400	0.0010752	0.0001590	0.0001600	1.23	0.000005	0.074880	0.0000021	3.08	0.02400	5.25	0.0000004	0.000108	0.000016	0.000008	0.0000064	0.000035	0.0000032
12-Mar-08	20	0.0000040		0.73	0.0001800		0.0007000	0.0001000	0.0002000	0.77	0.000002	0.057800	0.0000004	1.92	0.01532	3.16	0.0000010	0.000100	0.000004	0.000006	0.0001000	0.000100	0.0000100
19-Mar-08	21	0.0000083	0.0015328	1.15	0.0002998	0.0006400	0.0011200	0.0001482	0.0002560	1.49	0.000005	0.084480	0.0000024	3.02	0.02426	5.28	0.0000002	0.000149	0.000045	0.000008	0.0000064	0.000384	0.0000032
26-Mar-08	22	0.0000070		0.72	0.0001800		0.0006800	0.0000800	0.0002000	1.66	0.000002	0.093200	0.0000004	1.95	0.01404	3.04	0.0000010	0.000100	0.000004	0.0001000	0.000100	0.0000100	0.0000100
02-Apr-08	23	0.0000022	0.0013952	1.00	0.0002733	0.0006400	0.0010816	0.0001187	0.0003520	1.23	0.000009	0.074560	0.0000052	2.59	0.02189	4.42	0.0000002	0.000125	0.000051	0.000007	0.0000064	0.000131	0.0000032
09-Apr-08	24	0.0000060		0.63	0.0001600		0.0006200	0.0000800	0.0002000	0.78	0.000002	0.050800	0.0000004	1.64	0.01238	2.64	0.0000010	0.000100	0.000004	0.0001000	0.000100	0.0000100	0.0000100
16-Apr-08	25	0.0000010	0.0013664	1.01	0.0002810	0.0006400	0.0010336	0.0002131	0.0003200	1.19	0.000003	0.092480	0.0000020	2.70	0.01936	3.87	0.0000004	0.000070	0.000016	0.000007	0.0000064	0.000125	0.0000032
23-Apr-08	26	0.0000040		0.64	0.0001600		0.0006400	0.0001000	0.0002000	0.73	0.000002	0.053200	0.0000004	1.44	0.01172	2.40	0.0000010	0.000100	0.000004	0.0001000	0.000100	0.0000100	0.0000100
30-Apr-08	27	0.0000022	0.0013440	0.88	0.0002656	0.0016000	0.0009248	0.0001376	0.0003200	1.10	0.000006	0.071720	0.0000016	1.93	0.01747	3.26	0.0000003	0.000112	0.000096	0.000006	0.0000032	0.000064	0.0000160
07-May-08	28	0.0000040		0.55	0.0002200		0.0005400	0.0000600	0.0002600	0.59	0.000004	0.048800	0.0000004	1.23	0.01014	1.88	0.0000010	0.000100	0.000004	0.0001000	0.000100	0.0000100	0.0000100
14-May-08	29	0.0000037	0.0013344	0.99	0.0003101	0.0003200	0.0009696	0.0000899	0.0005880	0.98	0.000004	0.082240	0.0000017	2.17	0.01648	3.33	0.0000004	0.000137	0.000016	0.000007	0.0000064	0.000125	0.0000032
21-May-08	30	0.0000040		0.58	0.0001800		0.0005600	0.0000400	0.0002400	0.60	0.000006	0.042000	0.0000004	1.20	0.00984	1.88	0.0000010	0.000100	0.000004	0.0001000	0.000100	0.0000100	0.0000100
28-May-08	31	0.0000091	0.0012928	0.91	0.0002746	0.0003200	0.0009824	0.0000829	0.0002460	0.97	0.000003	0.074100	0.0000045	1.90	0.01562	2.94	0.0000005	0.000194	0.000032	0.000006	0.0000064	0.000131	0.0000064
04-Jun-08	32	0.0000060		0.54	0.0001400		0.0005000	0.0000800	0.0002000	0.54	0.000008	0.044000	0.0000006	1.17	0.00896	1.68	0.0000010	0.000100	0.000004	0.0001000	0.000100	0.0000100	0.0000100
11-Jun-08	33	0.0000010	0.0011616	0.81	0.0002118	0.0009600	0.0008736	0.0000634	0.0008540	0.89	0.000003	0.074560	0.0000006	1.76	0.01331	2.50	0.0000002	0.000127	0.000016	0.000005	0.0000064	0.000070	0.0000032
18-Jun-08	34	0.0000040		0.50	0.0001400		0.0005400	0.0000400	0.0003400	0.52	0.000008	0.047000	0.0000004	1.01	0.00922	1.62	0.0000010	0.000100	0.000004	0.0001000	0.000100	0.0000100	0.0000100
25-Jun-08	35	0.0000040	0.0013216	0.88	0.0002445	0.0003200	0.0009280	0.0000646	0.0002680	0.89	0.000004	0.083200	0.0000005	1.70	0.01402	2.75	0.0000003	0.000113	0.000016	0.000006	0.0000064	0.000080	0.0000032
02-Jul-08	36	0.0000040		0.62	0.0002200		0.0005800	0.0000600	0.0002600	0.67	0.000002	0.060400	0.0000004	1.16	0.01010	1.80	0.0000010	0.000100	0.000004	0.000002	0.0001000	0.000100	0.0000100
09-Jul-08	37	0.0000039	0.0012576	0.72	0.0002509	0.0003200	0.0008800	0.0000630	0.0002240	0.86	0.000002	0.080640	0.0000002	1.40	0.01370	2.37	0.0000007	0.000101	0.000016	0.000005	0.0000064	0.000102	0.0000032
16-Jul-08	38	0.0000040		0.50	0.0001400		0.0005400	0.0000400	0.0002000	0.54	0.000002	0.050400	0.0000004	0.97	0.00868	1.46	0.0000010	0.000100	0.000004	0.000002	0.0001000	0.000100	0.0000100
23-Jul-08	39	0.0000028	0.0011712	0.76	0.0002157	0.0003200	0.0008480	0.0000582	0.0051520	0.85	0.000005	0.067520	0.0000002	1.45	0.01264	2.21	0.0000002	0.000111	0.000016	0.000004	0.0000064	0.000045	0.0000032
30-Jul-08	40	0.0000040		0.48	0.0001600		0.0004800	0.0000400	0.0008200	0.51	0.000002	0.050000	0.0000004	0.84	0.00744	1.40	0.0000010	0.000100	0.000004	0.000002	0.0001000	0.000100	0.0000100
06-Aug-08	41	0.0000075	0.0012736	0.72	0.0002237	0.0003200	0.0008352	0.0000474															

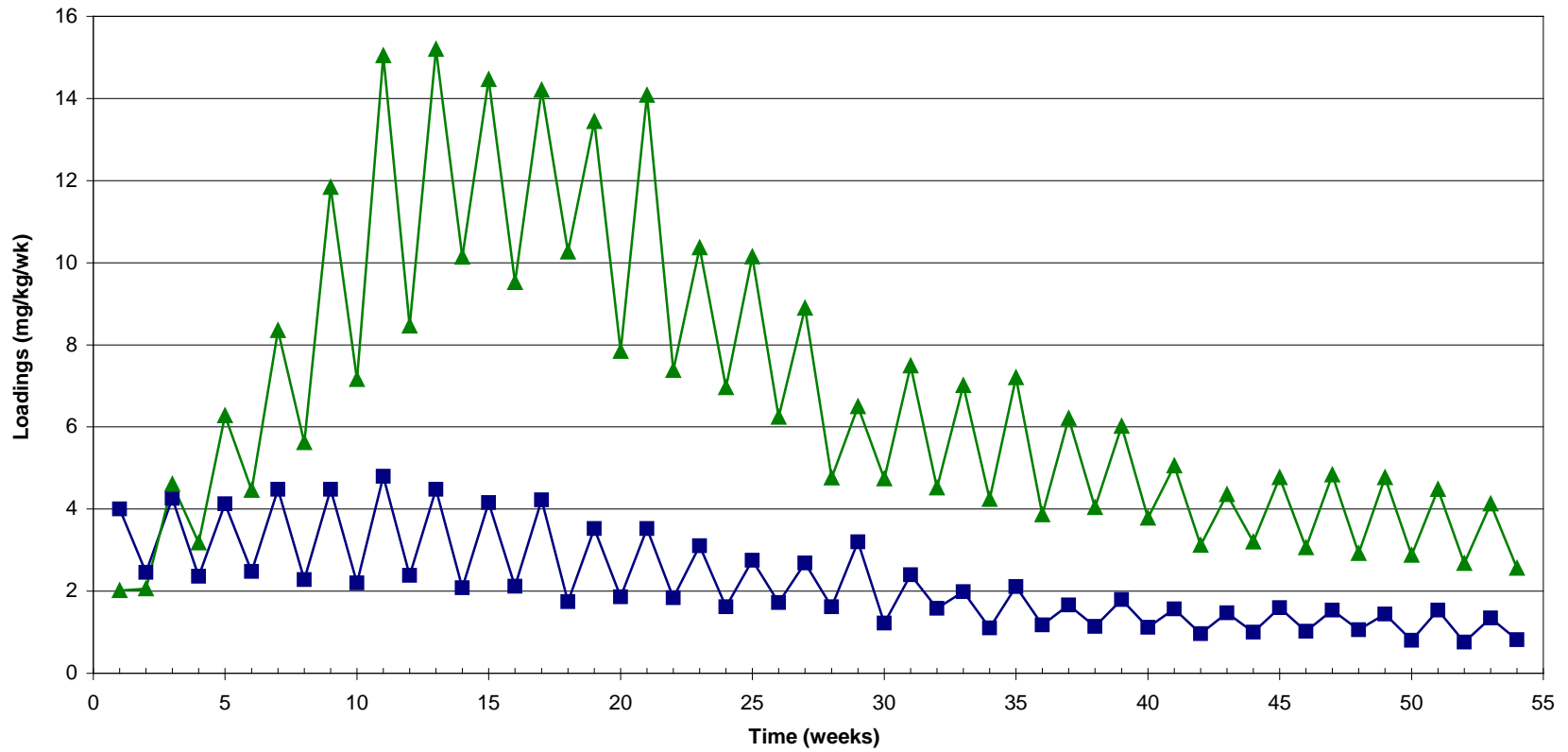


Sub-Surface Water
 
 Sub-Pore Water

Minago Tails Column Tests
pH
Weeks 1 to 54
Victory Nickel Inc.

Source: adapted from URS (2009i)



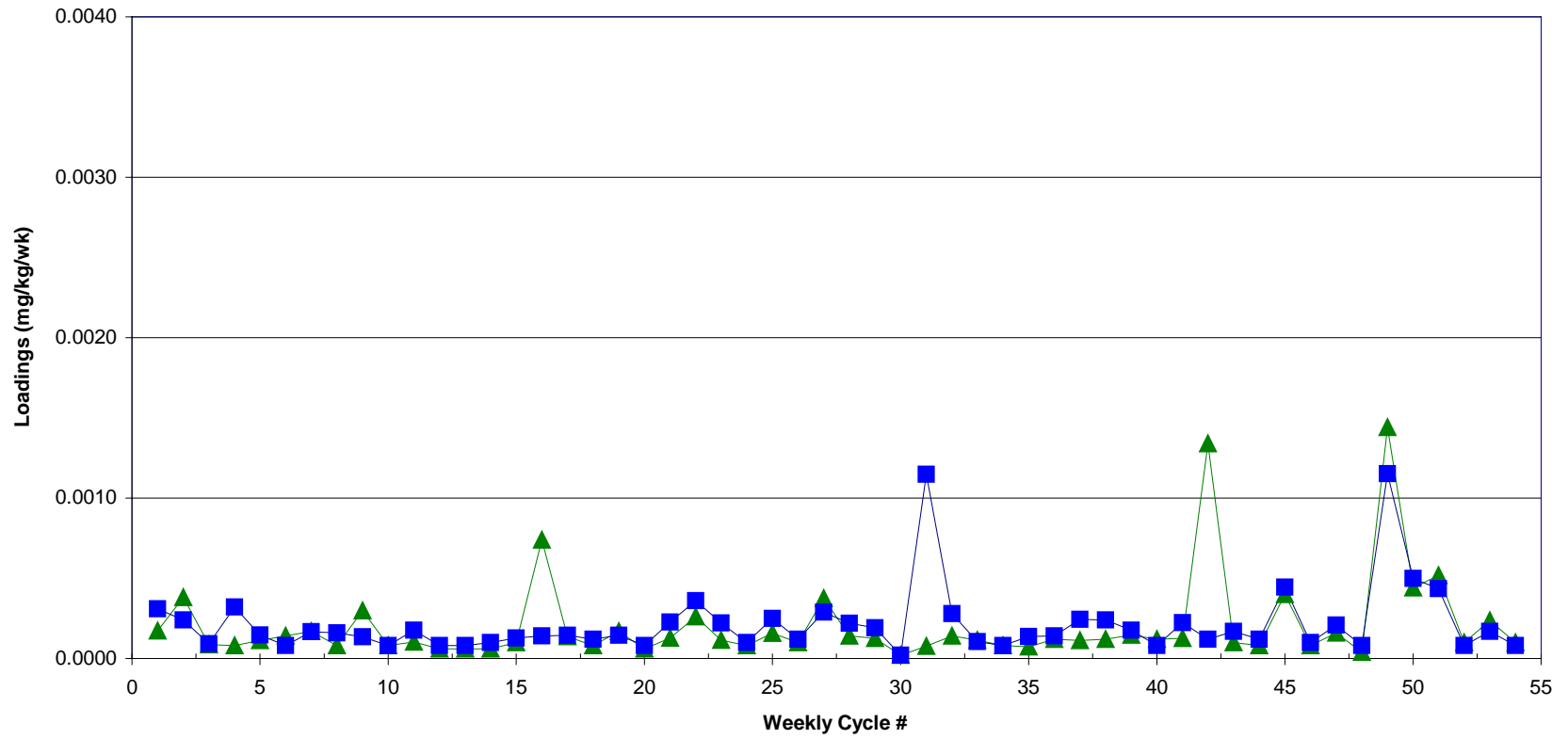


Sub-Surface Water
  Sub-Pore Water

Minago Tails Column Tests  
 Sulphate Loadings  
 Weeks 1 to 54  
 Victory Nickel Inc.

Source: adapted from URS (2009i)



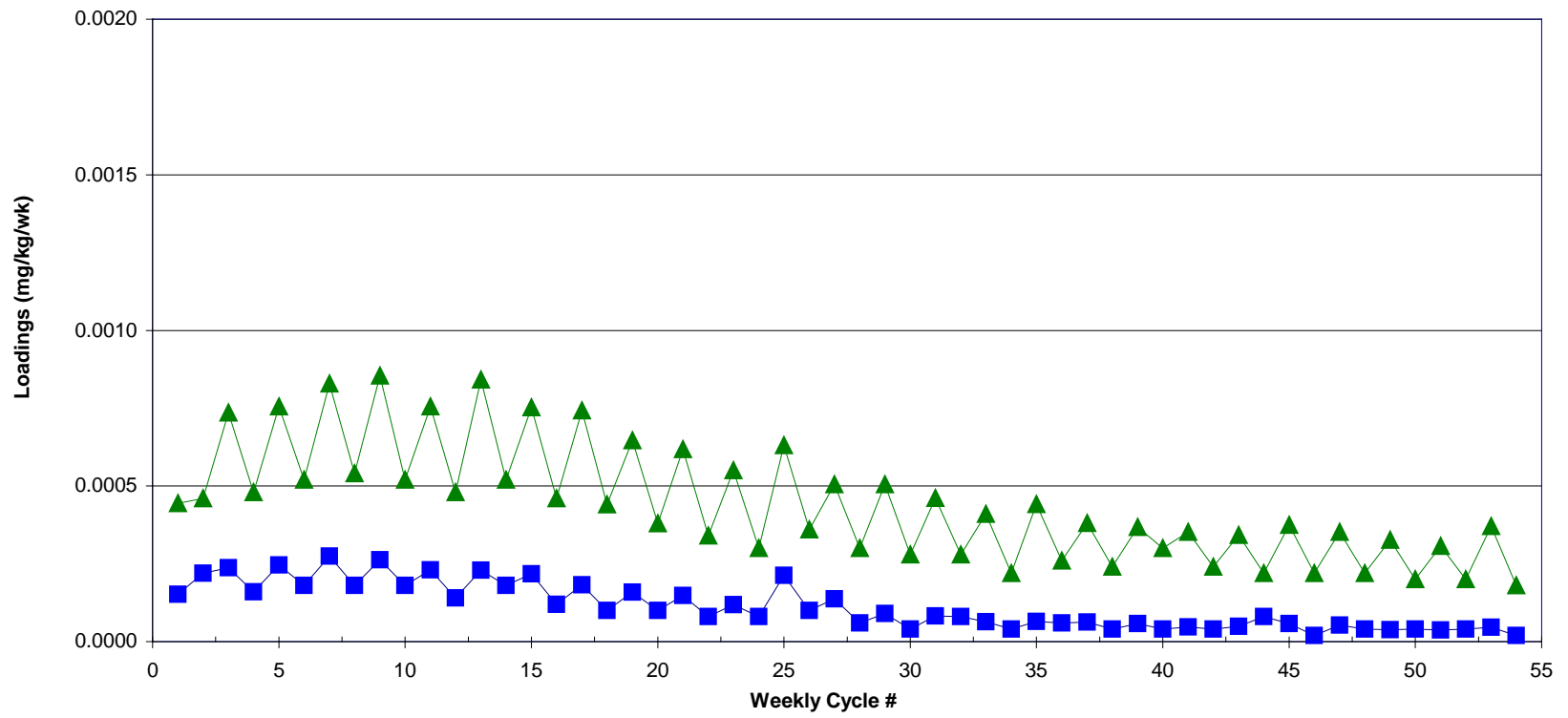


Sub-Surface Water
  Sub-Pore Water

Minago Tails Column Tests  
 Aluminum Loadings  
 Weeks 1 to 54  
 Victory Nickel Inc.

Source: adapted from URS (2009i)



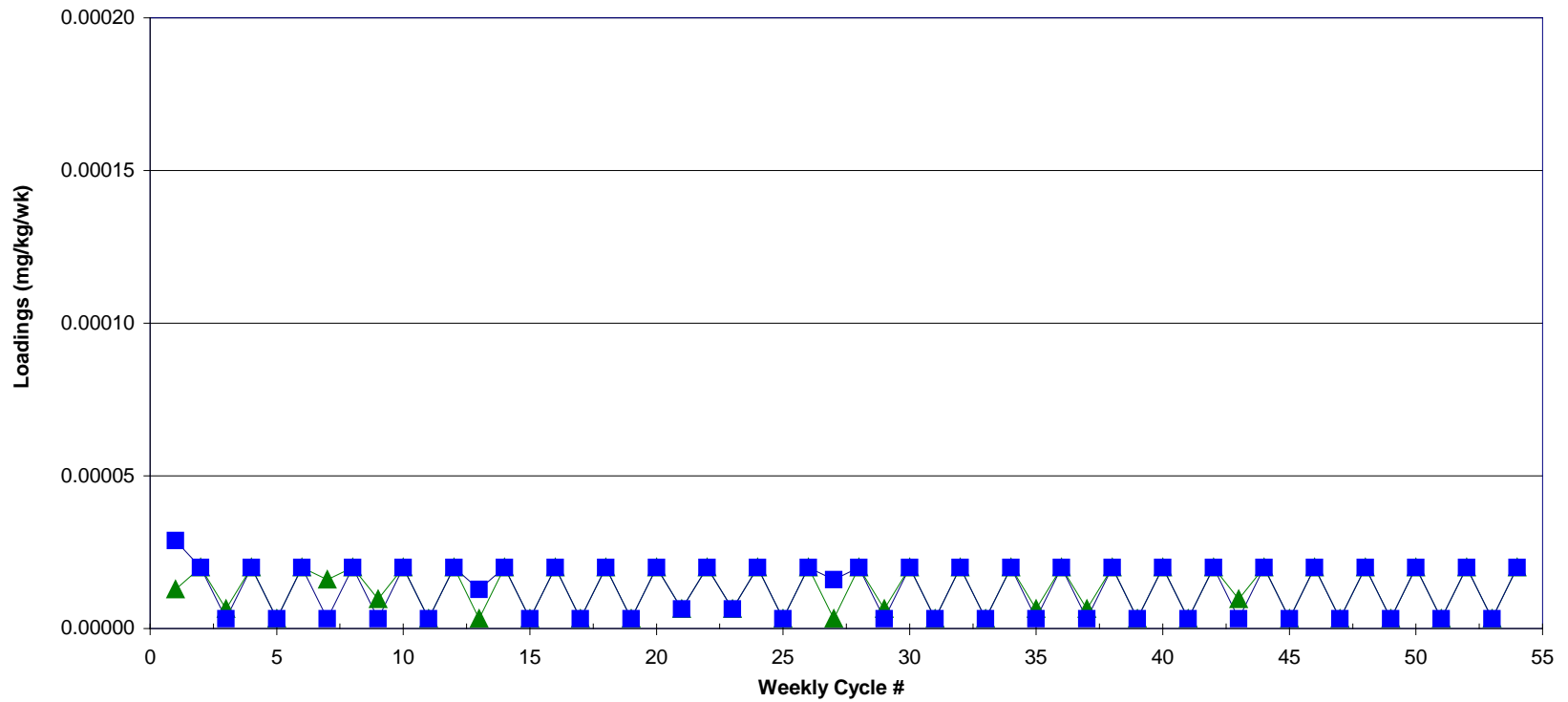


Sub-Surface Water
 
 Sub-Pore Water

Minago Tails Column Tests Nickel Loadings Weeks 1 to 54
Victory Nickel Inc.

Source: adapted from URS (2009i)



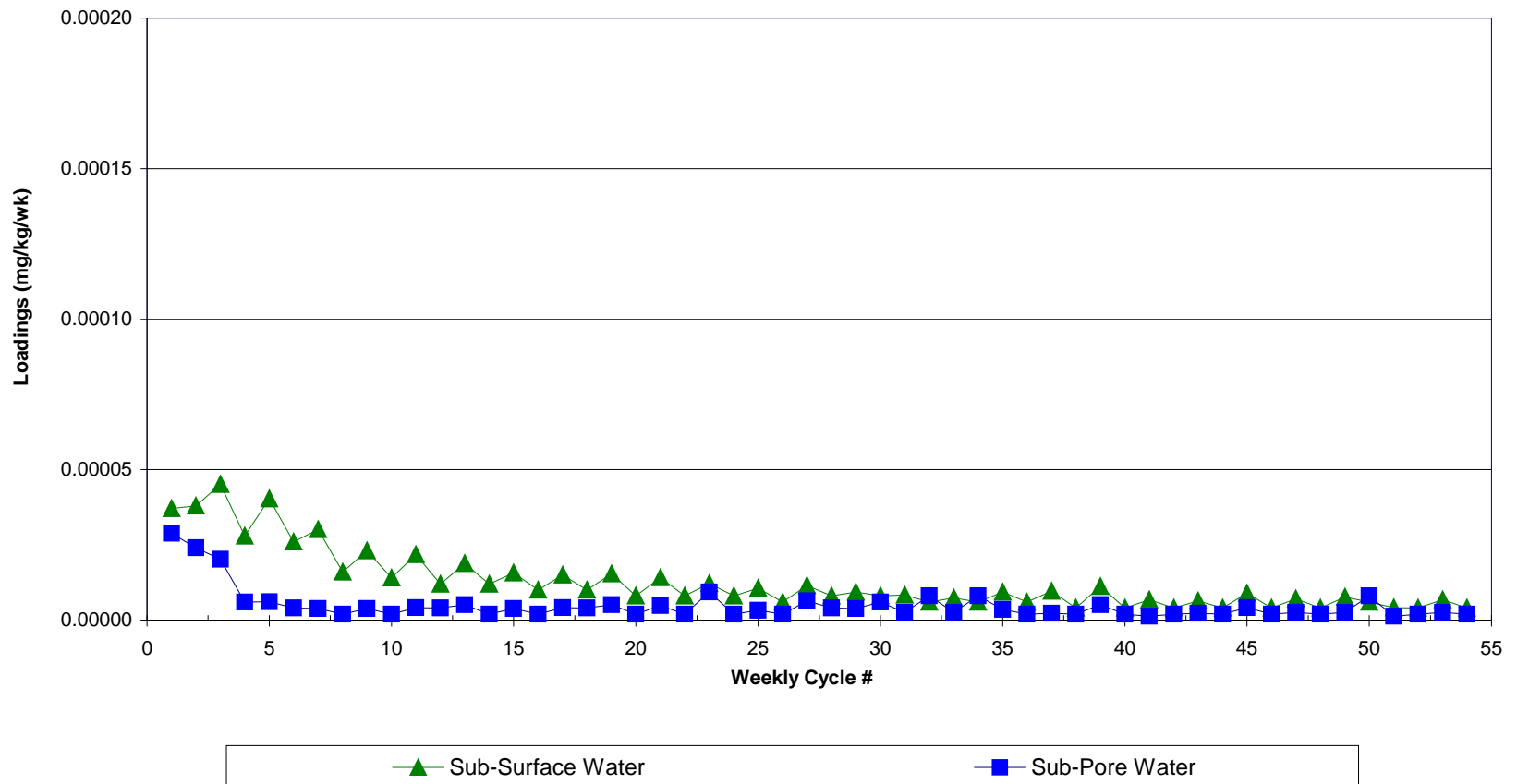


Sub-Surface Water
  Sub-Pore Water

Minago Tails Column Tests	
Chromium Loadings	
Weeks 1 to 54	
Victory Nickel Inc.	

Source: adapted from URS (2009i)



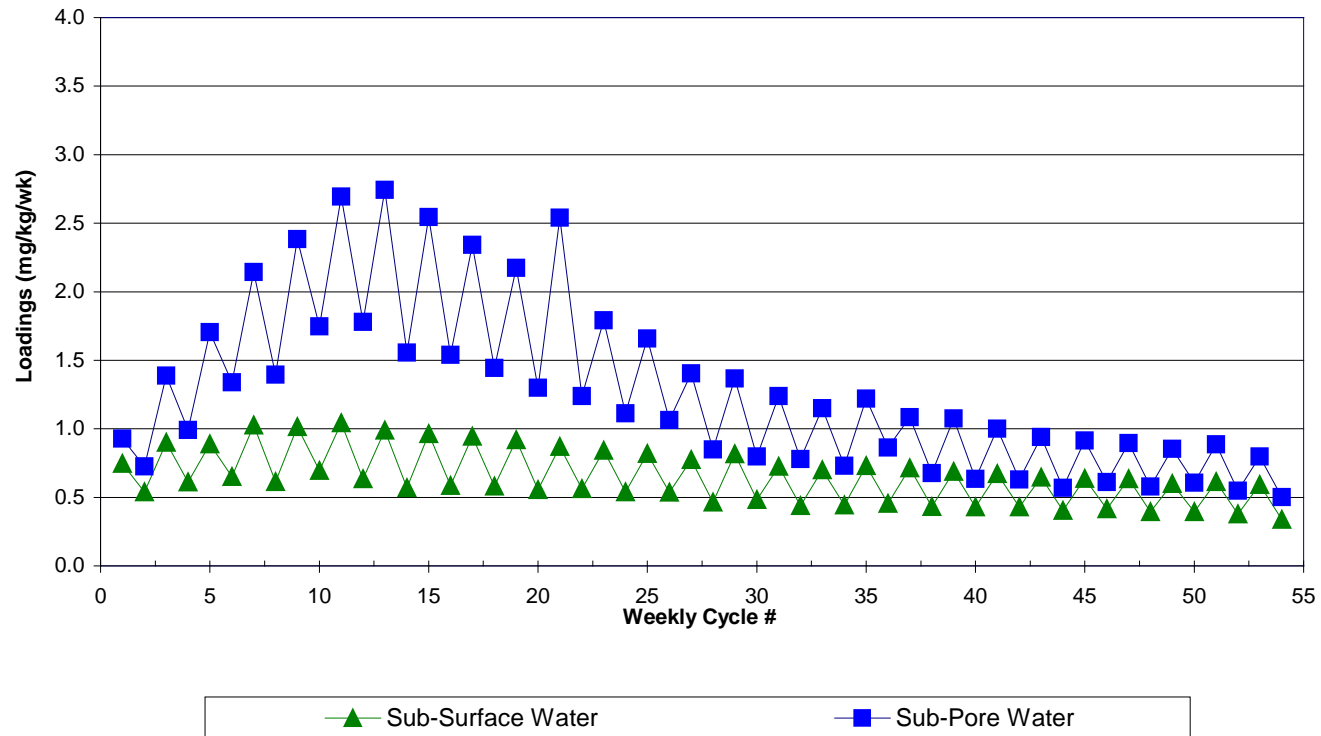


Minago Tails Column Tests  
 Selenium Loadings  
 Weeks 1 to 54  
 Victory Nickel Inc.

Source: adapted from URS (2009i)



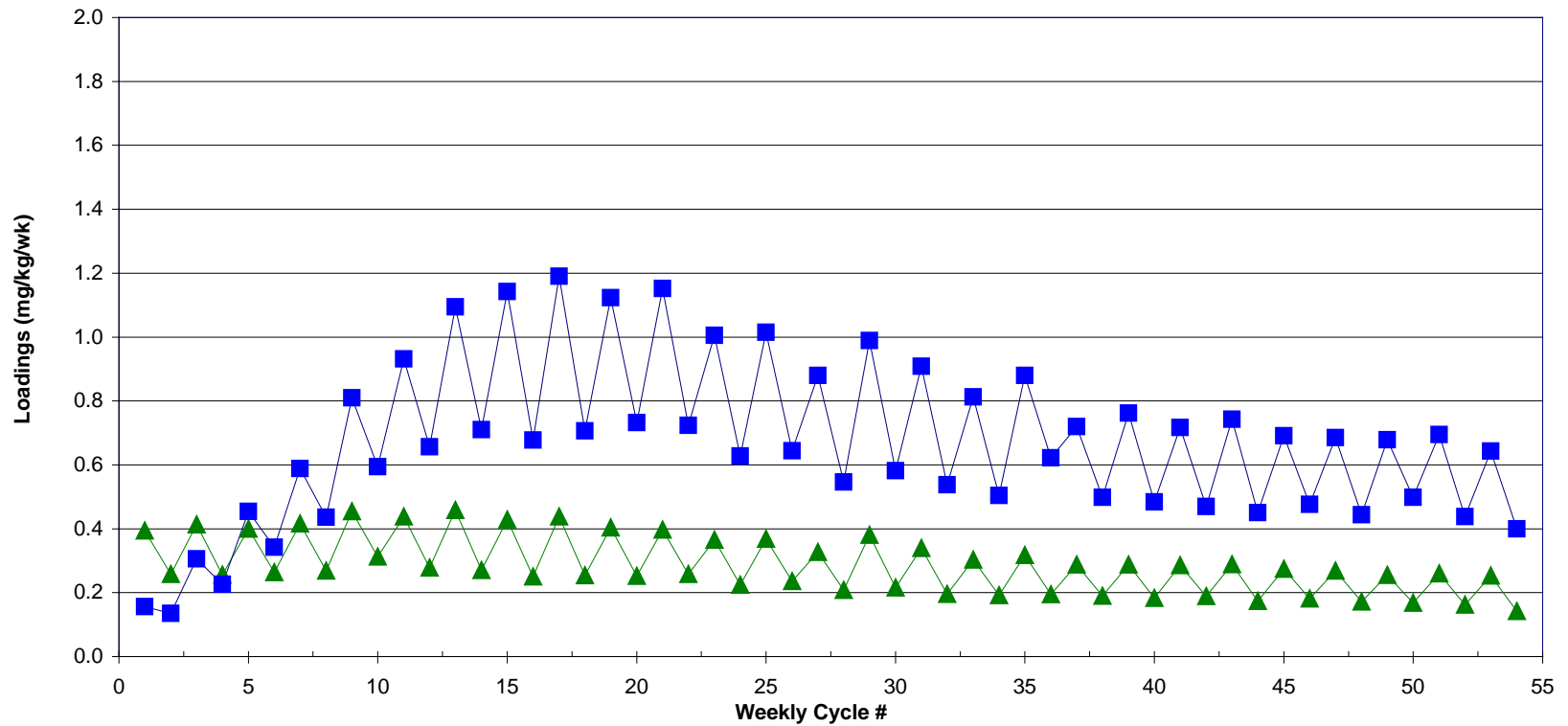




Minago Tails Column Tests  
 Calcium Loadings  
 Weeks 1 to 54  
 Victory Nickel Inc.

Source: adapted from URS (2009)





Minago Tails Column Tests  
 Magnesium Loadings  
 Weeks 1 to 54  
 Victory Nickel Inc.

Source: adapted from URS (2009i)



**TAILINGS SUBAQUEOUS COLUMNS  
SULPHIDE DEPLETION CALCULATIONS  
MINAGO PROJECT**

WEEK	DATE	SAC-1 Surface Water					SAC-1 Pore Water				
		Loading Rates					Loading Rates				
		Sulphate		Sulphur			Sulphate		Sulphur		
mg/wk	g/wk	mg/wk	g/wk	mmol/wk	mg/wk	g/wk	mg/wk	g/wk	mmol/wk		
1	31-Oct-07	20.00	6.67	0.007	0.00021	0.21	10.08	3.36	0.003	0.00010	0.10
2	07-Nov-07	12.30	4.11	0.004	0.00013	0.13	10.30	3.44	0.003	0.00011	0.11
3	14-Nov-07	21.28	7.10	0.007	0.00022	0.22	23.04	7.69	0.008	0.00024	0.24
4	21-Nov-07	11.80	3.94	0.004	0.00012	0.12	15.90	5.31	0.005	0.00017	0.17
5	28-Nov-07	20.64	6.89	0.007	0.00021	0.21	31.36	10.47	0.010	0.00033	0.33
6	05-Dec-07	12.40	4.14	0.004	0.00013	0.13	22.30	7.44	0.007	0.00023	0.23
7	12-Dec-07	22.40	7.48	0.007	0.00023	0.23	41.76	13.94	0.014	0.00043	0.43
8	19-Dec-07	11.40	3.80	0.004	0.00012	0.12	28.10	9.38	0.009	0.00029	0.29
9	26-Dec-07	22.40	7.48	0.007	0.00023	0.23	59.20	19.76	0.020	0.00062	0.62
10	02-Jan-08	11.00	3.67	0.004	0.00011	0.11	35.80	11.95	0.012	0.00037	0.37
11	09-Jan-08	24.00	8.01	0.008	0.00025	0.25	75.20	25.10	0.025	0.00078	0.78
12	16-Jan-08	11.90	3.97	0.004	0.00012	0.12	42.30	14.12	0.014	0.00044	0.44
13	23-Jan-08	22.40	7.48	0.007	0.00023	0.23	76.00	25.36	0.025	0.00079	0.79
14	30-Jan-08	10.40	3.47	0.003	0.00011	0.11	50.70	16.92	0.017	0.00053	0.53
15	06-Feb-08	20.80	6.94	0.007	0.00022	0.22	72.32	24.14	0.024	0.00075	0.75
16	13-Feb-08	10.60	3.54	0.004	0.00011	0.11	47.60	15.89	0.016	0.00050	0.50
17	20-Feb-08	21.12	7.05	0.007	0.00022	0.22	71.04	23.71	0.024	0.00074	0.74
18	27-Feb-08	8.70	2.90	0.003	0.00009	0.09	51.30	17.12	0.017	0.00053	0.53
19	05-Mar-08	17.60	5.87	0.006	0.00018	0.18	67.20	22.43	0.022	0.00070	0.70
20	12-Mar-08	9.30	3.10	0.003	0.00010	0.10	39.20	13.08	0.013	0.00041	0.41
21	19-Mar-08	17.60	5.87	0.006	0.00018	0.18	70.40	23.50	0.023	0.00073	0.73
22	26-Mar-08	9.20	3.07	0.003	0.00010	0.10	36.90	12.32	0.012	0.00038	0.38
23	02-Apr-08	15.52	5.18	0.005	0.00016	0.16	51.84	17.30	0.017	0.00054	0.54
24	09-Apr-08	8.10	2.70	0.003	0.00008	0.08	34.80	11.61	0.012	0.00036	0.36
25	16-Apr-08	13.76	4.59	0.005	0.00014	0.14	50.72	16.93	0.017	0.00053	0.53
26	23-Apr-08	8.60	2.87	0.003	0.00009	0.09	31.20	10.41	0.010	0.00032	0.32
27	30-Apr-08	13.44	4.49	0.004	0.00014	0.14	44.48	14.85	0.015	0.00046	0.46
28	07-May-08	8.10	2.70	0.003	0.00008	0.08	23.80	7.94	0.008	0.00025	0.25
29	14-May-08	16.00	5.34	0.005	0.00017	0.17	32.48	10.84	0.011	0.00034	0.34
30	21-May-08	6.10	2.04	0.002	0.00006	0.06	23.70	7.91	0.008	0.00025	0.25
31	28-May-08	12.00	4.00	0.004	0.00012	0.12	37.44	12.50	0.012	0.00039	0.39
32	04-Jun-08	7.90	2.64	0.003	0.00008	0.08	22.60	7.54	0.008	0.00024	0.24
33	11-Jun-08	9.92	3.31	0.003	0.00010	0.10	35.04	11.69	0.012	0.00036	0.36
34	18-Jun-08	5.50	1.84	0.002	0.00006	0.06	21.20	7.08	0.007	0.00022	0.22
35	25-Jun-08	10.56	3.52	0.004	0.00011	0.11	36.00	12.01	0.012	0.00037	0.37
36	02-Jul-08	5.90	1.97	0.002	0.00006	0.06	19.30	6.44	0.006	0.00020	0.20
37	09-Jul-08	8.32	2.78	0.003	0.00009	0.09	31.04	10.36	0.010	0.00032	0.32
38	16-Jul-08	5.70	1.90	0.002	0.00006	0.06	20.20	6.74	0.007	0.00021	0.21
39	23-Jul-08	8.96	2.99	0.003	0.00009	0.09	30.08	10.04	0.010	0.00031	0.31
40	30-Jul-08	5.60	1.87	0.002	0.00006	0.06	18.90	6.31	0.006	0.00020	0.20
41	06-Aug-08	7.84	2.62	0.003	0.00008	0.08	25.28	8.44	0.008	0.00026	0.26
42	13-Aug-08	4.80	1.60	0.002	0.00005	0.05	15.60	5.21	0.005	0.00016	0.16
43	20-Aug-08	7.36	2.46	0.002	0.00008	0.08	21.76	7.26	0.007	0.00023	0.23
44	27-Aug-08	5.00	1.67	0.002	0.00005	0.05	16.00	5.34	0.005	0.00017	0.17
45	03-Sep-08	8.00	2.67	0.003	0.00008	0.08	23.84	7.96	0.008	0.00025	0.25
46	10-Sep-08	5.10	1.70	0.002	0.00005	0.05	15.30	5.11	0.005	0.00016	0.16
47	17-Sep-08	7.68	2.56	0.003	0.00008	0.08	24.16	8.06	0.008	0.00025	0.25
48	24-Sep-08	5.30	1.77	0.002	0.00006	0.06	14.60	4.87	0.005	0.00015	0.15
49	01-Oct-08	7.20	2.40	0.002	0.00007	0.07	23.84	7.96	0.008	0.00025	0.25
50	08-Oct-08	4.00	1.33	0.001	0.00004	0.04	14.40	4.81	0.005	0.00015	0.15
51	15-Oct-08	7.68	2.56	0.003	0.00008	0.08	22.40	7.48	0.007	0.00023	0.23
52	22-Oct-08	3.80	1.27	0.001	0.00004	0.04	13.40	4.47	0.004	0.00014	0.14
53	29-Oct-08	6.72	2.24	0.002	0.00007	0.07	20.64	6.89	0.007	0.00021	0.21
54	05-Nov-08	4.10	1.37	0.001	0.00004	0.04	12.80	4.27	0.004	0.00013	0.13
Weekly depletion rates, steady state period - weeks 11 to 54		9.96	3.32	0.0033	0.0001	0.10	34.75	11.60	0.0116	0.0004	0.36

COLUMN	Column mass (kg)	Initial Sulphide-S					Sulphur remaining (mmol)	Avg. Sulphur depletion rate (mmol/kg/wk)	Weeks to Sulphur depletion	Years to Sulphur depletion
		(%)	(mg/kg)	(g/kg)	(mol)	(mmol)				
SAC-1 SURFACE WATER	5	0.07	700	0.7	0.11	109.17	102.88	0.021	992.4	19.08
SAC-1 PORE WATER	5	0.07	700	0.7	0.11	109.17	90.36	0.072	249.8	4.80

**TAILINGS SUBAQUEOUS COLUMNS  
ACID NEUTRALIZATION DEPLETION CALCULATIONS  
MINAGO PROJECT**

WEEK	DATE	SAC-1 Surface Water				SAC-1 Pore Water			
		Calcium Loading				Calcium Loading			
		mg/lwk	g/lwk	mmol/lwk	mmol/lwk	mg/lwk	g/lwk	mmol/lwk	mmol/lwk
2	31-Oct-07	3.73	0.00373	0.00009	0.00301	4.64	0.00464	0.00011	0.1158
3	07-Nov-07	2.69	0.00269	0.00007	0.06712	3.63	0.00363	0.0001	0.0906
4	14-Nov-07	4.50	0.00450	0.00011	0.11218	6.94	0.00694	0.0002	0.1733
5	21-Nov-07	3.06	0.00306	0.00008	0.07635	4.96	0.00500	0.0001	0.1238
6	28-Nov-07	4.45	0.00445	0.00011	0.11098	8.53	0.00853	0.0002	0.2128
7	05-Dec-07	3.25	0.00325	0.00008	0.08109	6.69	0.00667	0.0002	0.1669
8	12-Dec-07	5.14	0.00514	0.00013	0.12016	10.72	0.01072	0.0003	0.2675
9	19-Dec-07	3.07	0.00307	0.00008	0.07660	6.97	0.00700	0.0002	0.1739
10	26-Dec-07	5.07	0.00507	0.00013	0.12655	11.92	0.01192	0.0003	0.2974
11	02-Jan-08	3.48	0.00348	0.00009	0.08683	8.74	0.00874	0.0002	0.2181
12	09-Jan-08	5.22	0.00522	0.00013	0.13014	13.47	0.01350	0.0003	0.3361
13	16-Jan-08	3.17	0.00317	0.00008	0.07909	8.90	0.00890	0.0002	0.2221
14	23-Jan-08	4.94	0.00494	0.00012	0.12335	13.71	0.01371	0.0003	0.3421
15	30-Jan-08	2.85	0.00285	0.00007	0.07111	7.78	0.00778	0.0002	0.1941
16	06-Feb-08	4.82	0.00482	0.00012	0.12016	12.72	0.01272	0.0003	0.3174
17	13-Feb-08	2.93	0.00293	0.00007	0.07310	7.70	0.00777	0.0002	0.1921
18	20-Feb-08	4.72	0.00472	0.00012	0.11776	11.71	0.01171	0.0003	0.2922
19	27-Feb-08	2.90	0.00290	0.00007	0.07236	7.22	0.00722	0.0002	0.1801
20	05-Mar-08	4.59	0.00459	0.00011	0.11457	10.86	0.01089	0.0003	0.2711
21	12-Mar-08	2.77	0.00277	0.00007	0.06911	6.50	0.00650	0.0002	0.1622
22	19-Mar-08	4.35	0.00435	0.00011	0.10858	12.70	0.01272	0.0003	0.3170
23	26-Mar-08	2.27	0.00227	0.00006	0.05811	6.21	0.00621	0.0002	0.1544
24	02-Apr-08	4.21	0.00421	0.00010	0.10499	8.96	0.00900	0.0002	0.2236
25	09-Apr-08	2.69	0.00269	0.00007	0.06712	5.56	0.00556	0.0001	0.1387
26	16-Apr-08	4.10	0.00410	0.00010	0.10220	8.29	0.00829	0.0002	0.2068
27	23-Apr-08	2.68	0.00268	0.00007	0.06687	5.32	0.00532	0.0001	0.1327
28	30-Apr-08	3.87	0.00387	0.00010	0.09661	7.02	0.00702	0.0002	0.1752
29	07-May-08	2.32	0.00232	0.00006	0.05788	4.25	0.00425	0.0001	0.1060
30	14-May-08	4.98	0.00498	0.00012	0.10160	10.83	0.01083	0.0003	0.2756
31	21-May-08	2.41	0.00241	0.00006	0.06013	3.99	0.00400	0.0001	0.0996
32	28-May-08	3.63	0.00363	0.00009	0.09062	6.19	0.00621	0.0002	0.1545
33	04-Jun-08	2.19	0.00219	0.00005	0.05464	3.89	0.00389	0.0001	0.0971
34	11-Jun-08	3.50	0.00350	0.00009	0.08743	5.74	0.00574	0.0001	0.1433
35	18-Jun-08	2.21	0.00221	0.00006	0.05514	3.65	0.00365	0.0001	0.0911
36	25-Jun-08	3.65	0.00365	0.00009	0.09102	6.10	0.00610	0.0002	0.1521
37	02-Jul-08	2.27	0.00227	0.00006	0.05664	4.31	0.00431	0.0001	0.1075
38	09-Jul-08	3.57	0.00357	0.00009	0.08902	5.42	0.00542	0.0001	0.1353
39	16-Jul-08	2.16	0.00216	0.00005	0.05389	3.38	0.00338	0.0001	0.0843
40	23-Jul-08	3.44	0.00344	0.00009	0.08583	5.38	0.00538	0.0001	0.1341
41	30-Jul-08	2.14	0.00214	0.00005	0.05339	3.17	0.00317	0.0001	0.0791
42	06-Aug-08	3.36	0.00336	0.00008	0.08383	5.01	0.00501	0.0001	0.1250
43	13-Aug-08	2.15	0.00215	0.00005	0.05364	3.15	0.00315	0.0001	0.0786
44	20-Aug-08	3.23	0.00323	0.00008	0.08064	4.70	0.00470	0.0001	0.1174
45	27-Aug-08	2.02	0.00202	0.00005	0.05040	2.85	0.00289	0.0001	0.0711
46	03-Sep-08	3.18	0.00318	0.00008	0.07944	4.58	0.00458	0.0001	0.1142
47	10-Sep-08	2.07	0.00207	0.00005	0.05165	3.06	0.00306	0.0001	0.0763
48	17-Sep-08	3.17	0.00317	0.00008	0.07904	4.48	0.00448	0.0001	0.1118
49	24-Sep-08	1.97	0.00197	0.00005	0.04915	2.89	0.00289	0.0001	0.0721
50	01-Oct-08	2.99	0.00299	0.00007	0.07465	4.27	0.00427	0.0001	0.1066
51	08-Oct-08	1.97	0.00197	0.00005	0.04815	3.03	0.00303	0.0001	0.0756
52	15-Oct-08	3.07	0.00307	0.00008	0.07665	4.43	0.00443	0.0001	0.1106
53	22-Oct-08	1.89	0.00189	0.00005	0.04716	2.74	0.00274	0.0001	0.0684
54	29-Oct-08	2.96	0.00296	0.00007	0.07385	3.98	0.00400	0.0001	0.0994
54	05-Nov-08	1.69	0.00169	0.00004	0.04217	2.51	0.00251	0.0001	0.0626
		SAC-1 Surface Water				SAC-1 Pore Water			
		Magnesium Loading				Magnesium Loading			
		mg/lwk	g/lwk	mmol/lwk	mmol/lwk	mg/lwk	g/lwk	mmol/lwk	mmol/lwk
1	31-Oct-07	1.97	0.002	0.00008	0.081	0.78	0.001	0.00003	0.032
2	07-Nov-07	1.29	0.001	0.00005	0.053	0.68	0.001	0.00003	0.028
3	14-Nov-07	2.06	0.002	0.00008	0.085	1.53	0.002	0.00006	0.063
4	21-Nov-07	1.28	0.001	0.00005	0.053	1.13	0.001	0.00005	0.046
5	28-Nov-07	2.00	0.002	0.00008	0.082	2.27	0.002	0.00009	0.093
6	05-Dec-07	2.08	0.002	0.00008	0.086	1.32	0.001	0.00007	0.070
7	12-Dec-07	2.08	0.002	0.00009	0.086	2.94	0.003	0.00012	0.121
8	19-Dec-07	1.34	0.001	0.00006	0.055	2.18	0.002	0.00009	0.090
9	26-Dec-07	2.27	0.002	0.00009	0.093	4.05	0.004	0.00017	0.167
10	02-Jan-08	1.56	0.002	0.00006	0.064	2.97	0.003	0.00012	0.122
11	09-Jan-08	2.19	0.002	0.00009	0.090	4.66	0.005	0.00019	0.192
12	16-Jan-08	1.39	0.001	0.00006	0.057	3.28	0.003	0.00013	0.135
13	23-Jan-08	2.29	0.002	0.00009	0.095	4.47	0.004	0.00016	0.225
14	30-Jan-08	1.35	0.001	0.00006	0.056	3.55	0.004	0.00015	0.146
15	06-Feb-08	2.14	0.002	0.00009	0.088	5.71	0.006	0.00023	0.235
16	13-Feb-08	1.25	0.001	0.00005	0.051	3.39	0.003	0.00014	0.139
17	20-Feb-08	2.19	0.002	0.00009	0.090	5.95	0.006	0.00024	0.245
18	27-Feb-08	1.27	0.001	0.00005	0.052	3.53	0.004	0.00015	0.145
19	05-Mar-08	2.02	0.002	0.00008	0.083	5.62	0.006	0.00023	0.231
20	12-Mar-08	1.26	0.001	0.00005	0.052	3.66	0.004	0.00015	0.151
21	19-Mar-08	1.98	0.002	0.00008	0.082	5.76	0.006	0.00024	0.237
22	26-Mar-08	1.29	0.001	0.00005	0.053	3.62	0.004	0.00015	0.149
23	02-Apr-08	1.82	0.002	0.00008	0.075	5.02	0.005	0.00021	0.207
24	09-Apr-08	1.12	0.001	0.00005	0.046	3.14	0.003	0.00013	0.129
25	16-Apr-08	1.84	0.002	0.00008	0.076	5.07	0.005	0.00021	0.209
26	23-Apr-08	1.18	0.001	0.00005	0.049	3.22	0.003	0.00013	0.132
27	30-Apr-08	1.63	0.002	0.00007	0.067	4.40	0.004	0.00018	0.181
28	07-May-08	1.04	0.001	0.00004	0.043	2.73	0.003	0.00011	0.112
29	14-May-08	1.90	0.002	0.00008	0.078	4.94	0.005	0.00020	0.203
30	21-May-08	1.08	0.001	0.00004	0.044	2.91	0.003	0.00012	0.120
31	28-May-08	1.70	0.002	0.00007	0.070	4.54	0.005	0.00019	0.187
32	04-Jun-08	0.98	0.001	0.00004	0.040	2.69	0.003	0.00011	0.111
33	11-Jun-08	1.51	0.002	0.00006	0.062	4.06	0.004	0.00017	0.167
34	18-Jun-08	0.96	0.001	0.00004	0.039	2.52	0.003	0.00010	0.104
35	25-Jun-08	1.58	0.002	0.00007	0.065	4.40	0.004	0.00018	0.181
36	02-Jul-08	0.97	0.001	0.00004	0.040	3.11	0.003	0.00013	0.128
37	09-Jul-08	1.44	0.001	0.00006	0.059	3.60	0.004	0.00015	0.148
38	16-Jul-08	0.95	0.001	0.00004	0.039	2.49	0.002	0.00010	0.102
39	23-Jul-08	1.44	0.001	0.00006	0.059	3.81	0.004	0.00016	0.157
40	30-Jul-08	0.92	0.001	0.00004	0.038	2.42	0.002	0.00010	0.100
41	06-Aug-08	1.43	0.001	0.00006	0.059	3.58	0.004	0.00015	0.147
42	13-Aug-08	0.95	0.001	0.00004	0.039	2.35	0.002	0.00010	0.097
43	20-Aug-08	1.44	0.001	0.00006	0.059	3.71	0.004	0.00015	0.153
44	27-Aug-08	0.87	0.001	0.00004	0.036	2.25	0.002	0.00009	0.093
45	03-Sep-08	1.37	0.001	0.00006	0.056	3.46	0.003	0.00014	0.142
46	10-Sep-08	0.91	0.001	0.00004	0.037	2.38	0.002	0.00010	0.098
47	17-Sep-08	1.34	0.001	0.00006	0.055	3.42	0.003	0.00014	0.141
48	24-Sep-08	0.86	0.001	0.00004	0.035	2.22	0.002	0.00009	0.091
49	01-Oct-08	1.28	0.001	0.00005	0.052	3.39	0.003	0.00014	0.140
50	08-Oct-08	0.84	0.001	0.00003	0.035	2.49	0.002	0.00010	0.102
51	15-Oct-08	1.30	0.001	0.00005	0.053	3.47	0.003	0.00014	0.143
52	22-Oct-08	0.81	0.001	0.00003	0.033	2.19	0.002	0.00009	0.090
53	29-Oct-08	1.27	0.001	0.00005	0.052	3.22	0.003	0.00013	0.132
54	05-Nov-08	0.71	0.001	0.00003	0.029	2.00	0.002	0.00008	0.082
Combined weekly depletion rates, steady state period - weeks 11 to 54		4.48	0.0045	0.00013	0.134	9.73	0.010	0.00030	0.301

COLUMN	Sample mass (kg)	Initial Total Carbonate <sup>1</sup> </			
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# **APPENDIX 2.9**

**Supplemental Material for Mining Processes**

**Table A2.9.1 Anticipated Penetration Rate and Drilling Rate**

	Units	Rock Type		
		Dolomite	Basement Waste	Ore
Hole Depth	m	13.7	13.7	13.6
Penetration Rate	cm/min	100	65	65
Grade control sampling time	min	2.0	2.0	2.0
Move and Align Time	min	3.0	3.0	3.0
Total Time Per Hole	min	18.18	25.55	25.42
Holes Per Hour	holes	3.30	2.35	2.36
<b>Average Drilling Rate</b>	<b>m/h</b>	<b>45</b>	<b>32</b>	<b>32</b>

Source: Wardrop, 2009b

**Table A2.9.2 Yearly Drill Net Operating Hours Available per Unit**

Drills		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Total Time	hrs/unit		8,640	8,640	8,640	8,640	8,640	8,640	8,640	8,640	8,640	8,640
Availability	%		85.00%	82.00%	79.00%	76.00%	73.00%	70.00%	70.00%	70.00%	70.00%	70.00%
Down Time	hrs/unit		1,296	1,555	1,814	2,074	2,333	2,592	2,592	2,592	2,592	2,592
Available Time	hrs/unit		7,344	7,085	6,826	6,566	6,307	6,048	6,048	6,048	6,048	6,048
Standby Time	hrs/unit		0	0	0	0	0	0	0	0	0	0
Gross Operating Hours	hrs/unit		7,344	7,085	6,826	6,566	6,307	6,048	6,048	6,048	6,048	6,048
Operating Delays	hrs/unit		1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104
Net Operating Hours	hrs/unit		<b>6,240</b>	<b>5,981</b>	<b>5,722</b>	<b>5,462</b>	<b>5,203</b>	<b>4,944</b>	<b>4,944</b>	<b>4,944</b>	<b>4,944</b>	<b>4,944</b>

Source: Wardrop, 2009b

**Table A2.9.3 Yearly Shovel Net Operating Hours Available per Unit**

Shovel PC4000		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Total Time	hrs/unit	8,640	8,640	8,640	8,640	8,640	8,640	8,640	8,640	8,640	8,640
Physical Availability	%	92%	92%	89%	86%	83%	80%	77%	74%	74%	74%
Down Time	hrs/unit	691	691	950	1,210	1,469	1,728	1,987	2,246	2,246	2,246
Available Time	hrs/unit	7,949	7,949	7,690	7,430	7,171	6,912	6,653	6,394	6,394	6,394
Standby Time	hrs/unit	238	238	231	223	215	207	200	192	192	192
Gross Operating Hours	hrs/unit	7,710	7,710	7,459	7,207	6,956	6,705	6,453	6,202	6,202	6,202
Operating Delays	hrs/unit	1,524	1,524	1,524	1,524	1,524	1,524	1,524	1,524	1,524	1,524
Net Operating Hours (NOH)	hrs/unit	<b>6,186</b>	<b>6,186</b>	<b>5,935</b>	<b>5,683</b>	<b>5,432</b>	<b>5,181</b>	<b>4,929</b>	<b>4,678</b>	<b>4,678</b>	<b>4,678</b>

Source: Wardrop, 2009b

Table A2.9.4 Sample Shovel Productivity Calculations

		PC 400E Shovel	L1350 Loader
Bucket Capacity (heaped)	m <sup>3</sup>	21.0	20.0
Material Weight	dmt /bcm	2.57	2.57
Bulk Factor		1.3	1.3
Material Weight	dmt /lcm	1.98	1.98
Moisture	%	3%	3%
Material Weight	wmt /lcm	2.04	2.04
Fill Factor	%	95%	95%
Effective Bucket Capacity	m <sup>3</sup>	20.0	19.0
Tonnes/Pass	wmt	40.7	38.7
Truck Size Capacity	wmt	223.4	223.4
Ave # Passes	Passes	5.5	5.8
Truck Spot Time	Sec	30	30
First Bucket Cycle Time	Sec	37	47
Subsequent Bucket Cycle Time	Sec	37	47
Load Time per Truck	Min	3.9	5.0
Maximum Productivity	trks /hr	15.4	12.0
	wmt /hr	3,447	2,671
Truck Availability to Shovel	%	80%	80%
Producing Hours	hrs/year	4,133	4,133
Annual wet Tonnes	wmt /year	14,246,575	11,036,558
Base Productivity	wmt /NOH	2,758	2,136

Source: Wardrop, 2009b

**Note:**

- \* dmt - dry metric tonne
- wmt - wet metric tonne
- bcm - bank cubic metre
- lcm - loose cubic metre
- NOH - Net Operating Hour



**Table A2.9.5 Yearly Truck Net Operation Hours Available per Unit**

<b>Trucks</b>		<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>
Total Time	hrs/unit		8,640	8,640	8,640	8,640	8,640	8,640	8,640	8,640	8,640	8,640
Availability	%		95.00%	92.78%	89.90%	87.12%	84.45%	81.87%	79.38%	76.98%	75.00%	75.00%
Down Time	hrs/unit		432	688	934	1,172	1,401	1,622	1,835	2,040	2,160	2,160
Available Time	hrs/unit		8,208	7,952	7,706	7,468	7,239	7,018	6,805	6,600	6,480	6,480
Gross Operating Hours	hrs/unit		8,208	7,952	7,706	7,468	7,239	7,018	6,805	6,600	6,480	6,480
Operating Delays	hrs/unit		1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104
Net Operating	hrs/unit		<b>7,104</b>	<b>6,848</b>	<b>6,602</b>	<b>6,364</b>	<b>6,135</b>	<b>5,914</b>	<b>5,701</b>	<b>5,496</b>	<b>5,376</b>	<b>5,376</b>

Source: Wardrop, 2009b

# APPENDIX 2.10

## Supplemental Material for Milling Processes

	Page
<b>Appendix 2.10-A:</b> Material Safety Data Sheets for the Mill Reagents and Flocculants	2.10-1
<b>Appendix 2.10-B:</b> Process Flow Diagrams for the Frac Sand Plant	2.10-68

Drawing No.	Title	Description
WP-PFD-001 revP2	Area 01/Wet Plant	Screening and scrubbing
WP-PFD-002 revP2	Area 02/Wet Plant	Density separator circuit - Friable
WP-PFD-003 revP2	Area 03/Wet Plant	Crushing - Non Friable
WP-PFD-004 revP2	Area 04/Wet Plant	Density separator circuit - Non Friable
WP-PFD-005 revP2	Area 05/Wet Plant	Plant Thickener
DP-PFD-001 revP3	Area 06/Dry Plant	Drying and screening - Friable
DP-PFD-002 revP3	Area 07/Dry Plant	Screening and magnetic separation - Friable
DP-PFD-003 revP2	Area 08/Dry Plant	Drying and Screening - Non Friable
DP-PFD-004 revP3	Area 09/Dry Plant	Storage silos - Friable and Non Friable
DP-PFD-005 revP2	Area 09/Dry Plant	Plant Product load out

Source: Outotec, 2008

## **APPENDIX 2.10-A**

### **Material Safety Data Sheets for the Mill Reagents and Flocculants**

<b>CMC</b>	Carboxmethyl Cellulose
<b>PAX</b>	Potassium Amyl Xanthate
<b>SHMP</b>	Sodium hexametaphosphate
<b>MIBC</b>	Methyl isobutyl carbinol
<b>Flocculant</b>	Anionic polyacrylamide, Hyperfloc

# MATERIAL SAFETY DATA SHEET

2.10-2

Avicel® RC/CL Microcrystalline Cellulose and Sodium Carboxymethylcellulose

FMC BioPolymer

MSDS Ref. No.: 51395-75-6  
Date Approved: 01/31/2008  
Revision No.: 9

This document has been prepared to meet the requirements of the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200 and Canada's Workplace Hazardous Materials Information System (WHMIS) requirements.

## 1. PRODUCT AND COMPANY IDENTIFICATION

**PRODUCT NAME:** Avicel® RC/CL Microcrystalline Cellulose and Sodium Carboxymethylcellulose

**CHEMICAL FAMILY:** Carbohydrate, Cellulose Derivative

**SYNONYMS:** Microcrystalline cellulose (INCI name): MCC, cellulose gel; Sodium Carboxymethylcellulose: NaCMC, CMC, SCMC, Carboxymethylcellulose, Carboxymethyl ether, Sodium CMC, Sodium salt, Cellulose gum

**ALTERNATE PRODUCT NAME(S):** Avicel® RC 501, 581, 591, CL 611

### MANUFACTURER

FMC BioPolymer  
1735 Market Street  
Philadelphia, PA 19103  
(800) 526-3649 (General Information)  
msdsinfo@fmc.com (Email - General Information)

FMC Europe NV  
Avenue Mounier 83  
1200 Brussels, Belgium  
353 21 435 4133 (General Information - Cork, Ireland)

### EMERGENCY TELEPHONE NUMBERS

(302) 451-0100 (FMC Plant - Newark, Delaware)

(303) 595-9048 (Medical - U.S. - Call Collect)

For leak, fire, spill, or accident emergencies, call:  
(800) 424-9300 (CHEMTREC - U.S.A. & Canada)  
(703) 527-3887 (CHEMTREC - Collect - All Other Countries)

## 2. HAZARDS IDENTIFICATION

### EMERGENCY OVERVIEW:

- Off-white, free-flowing, odorless powder.
- Accumulation of overhead settled dust may form explosive concentrations in air when disturbed and dispersed.
- Powder becomes slippery when wet.

**POTENTIAL HEALTH EFFECTS:** No significant health hazard expected.

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### 3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name	CAS#	Wt.%	EC No.	EC Class
Microcrystalline cellulose	9004-34-6		232-674-9	Not Classified
Sodium Carboxymethylcellulose	9004-32-4		None	Not classified

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### 4. FIRST AID MEASURES

**EYES:** Flush with water for at least 15 minutes. If irritation occurs and persists, obtain medical attention.

**SKIN:** Wash with plenty of soap and water.

**INGESTION:** Drink plenty of water. Never give anything by mouth to an unconscious person. If any discomfort persists, obtain medical attention.

**INHALATION:** Remove to fresh air. If breathing difficulty or discomfort occurs and persists, obtain medical attention.

**NOTES TO MEDICAL DOCTOR:** This product has low oral, dermal and inhalation toxicity. It is non-irritating to the eyes and skin, and non-sensitizing to the skin. Treatment is symptomatic and supportive.

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### 5. FIRE FIGHTING MEASURES

**EXTINGUISHING MEDIA:** Water

**FIRE / EXPLOSION HAZARDS:** The accumulation of excessive dust on overhead structures may produce explosive concentrations when disturbed and dispersed. According to NFPA 68, (Explosion Venting Guide), the Hazard Class of Dust Deflagrations for microcrystalline cellulose is St-1, the lowest hazard class.

**FIRE FIGHTING PROCEDURES:** For fires involving this material, do not enter any enclosed or confined fire space without wearing full protective clothing and self-contained breathing apparatus (SCBA) approved for firefighting. This is necessary to protect against the hazards of heat, products of combustion and oxygen deficiency. Do not breathe smoke, gases or vapors generated.

**FLAMMABLE LIMITS:** Not applicable

## 6. ACCIDENTAL RELEASE MEASURES

**RELEASE NOTES:** Powder becomes slippery when wet. Maintain good housekeeping practices to minimize accumulation of settled dust, especially on overhead surfaces. Sweep up the spilled material and dispose of in accordance with the waste disposal method outlined in Section 13, "Disposal Considerations".

## 7. HANDLING AND STORAGE

**HANDLING AND STORAGE:** Use local exhaust or general dilution ventilation to control exposure to dust. Always use safe lifting techniques when manually moving containers, especially when handling containers weighing more than 50 pounds (22.7 kg). To protect quality, store in a tight container in a dry place. Avoid exposure to excessive heat.

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

### EXPOSURE LIMITS

Chemical Name	ACGIH	OSHA	Supplier
Microcrystalline cellulose	10 mg/m <sup>3</sup> (TWA)	15 mg/m <sup>3</sup> (PEL) (total dust) 5 mg/m <sup>3</sup> (PEL) (respirable fraction of dust)	

### PERSONAL PROTECTIVE EQUIPMENT

**EYES AND FACE:** Whenever airborne dust concentrations are high, appropriate protective eyewear, such as mono-goggles, should be worn to prevent eye contact.

**RESPIRATORY:** Whenever dust in the worker's breathing zone cannot be controlled with ventilation or other engineering means, workers should wear respirators or dust masks approved by NIOSH/MSHA, EU CEN or comparable certification organization to protect them against airborne dust.

**PROTECTIVE CLOTHING:** No special clothing is required.

**GLOVES:** No special gloves are required.

**COMMENTS:**

ADDITIONAL EXPOSURE LIMITS:

MCC:

Australia (TWA) 10 mg/m<sup>3</sup>

Belgium (TWA) 10 mg/m<sup>3</sup> (inhalable dust)

China (STEL): 25 mg/m<sup>3</sup>

China (TWA): 10 mg/m<sup>3</sup>

Hong Kong (TWA): 10 mg/m<sup>3</sup>

Ireland (TWA): 10 mg/m<sup>3</sup> (inhalable dust)

Korea (TWA): 10 mg/m<sup>3</sup>

New Zealand (TWA): 10 mg/m<sup>3</sup> (respirable dust with no asbestos and less than 1% free silica)

Singapore (PEL): 10 mg/m<sup>3</sup>

Switzerland (TWA): 3 mg/m<sup>3</sup> (respirable dust)

United Kingdom (STEL): 10 mg/m<sup>3</sup> (total inhalable dust)

United Kingdom (TWA): 10 mg/m<sup>3</sup> (total inhalable dust); 4 mg/m<sup>3</sup> (respirable dust)

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## 9. PHYSICAL AND CHEMICAL PROPERTIES

<b>ODOR:</b>	Odorless
<b>APPEARANCE:</b>	Off-white, free-flowing powder
<b>AUTOIGNITION TEMPERATURE:</b>	Not applicable
<b>BOILING POINT:</b>	Not applicable
<b>COEFFICIENT OF OIL / WATER:</b>	(Octanol/Water) Not available
<b>EVAPORATION RATE:</b>	(Butyl acetate = 1) Not applicable
<b>FLASH POINT:</b>	Not applicable
<b>MELTING POINT:</b>	Not applicable
<b>OXIDIZING PROPERTIES:</b>	Not applicable
<b>PERCENT VOLATILE:</b>	Approximately 4% water, by weight
<b>pH:</b>	(In solution) 6.0 - 8.0 (2% solids dispersion)
<b>SOLUBILITY IN WATER:</b>	Dispersible
<b>SPECIFIC GRAVITY:</b>	(H <sub>2</sub> O = 1) Bulk density, 0.6 g/cc
<b>VAPOR DENSITY:</b>	(Air = 1) Not applicable
<b>VAPOR PRESSURE:</b>	Not applicable

**COMMENTS:**

EXPLOSIVE PROPERTIES: Microcrystalline cellulose: St-1

MINIMUM IGNITION TEMPERATURE: Microcrystalline cellulose: 420°C

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## 10. STABILITY AND REACTIVITY

<b>CONDITIONS TO AVOID:</b>	None known
<b>STABILITY:</b>	Stable
<b>HAZARDOUS DECOMPOSITION PRODUCTS:</b>	None known.

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## 11. TOXICOLOGICAL INFORMATION

**EYE EFFECTS:** Non-irritating (rabbit)

**SKIN EFFECTS:** Non-irritating (rabbit) (PII = 0/8.0)

**DERMAL LD<sub>50</sub>:** > 2,000 mg/kg (rabbit)

**ORAL LD<sub>50</sub>:** > 5,000 mg/kg (rat)

**INHALATION LC<sub>50</sub>:** > 5.82 mg/l (4 h) (rat) Maximum attainable concentration - zero mortality

**SENSITIZATION:** (Skin) Non-sensitizing (guinea pig)

**ACUTE EFFECTS FROM OVEREXPOSURE:** This product has low oral, dermal and inhalation toxicity. It is non-irritating to the eyes and skin, and non-sensitizing to the skin. No significant acute toxicological effects are expected.

**CHRONIC EFFECTS FROM OVEREXPOSURE:** Ninety-day feeding studies with microcrystalline cellulose/sodium carboxymethylcellulose blend, in laboratory animals, at levels up to and including 50,000 ppm showed no significant toxicological effects as well as no adverse fetal effects. The maternal/fetal NOELs were > 50,000 ppm. Microcrystalline cellulose/sodium carboxymethylcellulose blend was negative in a battery of standard genotoxic tests. Microcrystalline cellulose is considered an inert dust, which is not toxic to the lungs when exposures are properly controlled.

### CARCINOGENICITY:

<b>NTP:</b>	Not listed
<b>IARC:</b>	Not listed
<b>OSHA:</b>	Not listed
<b>OTHER:</b>	Not Listed (ACGIH)



## 12. ECOLOGICAL INFORMATION

**ENVIRONMENTAL DATA:** Microcrystalline cellulose is inherently biodegradable in soil. It biodegrades in soil at a rate comparable to corn starch.

**ECOTOXICOLOGICAL INFORMATION:** No data available for the formulation.

MCC:

48-hour LC<sub>50</sub> > 100%, saturated solution, NOEC = 100% (daphnia)

96-hour LC<sub>50</sub> > 100%, saturated solution, NOEC = 100% (rainbow trout)

96-hour EC<sub>50</sub> > 100%, saturated solution, NOEC = 12.5% (algae)

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## 13. DISPOSAL CONSIDERATIONS

**DISPOSAL METHOD:** No special disposal methods are suggested. It is the user's responsibility to comply with all applicable local, state, and federal laws, rules, regulations and standards.

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## 14. TRANSPORT INFORMATION

### U.S. DEPARTMENT OF TRANSPORTATION (DOT)

**MARINE POLLUTANT:**

None

**ADDITIONAL INFORMATION:**

Not listed in Title 49 of the U.S. Code of Federal Regulations as a hazardous material.

**ADDITIONAL INFORMATION:**

National Motor Freight Classification Item 71390, Flour Cellulose, Edible

### INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG)

**ADDITIONAL INFORMATION:**

Not applicable

### ADR - EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD

**ADDITIONAL INFORMATION:** Not applicable

**INTERNATIONAL CIVIL AVIATION ORGANIZATION (ICAO) /  
INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA)**

**ADDITIONAL INFORMATION:** Not applicable

**OTHER INFORMATION:**

Canada (TDG) : Not applicable

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## **15. REGULATORY INFORMATION**

### **UNITED STATES**

**SARA TITLE III (SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT)**

**SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355, APPENDIX A):**

Not applicable

**SECTION 311 HAZARD CATEGORIES (40 CFR 370):**

None

**SECTION 312 THRESHOLD PLANNING QUANTITY (40 CFR 370):**

The Threshold Planning Quantity (TPQ) for this product, if treated as a mixture, is 10,000 lbs; however, this product contains the following ingredients with a TPQ of less than 10,000 lbs.:  
None

**SECTION 313 REPORTABLE INGREDIENTS (40 CFR 372):**

This product does not contain any toxic chemicals subject to the reporting requirements of Section 313, Title III of the SARA (Superfund Amendments and Reauthorization Act) of 1986.

**CERCLA (COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT)**

**CERCLA DESIGNATION & REPORTABLE QUANTITIES (RQ) (40 CFR 302.4):**

Not applicable

**TSCA (TOXIC SUBSTANCE CONTROL ACT)**

**TSCA INVENTORY STATUS (40 CFR 710):**

Listed (components)



Health	0
Flammability	1
Reactivity	0
Special	None

No special requirements

NFPA (National Fire Protection Association)

Degree of Hazard Code:

4 = Extreme

3 = High

2 = Moderate

1 = Slight

0 = Insignificant

**REVISION SUMMARY:**

This MSDS replaces Revision #8, dated November 7, 2005.

Changes in information are as follows:

Section 1 (Product and Company Identification)

Section 15 (Regulatory Information)

Section 16 (Other Information)

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# MATERIAL SAFETY DATA SHEET

## 1. IDENTIFICATION

<b>Revision Date</b>	November 2007			
<b>Product Name</b>	XANTHATES			
<b>Other Names</b>	POTASSIUM AMYL XANTHATE ; CARBONODITHIOIC ACID, O-PENTYL ESTER, POTASSIUM SALT ;			
<b>Uses</b>	As a collector in the flotation of sulphide minerals. Especially for gold telluride, antimony and bismuth ores.			
<b>Contact Information</b>	<b>Organisation</b>	<b>Location</b>	<b>Telephone</b>	<b>Ask For</b>
	Redox Pty Ltd	2 Swettenham Road Minto NSW 2566 Australia	+61 2 97333000	Technical Officer
		11 Mayo Road Wiri Auckland 2104 New Zealand	+64 9 2506222	
	Poison Information Centre	Westmead NSW Australia	131126 1800-251525	
	Chemcall	Australia New Zealand	1800-127406 0800-243622	
	National Poisons Centre	New Zealand	0800-764766	

## 2. HAZARD IDENTIFICATION

Hazardous according to criteria of NOHSC/ASCC.

Dangerous According to the Australian Code for the Transport of Dangerous Goods.

Classified as Dangerous Goods According to NZS 5433:1999.

HARMFUL

<b>Risk Phrases</b>	R15	Contact with water liberates extremely flammable gases.
	R20/22	Harmful by inhalation and if swallowed.
	R36/37/38	Irritating to eyes, respiratory system and skin.
<b>Safety Phrases</b>	S2	Keep out of reach of children.
	S16	Keep away from sources of ignition - No smoking.
	S17	Keep away from combustible material.
	S26	In case of contact with eyes, rinse immediately with plenty of water and seek medical

advice.

**2.10-12**

**ERMA New Zealand  
Approval Code** HSR007608

**HSNO Hazard  
Classification** 4.2C 6.1E 6.3A 6.4A

This Material Safety Data Sheet may not provide exhaustive guidance for all HSNO Controls assigned to this substance. The ERMA Web Site should be consulted for a full list of triggered controls and cited regulations.

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients	Chemical Entity	CAS Number	Proportions (%)
	POTASSIUM AMYL XANTHATE	[2720-73-2]	> 90

### 4. FIRST AID MEASURES

Description of necessary measures according to routes of exposure.

<b>Swallowed</b>	Rinse mouth with water. Give water to drink provided person is conscious. Do NOT induce vomiting. Seek medical attention.
<b>Eye</b>	Immediately flush eyes with plenty of water holding eyelids open. Seek medical attention.
<b>Skin</b>	Remove contaminated clothing. Wash affected area with soap and plenty of water. If irritation persists, seek medical attention.
<b>Inhaled</b>	Remove victim from exposure to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Seek medical attention.
<b>Advice to Doctor</b>	Treat symptomatically based on individual reactions of patient and judgement of doctor. NOTE: For advice in an emergency, contact a Poisons Information Centre (Australia 13-11-26 or New Zealand 0800-764-766).
<b>Aggravated medical conditions caused by exposure</b>	Long-term exposure to carbon disulphide (CS <sub>2</sub> ) may cause serious damage to the central nervous system (degeneration of the peripheral nerves), vision problems, liver and kidney damage, anaemia, fatigue and debility. Other symptoms of chronic exposure include insomnia, nightmares, memory deficits and impotence. Exposure to CS <sub>2</sub> has also been linked to coronary heart disease. Exposure for 4 hours daily at a concentration of 150ppm will cause chronic intoxication within months; at 100-150ppm, within a year or more, while 50-100ppm occasionally causes chronic intoxication. People with pre-existing nervous system, gastrointestinal tract, liver, kidney, skin or blood disorders are more susceptible to symptoms of exposure. Concentrations as low as 20ppm may damage the nervous system. This is characterized by headache, apprehension, lethargy, hearing loss and disorientation, muscle pain, tremors, weakness, loss of lower extremity reflexes and paralysis.

### 5. FIRE FIGHTING MEASURES

<b>Extinguishing Media</b>	In case of fire, appropriate extinguishing media is dry chemical powder. Beware of re-ignition.
<b>Hazards from Combustion Products</b>	Spontaneous combustible solid. Incompatible with oxidizing agents, acids, combustible materials and sources of ignition. Reacts with water to produce toxic and flammable carbon disulphide vapour and hydrogen sulphide gas. Carbon disulphide vapours which may evolve due to decomposition can readily be ignited by static discharge. Risk of dust explosion. Carbon oxides and various hydrocarbons formed when burned.
<b>Special Protective</b>	Fire fighters should wear a self contained breathing apparatus and full protective clothing along

<b>Precautions and Equipment for Fire Fighters</b>	with protective equipment.
<b>Flammability Conditions</b>	Spontaneous combustible solid.
<b>Additional Information</b>	
<b>Hazchem Code</b>	1[Y]

## 6. ACCIDENTAL RELEASE MEASURES

<b>Emergency Procedures</b>	Personnel involved in the clean up should wear full protective clothing. Eliminate all sources of ignition. Increase ventilation. Avoid generating dust. Ensure that walking surfaces are not slippery before walking on them. Do not allow product to reach drains, sewers or waterways. If the product does enter a waterway, advise the Environmental Protection Authority or your local Waste Management. Use clean, non-sparking tools and equipment.
<b>Methods and Materials for Containment and Clean Up</b>	Contain and sweep/shovel up spills with dust binding material or use an industrial vacuum cleaner. Transfer to a suitable, labelled container and hold for disposal.

## 7. HANDLING AND STORAGE

<b>Precautions for Safe Handling</b>	Ensure an eye bath and safety shower are available and ready for use. Observe good personal hygiene practices and recommended procedures. Wash thoroughly after handling. Take precautionary measures against static discharges by bonding and grounding equipment.
<b>Conditions for Safe Storage (Including Any Incompatibles)</b>	Store in a cool, dry, well-ventilated area. Keep containers tightly closed when not in use. Inspect regularly for deficiencies such as damage or leaks. Protect against physical damage. Store away from incompatible materials including oxidizing agents, acids, combustible materials and ignition sources. Protect from direct sunlight, moisture and static charges. Store away from food, drink and animal feed stuffs. Storage life 6 months. This product has a UN classification of 3342 and a Dangerous Goods Class 4.2 (spontaneous combustible solid) according to The Australian Code for the Transport of Dangerous Goods by Road and Rail.
<b>Container Type</b>	Packaging must comply with requirements of Hazardous Substances (Packaging) Regulations 2001. Store in original packaging as approved by manufacturer.

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

<b>National Exposure Standards</b>	No exposure standard has been established for this product by the Australian Safety and Compensation Council (ASCC) formerly known as NOHSC. However, the following exposure standard applies for decomposition products; Carbon Disulphide cas no: 75-15-0 TWA = 10ppm (31mg/m <sup>3</sup> ) (Sk) Hydrogen Sulphide cas no: 7783-06-4 TWA= 10ppm (14mg/m <sup>3</sup> ) STEL = 15ppm (21mg/m <sup>3</sup> )
<b>Biological Limit Values</b>	Carbon disulphide intoxication results in severe debilitating CNS symptoms (irritability, mania, hallucinations, tremors, memory loss). Chronic exposure may cause neuropsychiatric changes, peripheral neuropathies and accelerated atherogenic changes. Peak blood concentrations appear 2 hours after inhaled. Plasma elimination half-life is about 1 hour. Metabolic products seen in urine include thiourea, 2-mercapto-2-thiazolin-5-one and 2-thiothiazolidine-4-carboxylic acid (TTCA). The iodine-azide test identifies these. These represent the determinants observed in specimens collected from a healthy worker exposed at the Exposure Standard; DETERMINANT INDEX SAMPLING TIME 2-Thiothiazolidine-4-carboxylic acid 5mg/gm creatinine End of Shift (TTCA) in urine
<b>Engineering Controls</b>	

A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Use a flame proof exhaust ventilation system.

**Personal Protection** RESPIRATOR: Wear an approved full-face piece airline respirator in the positive pressure mode with emergency escape provisions (AS1715/1716) EYES: Safety glasses with side shields (AS1336/1337) HANDS: Wear PVC gloves (AS2161) CLOTHING: Impervious coveralls and antistatic footwear (AS3765/2210)

## 9. PHYSICAL AND CHEMICAL PROPERTIES

<b>Appearance</b>	yellow to grey pellets, powder
<b>Formula</b>	C6H12OS2.K
<b>Odour</b>	strong carbon disulphide like odour
<b>Vapour Pressure</b>	Not applicable.
<b>Vapour Density</b>	Not applicable.
<b>Boiling Point</b>	Not applicable.
<b>Melting Point</b>	Not applicable.
<b>Solubility in Water</b>	Soluble
<b>Specific Gravity</b>	0.94 (Water = 1)
<b>Flash Point</b>	Closed Cup 12-13°C
<b>pH</b>	Not applicable.
<b>Lower Explosion Limit</b>	1.3% (as percentage volume in air)
<b>Upper Explosion Limit</b>	50% (as percentage volume in air)
<b>Ignition Temperature</b>	Not applicable.
<b>Specific Heat Value</b>	Not applicable.
<b>Particle Size</b>	Not applicable.
<b>Flame Propagation/Burning Rate of Solid Materials</b>	Not applicable.
<b>Properties of Materials That May Initiate or Contribute to Fire Intensity</b>	Not applicable.
<b>Potential for Dust Explosion</b>	Potential dust explosion hazard
<b>Reactions that Release Flammable Gases</b>	Decomposition yields carbon disulphide and hydrogen sulphide
<b>Fast of Intensely Burning Characteristics</b>	Not applicable.
<b>Non-flammables</b>	water



<b>That Could Contribute Unusual Hazards to a Fire</b>	Not applicable.
<b>Release of Invisible Flammable Vapours and Gases</b>	
<b>Decomposition Temperature</b>	Not applicable.
<b>Additional Information</b>	Solubility: Readily soluble in water and alcohol. Insoluble in hydrocarbons and ether.

## 10. STABILITY AND REACTIVITY

<b>Chemical Stability</b>	Product is stable under directed conditions of use, storage and temperature. Self-heating solid.
<b>Conditions to Avoid</b>	Avoid excessive heat, direct sunlight, generating dust, moisture, static discharges and high temperatures.
<b>Incompatible Materials</b>	Incompatible with oxidizing agents, acids, combustible materials and sources of ignition.
<b>Hazardous Decomposition Products</b>	Reacts with water to product toxic, flammable carbon disulphide vapour and hydrogen sulphide gas. Burning produces carbon oxides, sulfur oxides and carbon disulphide.
<b>Hazardous Reactions</b>	

## 11. TOXICOLOGICAL INFORMATION

<b>Toxicity Data</b>	Effects from Carbon Disulphide; Severe acute effects on the central nervous system and the mind. Aneasthesia/respiratory paralysis. Local effects are skin or mucosal membrane irritation and burning, peripherall nerve degeneration. Chronic over-exposure leads to cardio-vascular disease. Effects from Hydrogen Sulphide; Deep rapid breathing. Loss of consciousness. Respiratory paralysis. Irritating to the respiratory tract. Conjunctivitis and keratitis.
----------------------	---

Health Effects - Acute

<b>Swallowed</b>	Harmful if swallowed. If swallowed, carbon disulphide is released into the stomach due to the acid present.
<b>Eye</b>	Irritating to eyes. Possible infection and injury.
<b>Skin</b>	Mildly irritates skin. Toxic components can be absorbed through the skin.
<b>Inhaled</b>	Inhalation of dust may cause irritation of the nose, throat and respiratory tract. Causes deep and rapid breathing, drowsiness and loss of feeling. Inhalation of decomposition products may cause loss of consciousness and respiratory paralysis. Affects the central nervous system. May cause irritability, mania, hallucinations, tremors and memory loss.

## 12. ECOLOGICAL INFORMATION

<b>Ecotoxicity</b>	No data available.
<b>Persistence and Degardability</b>	No information available on persistence/degradability for this product.
<b>Mobility</b>	

No information available on mobility for this product.

**Environmental Fate  
(Exposure)**

Do not allow product to enter drains, waterways or sewers.

**Bioaccumulative  
Potential**

No information available on bioaccumulation for this product.

## 13. DISPOSAL CONSIDERATIONS

**Disposal**

Dispose of in accordance with all local, state and federal regulations.

**Special Precautions  
for Land Fill or  
Incineration**

The waste code classification is to be carried out according to the European Waste Catalogue (EWC) specifically for each branch of industry and each type of process.

## 14. TRANSPORT INFORMATION

Land Transport

<b>UN Number</b>	3342
<b>Shipping Name</b>	XANTHATES
<b>Dangerous Goods Class</b>	4.2
<b>Subsidiary Risk</b>	Not applicable.
<b>Pack Group</b>	II
<b>Precaution for User</b>	HARMFUL
<b>Hazchem Code</b>	1[Y]



Sea Transport

<b>UN Number</b>	3342
<b>Shipping Name</b>	XANTHATES
<b>Dangerous Goods Class</b>	4.2
<b>Subsidiary Risk</b>	Not applicable.
<b>Pack Group</b>	II
<b>Precaution for User</b>	HARMFUL
<b>Hazchem Code</b>	1[Y]



## 15. REGULATORY INFORMATION

National Inventories; Australia AICS - Listed Canada DSL - Listed USA TSCA - Listed

<b>Poisons Schedule</b>	N/A
<b>EPG</b>	25
<b>AICS Name</b>	CARBONODITHIOIC ACID, O-PENTYL ESTER, POTASSIUM SALT
<b>NZ Toxic Substance</b>	N

## 16. OTHER INFORMATION

**Literature References** No data available.

**Sources for Data** No data available.

Legend to Abbreviations and Acronyms

<	less than
>	greater than
<b>AICS</b>	Australian Inventory of Chemical Substances
<b>CAS</b>	Chemical Abstracts Service (Registry Number)
<b>cm<sup>2</sup></b>	square centimetres
<b>CO<sub>2</sub></b>	Carbon Dioxide
<b>COD</b>	Chemical Oxygen Demand
<b>deg C ( °C )</b>	degrees Celsius
<b>ERMA</b>	Environmental Risk Management Authority
<b>g</b>	gram
<b>g/cm<sup>3</sup></b>	grams per cubic centimetre
<b>g/l</b>	grams per litre
<b>HSNO</b>	Hazardous Substance and New Organism
<b>IDLH</b>	Immediately Dangerous to Life and Health
<b>immiscible</b>	liquids are insoluble in each other
<b>kg</b>	kilogram
<b>kg/m<sup>3</sup></b>	kilograms per cubic metre
<b>LC<sub>50</sub></b>	LC stands for lethal concentration. LC <sub>50</sub> is the concentration of a material in air which causes

the death of 50% (one half) of a group of test animals. The material is inhaled over a set period of time, usually 1 or 4 hours.

<b>LD50</b>	LD stands for Lethal Dose. LD50 is the amount of a material, given all at once, which causes the death of 50% (one half) of a group of test animals
<b>ltr</b>	Litre
<b>m3</b>	cubic metre
<b>mbar</b>	millibar
<b>mg</b>	milligram
<b>mg/24H</b>	milligrams per 24 hours
<b>mg/kg</b>	milligrams per kilogram
<b>mg/m3</b>	milligrams per cubic metre
<b>Misc</b>	miscible
<b>miscible</b>	liquids form one homogeneous liquid phase regardless of the amount of either component present
<b>mm</b>	millimetre
<b>mPa.s</b>	milli Pascal per second
<b>N/A</b>	Not Applicable
<b>NIOSH</b>	National Institute for Occupational Safety and Health
<b>NOHSC</b>	National Occupational Health and Safety Commission
<b>OECD</b>	Organization for Economic Co-operation and Development
<b>PEL</b>	Permissible Exposure Limit
<b>ppb</b>	parts per billion
<b>ppm</b>	parts per million
<b>ppm/2h</b>	parts per million per 2 hours
<b>ppm/6h</b>	parts per million per 6 hours
<b>RCP</b>	Reciprocal Calculation Procedure
<b>STEL</b>	Short Term Exposure Limit
<b>TLV</b>	Threshold Limit Value
<b>tne</b>	tonne
<b>TWA</b>	Time Weighted Average
<b>ug/24H</b>	micrograms per 24 hours
<b>UN</b>	United Nations (number)
<b>wt</b>	weight



**Australia New Zealand**  
 Adelaide Auckland  
 Brisbane Christchurch  
 Melbourne Hawke's Bay  
 Perth  
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**facsimile** +61 2 97333111  
**web** www.redox.com  
**email** info@redox.com

This MSDS summarises Redox Pty Ltd best knowledge of the health and safety hazard information of the selected substance and how to safely handle the selected substance in the workplace however Redox Pty Ltd expressly disclaims that the MSDS is a representation or guarantee of the chemical specifications for the substance.

Each user should read the MSDS and consider the information in the context of how the selected substance will be handled and used in the workplace including its use in conjunction with other substances.

MSDS: 0000290  
 Print Date: 04/23/2007  
 Revision Date: 04/23/2007

## MATERIAL SAFETY DATA SHEET

### 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

**Product Name:** AERO<sup>®</sup>50 Xanthate  
**Synonyms:** Potassium Amyl Xanthate, Potassium Isoamyl Xanthate  
**Chemical Family:** Alkyl xanthate salt  
**Molecular Formula:** C<sub>6</sub>H<sub>12</sub>OS<sub>2</sub>K  
**Molecular Weight:** 203.4

CYTEC INDUSTRIES INC., FIVE GARRET MOUNTAIN PLAZA, WEST PATERSON, NEW JERSEY 07424, USA  
 For Product Information call 1-800/652-6013. Outside the USA and Canada call 1-973/357-3193.

EMERGENCY PHONE: For emergency involving spill, leak, fire, exposure or accident call CHEMTREC: 1-800/424-9300. Outside the USA and Canada call 1-703/527-3887.

® indicates trademark registered in the U.S. Outside the U.S., mark may be registered, pending or a trademark. Mark is or may be used under license.

### 2. COMPOSITION/INFORMATION ON INGREDIENTS

#### OSHA REGULATED COMPONENTS

Component / CAS No.	%	(w/w)	OSHA (PEL):	ACGIH (TLV)	Carcinogen
Potassium sulfide 1312-73-8	~ 1		Not established	Not established	-
Carbonodithioic acid, O-(3-methylbutyl) ester, potassium salt 928-70-1	> 90		Not established	Not established	-
Potassium hydroxide 1310-58-3	0 - 1		2 mg/m <sup>3</sup> (ceiling)	2 mg/m <sup>3</sup> (Ceiling)	-

### 3. HAZARDS IDENTIFICATION

#### EMERGENCY OVERVIEW

#### APPEARANCE AND ODOR:

Color: yellow  
 Appearance: pellets or powder  
 Odor: slight disagreeable

#### STATEMENTS OF HAZARD:

WARNING!

SELF-HEATING MATERIAL  
MAY BE SPONTANEOUSLY COMBUSTIBLE  
MAY FORM EXPLOSIVE DUST-AIR MIXTURES  
HARMFUL IF ABSORBED THROUGH SKIN  
DUST IRRITATING  
CAUSES EYE AND SKIN IRRITATION

**POTENTIAL HEALTH EFFECTS**

**EFFECTS OF EXPOSURE:**

The acute oral (rat) LD50 and dermal (rabbit) LD50 values are estimated to be >1,000 mg/kg and >500 mg/kg, respectively. Skin or eye contact with solutions of this product may cause moderate skin and eye irritation. Airborne dust may cause significant eye, skin or respiratory tract irritation. Refer to Section 11 for toxicology information on the regulated components of this product.

---

**4. FIRST AID MEASURES**

**Ingestion:**

If swallowed, call a physician immediately. Only induce vomiting at the instruction of a physician. Never give anything by mouth to an unconscious person.

**Skin Contact:**

Remove contaminated clothing and shoes without delay. Wash immediately with plenty of water. Do not reuse contaminated clothing without laundering. Get medical attention if pain or irritation persists after washing or if signs and symptoms of overexposure appear.

**Eye Contact:**

Rinse immediately with plenty of water for at least 15 minutes. Obtain medical advice if there are persistent symptoms.

**Inhalation:**

Remove to fresh air. If breathing is difficult, give oxygen. Obtain medical advice if there are persistent symptoms.



**5. FIRE-FIGHTING MEASURES**

**Suitable Extinguishing Media:**

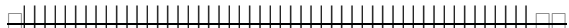
Use carbon dioxide, dry chemical or large quantities of water.

**Protective Equipment:**

Firefighters, and others exposed, wear self-contained breathing apparatus. Wear full firefighting protective clothing.

**Special Hazards:**

Solid xanthates are stable when kept cool and dry. Exposure to heat and moisture can cause decomposition to flammable and explosive vapor of carbon disulfide. Since xanthates decompose in solution, even at room temperature, fire and explosion hazards can develop with aging.



**6. ACCIDENTAL RELEASE MEASURES**

**Personal precautions:**

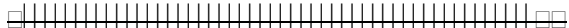
Where exposure level is not known, wear approved, positive pressure, self-contained respirator. Where exposure level is known, wear approved respirator suitable for level of exposure. Refer to Section 8 (Exposure Controls/Personal Protection) for appropriate personal protective equipment.

**Methods For Cleaning Up:**

Sweep up into containers for disposal. Flush spill area with water.

**Environmental Precautions:**

Use appropriate containment to avoid environmental contamination.

**7. HANDLING AND STORAGE****HANDLING**

**Precautionary Measures:** Avoid excessive heat or moisture. Avoid contact with eyes, skin and clothing. Avoid breathing dust. Keep container closed. Wash thoroughly after handling. Use non-sparking tools and do not smoke when opening drum. Use with adequate ventilation. Contains finely divided material. Dust suspended in air may ignite with static discharge, sparks or flame. Equipment, including venting systems, should be grounded. Provide adequate ventilation in areas of use to remove dust. Wash contaminated clothing before reuse.

**Special Handling Statements:** Minimize dust. Special precautions against fire and explosion must be observed in (1) pumping xanthate solutions, (2) draining mobile tanks, (3) cleaning mobile tanks, and (4) performing maintenance work on storage tanks and pipelines leading to and from tanks. Use nonsparking tools and do not smoke when opening drums of xanthate.

**STORAGE**

Heating or overexposure to moisture of solid xanthates or heating or aging of xanthate solutions causes some decomposition to poisonous and flammable carbon disulfide. Storage tanks should have certain design features for maximum safety, and the vapor space should be free of sources of ignition.

**Storage Temperature:** Store at <math>-32.2 - 10\text{ }^{\circ}\text{C}</math> 90 - 50 °F

**Reason:** Safety.

**8. EXPOSURE CONTROLS/PERSONAL PROTECTION****Engineering Measures:**

Where this material is not used in a closed system, good enclosure and local exhaust ventilation should be provided to control exposure.

**Respiratory Protection:**

Where exposures are below the established exposure limit, no respiratory protection is required. Where exposures exceed the established exposure limit, use respiratory protection recommended for the material and level of exposure.

**Eye Protection:**

Wear eye/face protection such as chemical splash proof goggles or face shield. Eyewash equipment and safety shower should be provided in areas of potential exposure.

**Skin Protection:**

Avoid skin contact. Wear impermeable gloves and suitable protective clothing.

**Additional Advice:**

Food, beverages, and tobacco products should not be carried, stored, or consumed where this material is in use. Before eating, drinking, or smoking, wash face and hands thoroughly with soap and water.

**9. PHYSICAL AND CHEMICAL PROPERTIES**

<b>Color:</b>	yellow
<b>Appearance:</b>	pellets or powder
<b>Odor:</b>	slight disagreeable
<b>Boiling Point:</b>	Not applicable
<b>Melting Point:</b>	255 - 280 °C      491 - 536 °F
<b>Vapor Pressure:</b>	Not applicable
<b>Specific Gravity/Density:</b>	Not available

## 9. PHYSICAL AND CHEMICAL PROPERTIES

Vapor Density:	Not applicable
Percent Volatile (% by wt.):	~1.5
pH:	Not applicable
Saturation In Air (% By Vol.):	Not applicable
Evaporation Rate:	Not applicable
Solubility In Water:	35 g/100 g @ 20°C-
Volatile Organic Content:	Not available
Flash Point:	Not applicable
Flammable Limits (% By Vol):	Not applicable
Autoignition Temperature:	120 °C 248 °F (value for carbon disulfide)
Decomposition Temperature:	>131 - 280 °C 267.8 - 536 °F -
Partition coefficient (n-octanol/water):	Not available
Odor Threshold:	Not available

## 10. STABILITY AND REACTIVITY

**Stability:** Stable

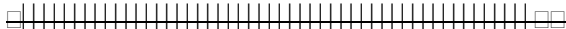
**Conditions To Avoid:** Keep water and moist air out of container. Exposure of the solid xanthate to heat or moisture and heating or aging of xanthate solutions. Keep container in a cool, well-ventilated area. Containers filled with this product should be kept closed when not in use. Avoid prolonged exposure to heat; avoid strong acids, alkalies and oxidizing agents.

**Polymerization:** Will not occur

**Conditions To Avoid:** None known

**Materials To Avoid:** Strong acids, oxidizing agents, moisture.

**Hazardous Decomposition Products:** Carbon monoxide (CO)  
Carbon dioxide  
oxides of sulfur (includes sulfur di and tri oxides)  
carbon disulfide  
hydrogen sulfide (H<sub>2</sub>S)



## 11. TOXICOLOGICAL INFORMATION

Toxicological information for the product is found under Section 3. HAZARDS IDENTIFICATION.

Toxicological information on the regulated components of this product is as follows:

Potassium hydroxide has an acute oral (rat) LD<sub>50</sub> value of 273 mg/kg. Acute overexposure to potassium hydroxide or dusts causes severe respiratory irritation. Potassium hydroxide is severely irritating to the eyes and skin.

Potassium sulfide may cause eye and skin irritation. Under acidic conditions, potassium sulfide can decompose to produce flammable poisonous hydrogen sulfide gas.

Potassium 3 methylbutyl xanthate has an estimated acute oral (rat) LD<sub>50</sub> and acute dermal (rabbit) LD<sub>50</sub> values of > 1,000 mg/kg and > 500 mg/kg, respectively, based on similar materials. Direct contact with this material may cause moderate eye and skin irritation. Airborne dust may cause significant eye, skin or respiratory tract irritation.

California Proposition 65 Warning (applicable in California only) - This product contains (a) chemical(s) known to the State of California to cause birth defects or other reproductive harm.



## 12. ECOLOGICAL INFORMATION

Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.  
This material is not readily biodegradable.  
All ecological information provided was conducted on a structurally similar product.

### FISH TEST RESULTS

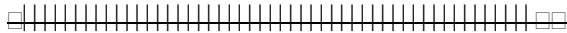
**Test:** Acute toxicity, freshwater (OECD 203)  
**Duration:** 96 hr.  
**Species:** Rainbow Trout (*Oncorhynchus mykiss*)  
>10 - 100 mg/l LC50

### INVERTEBRATE TEST RESULTS

**Test:** Acute Immobilization (OECD 202)  
**Duration:** 48 hr  
**Species:** Water Flea (*Daphnia magna*)  
>1 - 10 mg/l EC50

### DEGRADATION

**Test:** Biodegradability  
<70 %  
Information based on a  
structurally similar  
material



## 13. DISPOSAL CONSIDERATIONS

### 13. DISPOSAL CONSIDERATIONS

The information on RCRA waste classification and disposal methodology provided below applies only to the product, as supplied. If the material has been altered or contaminated, or it has exceeded its recommended shelf life, the guidance may be inapplicable. Hazardous waste classification under federal regulations (40 CFR Part 261 et seq) is dependent upon whether a material is a RCRA `listed hazardous waste` or has any of the four RCRA `hazardous waste characteristics.` Refer to 40 CFR Part 261.33 to determine if a given material to be disposed of is a RCRA `listed hazardous waste`; information contained in Section 15 of this MSDS is not intended to indicate if the product is a `listed hazardous waste.` RCRA Hazardous Waste Characteristics: There are four characteristics defined in 40 CFR Section 261.21-61.24: Ignitability, Corrosivity, Reactivity, and Toxicity. To determine Ignitability, see Section 9 of this MSDS (flash point). For Corrosivity, see Sections 9 and 14 (pH and DOT corrosivity). For Reactivity, see Section 10 (incompatible materials). For Toxicity, see Section 2 (composition). Federal regulations are subject to change. State and local requirements, which may differ from or be more stringent than the federal regulations, may also apply to the classification of the material if it is to be disposed. The Company encourages the recycle, recovery and reuse of materials, where permitted, as an alternate to disposal as a waste. The Company recommends that organic materials classified as RCRA hazardous wastes be disposed of by thermal treatment or incineration at EPA approved facilities. The Company has provided the foregoing for information only; the person generating the waste is responsible for determining the waste classification and disposal method.

---

### 14. TRANSPORT INFORMATION

This section provides basic shipping classification information. Refer to appropriate transportation regulations for specific requirements.

#### US DOT

Proper Shipping Name: Xanthates

Hazard Class: 4.2

Packing Group: II

UN/ID Number: UN3342

Transport Label Required: Spontaneously Combustible  
Marine Pollutant

Technical Name (N.O.S.): Contains potassium amyl xanthate

Hazardous Substances:

Not applicable

Comments: Marine Pollutants - DOT requirements specific to Marine Pollutants do not apply to non-bulk packagings transported by motor vehicles, rail cars or aircraft.

#### TRANSPORT CANADA

Proper Shipping Name: Xanthates

Hazard Class: 4.2

Packing Group: II

UN Number: 3342

Transport Label Required: Spontaneously Combustible  
Marine Pollutant

Technical Name (N.O.S.): Contains potassium amyl xanthate

#### ICAO / IATA

Proper Shipping Name: Xanthates

Hazard Class: 4.2

Packing Group: II

UN Number: 3342

Transport Label Required: Spontaneously Combustible

Packing Instructions/Maximum Net Quantity Per Package:

Passenger Aircraft: 415; 15 KG

Cargo Aircraft: 417; 50 KG

Technical Name (N.O.S.): Contains potassium amyl xanthate

**IMO**

Proper Shipping Name: Xanthates  
 Hazard Class: 4.2  
 UN Number: 3342  
 Packing Group: II  
 Transport Label Required: Spontaneously Combustible  
 Marine Pollutant  
 Technical Name (N.O.S.): Contains potassium amyl xanthate

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**15. REGULATORY INFORMATION****INVENTORY INFORMATION**

**United States (USA):** All components of this product are included on the TSCA Chemical Inventory or are not required to be listed on the TSCA Chemical Inventory.

**Canada:** This product contains components not on the Domestic Substances List. These components are on the Non-Domestic Substances List.

**European Union (EU):** All components of this product are included in the European Inventory of Existing Chemical Substances (EINECS) in compliance with Council Directive 67/548/EEC and its amendments.

**Australia:** All components of this product are included in the Australian Inventory of Chemical Substances (AICS) or are not required to be listed on AICS.

**China:** All components of this product are included on the Chinese inventory or are not required to be listed on the Chinese inventory.

**Japan:** All components of this product are included on the Japanese (ENCS) inventory or are not required to be listed on the Japanese inventory.

**Korea:** All components of this product are NOT included on the Korean (ECL) inventory.

**Philippines:** All components of this product are NOT included on the Philippine (PICCS) inventory.

**OTHER ENVIRONMENTAL INFORMATION**

The following components of this product may be subject to reporting requirements pursuant to Section 313 of CERCLA (40 CFR 372), Section 12(b) of TSCA, or may be subject to release reporting requirements (40 CFR 307, 40 CFR 311, etc.) See Section 13 for information on waste classification and waste disposal of this product.

Component / CAS No.	%	TPQ (lbs)	RQ(lbs)	S313	TSCA 12B
Carbon disulfide 75-15-0	~ 0.001	10000	100	Yes	Yes

**PRODUCT HAZARD CLASSIFICATION UNDER SECTION 311 OF SARA**

- Acute
  - Fire
  - Reactivity
- 

**16. OTHER INFORMATION****NFPA Hazard Rating (National Fire Protection Association)**

Health: 2 - Materials that, under emergency conditions, can cause temporary incapacitation or residual injury.

Fire: 1 - Materials that must be preheated before ignition can occur.

Reactivity: 1 - Materials that in themselves are normally stable, but that can become unstable at elevated temperatures and pressures.

**Reasons For Issue:**

Revised Section 15

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Randy Deskin, Ph.D., DABT +1-973-357-3100

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This information is given without any warranty or representation. We do not assume any legal responsibility for same, nor do we give permission, inducement, or recommendation to practice any patented invention without a license. It is offered solely for your consideration, investigation, and verification. Before using any product, read its label.

---

**MSDS** **Material Safety Data Sheet**

From: Mallinckrodt Baker, Inc.  
222 Red School Lane  
Phillipsburg, NJ 08865



24 Hour Emergency Telephone: 908-859-2151  
CHEMTREC: 1-800-424-9300

National Response in Canada  
CANUTEC: 613-996-6666

Outside U.S. and Canada  
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

**1. SODIUM HEXAMETAPHOSPHATE**

**1. Product Identification**

**Synonyms:** Hexametaphosphate, sodium salt; SHMP; Metaphosphoric acid, hexadosium salt; Sodium polyphosphates, glassy

**CAS No.:** 68915-31-1

**Molecular Weight:** Not applicable to mixtures.

**Chemical Formula:** Na(x+2) Px O(3x+1) x = 6 to 21

**Product Codes:**

J.T. Baker: V030

Mallinckrodt: E024

**2. Composition/Information on Ingredients**

Ingredient	CAS No	Percent	Hazardous
Polyphosphoric Acids, Sodium Salts	68915-31-1	90 - 100%	Yes

**3. Hazards Identification**

**Emergency Overview**

**CAUTION! MAY CAUSE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT. MAY BE HARMFUL IF SWALLOWED OR INHALED.**

**SAF-T-DATA<sup>(tm)</sup>** Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Life)

Flammability Rating: 0 - None

Reactivity Rating: 0 - None

Contact Rating: 2 - Moderate

Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES

Storage Color Code: Green (General Storage)

**Potential Health Effects**  
-----

Many of the systemic effects given below were taken from toxicity information for other phosphates.

**Inhalation:**

May cause irritation to the respiratory tract. Symptoms may include coughing and shortness of breath.

**Ingestion:**

Phosphates are slowly and incompletely absorbed when ingested, and seldom result in systemic effects. Such effects, however, have occurred. Symptoms may include vomiting, lethargy, diarrhea, blood chemistry effects, heart disturbances and central nervous system effects. The toxicity of phosphates is because of their ability to sequester calcium. Systemic acidosis may result as this material is believed to hydrolyze into phosphoric acid when ingested.

**Skin Contact:**

May cause irritation with redness and pain.

**Eye Contact:**

May cause irritation, redness and pain.

**Chronic Exposure:**

May sequester calcium and cause calcium phosphate deposits in the kidneys. Chronic ingestion or inhalation may induce systemic phosphorous poisoning. Liver damage, kidney damage, jaw/tooth abnormalities, blood disorders and cardiovascular effects can result.

**Aggravation of Pre-existing Conditions:**

Persons with pre-existing skin disorders or eye problems, jaw/tooth abnormalities, or impaired liver, kidney or respiratory function may be more susceptible to the effects of the substance.

---

**4. First Aid Measures**

**Inhalation:**

Remove to fresh air. Get medical attention for any breathing difficulty.

**Ingestion:**

Give large amounts of water to drink. Never give anything by mouth to an unconscious person. Get medical attention.

**Skin Contact:**

Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention if irritation develops.

**Eye Contact:**

Immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention if irritation persists.

---

**5. Fire Fighting Measures**

**Fire:**

Not considered to be a fire hazard.

**Explosion:**

Not considered to be an explosion hazard.

**Fire Extinguishing Media:**

Use any means suitable for extinguishing surrounding fire.

**Special Information:**

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

---

**6. Accidental Release Measures**

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal. Small amounts of residue may be flushed to sewer with plenty of water.

---

## 7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

---

## 8. Exposure Controls/Personal Protection

### **Airborne Exposure Limits:**

None established.

### **Ventilation System:**

In general, dilution ventilation is a satisfactory health hazard control for this substance. However, if conditions of use create discomfort to the worker, a local exhaust system should be considered.

### **Personal Respirators (NIOSH Approved):**

For conditions of use where exposure to dust or mist is apparent and engineering controls are not feasible, a particulate respirator (NIOSH type N95 or better filters) may be worn. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-face positive-pressure, air-supplied respirator. **WARNING:** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

### **Skin Protection:**

Wear protective gloves and clean body-covering clothing.

### **Eye Protection:**

Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

---

## 9. Physical and Chemical Properties

### **Appearance:**

White powder or plates.

### **Odor:**

No information found.

### **Solubility:**

Soluble in water.

### **Density:**

1.25

### **pH:**

No information found.

### **% Volatiles by volume @ 21C (70F):**

0

### **Boiling Point:**

1500C (2732F)

### **Melting Point:**

550C (1022F)

### **Vapor Density (Air=1):**

No information found.

### **Vapor Pressure (mm Hg):**

No information found.

### **Evaporation Rate (BuAc=1):**

No information found.

---

## 10. Stability and Reactivity

### **Stability:**

Stable under ordinary conditions of use and storage.

### **Hazardous Decomposition Products:**

Sodium and phosphorus oxides may form when heated to decomposition.

### **Hazardous Polymerization:**

Will not occur.

### **Incompatibilities:**

No information found.

### **Conditions to Avoid:**

No information found.

---

**11. Toxicological Information**

Oral rat LD50: 3053 mg/kg

-----\Cancer Lists\-----

---NTP Carcinogen---

Ingredient	Known	Anticipated	IARC Category
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Polyphosphoric Acids, Sodium Salts (68915-31-1)	No	No	None
--	----	----	------

---

**12. Ecological Information****Environmental Fate:**

No information found.

**Environmental Toxicity:**

No information found.

---

**13. Disposal Considerations**

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

---

**14. Transport Information**

Not regulated.

---

**15. Regulatory Information**

-----\Chemical Inventory Status - Part 1\-----

Ingredient	TSCA	EC	Japan	Australia
------------	------	----	-------	-----------

Polyphosphoric Acids, Sodium Salts (68915-31-1)	Yes	Yes	Yes	Yes
---	-----	-----	-----	-----

-----\Chemical Inventory Status - Part 2\-----

--Canada--

Ingredient	Korea	DSL	NDSL	Phil.
------------	-------	-----	------	-------

Polyphosphoric Acids, Sodium Salts (68915-31-1)	Yes	Yes	No	Yes
---	-----	-----	----	-----

-----\Federal, State &amp; International Regulations - Part 1\-----

-SARA 302- -----SARA 313-----

Ingredient	RQ	TPQ	List	Chemical Catg.
------------	----	-----	------	----------------

Polyphosphoric Acids, Sodium Salts (68915-31-1)	No	No	No	No
--	----	----	----	----



-----\Federal, State &amp; International Regulations - Part 2\-----

-RCRA- -TSCA-

Ingredient CERCLA 261.33 8(d)

-----  
-----  
Polyphosphoric Acids, Sodium Salts No No No  
(68915-31-1)

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No

SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No

Reactivity: No (Mixture / Solid)

**Australian Hazchem Code:** None allocated.**Poison Schedule:** None allocated.**WHMIS:**

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

**16. Other Information****NFPA Ratings:** Health: 1 Flammability: 0 Reactivity: 0**Label Hazard Warning:**

CAUTION! MAY CAUSE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT. MAY BE HARMFUL IF SWALLOWED OR INHALED.

**Label Precautions:**

Keep container closed.

Use with adequate ventilation.

Avoid breathing dust.

Wash thoroughly after handling.

Avoid contact with eyes, skin and clothing.

**Label First Aid:**

If inhaled, remove to fresh air. Get medical attention for any breathing difficulty. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Get medical attention if irritation develops or persists. If swallowed, give large amounts of water to drink. Never give anything by mouth to an unconscious person. Get medical attention.

**Product Use:**

Laboratory Reagent.

**Revision Information:**

MSDS Section(s) changed since last revision of document include: 3.

**Disclaimer:**

\*\*\*\*\*

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\*\*\*\*\*

**Prepared by:** Environmental Health & Safety

Phone Number: (314) 654-1600 (U.S.A.)



**ICL Performance  
Products LP**

# Material Safety Data Sheet

## 1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY UNDERTAKING

### Identification

Product Name                    Sodium Hexametaphosphate (SHMP)  
 Reference Number            AST10053  
 Date                                May 1, 2006  
 Synonyms:                        Glass H, Hexaphos, Sodaphos, SHMP; glassy Sodium Phosphate; Sodium Polyphosphate, glassy; Metaphosphoric Acid, Sodium Salt; Sodium Acid Metaphosphate; Graham's Salt.

### Use of the substance or preparation

Food Ingredient

### Company Information:

**ICL PERFORMANCE PRODUCTS LP**  
 622 Emerson Road - Suite 500  
 St. Louis, Missouri 63141

Emergency telephone:        In USA call CHEMTREC: 1 800 424 9300  
     In Canada call CANUTEC: 1 613 996 6666

General Information:        +1 800 244 6169 (Worldwide)

## 2. COMPOSITION/INFORMATION ON INGREDIENTS

### Composition

<u>Substance</u>	<u>CAS No.</u>	<u>EINECS No.</u>	<u>%w/w</u>	<u>Risk Phrase</u>
Sodium Hexametaphosphate (Polyphosphoric acids, sodium salts)	68915-31-1	272-808-3	100	R36/37/38

## 3. HAZARDS IDENTIFICATION

### Classification of the substance/preparation

EC Classification                None  
 Safety phrase                    S26 S36

### Human Health Effects

May cause skin, eye and respiratory tract irritation.

**Environmental Effects**

On the basis of available information, this material is not expected to produce any significant environmental effects when recommended use instructions are followed.

**4. FIRST-AID MEASURES****General**

This product has low oral toxicity and is minimally irritating to the skin and eyes. Treatment is controlled removal of exposure and symptomatic and supportive care.

**Eye contact**

Rinse immediately with plenty of water. Get medical attention if irritation occurs and persists. The dry material may cause foreign body irritation in some individuals.

**Skin contact**

Wash with plenty of water. Prolonged contact with the dry material may cause drying or chapping of the skin.

**Inhalation**

Remove to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Inhalation of the dust may cause coughing and sneezing.

**Ingestion**

Drink plenty of water. Never give anything by mouth to an unconscious person. No significant adverse health effects are expected if only small amount (less than a mouthful) are swallowed.

**5. FIRE FIGHTING MEASURES****Extinguishing media**

Non-combustible.  
No special requirement.

**Unsuitable extinguishing media**

Non-combustible  
No special requirement.

**Exposure hazards**

No special considerations.

**Protective equipment**

As a general precaution, firefighters, and others exposed, wear self-contained breathing apparatus.

**6. ACCIDENTAL RELEASE MEASURES**

**Personal precautions**

No special requirement.

**Environmental precautions**

Small quantities: Presents no environmental problems.

Large quantities: As general precaution, avoid discharge into the environment.

**Methods for cleaning up**

Sweep, scoop or vacuum and place into containers for disposal.

Flush area with water.

**7. HANDLING AND STORAGE****Handling**

Good industrial practice in housekeeping and personal hygiene should be followed.

Avoid contact with eyes and skin.

Wash hands immediately after handling.

Remove material from clothing.

**Engineering measures**

Prevention of eye and skin contact may be required under normal use conditions. However, severe agitation or dispersion into the work environment may require enclosure of the process and local exhaust ventilation at the source to prevent release into the air. If the work environment controls are not implemented, then personal protection for inhalation, skin and eye may be required.

**Storage**

Store in cool, dry place to maintain product performance.

**8. EXPOSURE CONTROLS/PERSONAL PROTECTION****Occupational exposure limit**

ACGIH TLV 10 mg/m<sup>3</sup> (inhalable) 8-hr TWA, 3 mg/m<sup>3</sup> (respirable) 8-hr TWA  
OSHA PEL 15 mg/m<sup>3</sup> (total dust) 8-hr TWA, 5 mg/m<sup>3</sup> (respirable) 8-hr TWA

OSHA and ACGIH have not established specific exposure limits for this material. However, OSHA and ACGIH have established limits for particulates not otherwise regulated (PNOR) and particulates not otherwise classified (PNOC) which are the least stringent exposure limits applicable to dusts.

**Respiratory protection**

In case of insufficient ventilation, wear suitable respiratory equipment. Use approved respiratory protective equipment as described in the U.S. OSHA 29 CFR 1910.134 or European Standard EN149.

**Hand/skin protection**

Wearing protective clothes is recommended; wash hand and contaminated skin thoroughly after handling.

**Eye protection**

Wear appropriate protective eye glasses or chemical safety goggles as described in the U.S. OSHA 29 CFR 1910.133 or European Standard EN 166.

**9. PHYSICAL AND CHEMICAL PROPERTIES****General Information**

Chemical Formula:	Na <sub>2</sub> O P <sub>2</sub> O <sub>5</sub>
Form	powder, free flowing
Color	White
Odor	Odorless

**Important health, safety and environmental information**

pH (1% solution) SHMP:	7.0
long chain SHMP:	5.6-6.8
Specific gravity:	1.79 (20 °C / 4 °C)
Water solubility:	< 150 g/l (partly soluble)
Melting point:	628 °C or 1162 °F
Boiling point:	1500 °C or 2732 °F
Bulk density:	700 kg/m <sup>3</sup> (loose) 850 kg/m <sup>3</sup> (packed)

**Other Information**

Miscibility with water	< 150g/l
Flash point:	not applicable
Lower/upper explosion limits:	not applicable
Minimum ignition temperature:	not applicable
Particulate size and distribution	> 45% -100 mesh USSS

**10. STABILITY AND REACTIVITY**

Solutions of this product will hydrolyze to form ortho-phosphate and other shorter chain phosphates. Dissolution is impacted by temperature and pH of the system.

**Conditions to avoid**

Excessive moisture.

**Materials to avoid**

No special material to avoid.

**Hazardous decomposition products**

Oxides of phosphorus

**11. TOXICOLOGICAL INFORMATION****Laboratory data**

Oral LD <sub>50</sub> (rat):	6600 mg/kg.
Dermal LD <sub>50</sub> (rabbit):	> 7940 mg/kg.

Material: Sodium Hexametaphosphate

Page 5 of 6

Reference No.: AST10053

May 1, 2006

Eye Irritation (rabbit): 1.3/110.0; slightly irritating  
Skin irritation (rabbit): 0.0/8.0, nonirritating

Rats fed this material in their diet for one month showed decreased growth, increased kidney, lung and spleen weight, and kidney damage. Rats fed this material for two years also showed decreased weight gain, increased kidney weight, and kidney changes. No increase in tumors was reported. No adverse effects in reproduction capacity were reported in a multigenerational study using rats fed this material.

This material has been defined as a hazardous chemical under the criteria of the OSHA Hazard Communication Standard (29 CFR 1910.1200).

## 12. ECOLOGICAL INFORMATION

### Environmental Toxicity

The following data have been classified using the criteria adopted by the European Economic Community (EEC) for aquatic organism toxicity

48-hr EC50 Daphnia magna > 485 mg/l  
96-hr LC50 Rainbow trout > 1000 mg/l  
96-hr LC50 Medina & Mysid shrimp > 1000 mg/l

### Environmental Fate

Inorganic compounds in contact with the soil, sub-surface or surface waters may be taken up by plants and utilized as essential nutrients. Phosphates may also form precipitates, usually with calcium or magnesium. The resultant compounds are insoluble in water and become a part of the soil or sediment. The term biodegradability, as such, is not applicable to inorganic compounds.

## 13. DISPOSAL CONSIDERATIONS

### European waste catalog number

Unknown

### Disposal Considerations

This material when discarded is not a hazardous waste as that term is defined by the U.S. Resource, Conservation and Recovery Act (RCRA), 40 CFR 261. Dry material may be land filled or recycled in accordance with local, state and federal regulations. Consult your attorney or appropriate regulatory officials for information on such disposal.

## 14. TRANSPORT INFORMATION

### Road/Rail, Sea and Air

IMDG/UN Not classified  
ICAO/IATA Not classified  
RID/ADR Unknown  
Canadian TDG Not classified  
U.S. DOT Not classified

## 15. REGULATORY INFORMATION

### EC label

Hazard symbol: none  
 Risk phrase R36/37/38 – irritating to eyes, respiratory system and skin.  
 Safety phrase S26 – In case of contact with eyes, immediately flush with plenty of water and seek medical attention  
 S36 – Wear suitable protective clothing

**Chemical Inventory**

USA TSCA: Listed  
 Canada DSL: Listed  
 EC: Listed  
 Japan Listed  
 Australia Listed  
 Korea Listed  
 Philippines Listed  
 China Listed

**Additional information**

WHMIS Classification Not Controlled

SARA Hazard Notification

Hazard Categories Under Title III Rules (40 CFR 370): None  
 Section 302 Extremely Hazardous Substances: None  
 Section 313 Toxic Chemical(s): None

CERCLA Reportable Quantity: Not applicable

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulation and the MSDS contains all the information required by the Canadian Controlled Products Regulation.

**16. OTHER INFORMATION**

	Health	Fire	Reactivity	Additional Information
Suggested NFPA Rating	1	0	0	
Suggested HMIS Rating	1	0	0	F F = Safety glasses, gloves, synthetic apron, dust respirator

Reason for revision: Revised section 1. Supersedes MSDS dated: November 1, 2006  
 Drafted in accordance with ECC Dir 2001/58/EC

Although the information and recommendations set forth herein (hereinafter "Information") are presented in good faith and believed to be correct as of the date hereof, ICL Performance Products LP makes no representations as to the completeness or accuracy thereof. Information is supplied upon the condition that the persons receiving same will make their own determination as to its suitability for their purposes prior to use. In no event will ICL Performance Products LP be responsible for damages of any nature whatsoever resulting from the use of or reliance upon information. NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE ARE MADE HEREUNDER WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH INFORMATION REFERS

**Toxicity Studies for Sodium hexametaphosphate on Molluscs** - Toxicology studies from the primary scientific literature on aquatic organisms






Use(s): pH Adjustment [Chem Class](#): Inorganic [U.S. EPA PC Code](#): 076402 [CAS Number](#): 10124-56-8

Sorted by Organism Group, Effect, Measurement, Endpoint and LatinName.

**Note:** Only partial study information is reported on these pages. Full study information can be found at the [U.S. EPA AQUIRE](#) web site.

Records 1 to 2 of 2

[First](#) [Previous](#) [Next](#) [Last](#)


<a href="#">Common Name</a> <a href="#">Scientific Name</a>	<a href="#">Effect</a>	<a href="#">Measurement</a>	<a href="#">Life Stage</a>	<a href="#">Study Time</a>	<a href="#">Toxicity Endpoint</a>	<a href="#">Toxic Dose</a>			<a href="#">Conc Units</a>	<a href="#">Conc Type</a>	<a href="#">Chem Desc</a>	<a href="#">Exper. Type</a>	<a href="#">Acute Tox Rating</a>	<a href="#">Outlier</a>	<a href="#">Year</a>	<a href="#">Journal</a>
						Mean	Min	Max								
<b>Molluscs</b>  <a href="#">Show list of all Molluscs Species</a>																
 <a href="#">American or virginia oyster</a> Crassostrea virginica	Development	Developmental changes, general	TROCHOPHORE LARVE, 18-24 H	NR h	NR	-	15,000	150,000	ug/L	T	PRA	Static			1987	 <a href="#">Int.J.Invertebr.Reprod.Dev. 12(2):161-172</a>
 <a href="#">American or virginia oyster</a> Crassostrea virginica	Mortality	Mortality	TROCHOPHORE LARVE, 18-24 H	NR h	NR	-	15,000	150,000	ug/L	T	PRA	Static			1987	 <a href="#">Int.J.Invertebr.Reprod.Dev. 12(2):161-172</a>

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**Working with the Information on this Page**

Click on underlined terms for definitions or go to the [Pesticide Tutorial](#) overview page.

Any underlined term with a book icon  has additional information.

To print this page, choose **Print**. To export this data, choose **Save As 'HTML Source'** and open it in Excel or equivalent program.



<b>Product name:</b>	Methyl isobutyl carbinol
<b>MSDS number:</b>	63
<b>Material number:</b>	80063
<b>Published date:</b>	07/28/2005(V1)

## MATERIAL SAFETY DATA SHEET

### 1. Product and Company Identification

<b>Product:</b>	Methyl isobutyl carbinol
<b>MSDS number:</b>	63
<b>Material number:</b>	80063

**Manufacturer name and address:**

**Celanese Ltd.**  
 1601 W. LBJ Freeway  
 P.O. Box 819005  
 Dallas, TX 75381-9005  
 United States  
 Phone: 972 443 4000  
 Internet: www.celanesechemicals.us

<b>Transportation emergency phone numbers:</b> In USA, call 800 424 9300 Outside USA, call 703 527 3887, collect calls accepted
---

**Product Use:** Intermediate for lube oil additives, especially zinc dialkyl dithiophosphates; frothing agent for ore flotation, especially copper.

### 2. Composition / Information on Ingredients

Component	CAS Number	Percent %	OSHA hazard category:
METHYL ISOBUTYL CARBINOL	108-11-2	99	Hazardous

### 3. Hazards Identification

**Emergency Overview:**

**WARNING!**

- Flammable liquid and vapor.
- May cause respiratory tract and eye irritation.
- May cause skin irritation.
- Prolonged or repeated contact may dry skin and cause irritation.
- Material creates a special hazard because it floats on water.

---

<b>Transportation emergency:</b>	800 424 9300	CHEMTREC, 24 hrs/day
	703 527 3887	Outside USA, collect calls accepted, 24 hrs/day
<b>Product information:</b>	800 835 5235	

<b>Product name:</b>	Methyl isobutyl carbinol
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**Product Description**

**Appearance:** Clear, colorless mobile liquid.  
**Odor:** Slightly irritating, alcohol odor.

**Potential health effects**

**Routes of exposure:** Skin, eyes, inhalation, ingestion.

**Immediate effects:**

**Skin:** May cause skin irritation. Prolonged or repeated contact may dry skin and cause irritation. May be harmful if absorbed through skin. Symptoms of exposure may include: Central nervous system depression with headache, stupor, uncoordinated or strange behavior or unconsciousness. Drying, cracking or inflammation of skin.

**Eyes:** Exposure to vapors and liquid Causes eye irritation. Symptoms of exposure may include: Eye irritation, burning sensation, pain, watering, and/or change of vision.

**Inhalation:** Causes respiratory tract irritation. Harmful if inhaled. Symptoms of exposure may include: Central nervous system depression with nausea, dizziness, headache, stupor, uncoordinated or strange behavior or unconsciousness. Nasal discharge, hoarseness, coughing, chest pain and breathing difficulty.

**Ingestion:** May be harmful if swallowed. Symptoms of exposure may include: Nausea, vomiting, loss of appetite, gastrointestinal irritation and/or diarrhea. Central nervous system depression with nausea, headache and mental sluggishness.

**Mutagenic:** Does not show mutagenic potential in most in vitro tests.

**Target organ effects:**

- Overexposure (prolonged or repeated exposure) may cause:
  - Kidney damage
  - Central nervous system depression
  - Injury to the eyes
  - Irritation of the respiratory tract
  - Irritation of the digestive tract
  - Drying of the skin

**Medical conditions which may be aggravated by exposure:** Significant exposure to this chemical may adversely affect people with acute or chronic disease of the:

- Respiratory Tract
- Skin
- Eyes
- Kidneys
- Central nervous system
- Digestive tract

**Transportation emergency:** 800 424 9300 CHEMTREC, 24 hrs/day  
 703 527 3887 Outside USA, collect calls accepted, 24 hrs/day

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**For further information, see:**

- Section 4 - First Aid Measures
- Section 5 - Fire Fighting Measures
- Section 6 - Accidental Release Measures
- Section 8 - Exposure Controls/Personal Protection
- Section 9 - Physical and Chemical Properties
- Section 10 - Stability and Reactivity

#### 4. First Aid Measures

**Skin:** Immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Call a physician if irritation develops and persists. Wash clothing before reuse. Thoroughly clean shoes before reuse.

**Eyes:** Immediately flush eyes with plenty of water for at least 15 minutes. If easy to do, remove contact lenses, if worn. Get medical attention immediately.

**Inhalation:** Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Ingestion:** DO NOT induce vomiting. Get medical attention immediately. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person.

#### 5. Fire Fighting Measures

**NFPA:** Health: 2 Flammability: 2 Reactivity: 0

**Flammable properties**

**Flash point (test method):** 42.4 C (108 F)

**Flammable limits in air, % by volume:**

**Upper:** 5.5 %  
**Lower:** 1 %

**Autoignition temperature:** 360.3 C (680 F)

**Products of combustion:** Carbon Monoxide.

**Extinguishing Media:** Use CO<sub>2</sub> or dry chemical for small fires. Use aqueous film forming foam for large fires.

**Transportation emergency:** 800 424 9300 CHEMTREC, 24 hrs/day  
 703 527 3887 Outside USA, collect calls accepted, 24 hrs/day

**Product information:** 800 835 5235

<b>Product name:</b>	Methyl isobutyl carbinol
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**Fire Fighting Instructions:** Water spray should be used to cool fire-exposed structures and vessels. Keep personnel removed from and upwind of fire. If potential for exposure to vapors or products of combustion exists, wear full fire fighting turnout gear and NIOSH approved self-contained breathing apparatus. Oxidizing chemicals may accelerate the burning rate in a fire situation.

**Fire Fighting Environmental Concerns:** Thoroughly decontaminate bunker gear and other fire-fighting equipment before re-use.

### 6. Accidental Release Measures

**Spill or Leak Instructions** Eliminate ignition sources. See Section 8 for appropriate personal protective equipment. Contain spill with dikes of soil or nonflammable absorbent to minimize contaminated area. If fire potential exists, blanket spill with alcohol type aqueous film-forming foam or use water fog stream to disperse vapors. Avoid run-off into storm sewers and ditches leading to waterways. If required, notify state and local authorities. Place leaking containers in well-ventilated area. Clean up small spills by using a nonflammable absorbent or flushing sparingly with water. Contain larger spills with nonflammable diking or absorbent. Clean up by vacuuming or sweeping.

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Isolate for 800 meters or 0.5 miles in all directions if tank, rail car, or tank truck is involved in fire. Material creates a special hazard because it floats on water. Assess the spill situation, as the spill may not evolve large amounts of hazardous airborne contaminants in many outdoor spill situations. It may be advisable in some cases to simply monitor the situation until spilled product is removed.

### 7. Handling and Storage

**Handling:** Use with adequate ventilation. Keep containers closed when not in use. Always open containers slowly to allow any excess pressure to vent. Avoid breathing vapor. Avoid contact with eyes, skin or clothing. Wash thoroughly with soap and water after handling. Decontaminate soiled clothing thoroughly before re-use. Destroy contaminated leather clothing.

This product may generate a static charge. Ground/bond equipment when transferring material to prevent static accumulation. Electrical equipment and circuits in all storage and handling must conform to requirements of National Electric Code (Article 500 and 501) for hazardous location.

**Storage:** Keep all containers tightly closed when not in use. Store out of direct sunlight and on an impermeable floor. Do not store with incompatible materials. See Section 10. Stability and Reactivity.

<b>Transportation emergency:</b>	800 424 9300	CHEMTREC, 24 hrs/day
	703 527 3887	Outside USA, collect calls accepted, 24 hrs/day
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<b>Published date:</b>	07/28/2005(V1)

### **8. Exposure Controls / Personal Protection**

**Engineering Controls:** General or dilution ventilation is frequently insufficient as the sole means of controlling employee exposure. Local ventilation is usually preferred.

**Protective Equipment** A safety shower and eyebath should be readily available.

**Skin protection:** Wear impervious clothing and gloves to prevent contact. Butyl rubber is recommended. Other protective material may be used, depending on the situation, if adequate degradation and permeation data is available. If other chemicals are used in conjunction with this chemical, material selection should be based on protection for all chemicals present.

**Eye/face protection:** Wear chemical goggles when there is a reasonable chance of eye contact.

**Respiratory protection:** Based on workplace contaminant level and working limits of the respirator, use a respirator approved by NIOSH. The following is the minimum recommended equipment for an occupational exposure level. To estimate an occupational exposure level see Section 3, Section 8 and Section 11.

For concentrations > 1 and < 10 times the occupational exposure level: Use air-purifying respirator with full facepiece and organic vapor cartridge(s) or air-purifying full facepiece respirator with an organic vapor canister or a full facepiece powered air-purifying respirator fitted with organic vapor cartridge(s). The air purifying element must have an end of service life indicator, or a documented change out schedule must be established. Otherwise, use supplied air.

For concentrations more than 10 times the occupational exposure level and less than the lower of either 100 times the occupational exposure level or the IDLH: Use Type C full facepiece supplied-air respirator operated in positive-pressure or continuous-flow mode.

For concentrations > 100 times the occupational exposure level or greater than the IDLH level or unknown concentrations (such as in emergencies): Use self-contained breathing apparatus with full facepiece in positive-pressure mode or Type C positive-pressure full facepiece supplied-air respirator with an auxiliary positive-pressure self-contained breathing apparatus escape system.

For escape: Use self-contained breathing apparatus with full facepiece or any respirator specifically approved for escape.

### **Exposure guidelines**

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<b>Transportation emergency:</b>	800 424 9300	CHEMTREC, 24 hrs/day
	703 527 3887	Outside USA, collect calls accepted, 24 hrs/day
<b>Product information:</b>	800 835 5235	

<b>Product name:</b>	Methyl isobutyl carbinol
<b>MSDS number:</b>	63
<b>Material number:</b>	80063
<b>Published date:</b>	07/28/2005(V1)

Component	CAS Number	Percent %	ACGIH TWA	ACGIH STEL	ACGIH CEILING	OSHA TWA	OSHA STEL	OSHA CEILING	Celanese WEL *	Mexico TWA	Mexico STEL	Mexico CEILING
METHYL ISOBUTYL CARBINOL	108-11-2	99	25 ppm	40 ppm	-	25 ppm	-	-	-	25 ppm	40 ppm	-

Component	CAS Number	Percent %	1990 NIOSH IDLH (Recognized by OSHA)	1994 NIOSH IDLH
METHYL ISOBUTYL CARBINOL	108-11-2	99	2000 PPM	400 ppm

**Comments:** Celanese has adopted the ACGIH TLVs  
\* Workplace Exposure Limit

### 9. Physical and Chemical Properties

**Appearance:** Clear, colorless mobile liquid.

**Odor:** Slightly irritating, alcohol odor.

**Vapor Pressure:** 4.7 mm Hg at 20 deg C

**Vapor Density (Air=1 @ 20°C):** 3.53

**Boiling Point (760 mmHgA):** 132 C (269.6 F)

**Freezing Point:** < -50 C (< -58 F)

**Solubility in Water @ 20°C:** 1.82 grams per 100 grams H<sub>2</sub>O

**Specific Gravity:** 0.808 at 20 deg C

**Molecular Weight:** 102.2

**Evaporation Rate (n-Butyl acetate = 1):** 0.26

### 10. Stability and Reactivity

**Stability:** Stable.

**Conditions to Avoid:** Avoid heat , flames, sparks, and other sources of ignition.

**Incompatibility:** Keep away from sulfuric and other strong inorganic acids, aluminum or lead (including equipment made of these metals), and oxidizing agents such as peroxides, nitric acid, perchloric acid or chromium trioxide.

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703 527 3887 Outside USA, collect calls accepted, 24 hrs/day

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**Hazardous Combustion or Decomposition Products:** Thermal decomposition products may include oxides of carbon.

**Hazardous Polymerization:** Hazardous polymerization will not occur.

### 11. Toxicological Information

#### Component Toxicological Information

Component	METHYL ISOBUTYL CARBINOL
	<p><b>Acute Exposure:</b> Excessive exposure leads to depression of the central nervous system which is generally reversible and is shown by headache, dizziness, drowsiness, loss of coordination and unconsciousness.</p> <p><b>Oral LD50:</b> 2.6g/kg (rats); Slightly toxic to animals. Nausea, vomiting, gastrointestinal irritation and diarrhea may occur.</p> <p><b>Inhalation LC50:</b> &gt;3776 ppm (rats; vapor; 4hrs.); Slightly toxic to animals. Vapors are irritating to the respiratory tract.</p> <p><b>Skin:</b> Repeated or prolonged contact may cause drying of the skin dermatitis. Moderately irritating to rabbit skin. Slightly toxic (dermal LD50, rabbit:2.9g/kg).</p> <p><b>Eyes:</b> Liquid causes moderate to severe irritation of rabbit eyes. Vapors are irritating to the eyes.</p> <p><b>Mutagenicity:</b> Not mutagenic in bacterial, yeast and rat liver cell in vitro assays, including the Ames Test.</p> <p><b>Carcinogenicity:</b> No information.</p> <p><b>Reproductive/Developmental Effects:</b> No information.</p> <p><b>Other:</b> Methyl isobutyl carbinol has potentiated the liver toxicity of halogenated solvents (e.g., chloroform and carbon tetrachloride) in experimental animals at oral doses of 570 mg/kg or higher.</p>

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**Repeated Exposure:** Male and female rats exposed for 6hr/day. 5 days/wk for 6 wks to 211. 825 or 3698 mg/m<sup>3</sup> showed no overt signs of toxicity, effects on blood parameters or compound-related effects based on gross and microscopic examination of tissues. Increased kidney weight was observed in the males at the high dose. Effects on urine parameters were noted at all dose levels except for the low dose males. There are several other studies of limited quality and with limited details. In a 90-day inhalation study, kidney effects were reported in rats at 0.425 mg/1, but not in monkeys or dogs. The effect in rats was reversible on cessation of exposure. In mice exposed 12 times for 4 hours to vapor saturated air (approximately 20 mg/1), an anesthetic effect was reported, but no mortality. In rabbits exposed dermally 5 times over a period of 15-21 days at 2.5 g/kg, no systemic effects were observed.

## 12. Ecological Information

### Component Ecological Information

Component	METHYL ISOBUTYL CARBINOL
	<p><b>Ecotoxicity:</b> Methyl isobutyl carbinol exhibits low acute toxicity to aquatic species. The 96-hour LC50 for fish (<i>Pimephales promelas</i>) was greater than 92.4 ppm. There was no mortality at this level. The 24-hour LC50 value for fish (<i>Carassius auratus</i>) is 360 ppm. The 24-hour LC50 value for shrimp (<i>Artemia salina</i>) is 370 ppm. The 48-hour LC50 value for the clawed toad (<i>Xenopus laevis</i>) is 656 ppm. The 3-hour EC50 for inhibition of bacteria was greater than 100 ppm in the Activated Sludge Respiration Inhibition Test.</p>

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<b>Product name:</b>	Methyl isobutyl carbinol
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<b>Published date:</b>	07/28/2005(V1)

### **13. Disposal Considerations**

Dispose of spilled material in accordance with state and local regulations for hazardous waste. Recommended methods are incineration or biological treatment at a federally or state-permitted disposal facility. Note that this information applies to the material as manufactured; processing, use, or contamination may make this information inappropriate, inaccurate, or incomplete.

Note that this handling and disposal information may also apply to empty containers, liners and rinsate. State or local regulations or restrictions are complex and may differ from federal regulations. This information is intended as an aid to proper handling and disposal; the final responsibility for handling and disposal is with the owner of the waste. See Section 9 - Physical and Chemical Properties.

EPA Hazardous Waste Code(s): D001

### **14. Transport Information**

#### **US Department of Transportation:**

<b>UN/NA Number:</b>	UN 2053
<b>Shipping name:</b>	METHYL ISOBUTYL CARBINOL
<b>Hazard class:</b>	3
<b>Packing Group:</b>	PG III
<b>Emergency Response Guide:</b>	129

#### **ICAO/IATA:**

<b>IATA UN Number:</b>	UN 2053
<b>Proper Shipping Name:</b>	METHYL ISOBUTYL CARBINOL
<b>Hazard Classification:</b>	3
<b>Packing group:</b>	III
<b>Label:</b>	(Flammable Liquid)

#### **IMDG:**

<b>International Marine UN Number:</b>	UN 2053
<b>Proper Shipping Name:</b>	METHYL ISOBUTYL CARBINOL
<b>Hazard Class:</b>	3
<b>Packing Group:</b>	III
<b>Flash point (test method):</b>	42.4 C (108 F)

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<b>Transportation emergency:</b>	800 424 9300	CHEMTREC, 24 hrs/day
	703 527 3887	Outside USA, collect calls accepted, 24 hrs/day
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<b>Product name:</b>	Methyl isobutyl carbinol
<b>MSDS number:</b>	63
<b>Material number:</b>	80063
<b>Published date:</b>	07/28/2005(V1)

**Transport Canada****Trade Information****Schedule B Code (export):** 2905.19.0020**15. Regulatory Information****U.S. STATE REGULATIONS**

Chemicals associated with the product which are subject to the state right-to-know regulations are listed along with the applicable state(s):

METHYL ISOBUTYL CARBINOL 108-11-2

<b>Pennsylvania</b>	Listed
<b>New Jersey</b>	Listed
<b>Illinois</b>	Listed
<b>Massachusetts</b>	Listed

**U.S. FEDERAL REGULATIONS**

**TSCA Inventory:** We certify that all components are either on the TSCA inventory or qualify for an exemption.

**Environmental Regulations:****SARA 311:**

<b>Acute health:</b>	Yes
<b>Chronic health:</b>	No
<b>Fire:</b>	Yes
<b>Sudden release of pressure:</b>	No
<b>Reactive:</b>	No

**INTERNATIONAL REGULATIONS****International Chemical Inventory**

Listed on the chemical inventories of the following countries or qualifies for an exemption:

AUSTRALIA, CHINA, CANADA, EUROPE, KOREA, PHILIPPINES, JAPAN

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<b>Material number:</b>	80063
<b>Published date:</b>	07/28/2005(V1)

## 16. Other Information

**Prepared by:** Product Stewardship Department  
Celanese Ltd.

**Hazard ratings** This information is intended solely for the use of individuals trained in the NFPA and/or HMIS systems.

**NFPA:** Health: 2 Flammability: 2 Reactivity: 0

**HMIS:** Health: 2 Flammability: 2 Reactivity: 0

**Revisions:** The following sections have been revised since the last issue of this MSDS.

Footer: Product Information number

**For industrial use only.** The information contained herein is accurate to the best of our knowledge. We do not suggest or guarantee that any hazards listed herein are the only ones which exist. Celanese makes no warranty of any kind, express or implied, concerning the safe use of this material in your process or in combination with other substances. Effects can be aggravated by other materials and/or this material may aggravate or add to the effects of other materials. This material may be released from gas, liquid, or solid materials made directly or indirectly from it. User has the sole responsibility to determine the suitability of the materials for any use and the manner of use contemplated. User must meet all applicable safety and health standards. Material safety data sheets are provided on the Internet by Celanese as a service to its customers. Possession of an Internet MSDS does not indicate that the possessor of the MSDS was a purchaser or user of the subject product.

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<b>Transportation emergency:</b>	800 424 9300	CHEMTREC, 24 hrs/day
	703 527 3887	Outside USA, collect calls accepted, 24 hrs/day
<b>Product information:</b>	800 835 5235	

# MATERIAL SAFETY DATA SHEET

## POLYACRYLAMIDE HCP, ANIONIC

### 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Brenntag Canada Inc.  
43 Jutland Rd.  
Toronto, ON  
M8Z 2G6  
(416) 259-8231

WHMIS#: 00065342  
Index: HCl4482/06D  
Effective Date: 2006 October 06  
Date of Revision: 2006 October 06

Website: <http://www.brenntag.ca>

#### EMERGENCY TELEPHONE NUMBERS (FOR EMERGENCIES INVOLVING CHEMICAL SPILLS OR RELEASE)

Toronto, ON (416) 226-6117  
Edmonton, AB (780) 424-1754

Montreal, QC (514) 861-1211  
Calgary, AB (403) 263-8660

Winnipeg, MB (204) 943-8827  
Vancouver, BC (604) 685-5036

#### PRODUCT IDENTIFICATION

Product Name: Polyacrylamide HCP, Anionic.  
Chemical Name: Ethanaminium, N,N,N-trimethyl-2-[(1-oxo-2-propenyl)oxy]-, chloride, polymer with 2-propenamamide.  
Synonyms: Polyacrylamide HCP 511, 516, 526 W, 540.  
Chemical Family: Anionic acrylamide copolymer salt. Anionic water-soluble polymer.  
Molecular Formula: (C<sub>8</sub>H<sub>16</sub>NO<sub>2</sub> · C<sub>3</sub>H<sub>5</sub>NO · Cl)<sub>n</sub>.  
Product Use: Drying agent. Flocculant.

#### WHMIS Classification / Symbol:

Not regulated.

READ THE ENTIRE MSDS FOR THE COMPLETE HAZARD EVALUATION OF THIS PRODUCT.

### 2. COMPOSITION, INFORMATION ON INGREDIENTS (Not Intended As Specifications)

Ingredient	CAS#	ACGIH TLV	% Concentration
Ethanaminium, N,N,N-trimethyl-2-[(1-oxo-2-propenyl)oxy]-, chloride, polymer with 2-propenamamide	69418-26-4	---	90 - 95
Acrylamide	79-06-1	0.03 mg/m <sup>3</sup> (IV) (Skin)	*A3 < 1000 ppm

A3 = Animal Carcinogen (ACGIH-A3).

Skin Notation: Contact with skin, eyes and mucous membranes can contribute to the overall exposure and may invalidate the TLV. Consider measures to prevent absorption by these routes.

### 3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Dust may cause mechanical irritation to skin, eyes and respiratory tract. Low hazard for usual industrial or commercial handling. High vapour concentrations may cause drowsiness. Can decompose at high temperatures forming toxic gases.

#### POTENTIAL HEALTH EFFECTS

Inhalation: Product may be mildly irritating to the nose, throat and respiratory tract and may cause coughing and sneezing. Excessive contact with powder may cause drying of mucous membranes of nose and throat due to absorption of moisture and oils. See "Other Health Effects" Section.

Skin Contact: This product may cause irritation due to abrasive action. Excessive contact with powder may cause drying of the skin due to absorption of moisture and oils.

Skin Absorption:	Not likely to be absorbed through the skin.
Eye Contact:	This product may cause irritation, redness and possible damage due to abrasiveness. Excessive contact with powder may cause drying of mucous membranes of the eyes due to absorption of moisture and oils.
Ingestion:	This product may cause mild gastrointestinal discomfort.
Other Health Effects:	Low hazard for usual industrial or commercial handling.  In general, long-term exposure to high concentrations of dust may cause increased mucous flow in the nose and respiratory system airways. This condition usually disappears after exposure stops. Controversy exists as to the role exposure to dust has in the development of chronic bronchitis (inflammation of the air passages into the lungs). Other factors such as smoking and general air pollution are more important, but dust exposure may contribute. (4)  May cause central nervous system (CNS) depression. CNS depression is characterized by headache, dizziness, drowsiness, nausea, vomiting and incoordination. Severe overexposures may lead to coma and possible death due to respiratory failure.

#### 4. FIRST AID MEASURES

##### FIRST AID PROCEDURES

Inhalation:	If respiratory problems arise, move the victim to fresh air. Give artificial respiration ONLY if breathing has stopped. Give cardiopulmonary resuscitation (CPR) if there is no breathing AND no pulse. Obtain medical advice IMMEDIATELY.
Skin Contact:	Start flushing while removing contaminated clothing. Wash affected areas thoroughly with soap and water. If irritation, redness, or a burning sensation develops and persists, obtain medical advice.
Eye Contact:	Immediately flush eyes thoroughly for 15 minutes with running water. Hold eyelids open during flushing. If irritation persists, repeat flushing.
Ingestion:	Do not attempt to give anything by mouth to an unconscious person. If victim is alert and not convulsing, rinse mouth out and give 1/2 to 1 glass of water to dilute material. DO NOT induce vomiting. If spontaneous vomiting occurs, have victim lean forward with head down to avoid breathing in of vomitus, rinse mouth and administer more water. Obtain medical attention IMMEDIATELY.
Note to Physicians:	Treat symptomatically. Medical conditions that may be aggravated by exposure to this product include diseases of the skin, eyes or respiratory tract.

#### 5. FIRE-FIGHTING MEASURES

<i>Flashpoint (°C)</i>	<i>Autolgnition Temperature (°C)</i>	<b>Flammability Limits in Air (%):</b>	
		<i>LEL</i>	<i>UEL</i>
> 100 (3)	Not available.	Not available.	Not available.
Flammability Class (WHMIS):	Not regulated.		
Hazardous Combustion Products:	Thermal decomposition products are toxic and may include hydrogen chloride, oxides of nitrogen and carbon and irritating gases.		
Unusual Fire or Explosion Hazards:	Not normally a fire hazard. Water content of product prevents ignition. Spilled material may cause floors and contact surfaces to become slippery. Enforce NO SMOKING rules in area of use.		
Sensitivity to Mechanical Impact:	Not expected to be sensitive to mechanical impact.		
Rate of Burning:	Not available.		
Explosive Power:	Not available.		
Sensitivity to Static Discharge:	Not expected to be sensitive to static discharge.		
<b>EXTINGUISHING MEDIA</b>			
Fire Extinguishing Media:	Foam. Carbon Dioxide. Dry Chemical. Use carbon dioxide or dry chemical media for small fires. If only water is available, use it in the form of a fog.		
<b>FIRE FIGHTING INSTRUCTIONS</b>			
Instructions to the Fire Fighters:	Isolate materials that are not involved in the fire and protect personnel. Spilled material may cause floors and contact surfaces to become slippery. Clean up immediately to eliminate slipping hazard. Do not allow to enter sewers or watercourses.		

Fire Fighting Protective Equipment: Use self-contained breathing apparatus and protective clothing.

## 6. ACCIDENTAL RELEASE MEASURES

Information in this section is for responding to spills, leaks or releases in order to prevent or minimize the adverse effects on persons, property and the environment. There may be specific reporting requirements associated with spills, leaks or releases, which change from region to region.

Containment and Clean-Up Procedures: In all cases of leak or spill contact vendor at Emergency Number shown on the front page of this MSDS. Eliminate all sources of ignition. Do not flush with water as aqueous solutions or powders that become wet render surfaces extremely slippery. Wear respirator, protective clothing and gloves. Avoid dry sweeping. Do not use compressed air to clean surfaces. Vacuuming is preferred. Return all material possible to container for proper disposal. Minimize air borne spreading of dust. Avoid accumulation and dispersion of dust to reduce explosion potential. Collect product for recovery or disposal. Ventilate enclosed spaces. Notify applicable government authority if release is reportable or could adversely affect the environment.

## 7. HANDLING AND STORAGE

### HANDLING

Handling Practices: Use normal "good" industrial hygiene and housekeeping practices. Product becomes slippery when mixed with water. Clean up immediately to eliminate slipping hazard.

Ventilation Requirements: See Section 8, "Engineering Controls".

Other Precautions: Product becomes slippery when mixed with water. (3) Use only with adequate ventilation and avoid breathing vapours. Avoid contact with eyes, skin or clothing. Wash thoroughly with soap and water after handling. Wash contaminated clothing thoroughly before re-use.

### STORAGE

Storage Temperature (°C): 0 to 35 °C. (3)

Ventilation Requirements: General exhaust is acceptable.

Storage Requirements: Store in a cool, well-ventilated area. Keep away from heat, sparks and flames. Keep containers closed. Avoid moisture contamination. Protect against physical damage.

Special Materials to be Used for Packaging or Containers: Confirm suitability of any material before using.

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Recommendations listed in this section indicate the type of equipment, which will provide protection against overexposure to this product. Conditions of use, adequacy of engineering or other control measures, and actual exposures will dictate the need for specific protective devices at your workplace.

### ENGINEERING CONTROLS

Engineering Controls: General exhaust is acceptable. Local exhaust ventilation preferred. Make up air should be supplied to balance air that is removed by local or general exhaust ventilation. Ventilate low lying areas such as sumps or pits where dense dust may collect.

### PERSONAL PROTECTIVE EQUIPMENT (PPE)

Eye Protection: Safety glasses with side shields are recommended to prevent eye contact. Use chemical safety goggles when there is potential for eye contact. Contact lenses should not be worn when working with this material.

Skin Protection: Gloves and protective clothing made from rubber or plastic should be impervious under conditions of use. Prior to use, user should confirm impermeability. Discard contaminated gloves.

Respiratory Protection: No specific guidelines available. A NIOSH/MSHA approved dust mask for concentrations of nuisance dust up to 100 mg/m<sup>3</sup> particulate. An air-supplied respirator if concentrations are higher or unknown.

Other Personal Protective Equipment: Wear regular work clothing. The use of coveralls is recommended. Locate safety shower and eyewash station close to chemical handling area. Take all precautions to avoid personal contact.

### EXPOSURE GUIDELINES

Particulate Not Otherwise Classified:	
ACGIH	OSHA
10 mg/m <sup>3</sup> - Inhalable particulate	50 mppcf* or 15 mg/m <sup>3</sup> - Total Dust
3 mg/m <sup>3</sup> - Respirable particulate	15 mppcf* or 5 mg/m <sup>3</sup> - Respirable Fraction

\* mppcf = million particles per cubic foot

## 9. PHYSICAL AND CHEMICAL PROPERTIES (Not intended as Specifications)

Physical State:	Solid.
Appearance:	White granular solid.
Odour:	Odourless.
Odour Threshold (ppm):	Not applicable.
Boiling Range (°C):	Not available.
Melting/Freezing Point (°C):	Not available.
Vapour Pressure (mm Hg at 20° C):	Not available.
Vapour Density (Air = 1.0):	Not available.
Relative Density (g/cc):	1.0 - 1.25. (4)
Bulk Density:	Not available.
Viscosity:	50 cP @ 1 g/L; 250 cP @ 5.0 g/L. (3)
Evaporation Rate (Butyl Acetate = 1.0):	Not applicable.
Solubility:	Soluble in water.
% Volatile by Volume:	Not available.
pH:	4 - 9 @ 5 g/L. (3)
Coefficient of Water/Oil Distribution:	Not available.
Volatile Organic Compounds (VOC):	Not applicable.

## 10. STABILITY AND REACTIVITY

### CHEMICAL STABILITY

Under Normal Conditions:	Stable.
Under Fire Conditions:	Not readily flammable, but will support combustion.
Hazardous Polymerization:	Will not occur.
Conditions to Avoid:	High temperatures, sparks, open flames and all other sources of ignition. Above 100 °C (212 °F) can contribute to instability. Minimize air borne spreading of dust.
Materials to Avoid:	Strong oxidizers. Oxidizers may cause strong exothermic reaction. Lewis or mineral acids. Strong bases.
Decomposition or Combustion Products:	Thermal decomposition products are toxic and may include hydrogen chloride, oxides of nitrogen and carbon and irritating gases.

## 11. TOXICOLOGICAL INFORMATION

### TOXICOLOGICAL DATA:

<b>SUBSTANCE</b>	<b>LD50 (Oral, Rat)</b>	<b>LD50 (Dermal, Rabbit)</b>	<b>LC50 (Inhalation, Rat, 4h)</b>
Polyacrylamide	> 5000 mg/kg (3)	---	---
Carcinogenicity Data:	The ingredient(s) of this product ( Acrylamide ) is classified as a suspected carcinogen by IARC ( IARC-2A ). This product does not meet WHMIS criteria to be classed as D2A carcinogenic. This product may contain a trace amount (less than 0.1%, w/w) of a carcinogen ( Acrylamide ). It is expected that there will not be any health effects attributable to this product owing to it's exceptionally low concentration.		
Reproductive Data:	No adverse reproductive effects are anticipated.		
Mutagenicity Data:	No adverse mutagenic effects are anticipated.		
Teratogenicity Data:	No adverse teratogenic effects are anticipated.		
Respiratory / Skin Sensitization Data:	None known.		
Synergistic Materials:	None known.		

Other Studies Relevant to Material: None known.

## 12. ECOLOGICAL INFORMATION

Ecotoxicity: The following ecotoxicity information is based on results obtained from tests of analogous products:

LC50 (Danio rerio), 96 hr = > 100 mg/L; (3)  
 IC50 (Scenedesmus subspicatus), 72 hr = > 100 mg/L; (3)  
 EC50 (Daphnia magna), 48 hr = > 100 mg/L. (3)

Environmental Fate: This material is not expected to bioaccumulate. (3) Not readily biodegradable. Do not contaminate domestic or irrigation water supplies, lakes, streams, ponds, or rivers.

## 13. DISPOSAL CONSIDERATIONS

Deactivating Chemicals: None required.

Waste Disposal Methods: This information applies to the material as manufactured. Reevaluation of the product may be required by the user at the time of disposal since the product uses, transformations, mixtures and processes may influence waste classification. Dispose of waste material at an approved (hazardous) waste treatment/disposal facility in accordance with applicable local, provincial and federal regulations. Do not dispose of waste with normal garbage, or to sewer systems.

Safe Handling of Residues: See "Waste Disposal Methods".

Disposal of Packaging: Empty containers retain product residue. Recycling is encouraged. Treat package in the same manner as the product. Empty package may be disposed of with normal garbage.

## 14. TRANSPORTATION INFORMATION

### CANADIAN TDG ACT SHIPPING DESCRIPTION:

This product is not regulated by TDG.

Label(s): Not applicable. Placard: Not applicable.

ERAP Index: ----. Exemptions: None known.

### US DOT CLASSIFICATION (49CFR 172.101, 172.102):

This product is not regulated by DOT.

Label(s): Not applicable. Placard: Not applicable.

CERCLA-RQ: Not available. Exemptions: None known.

## 15. REGULATORY INFORMATION

### CANADA

CEPA - NSNR: All constituents of this product are included on the DSL.

CEPA - NPRI: Not included.

Controlled Products Regulations Classification (WHMIS):

Not regulated.

### USA

Environmental Protection Act: All constituents of this product are included on the TSCA inventory.

OSHA HCS (29CFR 1910.1200): Not regulated.

~~HSR~~ 2: 1 Health, 1 Fire, 0 Reactivity (3)

~~FR~~ 2: 1 Health, 1 Fire, 0 Reactivity (3)

### INTERNATIONAL

This product or its components are on the European inventory of existing commercial chemicals (EINECS).



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**16. OTHER INFORMATION**

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## REFERENCES

1. RTECS-Registry of Toxic Effects of Chemical Substances, Canadian Centre for Occupational Health and Safety RTECS database.
2. Clayton, G.D. and Clayton, F.E., Eds., Patty's Industrial Hygiene and Toxicology, 3rd ed., Vol. IIA,B,C, John Wiley and Sons, New York, 1981.
3. Supplier's Material Safety Data Sheet(s)
4. CHEMINFO, through "CCINFOdisc", Canadian Centre for Occupational Health and Safety, Hamilton, Ontario, Canada.
5. Guide to Occupational Exposure Values, 2005, American Conference of Governmental Industrial Hygienists, Cincinnati, 2005.
6. Regulatory Affairs Group, Brenntag Canada Inc.
7. The British Columbia Drug and Poison Information Centre, Poison Managements Manual, Canadian Pharmaceutical Association, Ottawa, 1981.
8. Lewis, Sr., Richard J., Carcinogenically Active Chemicals, Van Nostrand Reinhold, 1991, ISBN 0-442-31875-8.

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The information contained herein is offered only as a guide to the handling of this specific material and has been prepared in good faith by technically knowledgeable personnel. It is not intended to be all-inclusive and the manner and conditions of use and handling may involve other and additional considerations. No warranty of any kind is given or implied and Brenntag Canada Inc. will not be liable for any damages, losses, injuries or consequential damages which may result from the use of or reliance on any information contained herein. This Material Safety Data Sheet is valid for three years.

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To obtain revised copies of this or other Material Safety Data Sheets, contact your nearest Brenntag Canada Regional office.

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Manitoba: 681 Plinquet Street, Winnipeg, MB, R2J 2X2  
Phone: (204) 233-3416 Facsimile: (204) 233-7005

Ontario: 43 Jutland Road, Toronto, ON, M8Z 2G6  
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Quebec: 2900 Jean Baptiste Des., Lachine, PQ, H8T 1C8  
Phone: (514) 636-9230 Facsimile: (514) 636-0877

Atlantic: A-105 Akerley Boulevard, Dartmouth, NS, B3B 1R7  
Phone: (902) 468-9690 Facsimile: (902) 468-3085

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Prepared By: Regulatory Affairs Group, Brenntag Canada Inc., (416) 259-8231.

## MATERIAL SAFETY DATA SHEET

Hercules Canada Inc.  
Paper Technologies and Ventures  
942 Brant Street  
Burlington, Ontario Canada L7R 3X8  
(905) 632-7861 (BUSINESS)  
(905) 848-8888 (24 HRS)

### 1 PRODUCT AND COMPANY IDENTIFICATION

**PRODUCT NAME** INFINITY® PS4137 PULP MILL ADDITIVE  
**CHEMICAL/COMMON NAME** anionic polyacrylamide  
**CAS NUMBER** mixture

### 2 COMPOSITION / INFORMATION ON INGREDIENTS

Hazardous Ingredient	CASRN	Amount
petroleum distillates, hydrotreated light	64742-47-8	22.5 %

### 3 HAZARDS IDENTIFICATION

#### EMERGENCY OVERVIEW

WARNING!

May cause skin irritation.  
May cause eye irritation.  
Inhalation may cause respiratory tract irritation.  
Surfaces subject to spills may become slippery.

#### POTENTIAL HEALTH EFFECTS

Ingestion may cause gastrointestinal irritation.  
Aspiration may cause lung damage.  
High concentrations may cause central nervous system depression (dizziness, drowsiness, incoordination).  
Prolonged or repeated skin contact may cause allergic reaction (dermatitis).

Refer to Section 5 for Hazardous Combustion Products, and Section 10 for Hazardous Decomposition/Hazardous Polymerization Products.

### 4 FIRST AID MEASURES

#### SKIN

Wash thoroughly with soap and water. Remove contaminated clothing. Get immediate medical attention. Thoroughly wash clothing before reuse.

#### EYE

Remove contact lenses. Hold eyelids apart. Immediately flush eyes with plenty of low-pressure water for at least 15 minutes. Get immediate medical attention.

#### INHALATION

Remove to fresh air. Get medical attention if nasal, throat or lung irritation develops.

#### INGESTION

Do NOT induce vomiting. Get immediate medical attention. See Note to Physician.

#### NOTES TO PHYSICIAN

Aspiration into the lungs will result in chemical pneumonitis and may be fatal.

## 5 FIRE FIGHTING MEASURES

### EXTINGUISHING MEDIA

Dry chemical, foam, carbon dioxide or clean extinguishing agents may be used on fires involving this product. Avoid using water if possible.

### FIRE FIGHTING PROCEDURES

Wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH approved (or equivalent) and full protective gear when fighting fires involving this product. Cool containers with water to prevent rupture.

### CONDITIONS TO AVOID

None known.

### HAZARDOUS COMBUSTION PRODUCTS

Thermal decomposition (destructive fires) yields elemental oxides.

### FLASH POINT

> 93 °C Pinsky-Martens Closed Cup

## 6 ACCIDENTAL RELEASE MEASURES

Ventilate area. Clean up spills immediately. Wear protective equipment as required (see MSDS Section 8). For small spills: Add absorbent, sweep up, and dispose appropriately. Flush spill area with water spray. Wet area may be slippery; spread sand/grit and sweep up for disposal. For large spills: Dike to contain and pump into drums for use or disposal. In case of accidental spill or release, refer to Section 8, Personal Protective Equipment and General Hygiene Practices.

This product contains a petroleum hydrocarbon. Material will float on water and runoff may create an explosion hazard. Prevent runoff from spills or leaks entering navigable waters, streams or other bodies of water.

## 7 HANDLING AND STORAGE

### GENERAL MEASURES

Store in a cool, dry, well-ventilated area at approximately 20° C (68° F). Keep container closed when not in use.

### MATERIALS OR CONDITIONS TO AVOID

Keep away from heat, flame, sparks and other ignition sources. Avoid storing product near incompatible materials. See MSDS Section 10.

## 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

### WORK PRACTICES AND ENGINEERING CONTROLS

Eyewash fountains and safety showers should be easily accessible. Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Discharge from the ventilation system should comply with applicable air pollution control regulations. Keep floors clean and dry. Clean up spills immediately.

### GENERAL HYGIENIC PRACTICES

Avoid contact with eyes, skin, and clothing. Avoid breathing vapour, fumes or mist. Handle in areas with adequate ventilation. Do not swallow. Avoid contamination of food, beverages, or smoking materials. Wash thoroughly after handling, and before eating, drinking or smoking. Remove contaminated clothing promptly and clean thoroughly before reuse.

### RECOMMENDED EXPOSURE LIMITS

#### Supplier Recommended PELs

petroleum distillates, hydrotreated light 1200 mg/m<sup>3</sup>; 165 ppm

**PRODUCT NAME** INFINITY® PS4137

**MSDS NUMBER** 999 1060 0427 **VERSION** 04

**PERSONAL PROTECTIVE EQUIPMENT**

Chemical goggles

Impervious gloves (polyethylene, nitrile, butyl)

Appropriate protective clothing

Appropriate respiratory protection is required when exposure to airborne contaminants may exceed acceptable limits. Respirators should be selected and used in accordance with OSHA, Subpart I (29 CFR 1910.134) and manufacturers recommendations.

**PROTECTIVE MEASURES DURING REPAIR AND MAINTENANCE**

Completely isolate and thoroughly clean all equipment, piping, or vessels before beginning maintenance or repairs.

Keep area clean.

**9 PHYSICAL AND CHEMICAL PROPERTIES**

<b>PHYSICAL STATE:</b>	liquid
<b>COLOR:</b>	white to off-white
<b>ODOR:</b>	slight hydrocarbon
<b>Specific Gravity</b>	1.002 at 21° C
<b>Vapour Pressure</b>	18 mmHg
<b>Evaporation Rate</b>	slower than butyl acetate
<b>Vapour Density</b>	heavier than air
<b>Viscosity</b>	383 cps at 21° C
<b>pH Value</b>	7.0
<b>Freezing Point</b>	< -5 °C

**10 STABILITY AND REACTIVITY****HAZARDOUS DECOMPOSITION PRODUCTS**

Thermal decomposition (destructive fires) yields elemental oxides.

**HAZARDOUS POLYMERIZATION**

Not anticipated under normal or recommended handling and storage conditions.

**GENERAL STABILITY CONSIDERATIONS**

Stable under recommended handling and storage conditions.

**INCOMPATIBLE MATERIALS**

Incompatible with: oxidizing agents

**11 TOXICOLOGICAL INFORMATION****CARCINOGENICITY INFORMATION**

Not listed as a carcinogen by NTP. Not regulated as a carcinogen by OSHA. Not evaluated by IARC.

**REPORTED HUMAN EFFECTS**

No human toxicity studies have been carried out with this product.

COMPONENT - petroleum distillates: Prolonged or repeated skin contact may cause irritation and dermatitis. Inhalation of vapour may cause irritation of the respiratory tract and symptoms of central nervous system depression, including dizziness and headache. Direct eye contact may cause irritation. Ingestion causes gastric irritation, pain, nausea, vomiting. Aspiration into the lungs will cause chemical pneumonia.

**REPORTED ANIMAL EFFECTS**

Oral LD50 (rat): > 5000 mg/kg. Dermal LD50 (rabbit): > 5000 mg/kg. Inhalation LC50 (rat): > 20 mg/l for 4 hour(s). Under occlusive conditions: Skin irritation (rabbit): corrosive. Under non-occlusive conditions: Slight rabbit skin irritant. Eye irritation (rabbit): mild.

## 12 ECOLOGICAL INFORMATION

### ECOTOXICOLOGICAL INFORMATION

No ecological studies have been carried out on this product.

### AQUATIC TOXICITY

Acute 48-hour LC50 (Ceriodaphnia dubia): .42 mg/l. Acute 96-hour LC50 (Rainbow trout): 120 mg/l.

## 13 DISPOSAL CONSIDERATIONS

### WASTE DISPOSAL

Incineration in accordance with applicable regulations is the recommended disposal method. Landfilling in a permitted solid or hazardous waste facility is a suitable alternative after solidification to remove free liquids. When the drum is empty, rinse it with plenty of water before discarding. Waste water may be sent to a sanitary sewer treatment facility in accordance with any local agreement, a permitted waste treatment facility, or discharged under a permit. Disposal should be in accordance with applicable federal, provincial and local regulations.

## 14 TRANSPORT INFORMATION

TDG: Non-regulated

For information regarding transportation classification of this product, please contact Hercules Canada Inc. at (905) 279-3338.

## 15 REGULATORY INFORMATION

This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

### CEPA

All components of this product comply with substance notification requirements under CEPA.

### CHEMICAL INVENTORIES

U.S. TSCA: The components of this product are included on the TSCA Inventory.  
Canadian CEPA : Included on DSL Inventory.

### WHMIS CLASSIFICATION

D2B - Other Toxic Effects/Toxic

PREPARED BY: Hercules Canada Inc., Regulatory Affairs, (905) 279-3338

## 16 OTHER INFORMATION

### HMIS RATINGS:

<b>Health</b>	2	Moderate Hazard
<b>Flammability</b>	1	Slight Hazard
<b>Reactivity</b>	0	Minimal Hazard

**LIST OF ACRONYMS**

ACGIH: American Conferences of Governmental Industrial Hygienists  
AIHA WEEL: American Industrial Hygienists Association - Workplace Environmental Exposure Level  
CASRN: Chemical Abstracts Service Registry Number  
CERCLA: Comprehensive Emergency Response, Compensation and Liability Act  
HMIS: Hazardous Materials Identification System  
IARC: International Agency for Research on Cancer  
NTP: National Toxicology Program  
OSHA: Occupational Safety and Health Administration  
PEL: OSHA Permissible Exposure Limit  
RCRA: Resource Conservation and Recovery Act  
RQ: Reportable Quantity  
SARA: Superfund Amendment Reauthorization Act  
STEL: Short-Term Exposure Limit  
TLV: Threshold Limit Values (registered trademark of ACGIH)  
TPQ: Threshold Planning Quantity  
TSCA: Toxic Substance Control Act  
TWA: Time Weighted Average

**DISCLAIMER**

The information and recommendations contained in this Material Safety Data Sheet have been compiled from sources believed to be reliable and to represent the most reasonable current opinion on the subject when the MSDS was prepared. No warranty, guaranty or representation is made as to the correctness or sufficiency of the information. The user of this product must decide what safety measures are necessary to safely use this product, either alone or in combination with other products, and determine its environmental regulatory compliance obligations under any applicable federal or provincial laws.



## Material Safety Data Sheet

### SECTION I – PRODUCT IDENTIFICATION AND USES

<b>Product name</b>	<b>ANIONIC POLYACRYLAMIDE, PAM for short of Polyacrylamide</b>
<b>Applications</b>	Works as a flocculant and/or coagulant for mineral processing Other varied applications – water treatment, paper mill, textile etc...
<b>Sales representative</b>	<b>LMS Canada</b>

### SECTION II – CHEMICAL INGREDIENTS

<b>Main ingredient</b>	$(\text{CH}_2\text{CHCONH}_2)_n$ polymer
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### SECTION III – PHYSICAL & CHEMICAL DATA

<b>Physical state</b>	Solid
<b>Appearance</b>	Colorless or white granular powder
<b>Odour</b>	None
<b>Vapor pressure</b>	N/A
<b>Melting point</b>	Approx 200 °C
<b>Solubility</b>	20 – 30%
<b>pH value</b>	Approx 6.0
<b>Bulk density</b>	Varies with granular size and moisture content. For rough calculation purpose: approx 0.7g /cm <sup>3</sup>

### SECTION IV – FIRE AND EXPLOSION

<b>Flammability &amp; explosion</b>	Flammable. Dust explosions may occur if material is efficiently fine and dispersed in air.
<b>Means of extinction</b>	Foam, CO <sub>2</sub> or dry chemical powder. Use water with precautions as this material becomes extremely slippery and swells when it has absorbed water. It may lead a mechanical bursting hazard under certain conditions. Full protective equipment and self contained breathing apparatus must be worn when combating fire.
<b>Flashpoint</b>	N/A

### SECTION V – STABILITY AND REACTIVITY

<b>Chemical stability</b>	Stable at room temperature
<b>Incompatibility with other substances</b>	Flammability may be enhanced by presence of strong oxidizers. Swells enormously and becomes much heavier when material absorbs water, mechanical bursting hazard may occur in the process.

**Reactivity, and under what conditions**

May emit acid fumes once heated to decomposition.

**SECTION VI – TOXICOLOGICAL PROPERTIES**

<b>Skin contact</b>	Non-irritating to slightly irritating to skin
<b>Eye contact</b>	May result in moderate mechanical irritation by palpable powder or granular forms. Dust may cause stinging eyes.
<b>Inhalation of dust</b>	Large quantity of dust inhalation may cause irritation to lung.
<b>Ingestion</b>	Consult a physician if possible. Do not induce vomiting except directed by a physician.

**SECTION VII – PREVENTIVE MEASURES****Personal protective gear**

Where creation of dust is unavoidable, prolonged and/or repeated skin exposure are unavoidable, use conventional approved or equivalent respiratory protection equipment based on consideration of airborne and duration of exposure.

**Hand and skin**

Gloves are recommended. No special type of protection clothing is required. Regular long sleeved garments and long pants should be sufficed.

**Eye**

Use appropriate eye protection equipment to minimize contact with dust from dry product. Avoid wearing contact lenses in the presence of dust.

**Other**

To avoid accidentally ingesting this product, wash hands at breaks and before eating.

Use adequate ventilation to prevent dust from accumulating in workplace.

**SECTION VIII – FIRST AID MEASURES**

<b>Skin</b>	Remove contaminated clothing; wash exposed skin thoroughly with soap and water. Treat any irritation symptomatically. Laundry clothing before reusing.
<b>Eye</b>	Hold eyelids apart and rinse with running water. If irritation persists, seek for medical attention.
<b>Inhalation of dust</b>	Remove victim to a well-ventilated area. If irritation develops, obtain medical attention. If breathing becomes difficult, administer oxygen if available. Obtain medical attention immediately.
<b>Ingestion</b>	Consult a physician. Do not induce vomiting unless directed by a physician.
<b>Other</b>	Eye wash facilities should be available at workplace.

**SECTION IX – STORAGE, SHIPPING & DISPOSAL****Spillage and waste disposal**

Do not rinse spilled area with water until the following steps have been conducted:

Take measures to eliminate foot or vehicular traffic to avoid spraying material out of the spilled area. Scoop up spilled dry material and place in an appropriate container for disposal or re-use. Sweep up dust and remaining material. Use an appropriate vacuum (with filter to avoid dispersing respirable dust into air) to remove powder residue.

Once wet, remaining powder will cause surface to become extremely slippery



and pose a hazard similar to ice. Clean up personnel should take precautions when rinsing the surface with water.

Discharge into drains, sewers or waterways is not recommended due to its persistence and swolleness in aquatic media. It may cause clogging drains, filters and plumbing systems. Dispose this material in accordance with all applicable regulations.

#### **Handling procedures and equipment**

Avoid contact with moisture as the material forms a gel which is extremely slippery when absorbing water. Eliminate conditions that may pose slipperiness. Wear a dust mask or respirator when handling this material, or where possibility of inhalation exists. Wear suitable clothing to avoid prolonged or repeated skin contact. Observe good personal hygiene. Prohibit eating, drinking and smoking in contaminated areas. Wash hands; remove contaminated clothing and protective equipment before eating.

#### **Packing and shipping information**

Use water-resistant methods.

#### **Storage requirement**

Store in a dry, cool, and ventilated area away from oxidizers. Ensure containers are properly closed and bags are properly sealed. All the stock should be properly labeled. Check regularly for spills.

Keep locked up and out of reach of children.

Keep away from sources of ignitions.

### **SECTION X – PREPARATION OF MSDS**

**Prepared and translated by** LMS, Canada

**Last update** April, 2006

Note: The information in this Material Safety Data Sheet associates only to the specific material designated herein and does not apply to uses in combination with any other materials or for any other processes. The information given is based on technical data provided by the manufacturer and those publications available when compiling/updating document and we believed to be reliable. It is subject to change or update without notice. Because conditions of applications vary and are beyond our control, it is users' responsibility to obtain safety data for combinations with other materials, or for applications in other processes. Always follow local safety regulations applicable on erection sites.

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**1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

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**Product:** HYPERFLOC® AF 200, AF 300, AF 400, AF 300-H, AF 300-HH, AF 300 PWG, AF 300 G,  
and AF 1100 Series

**Supplier:** HYCHEM, INC.  
10014 N. Dale Mabry Highway, Suite 213  
Tampa, FL 33618

**Current Revision Date:** 8/7/03      **Last Revision Date:** 5/18/00

**Emergency Telephone Number:** (800) 327-2998

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**2. COMPOSITION/INFORMATION ON INGREDIENTS**

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**Chemical Family:** Anionic acrylamide copolymer powder.

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**3. HAZARDOUS IDENTIFICATION**

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**Aqueous solutions or powders that become wet render surfaces extremely slippery.**

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**4. FIRST AID MEASURES**

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**Inhalation:** Move to fresh air.

**Skin Contact:** Wash with water and soap as a precaution. In case of skin irritation, consult a physician.

**Eye Contact:** Rinse thoroughly with plenty of water. In case of persistent eye irritation, consult a physician.

**Ingestion:** The product is not considered toxic based on studies on laboratory animals.

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The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release, and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process unless specified in the text.

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## 5. FIRE-FIGHTING MEASURES

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- Suitable Extinguishing Media:** Water, water spray, foam, dry powder, carbon dioxide (CO<sub>2</sub>).
- Special Fire-Fighting Precautions:** Aqueous solutions or powders that become wet render surfaces extremely slippery.
- Special Protective Equipment for Firefighters:** No special protective equipment required.

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## 6. ACCIDENTAL RELEASE MEASURES

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- Personal Precautions:** No special precautions required.
- Environmental Precautions:** Do not contaminate water.
- Methods for Cleaning Up:** Do not flush with water. Clean up promptly by scoop or vacuum. Keep in suitable and closed containers for disposal. After cleaning, flush away traces with water.

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## 7. HANDLING AND STORAGE

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- Handling:** Avoid contact with skin and eyes. Avoid dust formation. Do not breathe dust. Wash hands before breaks and at the end of workday.
- Storage:** Keep in a dry, cool place (0 - 35°C).

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## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

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**Engineering Measures to Reduce Exposure:** Use local exhaust if dusting occurs. Natural ventilation is adequate in absence of dusts.

### Personal Protection Equipment

- **Respiratory Protection:** Dust safety masks are recommended where concentration of total dust is more than 10 mg/m<sup>3</sup>.
- **Hand Protection:** Rubber gloves
- **Eye Protection:** Safety glasses with side shields. Do not wear contact lenses.
- **Skin and Body Protection:** No special protective clothing required.

**Hygiene Measures:** Wash hands before breaks and immediately after handling the product. Handle in accordance with good industrial hygiene and safety practice.

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**9. PHYSICAL AND CHEMICAL PROPERTIES**

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Form:	Granular solid
Color:	White
Odor:	None
pH:	4 - 9 @ 5 g/l for product series. See Technical Bulletin for specific value.
Melting Point (°C):	Not applicable
Flash Point (°C):	Not applicable
Autoignition Point (°C):	Not applicable
Vapor Pressure (mm Hg):	Not applicable
Bulk Density:	See Technical Bulletin
Water Solubility:	See Technical Bulletin
Viscosity (mPa s):	See Technical Bulletin

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**10. STABILITY AND REACTIVITY**

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Stability:	Product is stable. No hazardous polymerization will occur.
Materials to Avoid:	Oxidizing agents may cause exothermic reactions.
Hazardous Decomposition Products:	Thermal decomposition may produce: carbon oxides and nitrogen oxides (NO <sub>x</sub> ).

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**11. TOXICOLOGICAL INFORMATION**

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**Acute toxicity:**

- Oral: LD50/oral/rat > 5000 mg/kg
- Dermal: The results of testing on rabbits showed this material to be non-toxic even at high dose levels.
- Inhalation: The product is not expected to be toxic by inhalation.

**Irritation**

- Skin: The results of testing on rabbits showed this material to be non-irritating to the skin.
- Eyes: Testing conducted according to the Draize technique showed the material produces no corneal or iridial effects and only slight transitory conjunctival effects similar to those which all granular materials have on conjunctivae.

**Sensitization:** The results of testing on guinea pigs showed this material to be non-sensitizing.

**Chronic Toxicity:** A two-year feeding study on rats did not reveal adverse health effects. A one-year feeding study on dogs did not reveal adverse health effects.

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## 12. ECOLOGICAL INFORMATION

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- Fish: LC50/Fathead minnows/96 hours > 1000 mg/l
- Algae: EC50/ 72h / Selenastrum capricornutum/96 hours > 500 mg/l
- Bioaccumulation: The product is not expected to bioaccumulate.
- Persistence / Degradability: Not readily biodegradable.

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## 13. DISPOSAL CONSIDERATIONS

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- Waste from residues / unused products: In accordance with federal, state, and local regulations.
- Contaminated Packaging: Rinse empty containers with water and use the rinse water to prepare the working solution. Can be landfilled or incinerated, when in compliance with local regulations.

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## 14. TRANSPORT INFORMATION

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Not regulated by the Department of Transportation

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## 15. REGULATORY INFORMATION

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All components of this product are on TSCA and DSL inventories.

- RCRA status: Not a hazardous waste.
- Hazardous Waste Number: Not applicable.
- Reportable Quantity (40 CFR 302): Not applicable.
- Threshold Planning Quantity (40 CFR 355): Not applicable.

California Proposition 65 Information: The following statement is made in order to comply with the California Safe Drinking Water and Toxic Enforcement Act of 1986: This product contains a chemical(s) known to the State of California to cause cancer: acrylamide.

HMIS & NFPA Ratings:	HMIS	NFPA
Health:	1	1
Flammability:	1	1
Reactivity:	0	0

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## 16. OTHER INFORMATION

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Person to Contact: A. Sands

# **APPENDIX 2.10-B**

## **Process Flow Diagrams for the Frac Sand Plan**

## Flow Details of Process Flow Diagrams given below:

**WP-PFD-001 revP2 Area 01/Wet Plant: Screening and Scrubbing**

		STREAM	100	101	102	103	104	105	106	107	108	108A	109	110	111	112	113	114	115
AVERAGE	SOLIDS, TPH	284.6	107.2	157.4	22.5	134.9	134.9	129.7	2.7	132.2	132.2	132.2	132.2	2.7	129.5	129.5	129.5	5.4	
	WATER, m <sup>3</sup> /h	5.4	2.2	3.2	1.2	229.2	404.8	2.6	358.3	46.5	7.0	51.4	396.7	351.2	45.5	50.4	240.6	709.5	
	SLURRY, m <sup>3</sup> /h	105.2	42.6	62.6	9.7	280.1	455.7	51.6	359.3	96.4	56.9	101.3	446.6	352.2	94.4	98.3	289.5	711.5	
	% SOLIDS	98.0	98.0	98.0	95.0	37.1	25.0	98.0	0.7	74.0	95.0	72.0	25.0	0.8	74.0	72.0	35.0	.75	
	SLURRY S.G.	2.565	2.565	2.565	2.448	1.300	1.184	2.285	1.004	1.854	2.448	1.813	1.184	1.006	1.854	1.813	1.279	1.006	
	SOLIDS S.G.																		
DESIGN	SOLIDS, TPH	284.6	126.6	188.9	27.0	161.9	161.9	155.6	3.2	158.7	158.7	158.7	158.7	3.2	155.4	155.4	155.4	6.4	
	WATER, m <sup>3</sup> /h	5.4	2.6	3.9	1.4	229.6	405.2	3.2	349.4	55.8	8.4	61.8	476.0	421.4	54.6	60.4	288.6	770.8	
	SLURRY, m <sup>3</sup> /h	105.2	51.1	75.1	11.6	290.6	466.2	61.9	360.6	115.6	68.3	121.6	535.9	422.6	113.3	119.1	347.3	773.2	
	% SOLIDS	98.0	98.0	98.0	95.0	41.4	28.6	98.0	0.9	74.0	95.0	72.0	25.0	0.8	74.0	72.0	35.0	.85	
	SLURRY S.G.	2.57	2.57	2.57	2.46	1.35	1.22	2.57	1.01	1.85	2.46	1.81	1.18	1.01	1.85	1.81	1.28	1.01	
	SOLIDS S.G.																		

Source: Outotec, 2008

**WP-PFD-002 revP2 Area 02/Wet Plant: Density Separator Circuit – Friable**

		STREAM	114	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214
AVERAGE	SOLIDS, TPH	129.5	80.9	48.6	63.6	17.3	112.2	112.2	48.6	48.6	-	48.6	63.6	63.6	63.6	-	-	
	WATER, m <sup>3</sup> /h	240.6	293.4	17.2	22.3	332.4	39.5	5.9	145.8	17.2	128.6	2.6	190.8	22.3	3.3	168.5	297.1	
	SLURRY, m <sup>3</sup> /h	289.5	323.9	35.8	46.3	338.9	81.9	48.2	164.1	35.8	128.6	20.6	214.8	46.3	27.3	168.5	297.1	
	% SOLIDS	35.0	21.6	74.0	74.0	5.0	74.0	95.0	25.0	74.0	-	95.0	25	74.0	95.0	-	-	
	SLURRY S.G.	1.279	1.155	1.854	1.854	1.032	1.854	2.448	1.184	1.854	-	2.45	1.184	1.854	2.448	-	-	
	SOLIDS S.G.																	
DESIGN	SOLIDS, TPH	155.4	97.1	58.3	76.3	20.8	134.7	134.7	58.3	58.3	-	58.3	76.3	76.3	76.3	-	-	
	WATER, m <sup>3</sup> /h	288.6	338.1	20.5	26.8	372.6	47.3	7.1	174.9	20.5	154.4	3.1	228.9	26.8	4.0	202.1	356.5	
	SLURRY, m <sup>3</sup> /h	347.3	374.8	42.5	55.6	380.5	96.1	57.9	196.9	42.5	154.4	25.1	257.7	55.6	32.8	202.1	356.5	
	% SOLIDS	35.0	22.3	74.0	74.0	5.3	74.0	95.0	25.0	74.0	-	95.0	25.0	74.0	95.0	-	-	
	SLURRY S.G.	1.28	1.16	1.85	1.85	1.03	1.85	2.45	1.18	1.85	-	2.45	1.85	1.85	2.448	-	-	
	SOLIDS S.G.																	

Source: Outotec, 2008

**WP-PFD-003 revP2 Area 03/Wet Plant: Crushing – Non Friable**

		STREAM	106	300	301	302	303
AVERAGE	SOLIDS, TPH	129.7	162.1	32.4	129.7	129.6	
	WATER, m <sup>3</sup> /h	2.6	4.4	1.8	219.4	240.8	
	SLURRY, m <sup>3</sup> /h	51.6	65.6	14	268.3	289.7	
	% SOLIDS	98.0	97.4	95.0	37.1	35.0	
	SLURRY S.G.	2.565	2.541	2.448	1.301	1.279	
	SOLIDS S.G.						
DESIGN	SOLIDS, TPH	155.6	194.5	38.9	155.6	155.6	
	WATER, m <sup>3</sup> /h	3.2	4.9	1.7	263.3	288.9	
	SLURRY, m <sup>3</sup> /h	61.9	78.3	16.4	322	347.6	
	% SOLIDS	98.0	97.5	95.0	37.1	35.0	
	SLURRY S.G.	2.57	2.55	2.45	1.30	1.28	
	SOLIDS S.G.						

Source: Outotec, 2008

**WP-PFD-004 revP2 Area 04/Wet Plant: Density Separator Circuit – Non Friable**

	STREAM	303	400	401	402	403	404	405	406	407	408	409	410
AVERAGE	SOLIDS, TPH	129.6	80.0	49.6	49.6	53.0	49.6	49.6	27.1	-	102.6	110.3	25.5
	WATER, m³/h	240.8	312.8	19.3	148.9	20.6	19.3	2.6	351.9	129.6	5.4	42.9	33.5
	SLURRY, m³/h	289.7	343.0	38.0	167.6	40.6	38.0	21.3	362.1	129.6	44.1	84.5	43.1
	% SOLIDS	35.0	20.4	72.0	25.0	72.0	72.0	95.0	7.1	-	95.0	72.0	43.2
	SLURRY S.G.	1.279	1.145	1.813	1.184	1.813	1.813	2.448	1.046	-	2.448	1.813	1.368
	SOLIDS S.G.												
DESIGN	SOLIDS, TPH	155.6	96.0	59.5	59.5	63.6	59.5	59.5	32.5	-	123.1	132.4	33.2
	WATER, m³/h	288.9	357.1	23.2	178.6	24.71	23.2	3.1	392.1	155.5	6.5	51.5	43.6
	SLURRY, m³/h	347.6	393.3	45.6	201.1	48.7	45.6	25.6	404.4	155.5	52.9	101.4	56.0
	% SOLIDS	35.0	21.2	72.0	25.0	72.0	72.0	95.0	7.7	-	95.0	72.0	43.0
	SLURRY S.G.	1.28	1.15	1.81	1.18	1.81	1.81	2.45	1.05	-	2.45	1.81	1.37
	SOLIDS S.G.												

Source: Outotec, 2008

**WP-PFD-005 revP2 Area 05/Wet Plant: Plant Thickener**

	STREAM	115	203	214	406	407	409	410	500	501	610	808
AVERAGE	SOLIDS, TPH	5.4	17.3	-	27.1	-	110.3	25.5	49.8	-	-	-
	WATER, m³/h	1393.3	332.4	297.1	351.9	129.6	42.9	33.5	26.81	1374.2	-	-
	SLURRY, m³/h	1412.1	338.9	297.1	362.1	129.6	84.5	43.1	45.60	-	-	-
	% SOLIDS	.75	5.0	-	7.1	-	72.0	43.2	65.0	-	-	-
	SLURRY S.G.	1.005	1.032	-	1.046	-	1.813	1.368	1.679	-	-	-
	SOLIDS S.G.											
DESIGN	SOLIDS, TPH	6.4	20.8	-	32.5	-	132.4	33.2	49.7	-	-	-
	WATER, m³/h	770.8	372.6	356.5	392.1	155.5	51.5	43.6	32.2	1508.7	-	-
	SLURRY, m³/h	773.2	380.5	356.5	404.4	155.5	101.4	56.0	45.7	-	-	-
	% SOLIDS	.85	5.3	-	7.7	-	72.0	43.0	65.0	-	-	-
	SLURRY S.G.	1.01	1.03	-	1.05	-	1.81	1.37	1.68	-	-	-
	SOLIDS S.G.											

Source: Outotec, 2008

**DP-PFD-001 revP3 Area 06/Dry Plant: Drying and Screening – Friable**

	STREAM	205	207	600	601	602	603	604	605	606	607	608	609	
AVERAGE	SOLIDS, TPH	112.2	112.2	112.2	-	112.2	X	X	X	75.5	18.9	16.8	2.9	
	WATER, m³/h	5.9	5.9	5.9	5.9	-	-	-	-	-	-	-	-	
	SLURRY, m³/h	48.2	48.2	-	5.9	-	-	-	-	-	-	-	-	
	% SOLIDS	95.0	95.0	95.0	-	100.0	-	-	-	-	100.0	100.0	100.0	100.0
	SLURRY S.G.	2.448	2.448	2.448	-	-	-	-	-	-	-	-	-	-
	SOLIDS S.G.					2.65	-	-	-	-	2.65	2.65	2.65	2.65
DESIGN	SOLIDS, TPH	134.7	134.7	134.7	-	134.7	X	X	X	90.6	20.3	20.2	3.5	
	WATER, m³/h	7.1	7.1	7.1	7.1	-	-	-	-	-	-	-	-	
	SLURRY, m³/h	57.9	57.9	-	7.1	-	-	-	-	-	-	-	-	
	% SOLIDS	95.0	95.0	95.0	-	100.0	-	-	-	-	100.0	100.0	100.0	100.0
	SLURRY S.G.	2.45	2.45	2.45	-	-	-	-	-	-	-	-	-	-
	SOLIDS S.G.													

Source: Outotec, 2008



**DP-PFD-002 revP3 Area 07/Dry Plant: Screening and Magnetic Separation – Friable**

	STREAM	606	607	608	609	700	701	702	703	704	705	706	707	708	709	710
AVERAGE	SOLIDS, TPH	75.5	18.9	16.8	2.9	27.5	48.0	1.4	28.1	2.4	45.6	0.8	16.1	1.4	16.0	6.0
	WATER, m <sup>3</sup> /h															
	SLURRY, m <sup>3</sup> /h															
	% SOLIDS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	SLURRY S.G.															
DESIGN	SOLIDS S.G.	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65
	SOLIDS, TPH	90.6	20.3	20.2	3.5	33.0	57.6	1.6	31.3	2.9	54.7	1.0	19.3	1.6	19.2	7.1
	WATER, m <sup>3</sup> /h															
	SLURRY, m <sup>3</sup> /h															
	% SOLIDS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
SLURRY S.G.																

Source: Outotec, 2008

**DP-PFD-003 revP2 Area 08/Dry Plant: Drying and Screening – Non Friable**

	STREAM	408	800	801	802	803	804	805	806	807	808	809
AVERAGE	SOLIDS, TPH	102.6	102.6	102.6	-	TR	TR	TR	59.2	10.4	18.4	14.4
	WATER, m <sup>3</sup> /h	5.4	5.4		5.4							
	SLURRY, m <sup>3</sup> /h	44.1	-		5.4							
	% SOLIDS	95.0	95.0	100.0	-				100.0	100.0	100.0	100.0
	SLURRY S.G.	2.448	2.448		-							
DESIGN	SOLIDS S.G.			2.65					2.65	2.65	2.65	2.65
	SOLIDS, TPH	123.1	123.1	123.1	-	0.3	0.1	0.1	71.0	15.0	22.5	18.0
	WATER, m <sup>3</sup> /h	6.5	6.5		6.5							
	SLURRY, m <sup>3</sup> /h	52.9	-		6.5							
	% SOLIDS	95.0	95.0	100.0	-				100.0	100.0	100.0	100.0
SLURRY S.G.	2.45	2.45										

Source: Outotec, 2008

**DP-PFD-004 revP3 Area 09/Dry Plant : Storage Silos – Friable and Non Friable**

	STREAM	703	705	707	709	806	807	808	900	901
AVERAGE	SOLIDS, TPH	28.1	45.6	16.1	16.0	59.2	10.4	18.4	250	250
	WATER, m <sup>3</sup> /h									
	SLURRY, m <sup>3</sup> /h									
	% SOLIDS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	SLURRY S.G.									
DESIGN	SOLIDS S.G.	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65
	SOLIDS, TPH	31.3	54.7	19.3	19.2	71.0	15.0	22.5	250	250
	WATER, m <sup>3</sup> /h									
	SLURRY, m <sup>3</sup> /h									
	% SOLIDS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
SLURRY S.G.										

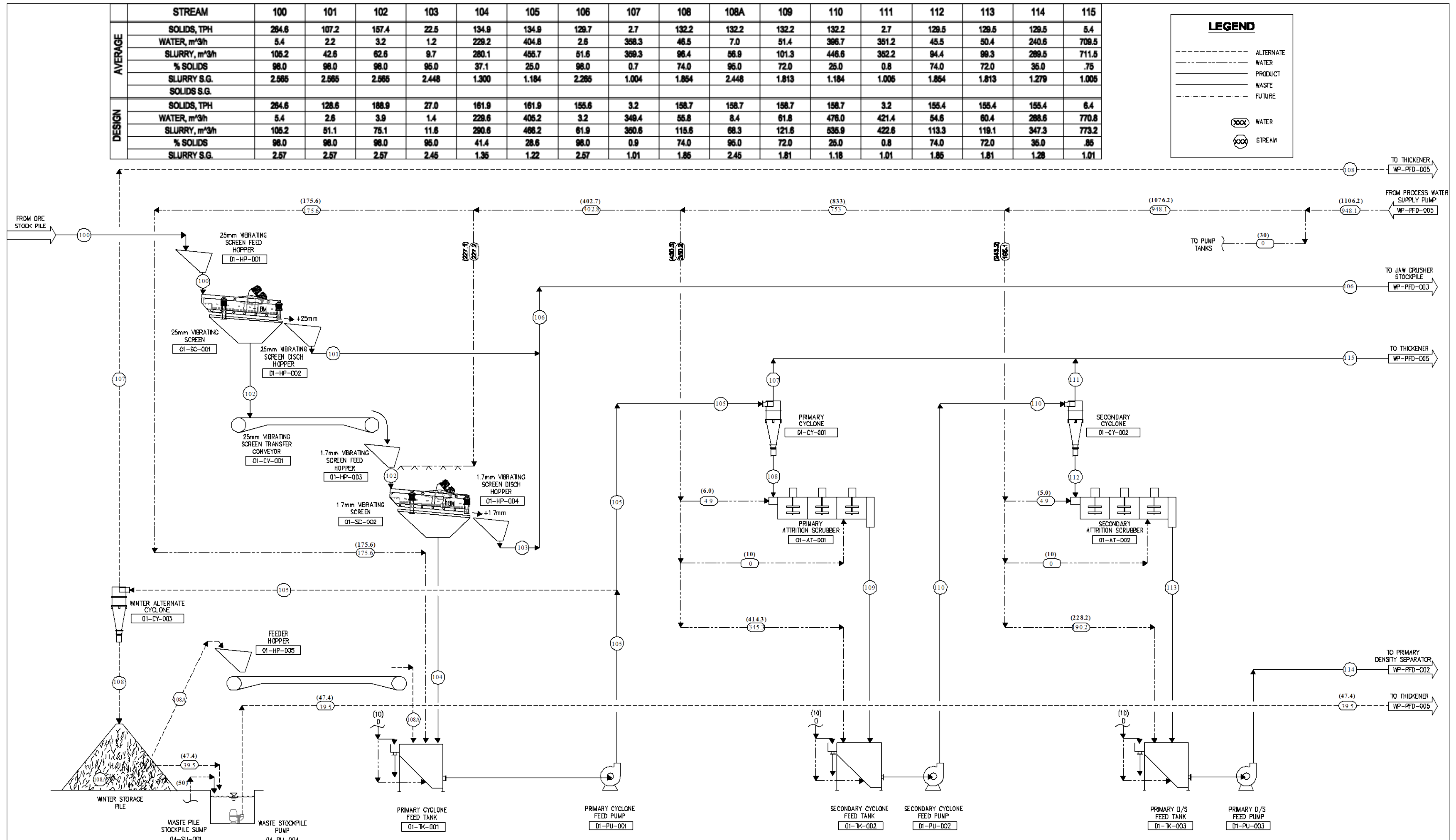
Source: Outotec, 2008

**DP-PFD-005 revP2 Area 09/ Dry Plant: Plant Product Load Out**

	STREAM	900	901
AVERAGE	SOLIDS, TPH	250	250
	WATER, m <sup>3</sup> /h		
	SLURRY, m <sup>3</sup> /h		
	% SOLIDS	100.0	100.0
	SLURRY S.G.		
	SOLIDS S.G.	2.65	2.65
DESIGN	SOLIDS, TPH	250	250
	WATER, m <sup>3</sup> /h		
	SLURRY, m <sup>3</sup> /h		
	% SOLIDS	100.0	100.0
	SLURRY S.G.		

Source: Outotec, 2008

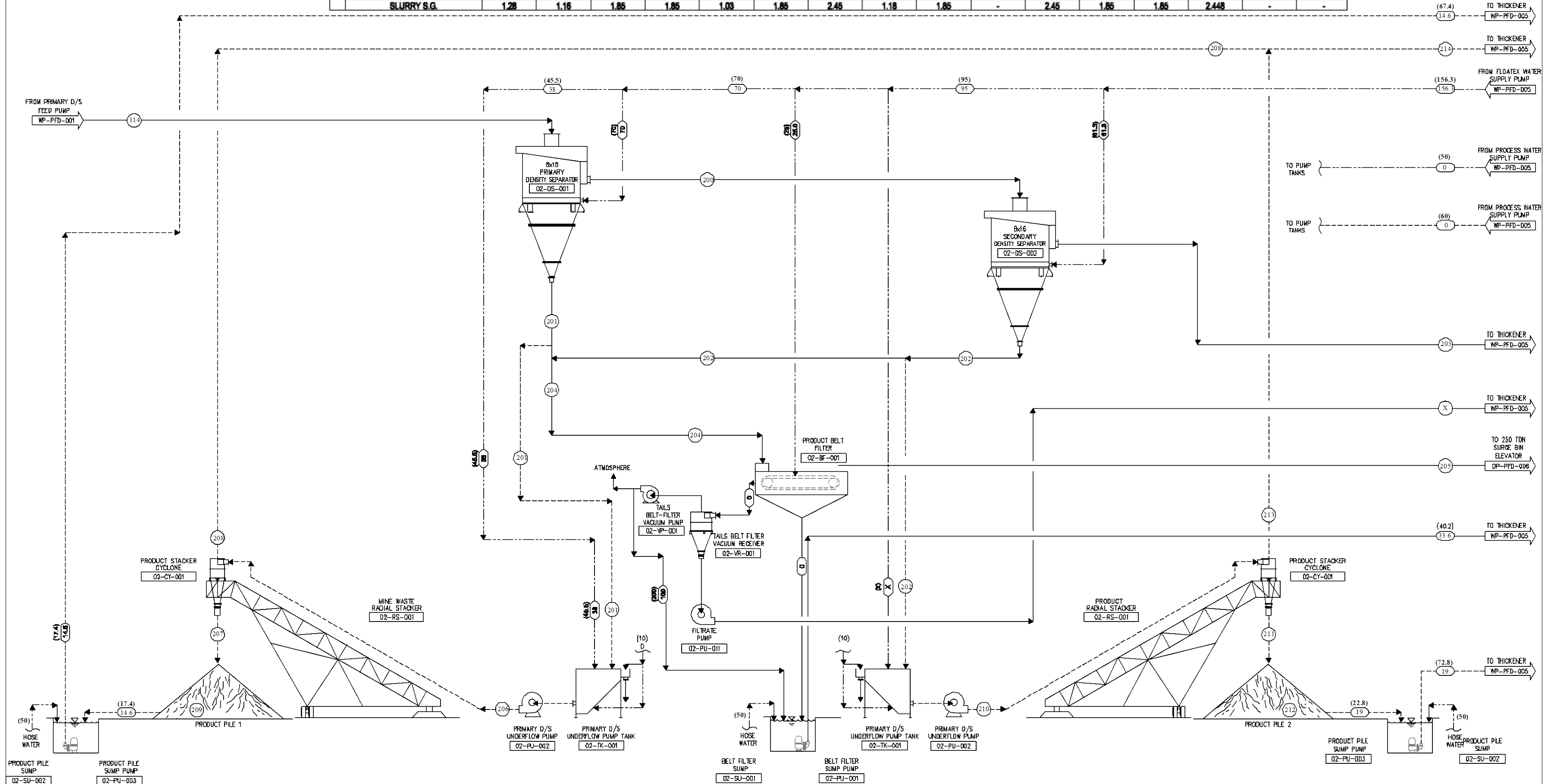
**DRAWING:**  
**WP-PFD-001 revP2 Area 01/Wet Plant: Screening and Scrubbing**



Source: adapted from Outotec, 2008

**DRAWING:**  
**WP-PFD-002 revP2 Area 02/Wet Plant: Density Separator Circuit - Friable**

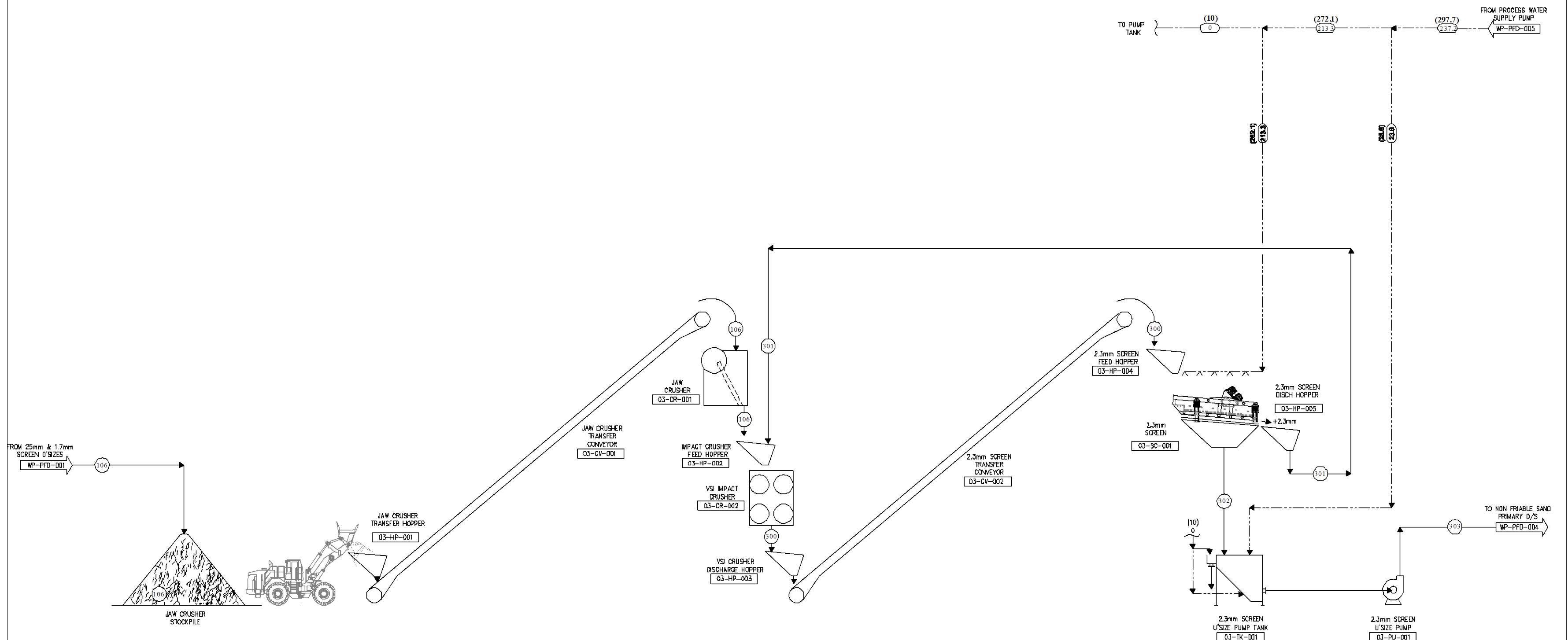
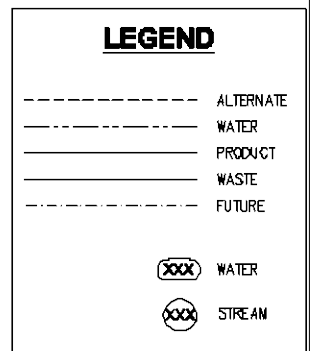
	STREAM	114	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214
AVERAGE	SOLIDS, TPH	129.5	80.9	48.6	63.6	17.3	112.2	112.2	48.6	48.6	-	48.6	63.6	63.6	63.6	-	-
	WATER, m <sup>3</sup> /h	240.6	293.4	17.2	22.3	332.4	39.5	5.9	145.8	17.2	128.6	2.6	190.8	22.3	3.3	168.5	297.1
	SLURRY, m <sup>3</sup> /h	289.5	323.9	35.6	46.3	338.9	81.9	48.2	164.1	35.6	128.6	20.6	214.8	46.3	27.3	168.5	297.1
	% SOLIDS	35.0	21.6	74.0	74.0	5.0	74.0	95.0	25.0	74.0	-	95.0	25	74.0	95.0	-	-
	SLURRY S.G.	1.279	1.155	1.854	1.854	1.032	1.854	2.448	1.184	1.854	-	2.45	1.184	1.854	2.448	-	-
DESIGN	SOLIDS, TPH	155.4	97.1	56.3	76.3	20.8	134.7	134.7	58.3	58.3	-	58.3	76.3	76.3	76.3	-	-
	WATER, m <sup>3</sup> /h	288.6	338.1	20.5	26.8	372.6	47.3	7.1	174.9	20.5	154.4	3.1	228.9	26.8	4.0	202.1	366.5
	SLURRY, m <sup>3</sup> /h	347.3	374.8	42.5	55.6	380.5	98.1	57.9	196.9	42.5	154.4	25.1	257.7	55.6	32.8	202.1	366.5
	% SOLIDS	35.0	22.3	74.0	74.0	5.3	74.0	95.0	25.0	74.0	-	95.0	25.0	74.0	95.0	-	-
	SLURRY S.G.	1.28	1.16	1.85	1.85	1.03	1.85	2.45	1.18	1.85	-	2.45	1.85	1.85	2.448	-	-



Source: adapted from Outotec, 2008

**DRAWING:**  
**WP-PFD-003 revP2 Area 03/Wet Plant: Crushing – Non Friable**

	STREAM	106	300	301	302	303
AVERAGE	SOLIDS, TPH	129.7	162.1	32.4	129.7	129.6
	WATER, m <sup>3</sup> /h	2.6	4.4	1.8	219.4	240.8
	SLURRY, m <sup>3</sup> /h	51.6	65.6	14	268.3	289.7
	% SOLIDS	98.0	97.4	95.0	37.1	35.0
	SLURRY S.G.	2.565	2.541	2.448	1.301	1.279
DESIGN	SOLIDS, TPH	155.6	194.5	38.9	155.6	155.6
	WATER, m <sup>3</sup> /h	3.2	4.9	1.7	263.3	288.9
	SLURRY, m <sup>3</sup> /h	61.9	78.3	16.4	322	347.6
	% SOLIDS	98.0	97.5	95.0	37.1	35.0
	SLURRY S.G.	2.57	2.55	2.45	1.30	1.28



Source: adapted from Outotec, 2008

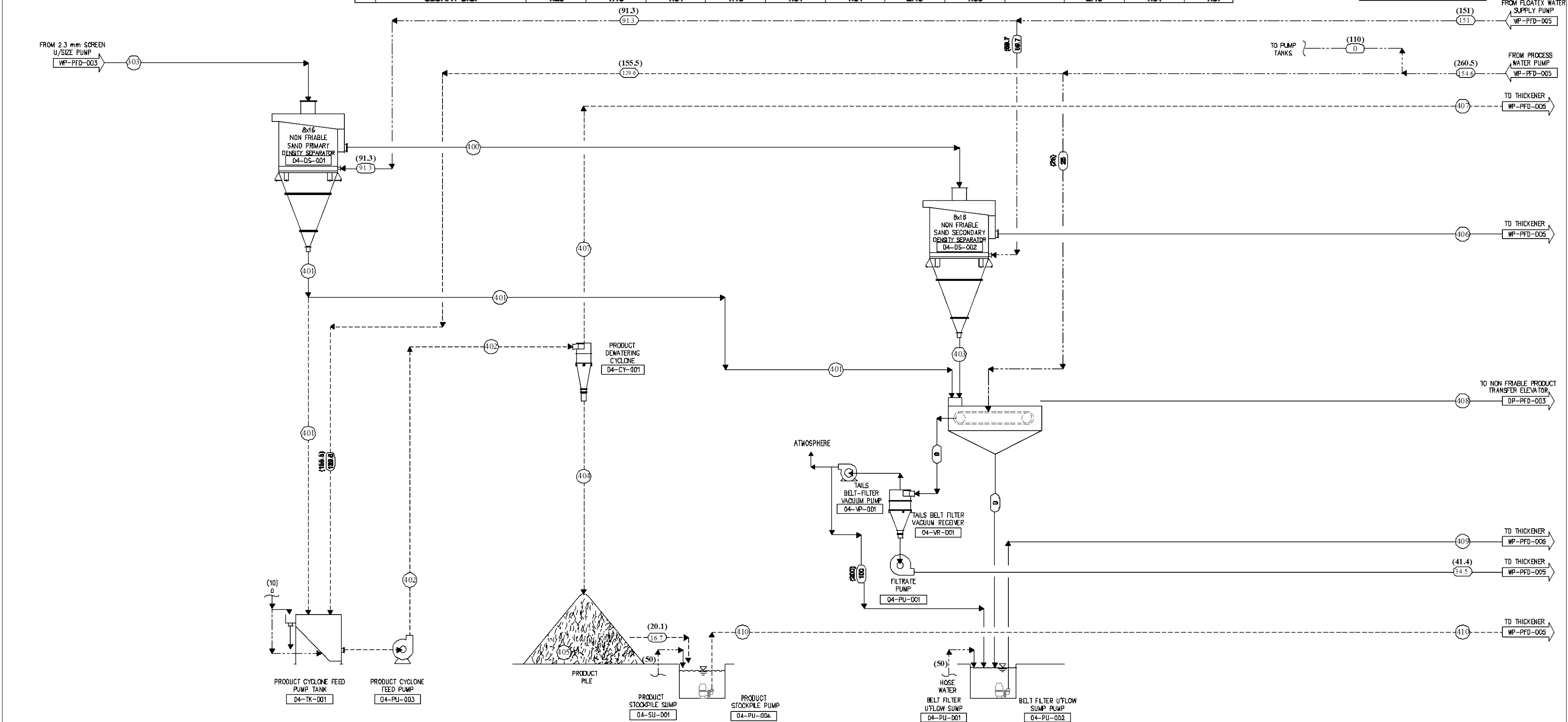
**DRAWING:**  
**WP-PFD-004 revP2 Area 04/Wet Plant: Density Separator Circuit – Non Friable**

	STREAM	303	400	401	402	403	404	405	406	407	408	409	410
AVERAGE	SOLIDS, TPH	129.6	80.0	49.6	49.6	53.0	49.6	49.6	27.1	-	102.6	110.3	25.5
	WATER, m <sup>3</sup> /h	240.8	312.8	19.3	148.9	20.6	19.3	2.6	351.9	129.6	5.4	42.9	33.5
	SLURRY, m <sup>3</sup> /h	289.7	343.0	38.0	167.6	40.6	38.0	21.3	362.1	129.6	44.1	84.5	43.1
	% SOLIDS	35.0	20.4	72.0	25.0	72.0	72.0	95.0	7.1	-	95.0	72.0	43.2
	SLURRY S.G.	1.279	1.145	1.813	1.184	1.813	1.813	2.448	1.046	-	2.448	1.813	1.368
DESIGN	SOLIDS, TPH	155.6	96.0	59.5	59.5	63.6	59.5	59.5	32.5	-	123.1	132.4	33.2
	WATER, m <sup>3</sup> /h	288.9	357.1	23.2	178.6	24.71	23.2	3.1	392.1	155.5	6.5	51.5	43.6
	SLURRY, m <sup>3</sup> /h	347.6	393.3	45.6	201.1	48.7	45.6	25.6	404.4	155.5	52.9	101.4	56.0
	% SOLIDS	35.0	21.2	72.0	25.0	72.0	72.0	95.0	7.7	-	95.0	72.0	43.0
	SLURRY S.G.	1.28	1.15	1.81	1.18	1.81	1.81	2.45	1.05	-	2.45	1.81	1.37

**LEGEND**

- ALTERNATE
- WATER
- PRODUCT
- WASTE
- FUTURE

WATER  
 STREAM



Source: adapted from Outotec, 2008

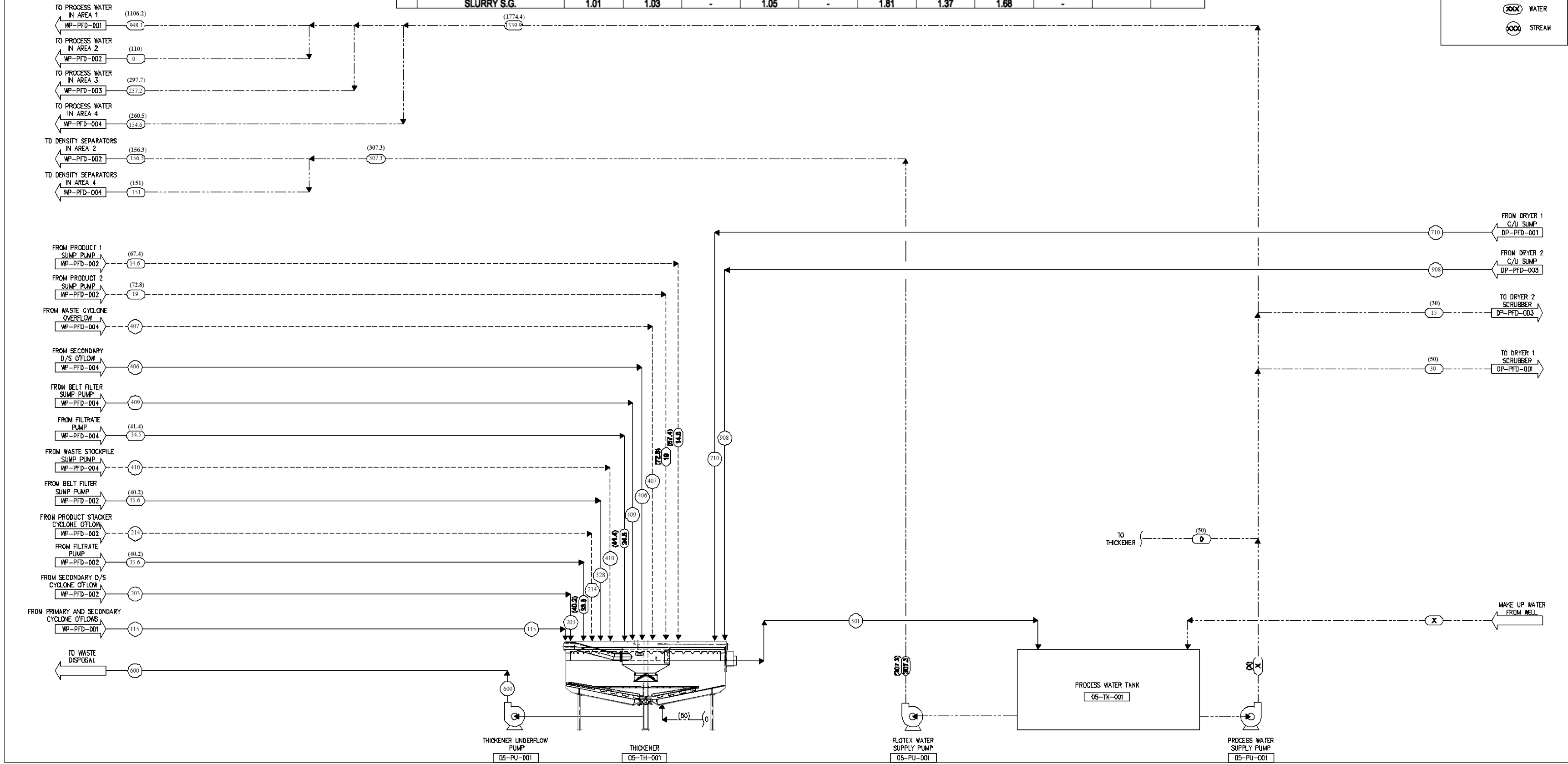
**DRAWING:**  
**WP-PFD-005 revP2 Area 05/Wet Plant: Plant Thickener**

	STREAM	115	203	214	406	407	409	410	500	501	610	808
AVERAGE	SOLIDS, TPH	5.4	17.3	-	27.1	-	110.3	25.5	49.8	-	-	-
	WATER, m <sup>3</sup> /h	1393.3	332.4	297.1	351.9	129.6	42.9	33.5	26.81	1374.2	-	-
	SLURRY, m <sup>3</sup> /h	1412.1	338.9	297.1	362.1	129.6	84.5	43.1	45.60	-	-	-
	% SOLIDS	.75	5.0	-	7.1	-	72.0	43.2	65.0	-	-	-
	SLURRY S.G.	1.005	1.032	-	1.046	-	1.813	1.368	1.679	-	-	-
DESIGN	SOLIDS, TPH	6.4	20.8	-	32.5	-	132.4	33.2	49.7	-	-	-
	WATER, m <sup>3</sup> /h	770.8	372.6	356.5	392.1	155.5	51.5	43.6	32.2	1508.7	-	-
	SLURRY, m <sup>3</sup> /h	773.2	380.5	356.5	404.4	155.5	101.4	56.0	45.7	-	-	-
	% SOLIDS	.85	5.3	-	7.7	-	72.0	43.0	65.0	-	-	-
	SLURRY S.G.	1.01	1.03	-	1.05	-	1.81	1.37	1.68	-	-	-

**LEGEND**

- ALTERNATE
- WATER
- PRODUCT
- WASTE
- FUTURE

WATER  
 STREAM



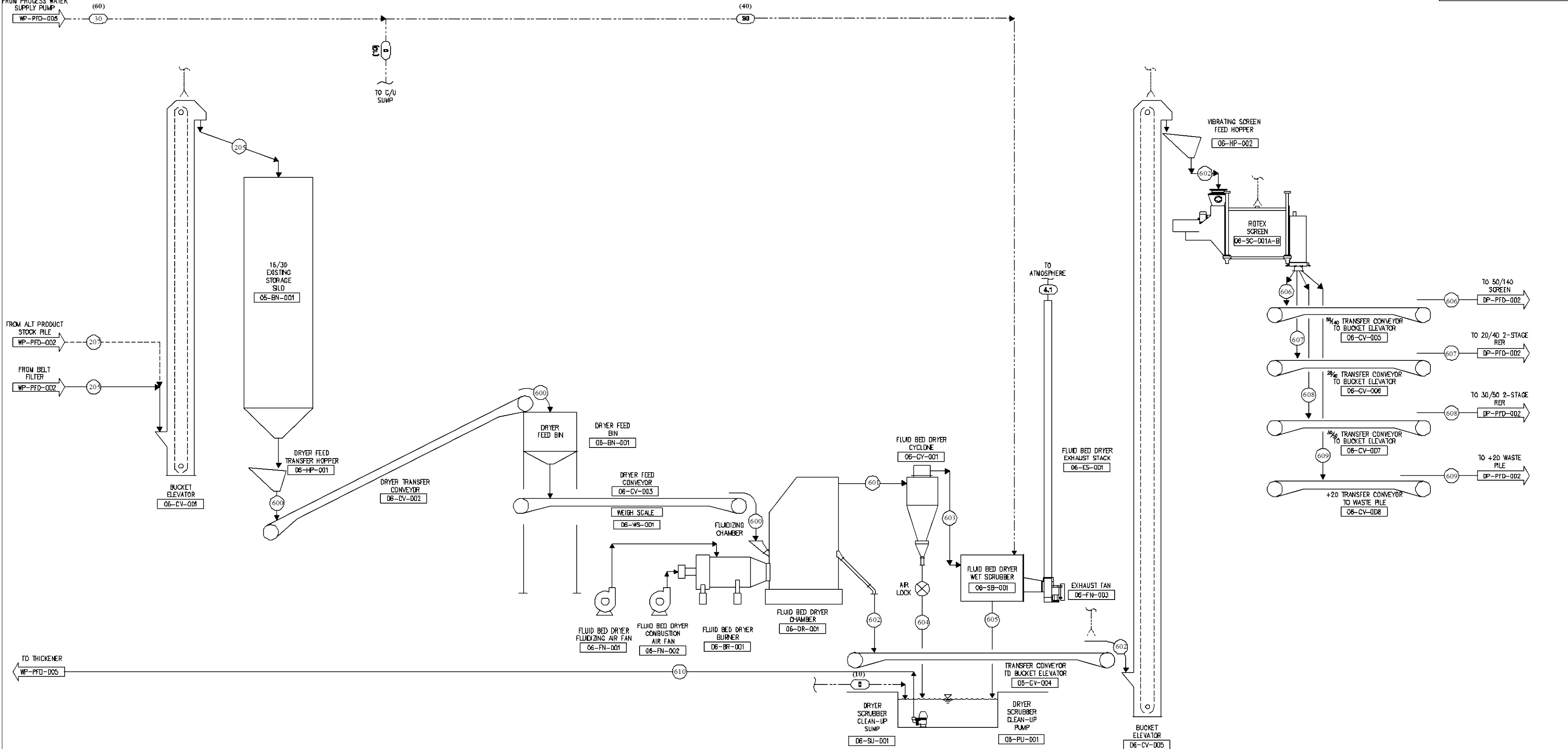
Source: adapted from Outotec, 2008

**DRAWING:**  
**DP-PFD-001 revP3 Area 06/Dry Plant: Drying and Screening – Friable**

	STREAM	205	207	600	601	602	603	604	605	606	607	608	609
AVERAGE	SOLIDS, TPH	112.2	112.2	112.2		112.2	X	X	X	75.5	16.9	16.8	2.9
	WATER, m <sup>3</sup> /h	5.9	5.9	5.9	5.9								
	SLURRY, m <sup>3</sup> /h	48.2	48.2	-	5.9								
	% SOLIDS	95.0	95.0	95.0		100.0				100.0	100.0	100.0	100.0
	SLURRY S.G.	2.448	2.448	2.448									
DESIGN	SOLIDS, TPH	134.7	134.7	134.7	-	134.7	X	X	X	90.8	20.3	20.2	3.5
	WATER, m <sup>3</sup> /h	7.1	7.1	7.1	7.1								
	SLURRY, m <sup>3</sup> /h	57.9	57.9	-	7.1								
	% SOLIDS	95.0	95.0	95.0	-	100.0				100.0	100.0	100.0	100.0
	SLURRY S.G.	2.45	2.45	2.45	-								

**LEGEND**

- ALTERNATE
- - - WATER
- PRODUCT
- - - WASTE
- - - FUTURE
- (XXX) WATER
- (XXX) STREAM



Source: adapted from Outotec, 2008



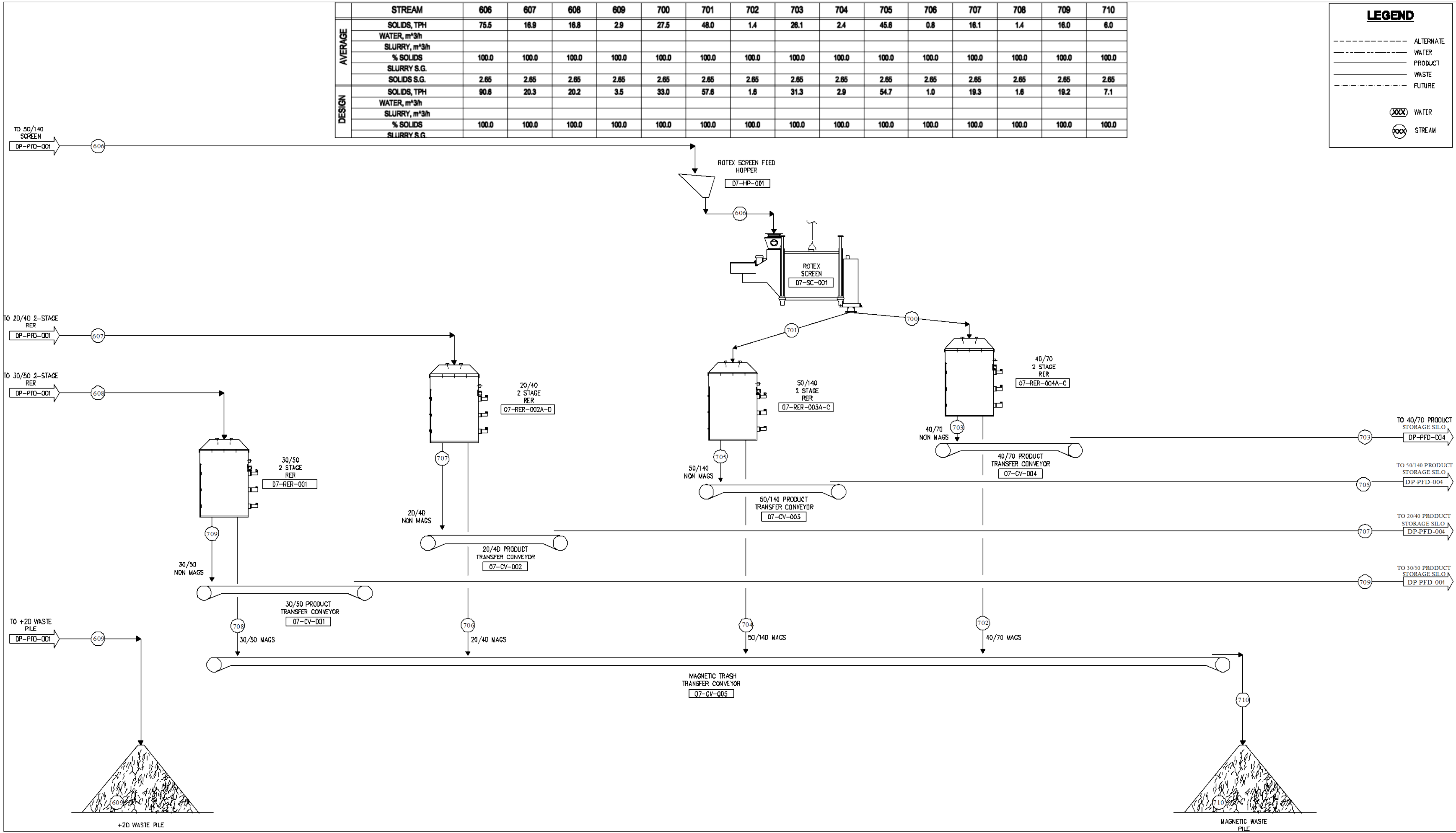
**DRAWING:**  
**DP-PFD-002 revP3 Area 07/Dry Plant: Screening and Magnetic Separation – Friable**

	STREAM	606	607	608	609	700	701	702	703	704	705	706	707	708	709	710
AVERAGE	SOLIDS, TPH	75.5	16.9	16.8	2.9	27.5	48.0	1.4	26.1	2.4	45.6	0.8	16.1	1.4	16.0	6.0
	WATER, m <sup>3</sup> /h															
	SLURRY, m <sup>3</sup> /h															
	% SOLIDS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
DESIGN	SLURRY S.G.	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65
	SOLIDS, TPH	90.6	20.3	20.2	3.5	33.0	57.6	1.6	31.3	2.9	54.7	1.0	19.3	1.6	19.2	7.1
	WATER, m <sup>3</sup> /h															
	SLURRY, m <sup>3</sup> /h															
DESIGN	% SOLIDS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	SLURRY S.G.															

**LEGEND**

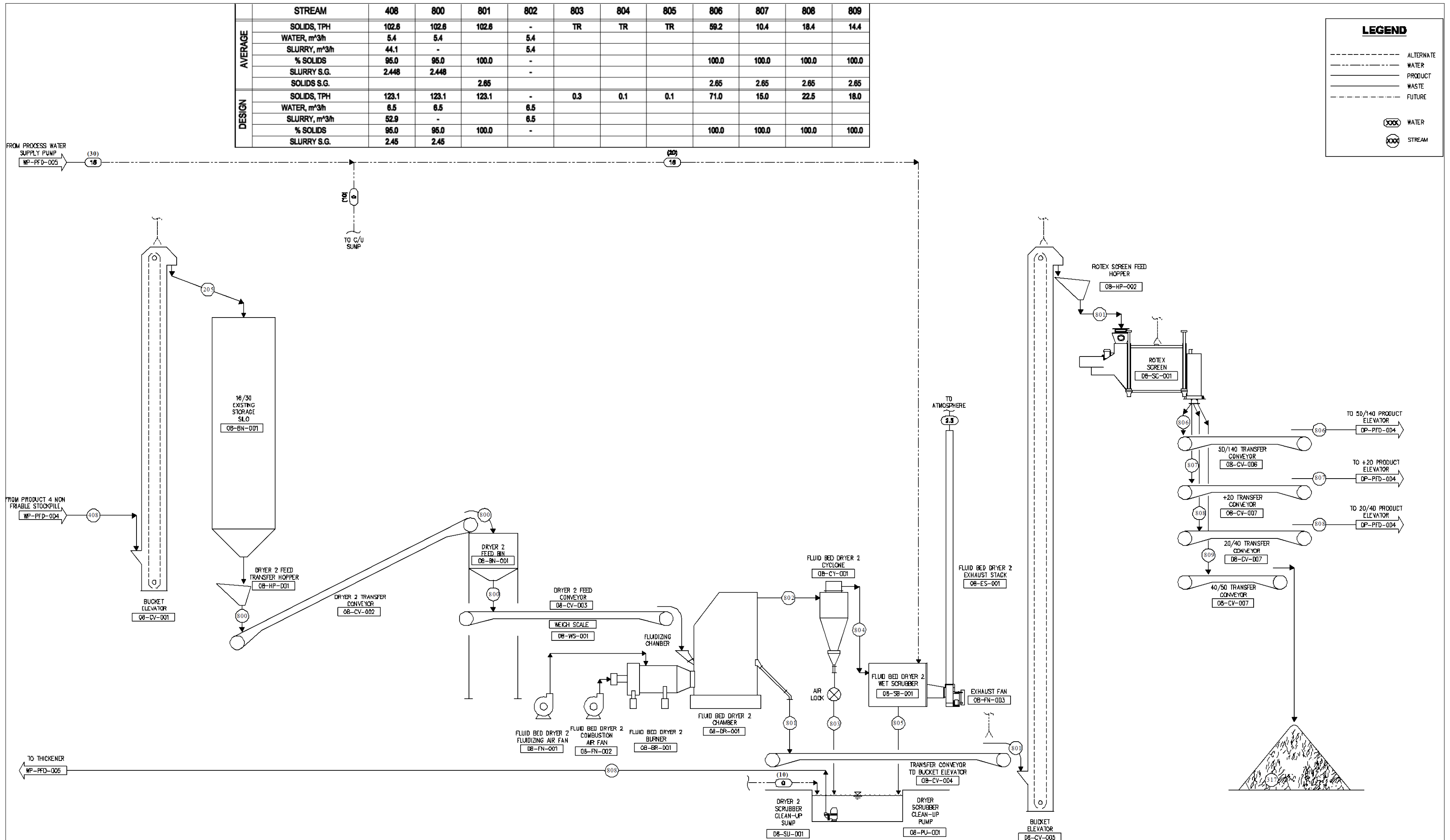
- ALTERNATE
- WATER
- PRODUCT
- WASTE
- FUTURE

WATER  
 STREAM



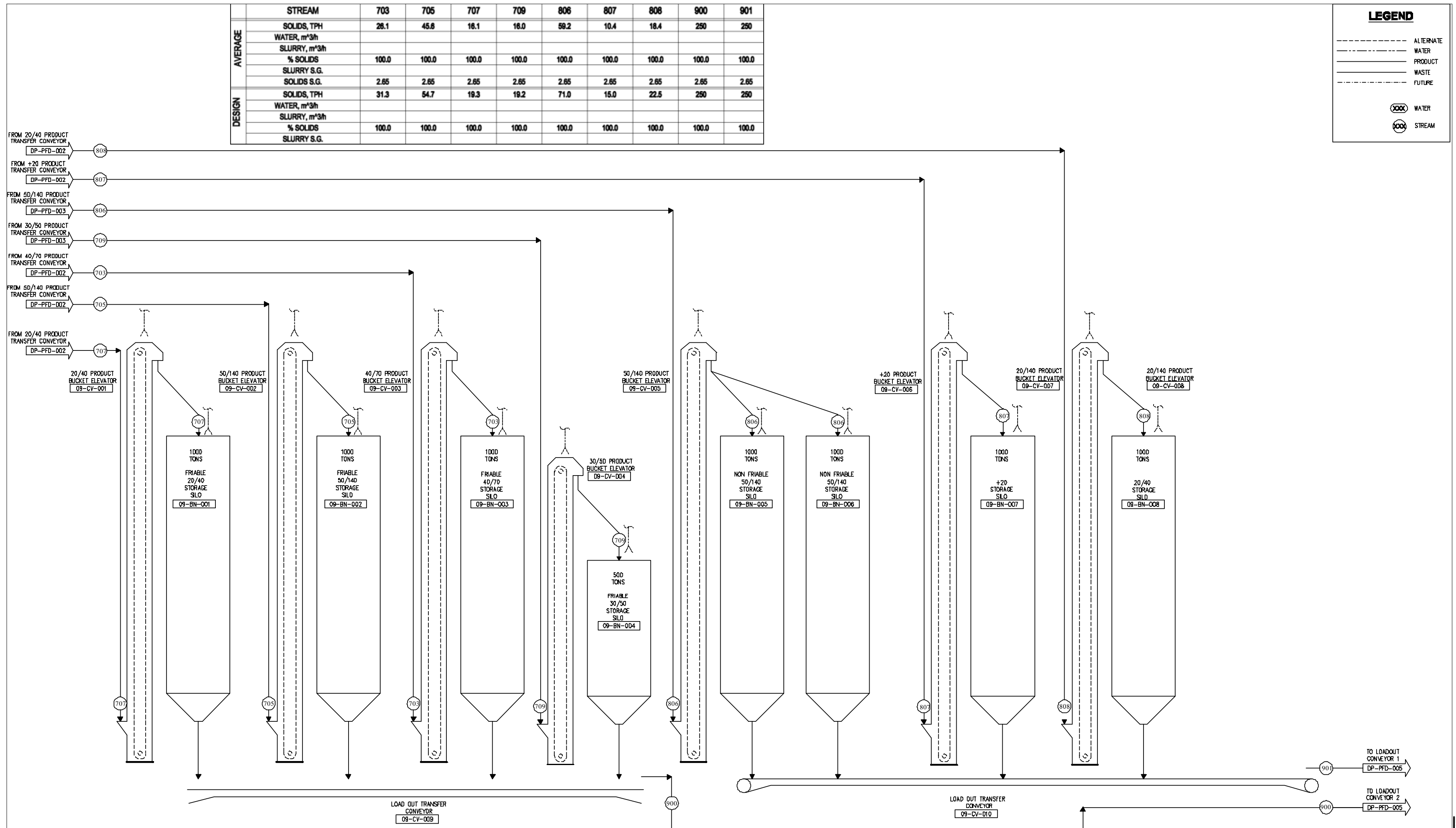
Source: adapted from Outotec, 2008

**DRAWING:**  
**DP-PFD-003 revP2 Area 08/Dry Plant: Drying and Screening – Non Friable**



Source: adapted from Outotec, 2008

**DRAWING:**  
**DP-PFD-004 revP3 Area 09/Dry Plant : Storage Silos – Friable and Non Friable**



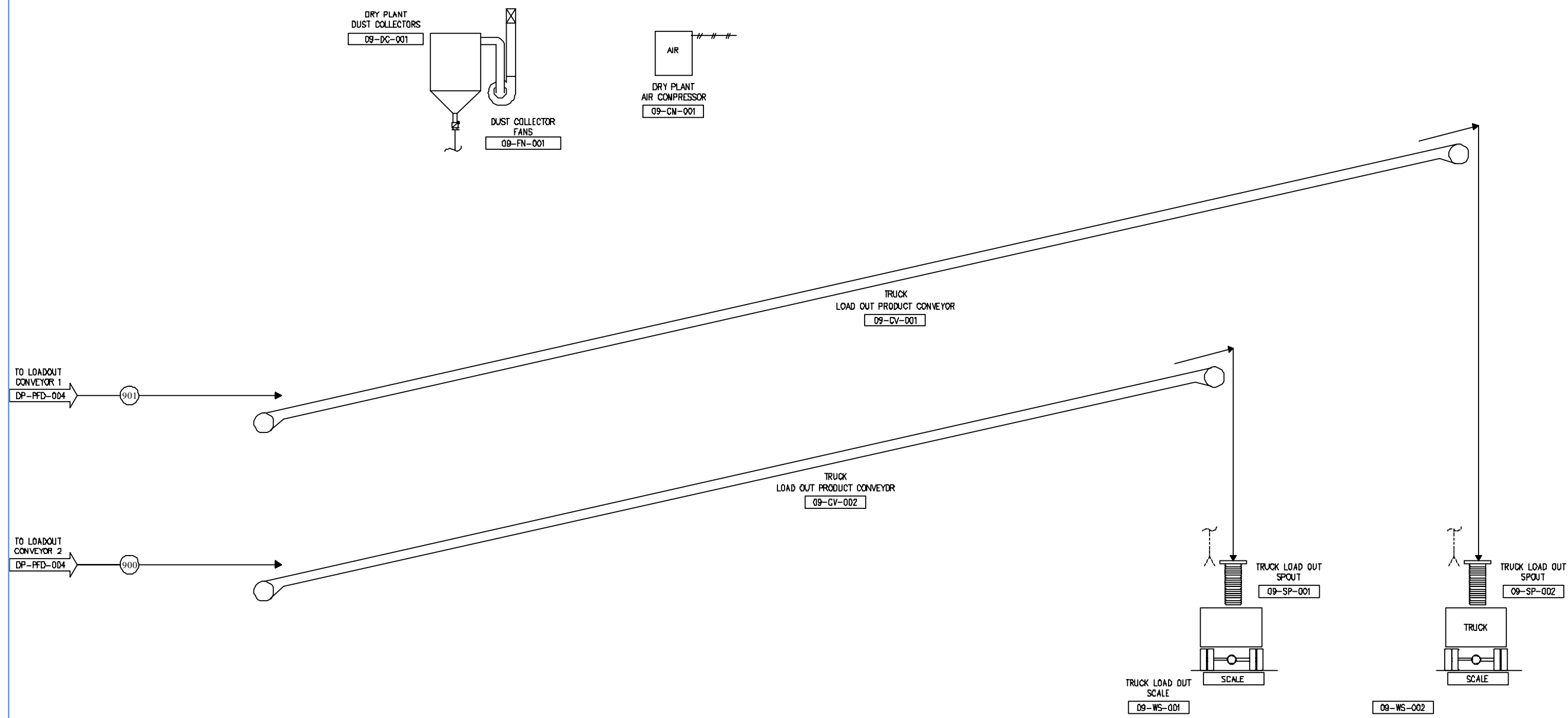
Source: adapted from Outotec, 2008

**DRAWING:**  
**DP-PFD-005 revP2 Area 09/ Dry Plant: Plant Product Load Out**

	STREAM	900	901
AVERAGE	SOLIDS, TPH	250	250
	WATER, m <sup>3</sup> /h		
	SLURRY, m <sup>3</sup> /h		
	% SOLIDS	100.0	100.0
	SLURRY S.G.		
DESIGN	SOLIDS, TPH	250	250
	WATER, m <sup>3</sup> /h		
	SLURRY, m <sup>3</sup> /h		
	% SOLIDS	100.0	100.0
	SLURRY S.G.		

**LEGEND**

---	ALTERNATE
- - - -	WATER
—	PRODUCT
---	WASTE
---	FUTURE
	WATER
	STREAM



Source: adapted from Outotec, 2008

# APPENDIX 2.14

## Supplemental Material for Site Water Management

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## **APPENDIX 2.14-A**

**Detailed Key Parameters and Considerations used for  
the Water Balance Model**

**Table 2.14-A1. Input Data - Average Concentrations for Frac Sand Plant Overflow and Underflow**

RESULTS OF ANALYSIS	FRAC SAND PLANT OVERFLOW				FRAC SAND PLANT UNDERFLOW			
	FSTOF-1	FSTOF-2	AVERAGE <sup>1</sup>	MAXIMUM	FSTUF-1	FSTUF-2	AVERAGE <sup>1</sup>	MAXIMUM
Sample ID	L714607-1	L714607-2			L714613-1	L714613-2		
ALS Sample ID								
Matrix	Water	Water			Water	Water		
	mg/L	mg/L			mg/L	mg/L		
<b>Physical Tests</b>								
Hardness (as CaCO3)	149	194	171.5	194	192	142	167	192
Total Suspended Solids	<3.0	11.9	6.7	11.9	41.9	5.9	23.9	41.9
<b>Dissolved Metals</b>								
Aluminum (Al)-Dissolved	0.0069	0.0044	0.00565	0.0069	0.0057	0.0066	0.00615	0.0066
Antimony (Sb)-Dissolved	0.00148	0.00132	0.0014	0.00148	0.00137	0.00145	0.00141	0.00145
Arsenic (As)-Dissolved	0.000743	0.000813	0.000778	0.000813	0.000829	0.000653	0.000741	0.000829
Barium (Ba)-Dissolved	0.0503	0.0688	0.05955	0.0688	0.0696	0.0489	0.05925	0.0696
Beryllium (Be)-Dissolved	<0.00020	<0.00020	0.0001	0.0001	<0.00020	<0.00020	0.0001	0.0001
Bismuth (Bi)-Dissolved	<0.00050	<0.00050	0.00025	0.00025	<0.00050	<0.00050	0.00025	0.00025
Boron (B)-Dissolved	0.0444	0.07	0.0572	0.07	0.069	0.0408	0.0549	0.069
Cadmium (Cd)-Dissolved	0.00007	0.000068	0.000069	0.00007	0.000082	0.000066	0.000074	0.000082
Calcium (Ca)-Dissolved	38.2	48.7	43.45	48.7	48.1	36.8	42.45	48.1
Chromium (Cr)-Dissolved	0.00021	0.0003	0.000255	0.0003	0.00027	0.0002	0.000235	0.00027
Cobalt (Co)-Dissolved	0.00093	0.00096	0.000945	0.00096	0.00283	0.00087	0.00185	0.00283
Copper (Cu)-Dissolved	0.00385	0.00212	0.002985	0.00385	0.00292	0.00282	0.00287	0.00292
Iron (Fe)-Dissolved	<0.010	<0.010	0.005	0.005	<0.010	<0.010	0.005	0.005
Lead (Pb)-Dissolved	<0.000050	<0.000050	0.000025	0.000025	<0.000050	<0.000050	0.000025	0.000025
Lithium (Li)-Dissolved	0.0074	0.0131	0.01025	0.0131	0.0128	0.0068	0.0098	0.0128
Magnesium (Mg)-Dissolved	12.9	17.7	15.3	17.7	17.4	12	14.7	17.4
Manganese (Mn)-Dissolved	0.0182	0.0389	0.02855	0.0389	0.0864	0.0155	0.05095	0.0864
Mercury (Hg)-Dissolved	<0.000010	<0.000010	0.000005	0.000005	<0.000010	<0.000010	0.000005	0.000005
Molybdenum (Mo)-Dissolved	0.0123	0.0189	0.0156	0.0189	0.0189	0.0117	0.0153	0.0189
Nickel (Ni)-Dissolved	0.02	0.0276	0.0238	0.0276	0.0292	0.0188	0.024	0.0292
Phosphorus (P)-Dissolved	<0.30	<0.30	0.15	0.15	<0.30	<0.30	0.15	0.15
Potassium (K)-Dissolved	3.16	4.04	3.6	4.04	3.99	3	3.495	3.99
Selenium (Se)-Dissolved	0.0005	0.00035	0.000425	0.0005	0.00034	0.00047	0.000405	0.00047
Silicon (Si)-Dissolved	0.75	1.52	1.135	1.52	1.47	0.708	1.089	1.47
Silver (Ag)-Dissolved	0.000018	0.000021	0.0000195	0.000021	<0.000010	0.000027	0.000016	0.000027
Sodium (Na)-Dissolved	16.2	17.4	16.8	17.4	17.1	15.8	16.45	17.1
Strontium (Sr)-Dissolved	0.776	1.15	0.963	1.15	1.15	0.719	0.9345	1.15
Thallium (Tl)-Dissolved	0.000083	0.000052	0.0000675	0.000083	0.000051	0.000073	0.000062	0.000073
Tin (Sn)-Dissolved	<0.00010	<0.00010	0.00005	0.00005	<0.00010	<0.00010	0.00005	0.00005
Titanium (Ti)-Dissolved	<0.010	<0.010	0.005	0.005	<0.010	<0.010	0.005	0.005
Uranium (U)-Dissolved	0.00436	0.00656	0.00546	0.00656	0.00655	0.00402	0.005285	0.00655
Vanadium (V)-Dissolved	0.000141	0.000188	0.0001645	0.000188	0.000175	0.000138	0.0001565	0.000175
Zinc (Zn)-Dissolved	0.0084	0.0107	0.00955	0.0107	0.0132	0.0084	0.0108	0.0132

NOTE: 1 If the concentration was below the detection limit, half the detection limit was used to calculate the average.

Table 2.14-A2. Groundwater Quality Data (Golder, 2008b)

ASSUMED RATIO FOR GROUNDWATER FROM LIMESTONE TO GROUNDWATER FROM SANDSTONE FORMATION: 2.34

	SAMPLE ID	HG-3 LS	HG-7 LS	HG-7 LS	LIMESTONE AVERAGE <sup>1</sup>	LIMESTONE MAXIMUM <sup>1</sup>	LIMESTONE MINIMUM <sup>1</sup>	HG-3 SS	HG-3 SS	HG-7 SS	SANDSTONE AVERAGE <sup>1</sup>	SANDSTONE MAXIMUM <sup>1</sup>	SANDSTONE MINIMUM <sup>1</sup>	AVERAGE AUG-08
	Date Sampled	15-AUG-08	15-AUG-08	15-AUG-08	Aug-08	Aug-08	Aug-08	15-AUG-08	15-AUG-08	15-AUG-08	Aug-08	Aug-08	Aug-08	GROUNDWATER QUALITY  USED FOR MODELING
	Time Sampled		FDA	FD				FDA	FD					
PARAMETER	Lab Sample ID	L672682-1	L672682-3	L672682-6				L672682-2	L672682-5	L672682-4				
	Units	Water	Water	Water				Water	Water	Water				
Total Suspended Solids	mg/L	4.6	1.5	7.9	4.7	7.9	1.5	1.5	1.5	1.5	1.5	1.5	1.5	3.7
<b>Dissolved Elements</b>														
Aluminum (Al)-Dissolved	mg/L	0.0005	0.0005	0.0215	0.00750	0.0215	0.0005	0.0005	0.0344	0.0005	0.0118	0.0344	0.0005	
Antimony (Sb)-Dissolved	mg/L	0.000025	0.000025	0.000025	0.00003	0.000025	0.000025	0.000025	0.000025	0.000025	0.000025	0.000025	0.000025	
Arsenic (As)-Dissolved	mg/L	0.0011	0.000988	0.00122	0.00110	0.00122	0.000988	0.000218	0.000227	0.000162	0.000202333			0.000833
Cadmium (Cd)-Dissolved	mg/L	0.0000057	0.0000057	0.0000057	0.00001	0.0000057	0.0000057	0.0000057	0.0000057	0.0000057	0.00001	0.0000057	0.0000057	0.0000057
Chromium (Cr)-Dissolved	mg/L	0.001	0.001	<0.00070	0.001	0.001	0.001	0.00107	0.00092	0.001	0.00100	0.00107	0.00092	0.00100
Cobalt (Co)-Dissolved	mg/L	0.00016	0.00005	0.00005	0.00009	0.00016	0.00005	0.00005	0.00005	0.00014	0.00008	0.00014	0.00005	0.00008
Copper (Cu)-Dissolved	mg/L	0.00092	0.00049	0.00033	0.00058	0.00092	0.00033	0.00021	0.00034	0.00055	0.00037	0.00055	0.00021	0.00052
Iron (Fe)-Dissolved	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Lead (Pb)-Dissolved	mg/L	0.000025	0.000025	0.000025	0.00003	0.00003	0.00003	0.000025	0.000074	0.000025	0.000041	0.000074	0.000025	0.000030
Molybdenum (Mo)-Dissolved	mg/L	0.000418	0.00051	0.000525	0.000484	0.000525	0.000418	0.00112	0.0011	0.00108	0.00110	0.00112	0.00108	0.00067
Nickel (Ni)-Dissolved	mg/L	0.00112	0.00114	0.00075	0.00100	0.00114	0.00075	0.00033	0.00005	0.0012	0.00053	0.00120	0.00005	0.00086
Selenium (Se)-Dissolved	mg/L	0.0001	0.00013	0.0005		0.0005	0.0001	0.00005	0.00012	0.00011	0.00009	0.00012	0.00005	0.00020
Zinc (Zn)-Dissolved	mg/L		0.001	0.0026		0.0026		0.0127	0.0201	0.0038	0.01	0.02	0.004	



**Table 2.14-A3. Upstream Minago River Water Quality Data**

Sample ID		MRW2	MRW2	MRW2	MRW2	MRW2	MRW2X	MRW2X	MINIMUM	AVERAGE <sup>1</sup>	MAXIMUM
Date Sampled		16-May-07	13-Jun-07	17-Jul-07	15-Aug-07	14-Sep-07	16-Oct-07	07-May-08			
UTM (NAD 83) Easting		472484	472484	472484	472484	472476	472571	472571			
UTM (NAD 83) Northing		6001209	6001209	6001209	6001209	6001212	6001166	6001166			
Lab Sample ID		L507178-2	L518885-6	L532666-5	L544316-5	L555597-1	L569390-20	L632454-4			
	<b>Units</b>	Water	Water	Water	Water	Water	Water	Water			
Total Suspended Solids	mg/L	6.7	1.5	4.9	3.3	3.3	4	12.5	1.5	5.2	12.5
<b>Dissolved Elements</b>											
Aluminum (Al)-Dissolved	mg/L	0.0119	0.0135	0.0053	0.026	0.0037	0.0046	0.0194	<b>0.00370</b>	<b>0.01206</b>	<b>0.02600</b>
Antimony (Sb)-Dissolved	mg/L	0.00005	0.00005	0.00012	0.00005	0.000025	0.000025	0.000025	<b>0.00003</b>	<b>0.00005</b>	<b>0.00012</b>
Arsenic (As)-Dissolved	mg/L	0.00048	0.00063	0.00086	0.00072	0.000582	0.000497	0.000461	<b>0.00046</b>	<b>0.00060</b>	<b>0.00086</b>
Cadmium (Cd)-Dissolved	mg/L	0.000025	0.000025	0.000025	0.000025	0.0000085	0.0000085	0.0000085	<b>0.00001</b>	<b>0.00002</b>	<b>0.00003</b>
Chromium (Cr)-Dissolved	mg/L	0.00025	0.00025	0.00025	0.00025	0.00005	0.00035	0.0002	<b>0.00005</b>	<b>0.00023</b>	<b>0.00035</b>
Cobalt (Co)-Dissolved	mg/L	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	<b>0.00005</b>	<b>0.00005</b>	<b>0.00005</b>
Copper (Cu)-Dissolved	mg/L	0.00043	0.00049	0.00084	0.00033	0.00118	0.00028	0.00045	<b>0.00028</b>	<b>0.00057</b>	<b>0.00118</b>
Iron (Fe)-Dissolved	mg/L	0.055	0.071	0.102	0.117	0.052	0.047	0.041	<b>0.04100</b>	<b>0.06929</b>	<b>0.11700</b>
Lead (Pb)-Dissolved	mg/L	0.000025	0.000025	0.000224	0.000052	0.000025	0.000025	0.000025	<b>0.00003</b>	<b>0.00006</b>	<b>0.00022</b>
Molybdenum (Mo)-Dissolved	mg/L	0.000145	0.000156	0.000111	0.000126	0.000119	0.00010	0.000132	<b>0.00010</b>	<b>0.00013</b>	<b>0.00016</b>
Nickel (Ni)-Dissolved	mg/L	0.00025	0.00025	0.00585	0.00025	0.00032	0.00019	0.00029	<b>0.00019</b>	<b>0.00106</b>	<b>0.00585</b>
Selenium (Se)-Dissolved	mg/L	0.00025	0.00025	0.00025	0.00081	0.00005	0.00005	0.00005	<b>0.00005</b>	<b>0.00024</b>	<b>0.00081</b>
Zinc (Zn)-Dissolved	mg/L	0.0005	0.0005	0.0026	0.0005	0.0005	0.0005	0.0019	<b>0.00050</b>	<b>0.00100</b>	<b>0.00260</b>

**Note:**

1

If the sample concentration was less than the detection limit, half the detection limit was used to compute the average.

**Table 2.14-A4. Upstream Oakley Creek Water Quality Data (2006 – 2008)**

Sample ID		OCW-2A	OCW-2A	OCW-2A	OCW-2A	OCW-2A	OCW-2A	OCW-2A	Duplicate OCW2	OCW2	OCW2	OCW2	OCW2	OCW2	OCW2	MINIMUM	AVERAGE <sup>1</sup>	MAXIMUM
Date Sampled		May 16, 2006	Jun. 20, 2006	Jul. 18-20, 2006	Aug 22-24, 2006	Sep. 19-21, 2006	Oct. 12, 2006	16-May-07	16-May-07	12-Jun-07	15-Jul-07	15-Aug-07	14-Sep-07	16-Oct-07	07-May-08			
UTM (NAD 83) Easting		487559	487559	487559	487559	487559	487559	487344	487344	487344	487344	487344	487463	487463	487463			
UTM (NAD 83) Northing		5990974	5990974	5990974	5990974	5990974	5990974	5990878	5990878	5990878	5990878	5990878	5990961	5990961	5990961			
Lab Sample ID								L507178-6		L518885-2	L532666-1	L544316-1	L555597-6	L569390-19	L632454-2			
	Units	Water	Water	Water	Water	Water	Water	Water		Water	Water	Water	Water	Water	Water			
Total Suspended Solids	mg/L	1.0	<1	11.0	<1	1.0	<1	<3.0		<3.0	<3.0	<3.0	<1.0	3.5	4.5		4.20	
<b>Dissolved Elements</b>																		
Aluminum (Al)-Dissolved	mg/L	0.001800	0.002100	0.003600	0.003500	0.001800	0.001100	0.002400	0.00220	0.002800	0.002500	0.008700	0.001700	0.001200	0.0019	0.00110	0.00266	0.00870
Antimony (Sb)-Dissolved	mg/L	0.000025	0.000025	0.000025	0.000025	0.000025	0.000025	0.000050	0.00005	0.000050	0.000050	0.000050	0.000025	0.000025	0.000025	0.00003	0.00003	0.00005
Arsenic (As)-Dissolved	mg/L	0.000300	0.000300	0.000500	0.000600	0.000500	0.000400	0.000280	0.00029	0.000340	0.000580	0.000420	0.000303	0.000191	0.000259	0.00019	0.00038	0.00060
Cadmium (Cd)-Dissolved	mg/L	0.000010	0.000005	0.000005	0.000005	0.000005	0.000005	0.000025	0.00003	0.000025	0.000025	0.000025	0.000006	0.000006	0.0000057	0.00001	0.00001	0.00003
Chromium (Cr)-Dissolved	mg/L	0.000800	0.000050	0.000100	0.000050	0.000050	0.000500	0.000250	0.00025	0.000250	0.001000	0.000250	0.000050	0.000350	0.00015	0.00005	0.00029	0.00100
Cobalt (Co)-Dissolved	mg/L	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000050	0.00005	0.000050	0.000050	0.000050	0.000050	0.000050	0.00005	0.00001	0.00003	0.00005
Copper (Cu)-Dissolved	mg/L	0.000050	0.000100	0.000200	0.000050	0.000400	0.000050	0.000220	0.00018	0.000180	0.000130	0.000170	0.000250	0.000050	0.00014	0.00005	0.00016	0.00040
Iron (Fe)-Dissolved	mg/L	0.021	0.032	0.091	0.122	0.042	0.026	0.015	0.015	0.032	0.055	0.152	0.031	0.038	0.035	0.015	0.051	0.152
Lead (Pb)-Dissolved	mg/L	0.000030	0.000010	0.000020	0.000010	0.000010	0.000010	0.000025	0.00003	0.000025	0.000025	0.000025	0.000025	0.000025	0.000025	0.00001	0.00002	0.00003
Molybdenum (Mo)-Dissolved	mg/L	0.000090	0.000090	0.000110	0.000090	0.000090	0.000080	0.000102	0.00010	0.000102	0.000110	0.000096	0.000095	0.000092	0.000195	0.00008	0.00010	0.00020
Nickel (Ni)-Dissolved	mg/L	0.000250	0.000250	0.000250	0.000250	0.000250	0.000250	0.000250	0.00025	0.000250	0.000250	0.000250	0.000240	0.000100	0.00005	0.00005	0.00022	0.00025
Selenium (Se)-Dissolved	mg/L	0.000250	0.000250	0.000250	0.000250	0.000250	0.000250	0.000250	0.00025	0.000250	0.000250	0.000600	0.000050	0.000050	0.00005	0.00005	0.00023	0.00060
Zinc (Zn)-Dissolved	mg/L	0.000250	0.000250	0.000250	0.000250	0.000250	0.000250	0.001200	0.00110	0.000500	0.000500	0.001500	0.001200	0.000500	0.0005	0.00025	0.00061	0.00150

**Note:** 1 If the sample concentration was less than the detection limit, half the detection limit was used to compute the average.

Table 2.14-A5. Laboratory CCME Detection Limits

ELEMENT	mg/L
Aluminum (Al)-Dissolved	0.0050
Antimony (Sb)-Dissolved	0.0005
Arsenic (As)-Dissolved	0.0005
Cadmium (Cd)-Dissolved	0.000017
Chromium (Cr)-Dissolved	0.0010
Cobalt (Co)-Dissolved	0.0003
Copper (Cu)-Dissolved	0.0010
Iron (Fe)-Dissolved	0.0300
Lead (Pb)-Dissolved	0.0005
Molybdenum (Mo)-Dissolved	0.0010
Nickel (Ni)-Dissolved	0.0010
Selenium (Se)-Dissolved	0.0010
Zinc (Zn)-Dissolved	0.0050
Total Suspended Solids (TSS)	3.00

## **APPENDIX 2.14-B**

Water Balance Model Results for Year 1 through Year 4 Operations

## Projected Flows during Year 1 to Year 4 Operations

FLOW	Year 1			Year 2			Year 3			Year 4		
	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	
	NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER	NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER	NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER	NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER
	m <sup>3</sup> /day	m <sup>3</sup> /day	m <sup>3</sup> /day	m <sup>3</sup> /day	m <sup>3</sup> /day	m <sup>3</sup> /day	m <sup>3</sup> /day	m <sup>3</sup> /day	m <sup>3</sup> /day	m <sup>3</sup> /day	m <sup>3</sup> /day	
UNIT EVAPORATION	0	18	14	0	18	14	0	18	14	0	18	14
UNIT PPT (U-PPT)	0	41	21	0	41	21	0	41	21	0	41	21
Q1	31,999	31,999	31,999	31,999	31,999	31,999	31,999	31,999	31,999	31,999	31,999	31,999
Q2	5,724	5,724	5,724	5,724	5,724	5,724	5,724	5,724	5,724	5,724	5,724	5,724
Q3	26,276	26,276	26,276	26,276	26,276	26,276	26,276	26,276	26,276	26,276	26,276	26,276
Q4	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440
Q5	96	96	96	96	96	96	96	96	96	96	96	96
Q6	4,188	4,188	4,188	4,188	4,188	4,188	4,188	4,188	4,188	4,188	4,188	4,188
Q7	0	0	0	0	0	0	0	0	0	0	0	0
Q8	96	96	96	96	96	96	96	96	96	96	96	96
Q9	0	0	0	0	0	0	0	0	0	0	0	0
Q10	10,632	10,632	10,632	10,632	10,632	10,632	10,632	10,632	10,632	10,632	10,632	10,632
Q11	6	6	6	6	6	6	6	6	6	6	6	6
Q12	5	5	5	5	5	5	5	5	5	5	5	5
Q13	72	72	72	72	72	72	72	72	72	72	72	72
Q14	12	12	12	12	12	12	12	12	12	12	12	12
Q15	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440
Q16	72	72	72	72	72	72	72	72	72	72	72	72
Q17	24	24	24	24	24	24	24	24	24	24	24	24
Q19	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080
Q20	32,928	32,928	32,928	32,928	32,928	32,928	32,928	32,928	32,928	32,928	32,928	32,928
Q21	20,856	20,856	20,856	20,856	20,856	20,856	20,856	20,856	20,856	20,856	20,856	20,856
Q21x	0	0	0	0	0	0	0	0	0	0	0	0
Q22	12,072	12,072	12,072	12,072	12,072	12,072	12,072	12,072	12,072	12,072	12,072	12,072
Q23	0	676	103	0	676	103	0	676	103	0	676	103
Q24	2,892	2,892	2,892	2,892	2,892	2,892	2,892	2,892	2,892	2,892	2,892	2,892
Q25	772	772	772	772	772	772	772	772	772	772	772	772
Q26	15,736	16,412	15,839	15,736	16,412	15,839	15,736	16,412	15,839	15,736	16,412	15,839
Q - Liquid PPT on TWRMF	0	8,930	4,694	0	8,930	4,694	0	8,930	4,694	0	8,930	4,694
Q - Retained Water in Tailings Voids	726	1,467	1,467	1,467	1,467	1,467	1,467	1,467	1,467	1,467	1,467	1,467
Q - TWRMF Supernatant	15,010	55,342	23,084	20,372	55,342	23,084	20,372	55,342	23,084	20,372	55,342	23,084
Q27	8,907	19,907	15,951	14,269	19,907	15,951	14,269	19,907	15,951	14,269	19,907	15,951
Q - Pit Dewatering	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000
Q - Precipitation on Pit	0	7,723	4,059	0	7,723	4,059	0	7,723	4,059	0	7,723	4,059
Q28	8,000	15,723	12,059	8,000	15,723	12,059	8,000	15,723	12,059	8,000	15,723	12,059
Q29	43,183	128,057	54,285	48,545	137,557	54,285	48,545	134,654	54,285	48,545	131,751	54,285
Q - Precipitation on Polishing Pond	0	3,049	1,602	0	3,049	1,602	0	3,049	1,602	0	3,049	1,602
Q - Evaporation from Polishing Pond	0	1,355	1,063	0	1,355	1,063	0	1,355	1,063	0	1,355	1,063
Q30	43,183	129,751	54,824	48,545	139,250	54,824	48,545	136,348	54,824	48,545	133,445	54,824
Q31	10,632	10,632	10,632	10,632	10,632	10,632	10,632	10,632	10,632	10,632	10,632	10,632
Q32	21,158	119,119	44,192	24,643	128,618	44,192	24,643	125,716	44,192	24,643	122,813	44,192
Q33	21,158	83,383	30,935	24,643	90,033	30,935	24,643	88,001	30,935	24,643	85,969	30,935
Q34	69,120	864,000	164,160	69,120	864,000	164,160	69,120	864,000	164,160	69,120	864,000	164,160
Q35	90,278	947,383	195,095	93,763	954,033	195,095	93,763	952,001	195,095	93,763	949,969	195,095
Q36	0	35,736	13,258	0	38,585	13,258	0	37,715	13,258	0	36,844	13,258
Q37	0	345,600	43,200	0	345,600	43,200	0	345,600	43,200	0	345,600	43,200
Q38	0	381,336	56,458	0	384,185	56,458	0	383,315	56,458	0	382,444	56,458
<b>FLOW RATIOS:</b>												
Q33 / Q34	31%	10%	19%	36%	10%	19%	36%	10%	19%	36%	10%	19%
Q36 / Q37	0%	10%	31%	0%	11%	31%	0%	11%	31%	0%	11%	31%

## Projected Concentrations in Flows during Year 1 to Year 4 Operations

SCENARIO:	WATER QUALITY	ESTIMATED AVERAGE CONCENTRATION												REGULATIONS					
		Year 1			Year 2			Year 3			Year 4			Metal Mining Liquid Effluents (2002)	Manitoba Water Quality Standards, Objectives, and Guidelines (Williamson, 2002)		Canadian Water Quality Guidelines for the Protection of Aquatic Life (CCME, 2007)		
		Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate		Tier II Water Quality Objectives	Freshwater			
		NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER	NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER	NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER	NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER	Monthly Mean	Grab Sample	assuming hardness = 150 mg/L CaCO <sub>3</sub>			
PARAM.	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)							
Q26	TWRMF INFLOW	Al	0.515	0.494	0.512	0.515	0.494	0.512	0.515	0.494	0.512	0.515	0.494	0.512				0.005 - 0.1	0.005
Q26	TWRMF INFLOW	Sb	0.0042	0.0040	0.0041	0.0042	0.0040	0.0041	0.0042	0.0040	0.0041	0.0042	0.0040	0.0041					
Q26	TWRMF INFLOW	As	0.0032	0.0031	0.0032	0.0032	0.0031	0.0032	0.0032	0.0031	0.0032	0.0032	0.0031	0.0032	0.5	1	0.15 mg/L (4-Day, 3-Year) <sup>A</sup>	Tier II	0.005
Q26	TWRMF INFLOW	Cd	0.00078	0.00075	0.00078	0.00078	0.00075	0.00078	0.00078	0.00075	0.00078	0.00078	0.00075	0.00078			0.00302 <sup>B</sup>	Tier II	0.000017 or 10 <sup>(0.86log(hardness))-3.2</sup>
Q26	TWRMF INFLOW	Cr	0.0139	0.0133	0.0138	0.0139	0.0133	0.0138	0.0139	0.0133	0.0138	0.0139	0.0133	0.0138			0.10331 <sup>C</sup>	Tier II	
Q26	TWRMF INFLOW	Co	0.0110	0.0106	0.0109	0.0110	0.0106	0.0109	0.0110	0.0106	0.0109	0.0110	0.0106	0.0109					
Q26	TWRMF INFLOW	Cu	0.0367	0.0353	0.0365	0.0367	0.0353	0.0365	0.0367	0.0353	0.0365	0.0367	0.0353	0.0365	0.3	0.6	0.01266 <sup>D</sup>	Tier II	0.002
Q26	TWRMF INFLOW	Fe	2.42	2.32	2.40	2.42	2.32	2.40	2.42	2.32	2.40	2.42	2.32	2.40				0.3	0.3
Q26	TWRMF INFLOW	Pb	0.0061	0.0059	0.0061	0.0061	0.0059	0.0061	0.00614	0.00591	0.00611	0.00614	0.00591	0.00611	0.2	0.4	0.0039 <sup>E</sup>	Tier II	0.001
Q26	TWRMF INFLOW	Mo	0.0121	0.0116	0.0120	0.0121	0.0116	0.0120	0.0121	0.0116	0.0120	0.0121	0.0116	0.0120				0.073	
Q26	TWRMF INFLOW	Ni	0.550	0.528	0.547	0.550	0.528	0.547	0.550	0.528	0.547	0.550	0.528	0.547	0.5	1	0.07329 <sup>F</sup>	Tier II	0.025
Q26	TWRMF INFLOW	Se	0.0078	0.0075	0.0077	0.0078	0.0075	0.0077	0.0078	0.0075	0.0077	0.0078	0.0075	0.0077				0.001	0.001
Q26	TWRMF INFLOW	Zn	0.0330	0.0318	0.0328	0.0330	0.0318	0.0328	0.0330	0.0318	0.0328	0.0330	0.0318	0.0328	0.5	1	0.16657 <sup>G</sup>	Tier II	0.03
Q27	TWRMF Decant	Al	0.543	0.496	0.507	0.555	0.517	0.517	0.562	0.552	0.531	0.570	0.594	0.547				0.005 - 0.1	0.005
Q27	TWRMF Decant	Sb	0.004	0.004	0.004	0.005	0.004	0.004	0.005	0.005	0.004	0.005	0.005	0.005					
Q27	TWRMF Decant	As	0.004	0.003	0.003	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.005	0.004	0.5	1	0.15 mg/L (4-Day, 3-Year) <sup>A</sup>	Tier II	0.005
Q27	TWRMF Decant	Cd	0.00083	0.00076	0.00079	0.00087	0.00081	0.00081	0.00090	0.00088	0.00085	0.00093	0.00097	0.00090			0.00302 <sup>B</sup>	Tier II	0.000017 or 10 <sup>(0.86log(hardness))-3.2</sup>
Q27	TWRMF Decant	Cr	0.015	0.013	0.014	0.015	0.014	0.014	0.015	0.015	0.014	0.015	0.016	0.015			0.10331 <sup>C</sup>	Tier II	
Q27	TWRMF Decant	Co	0.012	0.011	0.011	0.012	0.011	0.011	0.012	0.012	0.011	0.012	0.013	0.012					
Q27	TWRMF Decant	Cu	0.039	0.036	0.037	0.040	0.038	0.038	0.041	0.040	0.039	0.042	0.044	0.041	0.3	0.6	0.01266 <sup>D</sup>	Tier II	0.002
Q27	TWRMF Decant	Fe	2.54	2.32	2.37	2.58	2.40	2.40	2.59	2.54	2.44	2.61	2.71	2.50				0.3	0.3
Q27	TWRMF Decant	Pb	0.007	0.006	0.006	0.007	0.007	0.007	0.0078	0.0078	0.0076	0.008	0.009	0.008	0.2	0.4	0.0039 <sup>E</sup>	Tier II	0.001
Q27	TWRMF Decant	Mo	0.013	0.012	0.012	0.014	0.013	0.013	0.014	0.014	0.014	0.015	0.016	0.015				0.073	
Q27	TWRMF Decant	Ni	0.578	0.527	0.539	0.590	0.549	0.548	0.594	0.583	0.560	0.600	0.625	0.575	0.5	1	0.07329 <sup>F</sup>	Tier II	0.025
Q27	TWRMF Decant	Se	0.008	0.008	0.008	0.008	0.008	0.008	0.009	0.009	0.008	0.009	0.009	0.009				0.001	0.001
Q27	TWRMF Decant	Zn	0.036	0.034	0.035	0.039	0.037	0.037	0.042	0.042	0.041	0.044	0.047	0.044	0.5	1	0.16657 <sup>G</sup>	Tier II	0.03

# Projected Concentrations in Flows during Year 1 to Year 4 Operations

2.14-10

SCENARIO:	FLOW	WATER QUALITY PARAM.	ESTIMATED AVERAGE CONCENTRATION												REGULATIONS				
			Year 1			Year 2			Year 3			Year 4			Metal Mining Liquid Effluents (2002)		Manitoba Water Quality Standards, Objectives, and Guidelines (Williamson, 2002)		Canadian Water Quality Guidelines for the Protection of Aquatic Life (CCME, 2007)
			Tailings only; max. tailings leaching rate	Tailings only; max. tailings leaching rate	Tailings only; max. tailings leaching rate	Tailings only; max. tailings leaching rate	Tailings only; max. tailings leaching rate	Tailings only; max. tailings leaching rate	Tailings only; max. tailings leaching rate	Tailings only; max. tailings leaching rate	Tailings only; max. tailings leaching rate	Tailings only; max. tailings leaching rate	Tailings only; max. tailings leaching rate	Tailings only; max. tailings leaching rate					
			NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER	NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER	NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER	NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER	Monthly Mean	Grab Sample	TIER II Water Quality Objectives assuming hardness = 150 mg/L CaCO <sub>3</sub>	Freshwater	
Q29	POLISHING POND INFLOW	Al	0.119	0.141	0.155	0.169	0.171	0.158	0.171	0.176	0.162	0.174	0.183	0.167				0.005 - 0.1	
Q29	POLISHING POND INFLOW	Sb	0.00092	0.00115	0.00129	0.00135	0.00139	0.00132	0.00136	0.00144	0.00135	0.00138	0.00150	0.00139					
Q29	POLISHING POND INFLOW	As	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.5	1	0.15 mg/L (4-Day, 3-Year) <sup>A</sup>	Tier II	0.005
Q29	POLISHING POND INFLOW	Cd	0.000177	0.000213	0.000238	0.000260	0.000263	0.000244	0.000268	0.000277	0.000256	0.000277	0.000293	0.000268			0.00302 <sup>B</sup>	Tier II	0.000017 or <sub>10</sub> <sup>[0.86(log(hardness))-3.22]</sup>
Q29	POLISHING POND INFLOW	Cr	0.004	0.004	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005			0.10331 <sup>C</sup>	Tier II	
Q29	POLISHING POND INFLOW	Co	0.00245	0.00295	0.00327	0.00353	0.00357	0.00331	0.00355	0.00368	0.00338	0.00358	0.00380	0.00346					
Q29	POLISHING POND INFLOW	Cu	0.00844	0.01010	0.01113	0.01217	0.01231	0.01145	0.0124	0.0129	0.0119	0.01272	0.01347	0.01232	0.3	0.6	0.01266 <sup>D</sup>	Tier II	0.002
Q29	POLISHING POND INFLOW	Fe	0.527	0.636	0.702	0.762	0.769	0.710	0.765	0.790	0.724	0.769	0.814	0.739				0.3	0.3
Q29	POLISHING POND INFLOW	Pb	0.00141	0.00173	0.00193	0.00216	0.00222	0.00210	0.00233	0.00244	0.00229	0.00250	0.00269	0.00250	0.2	0.4	0.0039 <sup>E</sup>	Tier II	0.001
Q29	POLISHING POND INFLOW	Mo	0.003	0.004	0.004	0.005	0.005	0.004	0.005	0.005	0.005	0.005	0.005	0.005				0.073	
Q29	POLISHING POND INFLOW	Ni	0.120	0.144	0.159	0.174	0.175	0.162	0.175	0.181	0.165	0.177	0.187	0.170	0.5	1	0.07329 <sup>F</sup>	Tier II	0.025
Q29	POLISHING POND INFLOW	Se	0.0018	0.0023	0.0025	0.0026	0.0027	0.0026	0.0027	0.0028	0.0026	0.0027	0.0029	0.0027				0.001	0.001
Q29	POLISHING POND INFLOW	Zn	0.011	0.012	0.013	0.015	0.015	0.014	0.015	0.016	0.015	0.016	0.017	0.016	0.5	1	0.16657 <sup>G</sup>	Tier II	0.03

**Notes:**

August 2008 groundwater chemistry was assumed in the modeling.

A Arsenic III 0.15 mg/L for averaging duration 4 days (4-Day, 3-Year or 7Q10 Design Flow); 0.34 mg/L for averaging duration 1 hr (1-Day, 3-Year or 1Q10 Design Flow)

B Cadmium  $[e^{0.7852[\ln(\text{Hardness})]-2.715}][1.101672-\{\ln(\text{Hardness})(0.041838)\}]$  for 4 days averaging duration.  
 $[e^{1.128[\ln(\text{Hardness})]-3.6867}][1.136672-\{\ln(\text{Hardness})(0.041838)\}]$  for 1 hour averaging duration.

C Chromium Chromium III:  $[e^{0.8190[\ln(\text{Hardness})]+0.6848}][0.860]$  for 4 days averaging duration.  
 Chromium III:  $[e^{0.8190[\ln(\text{Hardness})]+3.7256}][0.316]$  for 1 hour averaging duration.  
 Chromium VI: 0.011 mg/L for averaging duration 4 days (4-Day, 3-Year or 7Q10 Design Flow); 0.016 mg/L for averaging duration 1 hr (1-Day, 3-Year or 1Q10 Design Flow)

D Copper III  $[e^{0.8545[\ln(\text{Hardness})]-1.702}][0.960]$  for 4 Days hour averaging duration.  
 $[e^{0.9422[\ln(\text{Hardness})]-1.700}][0.960]$  for 1 hour averaging duration.

E Lead limit  $[e^{1.273[\ln(\text{Hardness})]-4.705}][1.46203 -\{\ln(\text{Hardness})(0.145712)\}]$  for 4 Days averaging duration.  
 $[e^{1.273[\ln(\text{Hardness})]-1.460}][1.46203 -\{\ln(\text{Hardness})(0.145712)\}]$  for 1 hour averaging duration.

F Nickel lim  $[e^{0.8460[\ln(\text{Hardness})]+0.0584}][0.997]$  for 4 Days averaging duration.  
 $[e^{0.8460[\ln(\text{Hardness})]+2.255}][0.998]$  for 1 hour averaging duration.

G Zinc limits  $[e^{0.8473[\ln(\text{Hardness})]+0.884}][0.976]$  for 4 Days averaging duration.  
 $[e^{0.8473[\ln(\text{Hardness})]+0.884}][0.978]$  for 1 hour averaging duration.

## **APPENDIX 2.14-C**

Water Balance Model Results for Year 5 through Year 8 Operations



# Projected Flows during Year 5 to Year 8 Operations

2.14-12

FLOW	Year 5			Year 6			Year 7			Year 8		
	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate
	NOVEMBER TO APRIL  m <sup>3</sup> /day	MAY  m <sup>3</sup> /day	JUNE TO OCTOBER  m <sup>3</sup> /day	NOVEMBER TO APRIL  m <sup>3</sup> /day	MAY  m <sup>3</sup> /day	JUNE TO OCTOBER  m <sup>3</sup> /day	NOVEMBER TO APRIL  m <sup>3</sup> /day	MAY  m <sup>3</sup> /day	JUNE TO OCTOBER  m <sup>3</sup> /day	NOVEMBER TO APRIL  m <sup>3</sup> /day	MAY  m <sup>3</sup> /day	JUNE TO OCTOBER  m <sup>3</sup> /day
UNIT EVAPORATION	0	18	14	0	18	14	0	18	14	0	18	14
UNIT PPT (U-PPT)	0	41	21	0	41	21	0	41	21	0	41	21
Q1 FLOW FROM DEWATERING WELLS	31,999	31,999	31,999	31,999	31,999	31,999	31,999	31,999	31,999	31,999	31,999	31,999
Q2 WELL WATER FOR PROCESSING	5,724	5,724	5,724	5,724	5,724	5,724	5,724	5,724	5,724	5,724	5,724	5,724
Q3 EXCESS WATER FROM DEWATERING WELLS	26,276	26,276	26,276	26,276	26,276	26,276	26,276	26,276	26,276	26,276	26,276	26,276
Q4 GROUNDWATER TO OTHER OPERATIONS	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440
Q5 GROUNDWATER TO WATER TREATMENT	96	96	96	96	96	96	96	96	96	96	96	96
Q6 GROUNDWATER TO FRAC SAND PLANT	4,188	4,188	4,188	4,188	4,188	4,188	4,188	4,188	4,188	4,188	4,188	4,188
Q7 GROUNDWATER FOR FIRE FIGHTING	0	0	0	0	0	0	0	0	0	0	0	0
Q8 POTABLE WATER	96	96	96	96	96	96	96	96	96	96	96	96
Q9 WATER TREATMENT PLANT WASTE	0	0	0	0	0	0	0	0	0	0	0	0
Q10 RECYCLE WATER FROM FPP	10,632	10,632	10,632	10,632	10,632	10,632	10,632	10,632	10,632	10,632	10,632	10,632
Q11 POTABLE WATER TO MILL	6	6	6	6	6	6	6	6	6	6	6	6
Q12 POTABLE WATER TO OTHER OPERATIONS	5	5	5	5	5	5	5	5	5	5	5	5
Q13 POTABLE WATER TO OFFICES & CAMP	72	72	72	72	72	72	72	72	72	72	72	72
Q14 POTABLE WATER TO FRAC SAND PLANT	12	12	12	12	12	12	12	12	12	12	12	12
Q15 FLOW FROM OPERATIONS TO MILL	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440
Q16 SEWAGE & GREY WATER FROM CAMP AND OFFICES	72	72	72	72	72	72	72	72	72	72	72	72
Q17 SEWAGE & GREY WATER FROM ALL OTHER ON SITE SOURCES	24	24	24	24	24	24	24	24	24	24	24	24
Q19 FLOW FROM CONCENTRATE THICKENER IN MILL TO MILL	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080
Q20 FLOW FROM MILL TO MILL THICKENER	32,928	32,928	32,928	32,928	32,928	32,928	32,928	32,928	32,928	32,928	32,928	32,928
Q21 RECYCLE WATER FROM MILL THICKENER	20,856	20,856	20,856	20,856	20,856	20,856	20,856	20,856	20,856	20,856	20,856	20,856
Q21x ALTERNATE FLOW FOR RECYCLE WATER FROM MILL THICKENER	0	0	0	0	0	0	0	0	0	0	0	0
Q22 MILL TAILINGS SLURRY	12,072	12,072	12,072	12,072	12,072	12,072	12,072	12,072	12,072	12,072	12,072	12,072
Q23 SEWAGE TREATMENT OUTFLOW	0	676	103	0	676	103	0	676	103	0	676	103
Q24 LIQ. WASTE FROM FSP	2,892	2,892	2,892	2,892	2,892	2,892	2,892	2,892	2,892	2,892	2,892	2,892
Q25 SLURRY FROM FSP	772	772	772	772	772	772	772	772	772	772	772	772
Q26 TWRMF INFLOW	15,736	16,412	15,839	15,736	16,412	15,839	15,736	16,412	15,839	15,736	16,412	15,839
Q - Liquid PPT on TWRMF	0	8,930	4,694	0	8,930	4,694	0	8,930	4,694	0	8,930	4,694
Q - Retained Water in Tailings Voids	1,467	1,467	1,467	1,467	1,467	1,467	1,467	1,467	1,467	1,467	1,467	1,467
Q - TWRMF Supernatant	20,372	55,342	23,084	20,372	55,342	23,084	20,372	55,342	23,084	20,372	55,342	23,084
Q27 TWRMF Decant	14,269	19,907	15,951	14,269	19,907	15,951	14,269	19,907	15,951	14,269	19,907	15,951
Q - Pit Dewatering	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000
Q - Precipitation on Pit	0	7,723	4,059	0	7,723	4,059	0	7,723	4,059	0	7,723	4,059
Q28 TOT. OPEN PIT DEWATERING	8,000	15,723	12,059	8,000	15,723	12,059	8,000	15,723	12,059	8,000	15,723	12,059
Q29 POLISHING POND INFLOW	48,545	128,848	54,285	48,545	128,848	54,285	48,545	128,848	54,285	48,545	128,848	54,285
Q - Precipitation on Polishing Pond	0	3,049	1,602	0	3,049	1,602	0	3,049	1,602	0	3,049	1,602
Q - Evaporation from Polishing Pond	0	1,355	1,063	0	1,355	1,063	0	1,355	1,063	0	1,355	1,063
Q30 POLISHING POND OUTFLOW	48,545	130,542	54,824	48,545	127,639	54,824	48,545	124,737	54,824	48,545	123,337	54,824
Q31 RECYCLE FROM FINAL POLISHING POND	10,632	10,632	10,632	10,632	10,632	10,632	10,632	10,632	10,632	10,632	10,632	10,632
Q32 DISCHARGE PIPELINE	24,643	119,910	44,192	24,643	117,007	44,192	24,643	114,105	44,192	24,643	112,705	44,192
Q33 DISCHARGE TO MINAGO	24,643	83,937	30,935	24,643	81,905	30,935	24,643	79,873	30,935	24,643	78,894	30,935
Q34 MINAGO UPSTREAM	69,120	864,000	164,160	69,120	864,000	164,160	69,120	864,000	164,160	69,120	864,000	164,160
Q35 MINAGO DOWNSTREAM	93,763	947,937	195,095	93,763	945,905	195,095	93,763	943,873	195,095	93,763	942,894	195,095
Q36 DISCHARGE TO OAKLEY CREEK	0	35,973	13,258	0	35,102	13,258	0	34,231	13,258	0	33,812	13,258
Q37 OAKLEY CREEK UPSTREAM	0	345,600	43,200	0	345,600	43,200	0	345,600	43,200	0	345,600	43,200
Q38 OAKLEY CREEK DOWNSTREAM	0	381,573	56,458	0	380,702	56,458	0	379,831	56,458	0	379,412	56,458
<b>FLOW RATIOS:</b>												
Q33 / Q34	RATIO OF DISCHARGE TO MINAGO TO FLOW IN MINAGO			36%	10%	19%	36%	9%	19%	36%	9%	19%
Q36 / Q37	RATIO OF DISCHARGE TO OAKLEY CK TO FLOW IN OAKLEY CK			0%	10%	31%	0%	10%	31%	0%	10%	31%

## Projected Concentrations in Flows during Year 5 to Year 8 Operations

SCENARIO:	FLOW	WATER QUALITY PARAM.	ESTIMATED AVERAGE CONCENTRATION												REGULATIONS					
			Year 5			Year 6			Year 7			Year 8			Metal Mining Liquid Effluents (2002)		Manitoba Water Quality Standards, Objectives, and Guidelines (Williamson, 2002)		Canadian Water Quality Guidelines for the Protection of Aquatic Life (CCME, 2007)	
			Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate						
			NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER	NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER	NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER	NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER	Monthly Mean	Grab Sample	TIER II Water Quality Objectives	Freshwater		
(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)			assuming hardness = 150 mg/L CaCO <sub>3</sub>					
	Q26	TWRMF INFLOW	Al	0.515	0.494	0.512	0.515	0.494	0.512	0.515	0.494	0.512	0.515	0.494	0.512				0.005 - 0.1	0.005
	Q26	TWRMF INFLOW	Sb	0.0042	0.0040	0.0041	0.0042	0.0040	0.0041	0.0042	0.0040	0.0041	0.0042	0.0040	0.0041					
	Q26	TWRMF INFLOW	As	0.0032	0.0031	0.0032	0.0032	0.0031	0.0032	0.0032	0.0031	0.0032	0.0032	0.0031	0.0032	0.5	1	0.15 mg/L (4-Day, 3-Year) <sup>A</sup>	Tier II	0.005
	Q26	TWRMF INFLOW	Cd	0.00078	0.00075	0.00078	0.00078	0.00075	0.00078	0.00078	0.00075	0.00078	0.00078	0.00075	0.00078			0.00302 <sup>B</sup>	Tier II	0.000017 or <sub>10</sub> <sup>(0.86[log(hardness)]-3.2)</sup>
	Q26	TWRMF INFLOW	Cr	0.0139	0.0133	0.0138	0.0139	0.0133	0.0138	0.0139	0.0133	0.0138	0.0139	0.0133	0.0138			0.10331 <sup>C</sup>	Tier II	
	Q26	TWRMF INFLOW	Co	0.0110	0.0106	0.0109	0.0110	0.0106	0.0109	0.0110	0.0106	0.0109	0.0110	0.0106	0.0109					
	Q26	TWRMF INFLOW	Cu	0.0367	0.0353	0.0365	0.0367	0.0353	0.0365	0.0367	0.0353	0.0365	0.0367	0.0353	0.0365	0.3	0.6	0.01266 <sup>D</sup>	Tier II	0.002
	Q26	TWRMF INFLOW	Fe	2.42	2.32	2.40	2.42	2.32	2.40	2.42	2.32	2.40	2.42	2.32	2.40				0.3	0.3
	Q26	TWRMF INFLOW	Pb	0.0061	0.0059	0.0061	0.0061	0.0059	0.0061	0.00614	0.00591	0.00611	0.00614	0.00591	0.00611	0.2	0.4	0.0039 <sup>E</sup>	Tier II	0.001
	Q26	TWRMF INFLOW	Mo	0.0121	0.0116	0.0120	0.0121	0.0116	0.0120	0.0121	0.0116	0.0120	0.0121	0.0116	0.0120				0.073	
	Q26	TWRMF INFLOW	Ni	0.550	0.528	0.547	0.550	0.528	0.547	0.550	0.528	0.547	0.550	0.528	0.547	0.5	1	0.07329 <sup>F</sup>	Tier II	0.025
	Q26	TWRMF INFLOW	Se	0.0078	0.0075	0.0077	0.0078	0.0075	0.0077	0.0078	0.0075	0.0077	0.0078	0.0075	0.0077				0.001	0.001
	Q26	TWRMF INFLOW	Zn	0.0330	0.0318	0.0328	0.0330	0.0318	0.0328	0.0330	0.0318	0.0328	0.0330	0.0318	0.0328	0.5	1	0.16657 <sup>G</sup>	Tier II	0.03
	Q27	TWRMF Decant	Al	0.578	0.643	0.565	0.587	0.703	0.587	0.597	0.777	0.613	0.607	0.824	0.629				0.005 - 0.1	0.005
	Q27	TWRMF Decant	Sb	0.005	0.005	0.005	0.005	0.006	0.005	0.005	0.006	0.005	0.005	0.007	0.005					
	Q27	TWRMF Decant	As	0.004	0.005	0.005	0.005	0.006	0.005	0.007	0.005	0.005	0.007	0.006	0.006	0.5	1	0.15 mg/L (4-Day, 3-Year) <sup>A</sup>	Tier II	0.005
	Q27	TWRMF Decant	Cd	0.00096	0.00107	0.00094	0.00099	0.00119	0.00100	0.00103	0.00134	0.00106	0.00106	0.00144	0.00110			0.00302 <sup>B</sup>	Tier II	0.000017 or <sub>10</sub> <sup>(0.86[log(hardness)]-3.2)</sup>
	Q27	TWRMF Decant	Cr	0.015	0.017	0.015	0.016	0.019	0.016	0.016	0.021	0.016	0.016	0.022	0.017			0.10331 <sup>C</sup>	Tier II	
	Q27	TWRMF Decant	Co	0.012	0.013	0.012	0.012	0.015	0.012	0.012	0.016	0.013	0.013	0.017	0.013					
	Q27	TWRMF Decant	Cu	0.043	0.048	0.042	0.044	0.053	0.044	0.045	0.059	0.047	0.046	0.063	0.048	0.3	0.6	0.01266 <sup>D</sup>	Tier II	0.002
	Q27	TWRMF Decant	Fe	2.62	2.92	2.56	2.64	3.16	2.64	2.67	3.47	2.74	2.70	3.67	2.80				0.3	0.3
	Q27	TWRMF Decant	Pb	0.009	0.010	0.009	0.010	0.012	0.010	0.0104	0.0136	0.0108	0.011	0.015	0.011	0.2	0.4	0.0039 <sup>E</sup>	Tier II	0.001
	Q27	TWRMF Decant	Mo	0.016	0.018	0.016	0.017	0.020	0.017	0.018	0.023	0.018	0.018	0.025	0.019				0.073	
	Q27	TWRMF Decant	Ni	0.607	0.674	0.592	0.614	0.734	0.612	0.622	0.809	0.637	0.631	0.856	0.653	0.5	1	0.07329 <sup>F</sup>	Tier II	0.025
	Q27	TWRMF Decant	Se	0.009	0.010	0.009	0.009	0.011	0.009	0.009	0.012	0.010	0.009	0.013	0.010				0.001	0.001
	Q27	TWRMF Decant	Zn	0.047	0.053	0.048	0.050	0.061	0.052	0.053	0.070	0.056	0.056	0.076	0.059	0.5	1	0.16657 <sup>G</sup>	Tier II	0.03

# Projected Concentrations in Flows during Year 5 to Year 8 Operations

SCENARIO:	WATER QUALITY	PARAM.	ESTIMATED AVERAGE CONCENTRATION												REGULATIONS				
			Year 5			Year 6			Year 7			Year 8			Metal Mining Liquid Effluents (2002)		Manitoba Water Quality Standards, Objectives, and Guidelines (Williamson, 2002)		Canadian Water Quality Guidelines for the Protection of Aquatic Life (CCME, 2007)
			Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate					
			NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER	NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER	NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER	NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER	Monthly Mean	Grab Sample	TIER II Water Quality Objectives assuming hardness = 150 mg/L CaCO <sub>3</sub>	Freshwater	
(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)							
Q29	POLISHING POND INFLOW	Al	0.176	0.190	0.172	0.179	0.199	0.178	0.182	0.208	0.186	0.185	0.215	0.191				0.005 - 0.1	0.005
Q29	POLISHING POND INFLOW	Sb	0.00140	0.00156	0.00143	0.00142	0.00163	0.00149	0.00145	0.00171	0.00155	0.00147	0.00176	0.00159					
Q29	POLISHING POND INFLOW	As	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.5	1	0.15 mg/L (4-Day, 3-Year) <sup>A</sup>	Tier II	0.005
Q29	POLISHING POND INFLOW	Cd	0.000286	0.000311	0.000282	0.000296	0.000331	0.000298	0.000307	0.000353	0.000317	0.000315	0.000369	0.000328			0.00302 <sup>B</sup>	Tier II	0.000017 or $10^{(0.86[\log(\text{hardness}]-3.2)}$
Q29	POLISHING POND INFLOW	Cr	0.005	0.006	0.005	0.005	0.006	0.005	0.005	0.006	0.005	0.005	0.006	0.006			0.10331 <sup>C</sup>	Tier II	
Q29	POLISHING POND INFLOW	Co	0.00361	0.00393	0.00356	0.00365	0.00408	0.00367	0.00370	0.00426	0.00381	0.00374	0.00439	0.00390					
Q29	POLISHING POND INFLOW	Cu	0.01302	0.01414	0.01283	0.01334	0.01490	0.01343	0.0137	0.0158	0.0141	0.01397	0.01635	0.01455	0.3	0.6	0.01266 <sup>D</sup>	Tier II	0.002
Q29	POLISHING POND INFLOW	Fe	0.774	0.840	0.758	0.781	0.871	0.781	0.788	0.908	0.809	0.797	0.932	0.827				0.3	0.3
Q29	POLISHING POND INFLOW	Pb	0.00269	0.00295	0.00272	0.00287	0.00324	0.00296	0.00306	0.00357	0.00324	0.00320	0.00379	0.00340	0.2	0.4	0.0039 <sup>E</sup>	Tier II	0.001
Q29	POLISHING POND INFLOW	Mo	0.005	0.006	0.005	0.005	0.006	0.006	0.006	0.007	0.006	0.006	0.007	0.006				0.073	
Q29	POLISHING POND INFLOW	Ni	0.179	0.194	0.175	0.181	0.202	0.181	0.183	0.211	0.188	0.186	0.217	0.192	0.5	1	0.07329 <sup>F</sup>	Tier II	0.025
Q29	POLISHING POND INFLOW	Se	0.0027	0.0030	0.0028	0.0028	0.0031	0.0029	0.0028	0.0033	0.0030	0.0029	0.0034	0.0031				0.001	0.001
Q29	POLISHING POND INFLOW	Zn	0.017	0.019	0.017	0.018	0.020	0.018	0.019	0.022	0.020	0.020	0.023	0.021	0.5	1	0.18657 <sup>G</sup>	Tier II	0.03

**Notes:**

August 2008 groundwater chemistry was assumed in the modeling.

A Arsenic limits: 0.15 mg/L for averaging duration 4 days (4-Day, 3-Year or 7Q10 Design Flow); 0.34 mg/L for averaging duration 1 hr (1-Day, 3-Year or 1Q10 Design Flow)

B Cadmium limit:  $[e^{(0.7852[\ln(\text{Hardness}]-2.715)}] \times [1.101672 - \{\ln(\text{Hardness})(0.041838)\}]$  for 4 days averaging duration.  
 $[e^{(1.128[\ln(\text{Hardness}]-3.6867)}] \times [1.136672 - \{\ln(\text{Hardness})(0.041838)\}]$  for 1 hour averaging duration.

C Chromium limit Chromium III:  $[e^{(0.8190[\ln(\text{Hardness}]+0.6848)}] \times [0.860]$  for 4 days averaging duration.  
 Chromium III:  $[e^{(0.8190[\ln(\text{Hardness}]+3.7256)}] \times [0.316]$  for 1 hour averaging duration.  
 Chromium VI: 0.011 mg/L for averaging duration 4 days (4-Day, 3-Year or 7Q10 Design Flow); 0.016 mg/L for averaging duration 1 hr (1-Day, 3-Year or 1Q10 Design Flow)

D Copper limits:  $[e^{(0.8545[\ln(\text{Hardness}]-1.702)}] \times [0.960]$  for 4 Days hour averaging duration.  
 $[e^{(0.9422[\ln(\text{Hardness}]-1.700)}] \times [0.960]$  for 1 hour averaging duration.

E Lead limits:  $[e^{(1.273[\ln(\text{Hardness}]-4.705)}] \times [1.46203 - \{\ln(\text{Hardness})(0.145712)\}]$  for 4 Days averaging duration.  
 $[e^{(1.273[\ln(\text{Hardness}]-1.460)}] \times [1.46203 - \{\ln(\text{Hardness})(0.145712)\}]$  for 1 hour averaging duration.

F Nickel limits:  $[e^{(0.8460[\ln(\text{Hardness}]+0.0584)}] \times [0.997]$  for 4 Days averaging duration.  
 $[e^{(0.8460[\ln(\text{Hardness}]+2.255)}] \times [0.998]$  for 1 hour averaging duration.

G Zinc limits:  $[e^{(0.8473[\ln(\text{Hardness}]+0.884)}] \times [0.978]$  for 4 Days averaging duration.  
 $[e^{(0.8473[\ln(\text{Hardness}]+0.884)}] \times [0.978]$  for 1 hour averaging duration.

## **APPENDIX 2.14-D**

Water Balance Model Results for Year 9 and Year 10 Operations

# Projected Concentrations in Flows during Year 9 and Year 10 Operations

SCENARIO:		WATER QUALITY PARAM.	ESTIMATED AVERAGE CONCENTRATION						REGULATIONS					
			Year 9			Year 10			(2002)		TIER II Water Quality Objectives assuming hardness = 150 mg/L CaCO <sub>3</sub>		Freshwater	the Protection of Aquatic Life (CCME, 2007)
			Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate						
			NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER	NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER						
<b>FLOW</b>			(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)						
Q26	TWRMF INFLOW	Al	0.006	0.006	0.006	0.006	0.006	0.006					0.005 - 0.1	0.005
Q26	TWRMF INFLOW	Sb	0.0014	0.0013	0.0014	0.0014	0.0013	0.0014						
Q26	TWRMF INFLOW	As	0.0008	0.0007	0.0008	0.0008	0.0007	0.0008	0.5	1	0.15 mg/L (4-Day, 3-Year) <sup>A</sup>	Tier II	0.005	
Q26	TWRMF INFLOW	Cd	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007			0.00302 <sup>B</sup>	Tier II	0.000017 or 10 <sup>(0.86(log(hardness))-3.2)</sup>	
Q26	TWRMF INFLOW	Cr	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003			0.10331 <sup>C</sup>	Tier II		
Q26	TWRMF INFLOW	Co	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011						
Q26	TWRMF INFLOW	Cu	0.0030	0.0028	0.0029	0.0030	0.0028	0.0029	0.3	0.6	0.01266 <sup>D</sup>	Tier II	0.002	
Q26	TWRMF INFLOW	Fe	0.01	0.01	0.01	0.01	0.01	0.01				0.3	0.3	
Q26	TWRMF INFLOW	Pb	0.0000	0.0001	0.0000	0.0000	0.0001	0.0000	0.2	0.4	0.0039 <sup>E</sup>	Tier II	0.001	
Q26	TWRMF INFLOW	Mo	0.0155	0.0143	0.0153	0.0155	0.0143	0.0153					0.073	
Q26	TWRMF INFLOW	Ni	0.024	0.022	0.024	0.024	0.022	0.024	0.5	1	0.07329 <sup>F</sup>	Tier II	0.025	
Q26	TWRMF INFLOW	Se	0.0004	0.0005	0.0004	0.0004	0.0005	0.0004					0.001	
Q26	TWRMF INFLOW	Zn	0.0098	0.0094	0.0098	0.0098	0.0094	0.0098	0.5	1	0.16657 <sup>G</sup>	Tier II	0.03	
Q27	TWRMF Decant	Al	0.448	0.370	0.257	0.215	0.185	0.151					0.005 - 0.1	0.005
Q27	TWRMF Decant	Sb	0.004	0.004	0.003	0.003	0.003	0.002						
Q27	TWRMF Decant	As	0.006	0.006	0.005	0.006	0.005	0.005	0.5	1	0.15 mg/L (4-Day, 3-Year) <sup>A</sup>	Tier II	0.005	
Q27	TWRMF Decant	Cd	0.00099	0.00086	0.00074	0.00074	0.00063	0.00061			0.00302 <sup>B</sup>	Tier II	0.000017 or 10 <sup>(0.86(log(hardness))-3.2)</sup>	
Q27	TWRMF Decant	Cr	0.011	0.009	0.006	0.005	0.004	0.003			0.10331 <sup>C</sup>	Tier II		
Q27	TWRMF Decant	Co	0.009	0.007	0.005	0.004	0.004	0.003						
Q27	TWRMF Decant	Cu	0.039	0.034	0.027	0.026	0.023	0.021	0.3	0.6	0.01266 <sup>D</sup>	Tier II	0.002	
Q27	TWRMF Decant	Fe	1.77	1.43	0.85	0.55	0.45	0.29				0.3	0.3	
Q27	TWRMF Decant	Pb	0.013	0.012	0.012	0.013	0.012	0.012	0.2	0.4	0.0039 <sup>E</sup>	Tier II	0.001	
Q27	TWRMF Decant	Mo	0.025	0.023	0.024	0.028	0.025	0.025					0.073	
Q27	TWRMF Decant	Ni	0.447	0.366	0.241	0.190	0.161	0.124	0.5	1	0.07329 <sup>F</sup>	Tier II	0.025	
Q27	TWRMF Decant	Se	0.007	0.006	0.005	0.004	0.003	0.003					0.001	
Q27	TWRMF Decant	Zn	0.068	0.063	0.063	0.071	0.064	0.064	0.5	1	0.16657 <sup>G</sup>	Tier II	0.03	

# Projected Concentrations in Flows during Year 9 and Year 10 Operations

SCENARIO:  FLOW	WATER QUALITY PARAM.	ESTIMATED AVERAGE CONCENTRATION						REGULATIONS					
		Year 9			Year 10			(2002)		TIER II Water Quality Objectives		the Protection of Aquatic Life (CCME, 2007)	
		Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate						
		NOVEMBER TO APRIL (mg/L)	MAY (mg/L)	JUNE TO OCTOBER (mg/L)	NOVEMBER TO APRIL (mg/L)	MAY (mg/L)	JUNE TO OCTOBER (mg/L)	Monthly Mean	Grab Sample	assuming hardness = 150 mg/L CaCO <sub>3</sub>	Freshwater		
Q29	POLISHING POND INFLOW	Al	0.448	0.370	0.257	0.215	0.206	0.151				0.005 - 0.1	0.005
Q29	POLISHING POND INFLOW	Sb	0.00422	0.00368	0.00305	0.00289	0.00281	0.00245					
Q29	POLISHING POND INFLOW	As	0.006	0.006	0.005	0.006	0.006	0.005	0.5	1	0.15 mg/L (4-Day, 3-Year) <sup>A</sup>	Tier II	0.005
Q29	POLISHING POND INFLOW	Cd	0.000993	0.000863	0.000742	0.000743	0.000709	0.000608			0.00302 <sup>B</sup>	Tier II	0.000017 or <sub>10</sub> <sup>(0.86[log(hardness)]-3.2)</sup>
Q29	POLISHING POND INFLOW	Cr	0.011	0.009	0.006	0.005	0.005	0.003			0.10331 <sup>C</sup>	Tier II	
Q29	POLISHING POND INFLOW	Co	0.00901	0.00745	0.00508	0.00406	0.00390	0.00283					
Q29	POLISHING POND INFLOW	Cu	0.03935	0.03364	0.02696	0.02612	0.02522	0.02089	0.3	0.6	0.01266 <sup>D</sup>	Tier II	0.002
Q29	POLISHING POND INFLOW	Fe	1.772	1.425	0.849	0.555	0.525	0.291				0.3	0.3
Q29	POLISHING POND INFLOW	Pb	0.01304	0.01181	0.01163	0.01318	0.01281	0.01171	0.2	0.4	0.0039 <sup>E</sup>	Tier II	0.001
Q29	POLISHING POND INFLOW	Mo	0.025	0.023	0.024	0.028	0.027	0.025				0.073	
Q29	POLISHING POND INFLOW	Ni	0.447	0.366	0.241	0.190	0.182	0.124	0.5	1	0.07329 <sup>F</sup>	Tier II	0.025
Q29	POLISHING POND INFLOW	Se	0.0070	0.0060	0.0046	0.0038	0.0037	0.0031				0.001	0.001
Q29	POLISHING POND INFLOW	Zn	0.068	0.063	0.063	0.071	0.069	0.064	0.5	1	0.16657 <sup>G</sup>	Tier II	0.03

**Notes:**

August 2008 groundwater chemistry was assumed in the modeling.

A Arsenic limits: 0.15 mg/L for averaging duration 4 days (4-Day, 3-Year or 7Q10 Design Flow); 0.34 mg/L for averaging duration 1 hr (1-Day, 3-Year or 1Q10 Design Flow)

B Cadmium limit:  $[e^{(0.7852[\ln(\text{Hardness})]-2.715)} \times [1.101672 - (\ln(\text{Hardness})(0.041838))]]$  for 4 days averaging duration.  
 $[e^{(1.128[\ln(\text{Hardness})]-3.6867)} \times [1.136672 - (\ln(\text{Hardness})(0.041838))]]$  for 1 hour averaging duration.

C Chromium limit Chromium III:  $[e^{(0.8190[\ln(\text{Hardness})]+0.6848)} \times [0.860]]$  for 4 days averaging duration.  
 Chromium III:  $[e^{(0.8190[\ln(\text{Hardness})]+3.7256)} \times [0.316]]$  for 1 hour averaging duration.  
 Chromium VI: 0.011 mg/L for averaging duration 4 days (4-Day, 3-Year or 7Q10 Design Flow); 0.016 mg/L for averaging duration 1 hr (1-Day, 3-Year or 1Q10 Design Flow)

D Copper limits:  $[e^{(0.8545[\ln(\text{Hardness})]-1.702)} \times [0.960]]$  for 4 Days hour averaging duration.  
 $[e^{(0.9422[\ln(\text{Hardness})]-1.700)} \times [0.960]]$  for 1 hour averaging duration.

E Lead limits:  $[e^{(1.273[\ln(\text{Hardness})]-4.705)} \times [1.48203 - (\ln(\text{Hardness})(0.145712))]]$  for 4 Days averaging duration.  
 $[e^{(1.273[\ln(\text{Hardness})]-1.480)} \times [1.48203 - (\ln(\text{Hardness})(0.145712))]]$  for 1 hour averaging duration.

F Nickel limits:  $[e^{(0.8460[\ln(\text{Hardness})]+0.0584)} \times [0.997]]$  for 4 Days averaging duration.  
 $[e^{(0.8460[\ln(\text{Hardness})]+2.255)} \times [0.998]]$  for 1 hour averaging duration.

G Zinc limits:  $[e^{(0.8473[\ln(\text{Hardness})]+0.884)} \times [0.976]]$  for 4 Days averaging duration.  
 $[e^{(0.8473[\ln(\text{Hardness})]+0.884)} \times [0.976]]$  for 1 hour averaging duration.

## **APPENDIX 2.14-E**

Water Balance Model Results for the Closure and Post Closure Periods

## Projected Concentrations in Flows the Closure and Post Closure Periods

SCENARIO:	FLOW	WATER QUALITY PARAM.	ESTIMATED AVERAGE CONCENTRATION									REGULATIONS					
			Closure (Stage 1)	Closure (Stage 2)	Closure (Stage 2)	Year 12 - Closure (Stage 2)			Year 13 - POST CLOSURE			(2002)		TIER II Water Quality Objectives	Freshwater	the Protection of Aquatic Life (CCME, 2007)	
			Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Monthly Mean	Grab Sample				
			NOVEMBER TO APRIL (mg/L)	MAY (mg/L)	JUNE TO OCTOBER (mg/L)	NOVEMBER TO APRIL (mg/L)	MAY (mg/L)	JUNE TO OCTOBER (mg/L)	NOVEMBER TO APRIL (mg/L)	MAY (mg/L)	JUNE TO OCTOBER (mg/L)	NOVEMBER TO APRIL (mg/L)	MAY (mg/L)	JUNE TO OCTOBER (mg/L)	Monthly Mean	Grab Sample	assuming hardness = 150 mg/L CaCO <sub>3</sub>
	Q26	TWRMF INFLOW	Al	0.009	0.006	0.008	0.000	0.006	0.008	0.000	0.000	0.000				0.005 - 0.1	0.005
	Q26	TWRMF INFLOW	Sb	0.0000	0.0006	0.0008	0.0000	0.0006	0.0008	0.0000	0.0000	0.0000					
	Q26	TWRMF INFLOW	As	0.0008	0.0006	0.0008	0.0000	0.0006	0.0008	0.0000	0.0000	0.0000	0.5	1	0.15 mg/L (4-Day, 3-Year) <sup>A</sup>	Tier II	0.005
	Q26	TWRMF INFLOW	Cd	0.00001	0.00002	0.00003	0.00000	0.00002	0.00003	0.00000	0.00000	0.00000			0.00302 <sup>B</sup>	Tier II	0.000017 or $10^{(0.86[\log(\text{hardness}]-3.2)}$
	Q26	TWRMF INFLOW	Cr	0.0010	0.0011	0.0016	0.0000	0.0011	0.0016	0.0000	0.0000	0.0000			0.10331 <sup>C</sup>	Tier II	
	Q26	TWRMF INFLOW	Co	0.0001	0.0003	0.0005	0.0000	0.0003	0.0005	0.0000	0.0000	0.0000					
	Q26	TWRMF INFLOW	Cu	0.0005	0.0011	0.0016	0.0000	0.0011	0.0016	0.0000	0.0000	0.0000	0.3	0.6	0.01266 <sup>D</sup>	Tier II	0.002
	Q26	TWRMF INFLOW	Fe	0.01	0.03	0.05	0.00	0.03	0.05	0.00	0.00	0.00				0.3	0.3
	Q26	TWRMF INFLOW	Pb	0.00003	0.00057	0.00082	0.00000	0.00057	0.00082	0.00000	0.00000	0.00000	0.2	0.4	0.0039 <sup>E</sup>	Tier II	0.001
	Q26	TWRMF INFLOW	Mo	0.0007	0.0011	0.0016	0.0000	0.0011	0.0016	0.0000	0.0000	0.0000				0.073	
	Q26	TWRMF INFLOW	Ni	0.001	0.001	0.002	0.000	0.001	0.002	0.000	0.000	0.000	0.5	1	0.07329 <sup>F</sup>	Tier II	0.025
	Q26	TWRMF INFLOW	Se	0.0002	0.0011	0.0016	0.0000	0.0011	0.0016	0.0000	0.0000	0.0000				0.001	0.001
	Q26	TWRMF INFLOW	Zn	0.0046	0.0057	0.0082	0.0000	0.0057	0.0082	0.0000	0.0000	0.0000	0.5	1	0.16857 <sup>G</sup>	Tier II	0.03
	Q27	TWRMF Decant	Al	0.085	0.086	0.103	0.131	0.130	0.144	0.131	0.170	0.148				0.005 - 0.1	0.005
	Q27	TWRMF Decant	Sb	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002					
	Q27	TWRMF Decant	As	0.004	0.004	0.005	0.006	0.006	0.006	0.006	0.008	0.007	0.5	1	0.15 mg/L (4-Day, 3-Year) <sup>A</sup>	Tier II	0.005
	Q27	TWRMF Decant	Cd	0.00037	0.00038	0.00049	0.00065	0.00065	0.00072	0.00065	0.00086	0.00071			0.00302 <sup>B</sup>	Tier II	0.000017 or $10^{(0.86[\log(\text{hardness}]-3.2)}$
	Q27	TWRMF Decant	Cr	0.002	0.002	0.003	0.003	0.003	0.003	0.003	0.004	0.004			0.10331 <sup>C</sup>	Tier II	
	Q27	TWRMF Decant	Co	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002					
	Q27	TWRMF Decant	Cu	0.0118	0.0120	0.015	0.019	0.019	0.021	0.019	0.025	0.026	0.3	0.6	0.01266 <sup>D</sup>	Tier II	0.002
	Q27	TWRMF Decant	Fe	0.11	0.11	0.12	0.13	0.13	0.14	0.13	0.15	0.14				0.3	0.3
	Q27	TWRMF Decant	Pb	0.0072	0.0074	0.0095	0.013	0.013	0.014	0.013	0.017	0.014	0.2	0.4	0.0039 <sup>E</sup>	Tier II	0.001
	Q27	TWRMF Decant	Mo	0.013	0.013	0.015	0.019	0.019	0.021	0.019	0.024	0.029				0.073	
	Q27	TWRMF Decant	Ni	0.059	0.059	0.068	0.084	0.083	0.091	0.084	0.105	0.116	0.5	1	0.07329 <sup>F</sup>	Tier II	0.025
	Q27	TWRMF Decant	Se	0.002	0.002	0.002	0.003	0.003	0.003	0.003	0.003	0.004				0.001	0.001
	Q27	TWRMF Decant	Zn	0.040	0.041	0.051	0.066	0.065	0.074	0.066	0.088	0.078	0.5	1	0.16857 <sup>G</sup>	Tier II	0.03



## Projected Concentrations in Flows the Closure and Post Closure Periods

SCENARIO:  FLOW	WATER QUALITY PARAM.	ESTIMATED AVERAGE CONCENTRATION									REGULATIONS					
		Closure (Stage 1)	Closure (Stage 2)	Closure (Stage 2)	Year 12 - Closure (Stage 2)			Year 13 - POST CLOSURE			(2002)		TIER II Water Quality Objectives	the Protection of Aquatic Life		
		Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate						
		NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER	NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER	NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER	Monthly Mean	Grab Sample	assuming hardness = 150 mg/L CaCO <sub>3</sub>	Freshwater	(CCME, 2007)	
(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)								
Q29	POLISHING POND INFLOW	Al	0.000	0.086	0.103	0.000	0.130	0.144	0.000	0.170	0.148			0.005 - 0.1	0.005	
Q29	POLISHING POND INFLOW	Sb	0.00000	0.00110	0.00131	0.00000	0.00154	0.00172	0.00000	0.00194	0.00247					
Q29	POLISHING POND INFLOW	As	0.000	0.004	0.005	0.000	0.006	0.006	0.000	0.008	0.007	0.5	1	0.15 mg/L (4-Day, 3-Year) <sup>A</sup>	Tier II	0.005
Q29	POLISHING POND INFLOW	Cd	0.000000	0.000379	0.000494	0.000000	0.000645	0.000722	0.000000	0.000858	0.000712			0.00302 <sup>B</sup>	Tier II	0.000017 or 10 <sup>[0.86(log(hardness))-3.2]</sup>
Q29	POLISHING POND INFLOW	Cr	0.000	0.002	0.003	0.000	0.003	0.003	0.000	0.004	0.004			0.10331 <sup>C</sup>	Tier II	
Q29	POLISHING POND INFLOW	Co	0.00000	0.00125	0.00146	0.00000	0.00172	0.00186	0.00000	0.00207	0.00226					
Q29	POLISHING POND INFLOW	Cu	0.0000	0.0120	0.0148	0.00000	0.01906	0.02140	0.00000	0.02539	0.02627	0.3	0.6	0.01266 <sup>D</sup>	Tier II	0.002
Q29	POLISHING POND INFLOW	Fe	0.000	0.113	0.121	0.000	0.131	0.138	0.000	0.148	0.145				0.3	0.3
Q29	POLISHING POND INFLOW	Pb	0.00000	0.00740	0.00950	0.00000	0.01264	0.01438	0.00000	0.01732	0.01434	0.2	0.4	0.0039 <sup>E</sup>	Tier II	0.001
Q29	POLISHING POND INFLOW	Mo	0.000	0.013	0.015	0.000	0.019	0.021	0.000	0.024	0.029				0.073	
Q29	POLISHING POND INFLOW	Ni	0.000	0.059	0.068	0.000	0.083	0.091	0.000	0.105	0.116	0.5	1	0.07329 <sup>F</sup>	Tier II	0.025
Q29	POLISHING POND INFLOW	Se	0.0000	0.0017	0.0021	0.0000	0.0026	0.0029	0.0000	0.0033	0.0036				0.001	0.001
Q29	POLISHING POND INFLOW	Zn	0.000	0.041	0.051	0.000	0.065	0.074	0.000	0.088	0.078	0.5	1	0.16657 <sup>G</sup>	Tier II	0.03

**Notes:**  
 August 2008 groundwater chemistry was assumed in the modeling.

A Arsenic limits: 0.15 mg/L for averaging duration 4 days (4-Day, 3-Year or 7Q10 Design Flow); 0.34 mg/L for averaging duration 1 hr (1-Day, 3-Year or 1Q10 Design Flow)

B Cadmium limit:  $[e^{(0.7852[\ln(\text{Hardness})]-2.715)} \times [1.101672 - (\ln(\text{Hardness})(0.041838))]]$  for 4 days averaging duration.  
 $[e^{(1.128[\ln(\text{Hardness})]-3.6867)} \times [1.136672 - (\ln(\text{Hardness})(0.041838))]]$  for 1 hour averaging duration.

C Chromium limit Chromium III:  $[e^{(0.8190[\ln(\text{Hardness})]+0.8848)} \times [0.860]]$  for 4 days averaging duration.  
 Chromium III:  $[e^{(0.8190[\ln(\text{Hardness})]+3.7256)} \times [0.316]]$  for 1 hour averaging duration.  
 Chromium VI: 0.011 mg/L for averaging duration 4 days (4-Day, 3-Year or 7Q10 Design Flow); 0.016 mg/L for averaging duration 1 hr (1-Day, 3-Year or 1Q10 Design Flow)

D Copper limits:  $[e^{(0.8545[\ln(\text{Hardness})]-1.702)} \times [0.960]]$  for 4 Days hour averaging duration.  
 $[e^{(0.9422[\ln(\text{Hardness})]-1.700)} \times [0.960]]$  for 1 hour averaging duration.

E Lead limits:  $[e^{(1.273[\ln(\text{Hardness})]-4.705)} \times [1.46203 - (\ln(\text{Hardness})(0.145712))]]$  for 4 Days averaging duration.  
 $[e^{(1.273[\ln(\text{Hardness})]-1.460)} \times [1.46203 - (\ln(\text{Hardness})(0.145712))]]$  for 1 hour averaging duration.

F Nickel limits:  $[e^{(0.8460[\ln(\text{Hardness})]+0.0584)} \times [0.997]]$  for 4 Days averaging duration.  
 $[e^{(0.8460[\ln(\text{Hardness})]+2.255)} \times [0.998]]$  for 1 hour averaging duration.

G Zinc limits:  $[e^{(0.8473[\ln(\text{Hardness})]+0.884)} \times [0.976]]$  for 4 Days averaging duration.  
 $[e^{(0.8473[\ln(\text{Hardness})]+0.884)} \times [0.978]]$  for 1 hour averaging duration.

## **APPENDIX 2.14-F**

Water Balance Model Results  
for Temporary Suspension after Year 4  
& the State of Inactivity after one year of Temporary  
Suspension

# Projected Concentrations in Flows during Temporary Suspension and the State of Inactivity

SCENARIO:  FLOW			WATER QUALITY PARAM.	ESTIMATED AVERAGE CONCENTRATION						REGULATIONS				
				TS after Year 4			SI after one year TS			Metal Mining Liquid Effluents (2002)		Manitoba Water Quality Standards, Objectives, and Guidelines (Williamson, 2002)		Canadian Water Quality Guidelines for the Protection of Aquatic Life (CCME, 2007)
				Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate					
				NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER	NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER					
(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	Monthly Mean	Grab Sample	assuming hardness = 150 mg/L CaCO <sub>3</sub>	Freshwater					
Q26	TWRMF INFLOW	RC26	Al	0.000	0.006	0.010	0.000	0.007	0.012				0.005 - 0.1	0.005
Q26	TWRMF INFLOW	RC26	Sb	0.0000	0.0006	0.0010	0.0000	0.0007	0.0012					
Q26	TWRMF INFLOW	RC26	As	0.0000	0.0006	0.0010	0.0000	0.0007	0.0012	0.5	1	0.15 mg/L (4-Day, 3-Year) <sup>A</sup>	Tier II	0.005
Q26	TWRMF INFLOW	RC26	Cd	0.00000	0.00002	0.00004	0.00000	0.00002	0.00004			0.00302 <sup>B</sup>	Tier II	0.000017 or $10^{(0.86[\log(\text{hardness}]-3.2)}$
Q26	TWRMF INFLOW	RC26	Cr	0.0000	0.0013	0.0021	0.0000	0.0014	0.0024			0.10331 <sup>C</sup>	Tier II	
Q26	TWRMF INFLOW	RC26	Co	0.0000	0.0004	0.0006	0.0000	0.0004	0.0007					
Q26	TWRMF INFLOW	RC26	Cu	0.0000	0.0013	0.0021	0.0000	0.0014	0.0024	0.3	0.6	0.01266 <sup>D</sup>	Tier II	0.002
Q26	TWRMF INFLOW	RC26	Fe	0.00	0.04	0.06	0.00	0.04	0.07				0.3	0.3
Q26	TWRMF INFLOW	RC26	Pb	0.0000	0.0006	0.0010	0.0000	0.0007	0.0012	0.2	0.4	0.0039 <sup>E</sup>	Tier II	0.001
Q26	TWRMF INFLOW	RC26	Mo	0.0000	0.0013	0.0021	0.0000	0.0014	0.0024				0.073	
Q26	TWRMF INFLOW	RC26	Ni	0.000	0.001	0.002	0.000	0.001	0.002	0.5	1	0.07329 <sup>F</sup>	Tier II	0.025
Q26	TWRMF INFLOW	RC26	Se	0.0000	0.0013	0.0021	0.0000	0.0014	0.0024				0.001	0.001
Q26	TWRMF INFLOW	RC26	Zn	0.0000	0.0064	0.0104	0.0000	0.0071	0.0120	0.5	1	0.16657 <sup>G</sup>	Tier II	0.03
Q27	TWRMF Decant	C27	Al	0.589	0.523	0.460	0.502	0.447	0.398				0.005 - 0.1	0.005
Q27	TWRMF Decant	C27	Sb	0.005	0.004	0.004	0.004	0.004	0.004					
Q27	TWRMF Decant	C27	As	0.006	0.006	0.006	0.008	0.007	0.008	0.5	1	0.15 mg/L (4-Day, 3-Year) <sup>A</sup>	Tier II	0.005
Q27	TWRMF Decant	C27	Cd	0.00112	0.00102	0.00100	0.00122	0.00109	0.00106			0.00302 <sup>B</sup>	Tier II	0.000017 or $10^{(0.86[\log(\text{hardness}]-3.2)}$
Q27	TWRMF Decant	C27	Cr	0.015	0.014	0.012	0.013	0.012	0.010			0.10331 <sup>C</sup>	Tier II	
Q27	TWRMF Decant	C27	Co	0.012	0.011	0.009	0.009	0.008	0.007					
Q27	TWRMF Decant	C27	Cu	0.047	0.042	0.040	0.046	0.042	0.039	0.3	0.6	0.01266 <sup>D</sup>	Tier II	0.002
Q27	TWRMF Decant	C27	Fe	2.52	2.21	1.84	1.86	1.64	1.37				0.3	0.3
Q27	TWRMF Decant	C27	Pb	0.013	0.012	0.014	0.018	0.017	0.017	0.2	0.4	0.0039 <sup>E</sup>	Tier II	0.001
Q27	TWRMF Decant	C27	Mo	0.021	0.019	0.020	0.026	0.024	0.024				0.073	
Q27	TWRMF Decant	C27	Ni	0.599	0.529	0.450	0.475	0.420	0.361	0.5	1	0.07329 <sup>F</sup>	Tier II	0.025
Q27	TWRMF Decant	C27	Se	0.009	0.008	0.008	0.008	0.008	0.007				0.001	0.001
Q27	TWRMF Decant	C27	Zn	0.066	0.063	0.070	0.092	0.085	0.088	0.5	1	0.16657 <sup>G</sup>	Tier II	0.03

# Projected Concentrations in Flows during Temporary Suspension and the State of Inactivity

SCENARIO:	ESTIMATED AVERAGE CONCENTRATION									REGULATIONS				
	WATER QUALITY	TS after Year 4			SI after one year TS			Metal Mining Liquid Effluents (2002)		Manitoba Water Quality Standards, Objectives, and Guidelines (Williamson, 2002)		Canadian Water Quality Guidelines for the Protection of Aquatic Life (CCME, 2007)		
		Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate	Tailings only; max.tailings leaching rate							
		NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER	NOVEMBER TO APRIL	MAY	JUNE TO OCTOBER	Monthly Mean	Grab Sample	TIER II Water Quality Objectives assuming hardness = 150 mg/L CaCO <sub>3</sub>	Freshwater			
FLOW	PARAM.	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)							
Q29	POLISHING POND INFLOW	RC29	Al	0.009	0.028	0.024	0.009	0.104	0.154				0.005 - 0.1	0.005
Q29	POLISHING POND INFLOW	RC29	Sb	0.00003	0.00022	0.00021	0.00003	0.00091	0.00146					
Q29	POLISHING POND INFLOW	RC29	As	0.001	0.001	0.001	0.001	0.002	0.003	0.5	1	0.15 mg/L (4-Day, 3-Year) <sup>A</sup>	Tier II	0.005
Q29	POLISHING POND INFLOW	RC29	Cd	0.000006	0.000044	0.000041	0.000006	0.000240	0.000398			0.00302 <sup>B</sup>	Tier II	0.000017 or 10 <sup>[0.86(log(hardness))-3.2]</sup>
Q29	POLISHING POND INFLOW	RC29	Cr	0.001	0.001	0.001	0.001	0.003	0.005			0.10331 <sup>C</sup>	Tier II	
Q29	POLISHING POND INFLOW	RC29	Co	0.00008	0.00049	0.00042	0.00008	0.00187	0.00276					
Q29	POLISHING POND INFLOW	RC29	Cu	0.00052	0.00212	0.00193	0.00052	0.00946	0.01503	0.3	0.6	0.01266 <sup>D</sup>	Tier II	0.002
Q29	POLISHING POND INFLOW	RC29	Fe	0.005	0.089	0.071	0.005	0.358	0.514				0.3	0.3
Q29	POLISHING POND INFLOW	RC29	Pb	0.00003	0.00052	0.00055	0.00003	0.00369	0.00654	0.2	0.4	0.0039 <sup>E</sup>	Tier II	0.001
Q29	POLISHING POND INFLOW	RC29	Mo	0.001	0.001	0.001	0.001	0.006	0.009				0.073	
Q29	POLISHING POND INFLOW	RC29	Ni	0.001	0.021	0.017	0.001	0.092	0.135	0.5	1	0.07329 <sup>F</sup>	Tier II	0.025
Q29	POLISHING POND INFLOW	RC29	Se	0.0002	0.0005	0.0005	0.0002	0.0018	0.0028				0.001	0.001
Q29	POLISHING POND INFLOW	RC29	Zn	0.005	0.007	0.007	0.005	0.022	0.036	0.5	1	0.16657 <sup>G</sup>	Tier II	0.03

**Notes:**

August 2008 groundwater chemistry was assumed in the modeling.

A Arsenic limits: 0.15 mg/L for averaging duration 4 days (4-Day, 3-Year or 7Q10 Design Flow); 0.34 mg/L for averaging duration 1 hr (1-Day, 3-Year or 1Q10 Design Flow)

B Cadmium limit:  $[e^{(0.7852 \ln(\text{Hardness}) - 2.715)} \times [1.101672 - \ln(\text{Hardness})(0.041838)]]$  for 4 days averaging duration.  
 $[e^{(1.128 \ln(\text{Hardness}) - 3.6867)} \times [1.136672 - \ln(\text{Hardness})(0.041838)]]$  for 1 hour averaging duration.

C Chromium limit Chromium III:  $[e^{(0.8190 \ln(\text{Hardness}) + 0.6848)} \times 0.880]$  for 4 days averaging duration.  
 Chromium III:  $[e^{(0.8190 \ln(\text{Hardness}) + 3.7256)} \times 0.316]$  for 1 hour averaging duration.  
 Chromium VI: 0.011 mg/L for averaging duration 4 days (4-Day, 3-Year or 7Q10 Design Flow); 0.016 mg/L for averaging duration 1 hr (1-Day, 3-Year or 1Q10 Design Flow)

D Copper limits:  $[e^{(0.8545 \ln(\text{Hardness}) - 1.702)} \times 0.960]$  for 4 Days hour averaging duration.  
 $[e^{(0.9422 \ln(\text{Hardness}) - 1.700)} \times 0.960]$  for 1 hour averaging duration.

E Lead limits:  $[e^{(1.273 \ln(\text{Hardness}) - 4.705)} \times [1.46203 - \ln(\text{Hardness})(0.145712)]]$  for 4 Days averaging duration.  
 $[e^{(1.273 \ln(\text{Hardness}) - 1.460)} \times [1.46203 - \ln(\text{Hardness})(0.145712)]]$  for 1 hour averaging duration.

F Nickel limits:  $[e^{(0.8460 \ln(\text{Hardness}) + 0.0584)} \times 0.997]$  for 4 Days averaging duration.  
 $[e^{(0.8460 \ln(\text{Hardness}) + 2.255)} \times 0.998]$  for 1 hour averaging duration.

G Zinc limits:  $[e^{(0.8473 \ln(\text{Hardness}) + 0.884)} \times 0.976]$  for 4 Days averaging duration.  
 $[e^{(0.8473 \ln(\text{Hardness}) + 0.884)} \times 0.978]$  for 1 hour averaging duration.