
APPENDIX F-3
Hydrology and Water Balance

- **Part I – Hydrology Data**
- **Part II – Water Balance Tables**

Part I
Hydrology Data

Part I – Hydrology

The following is a list of data included in Part I:

- Table 1 Estimated Monthly Precipitation (mm) for Wolverine Mine by Return Period
- Table 2 Maximum Estimated Winter Snowpack at Wolverine Minesite by Return Period
- Table 3 Estimated Rainfall / Duration / Intensity for Wolverine Mine
- Table 4 Estimated Evaporation for Wolverine Mine

Table I-1 Estimated Monthly Precipitation (mm) for Wolverine Mine by Return Period

Month	Mean	Return Period (year)																			
		1.001	1.002	1.005	1.01	1.02	1.042	1.053	1.111	1.250	2	5	10	20	25	50	100	200	500	1,000	10,000
Jan	42.8	11.8	13.6	16.2	18.3	20.6	23.0	23.8	26.6	30.0	42.8	42.1	45.2	47.9	48.4	50.4	52.2	54.0	56.0	57.4	63.0
Feb	33.2	9.2	10.6	12.6	14.3	16.0	17.9	18.5	20.7	23.4	33.2	32.7	35.1	37.3	37.6	39.2	40.6	42.0	43.5	44.7	49.0
Mar	26.5	6.9	8.0	9.5	10.7	12.0	13.4	13.9	15.5	17.5	26.5	24.5	26.4	28.0	28.2	29.4	30.5	31.5	32.7	33.5	36.8
April	20.0	6.5	7.6	9.0	10.2	11.4	12.8	13.2	14.8	16.7	20.0	23.4	25.1	26.6	26.9	28.0	29.0	30.0	31.1	31.9	35.0
May	42.3	15.7	18.2	21.6	24.4	27.5	30.7	31.7	35.5	40.0	42.3	56.1	60.2	63.9	64.5	67.2	69.6	72.0	74.6	76.6	84.0
Jun	65.3	22.6	26.2	31.1	35.1	39.5	44.1	45.6	51.1	57.5	65.3	80.7	86.6	91.8	92.7	96.6	100.1	103.4	107.3	110.1	120.8
July	77.7	26.8	31.1	37.0	41.7	46.9	52.4	54.2	60.7	68.4	77.7	95.9	102.9	109.1	110.2	114.8	119.0	122.9	127.5	130.8	143.5
Aug	62.3	20.3	23.5	28.0	31.6	35.5	39.6	41.0	45.9	51.7	62.3	72.5	77.8	82.5	83.3	86.8	90.0	92.9	96.4	98.9	108.5
Sept	57.0	18.6	21.6	25.7	29.0	32.6	36.4	37.7	42.2	47.5	57.0	66.6	71.5	75.9	76.6	79.8	82.7	85.4	88.6	90.9	99.8
Oct	48.8	14.7	17.1	20.3	22.9	25.7	28.8	29.7	33.3	37.5	48.8	52.6	56.5	59.9	60.5	63.0	65.3	67.5	70.0	71.8	78.8
Nov	46.7	13.1	15.2	18.0	20.4	22.9	25.6	26.4	29.6	33.4	46.7	46.8	50.2	53.2	53.8	56.0	58.0	60.0	62.2	63.8	70.0
Dec	47.4	13.1	15.2	18.0	20.4	22.9	25.6	26.4	29.6	33.4	47.4	46.8	50.2	53.2	53.8	56.0	58.0	60.0	62.2	63.8	70.0
TOTAL	570.0	179.2	207.7	247.1	278.9	313.5	350.2	362.2	405.5	457.0	570.0	640.6	687.7	729.4	736.5	767.2	795.1	821.5	852.1	874.1	959.0

Data precipitation data from Madrone Environmental Services Ltd., January 24, 2006.

Precipitation data for other return periods from Madrone Environmental Services Ltd., July 29, 2005.

Table I-2 Maximum Estimated Winter Snowpack at Wolverine Minesite by Return Period

Return Period (year)	Maximum Snowpack Water Equivalent Low (mm)	Maximum Snowpack Water Equivalent High (mm)
1.001	49	57
1.002	57	66
1.005	68	79
1.01 (100 year dry)	76	89
1.02	86	100
1.042	96	112
1.053	99	116
1.111	111	130
1.25	125	146
2	151	176
5	175	205
10	188	220
20	200	233
25	202	235
50	210	245
100	218	254
200	225	262
500	233	272
1,000	239	279
10,000	263	306

Data provided by Madrone Environmental Services Ltd., July 29, 2005.

Table I-3 Estimated Rainfall / Duration / Intensity for Wolverine Mine

Duration	Rainfall (mm)			
	50 year	100 year	200 year	10,000 year
10 min.	7.2	7.9	8.5	-
15 min.	8.6	9.4	10.2	-
20 min.	9.7	10.6	11.5	-
25 min.	10.7	11.7	12.7	-
30 min.	11.6	12.7	13.8	16.3
60 min.	14.5	15.8	17.2	20.4
5 hour	-	-	32.0	38.0
10 hour	-	-	41.0	50.0
15 hour	-	-	48.0	60.0
20 hour	-	-	53.0	66.0
24hour	-	-	56.0	72.0

Data provided by Madrone Environmental Services Ltd., September 15, 2005.

Table I-4 Estimated Evaporation for Wolverine Mine

Month	Estimated Evaporation (mm/month)		
	Low	High	Average
January	3	7	5.0
February	3	6	4.5
March	8	11	9.5
April	20	22	21.0
May	56	88	72.0
June	73	100	86.5
July	80	100	90.0
August	58	65	61.5
September	33	31	32.0
October	12	17	14.5
November	4	8	6.0
December	1	3	2.0
Total	351	458	404.5

Data provided by Madrone Environmental Services Ltd., July 29, 2005.



Part II
Water Balance Tables

WOLVERINE TAILINGS FACILITY WATER BALANCE - INITIAL OPERATIONS - WITH DIVERSIONS - AVERAGE YEAR

DATA

	Daily tonnage (tpd)	% Solids		
		Transport	Starter	Final
Tailings production	268	15.630%	75%	80%
DMS production	186	90%	85%	85%
WR production	23	97%	85%	85%
Paste production	680	76%	76%	76%
Paste plant bypass	18	0.4%	75%	80%

Annual Precipitation (mm)	570
Runoff Coefficient	0.23
Water pond area	0.03
Catchment runoff area (sq.km.)	0.16
DMS & beach area (sq.km)	0.05
Uphill catchment area (sq.km.)	1.05
% Diversion ditch seepage	0.15

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-15	-16	-12	-8	2	9	11	8	2	-7	-10	-18	
Monthly percent of annual evap.	8%	6%	5%	4%	7%	11%	14%	11%	10%	9%	8%	8%	100%
Average Monthly Precipitation (mm)	42.8	33.2	26.5	20.0	42.3	65.3	77.7	62.3	57.1	48.8	46.7	47.4	569.86
Average monthly runoff (% of annual)	0%	0%	0%	1%	19%	35%	17%	9%	9%	6%	3%	1%	100%
Monthly Evaporation (mm)	5	4.5	9.5	21	72	86.5	90	61.5	32	14.5	6	2	404.5
Incremental ice thickness on pond (m)	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	1.6
Water Inputs (m3/hr)													Averages
Mine groundwater	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00
Recirculated drill u/g water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sewage water	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
Tailings transport water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plantsite Tailings, etc.	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238
DMS transport water	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
WR transport water	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Precipitation on pond	1.78	1.38	1.11	0.83	1.76	2.72	3.24	2.60	2.38	2.03	1.94	1.97	1.98
Runoff from catchment	0.00	0.00	0.00	0.29	5.54	10.20	4.95	2.62	2.54	1.73	0.99	0.29	2.43
Seepage from diversion ditch	0.00	0.00	0.00	0.29	5.45	10.04	4.88	2.58	2.50	1.70	0.98	0.29	2.39
Seepage reclaim	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Subtotal	268	268	267	268	279	289	279	274	274	272	270	269	273
Water Losses (m3/hr)													
Pond evapor.	0	0	0.66	1.46	5.00	6.01	6.25	4.27	2.22	1.01	0.42	0.14	2.34
Tailing voids	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72
DMS voids	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
WR voids	0.2	0.2	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Paste Voids	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Process water low level treatment	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00
Mine water low level treatment	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Truck wash low level treatment	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Seepage	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Water reclaim to process plant (Hatch)	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71
Subtotal	255	255	256	256	260	261	261	259	257	256	255	255	257
Net water surplus (deficit)	13	12	12	11	19	28	18	15	16	16	15	14	16
Environmental water treatment	0	0	0	0	31	31	31	31	31	31			31
Operational pond volume	64,000												
Incremental pond volume	9,149	8,886	8,437	8,083	(8,960)	(2,336)	(9,630)	(11,997)	(10,789)	(11,328)	10,631	9,854	
Seasonal pond volume	73,149	82,035	90,472	98,555	89,596	87,260	77,630	65,633	54,843	43,515	54,146	64,000	

WOLVERINE TAILINGS FACILITY WATER BALANCE - INITIAL OPERATIONS - WITH DIVERSIONS - 100 YEAR WET

DATA

	Daily tonnage (tpd)	% Solids		
		Transport	Starter	Final
Tailings production	268	15.630%	75%	80%
DMS production	186	90%	85%	85%
WR production	23	97%	85%	85%
Paste production	700	76%	76%	76%
Paste plant bypass	18	0.4%	75%	80%

Annual Precipitation (mm)	795
Runoff Coefficient	0.25
Water pond area	0.03
Catchment runoff area (sq.km.)	0.16
DMS & beach area (sq.km)	0.05
Uphill catchment area (sq.km.)	1.05
% Diversion ditch seepage	0.15

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-15	-16	-12	-8	2	9	11	8	2	-7	-10	-18	
Monthly percent of annual evap.	8%	6%	5%	4%	7%	11%	14%	11%	10%	9%	8%	8%	100%
Average Monthly Precipitation (mm)	59.6	46.2	37.0	27.9	59.0	91.0	108.4	86.9	79.6	68.0	65.1	66.1	794.80474
Average monthly runoff (% of annual)	0%	0%	0%	1%	19%	35%	17%	9%	9%	6%	3%	1%	100%
Monthly Evaporation (mm)	5	4.5	9.5	21	72	86.5	90	61.5	32	14.5	6	2	404.5
Incremental ice thickness on pond (m)	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	1.6
Water Inputs (m3/hr)													Averages
Mine groundwater	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00
Recirculated drill u/g water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sewage water	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
Tailings transport water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plantsite Tailings, etc.	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238
DMS transport water	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
WR transport water	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Precipitation on pond	2.48	1.93	1.54	1.16	2.46	3.79	4.51	3.62	3.32	2.84	2.71	2.75	2.76
Runoff from catchment	0.00	0.00	0.00	0.44	8.44	15.54	7.55	4.00	3.88	2.63	1.51	0.44	3.70
Seepage from diversion ditch	0.00	0.00	0.00	0.44	8.30	15.30	7.43	3.93	3.82	2.59	1.49	0.44	3.64
Seepage reclaim	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Subtotal	269	268	268	268	285	301	286	278	277	274	272	270	276
Water Losses (m3/hr)													
Pond evapor.	0	0	0.66	1.46	5.00	6.01	6.25	4.27	2.22	1.01	0.42	0.14	2.34
Tailing voids	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72
DMS voids	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
WR voids	0.2	0.2	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Paste Voids	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Process water low level treatment	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00
Mine water low level treatment	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Truck wash low level treatment	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Seepage	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Water reclaim to process plant (Hatch)	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71
Subtotal	255	255	256	256	260	261	261	259	257	256	255	255	257
Net water surplus (deficit)	13	13	12	12	25	40	25	19	20	18	17	15	19
Environmental water treatment	0	0	0	0	38	38	38	38	38	38			38
Operational pond volume	64,000												
Incremental pond volume	9,655	9,279	8,751	8,538	(9,077)	1,308	(9,764)	(14,059)	(12,971)	(14,219)	11,926	10,633	
Seasonal pond volume	73,655	82,934	91,686	100,224	91,146	92,455	82,690	68,631	55,661	41,442	53,367	64,000	

WOLVERINE TAILINGS FACILITY WATER BALANCE - INITIAL OPERATIONS - WITH DIVERSIONS - 100 YEAR DRY

DATA

	Daily tonnage (tpd)	% Solids		
		Transport	Starter	Final
Tailings production	268	15.630%	75%	80%
DMS production	186	90%	85%	85%
WR production	23	97%	85%	85%
Paste production	680	76%	76%	76%
Paste plant bypass	18	0.4%	75%	80%

Annual Precipitation (mm)	279
Runoff Coefficient	0.23
Water pond area	0.03
Catchment runoff area (sq.km.)	0.16
DMS & beach area (sq.km)	0.05
Uphill catchment area (sq.km.)	1.05
% Diversion ditch seepage	0.15

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-15	-16	-12	-8	2	9	11	8	2	-7	-10	-18	
Monthly percent of annual evap.	8%	6%	5%	4%	7%	11%	14%	11%	10%	9%	8%	8%	100%
Average Monthly Precipitation (mm)	20.9	16.2	13.0	9.8	20.7	31.9	38.0	30.5	27.9	23.9	22.8	23.2	278.93147
Average monthly runoff (% of annual)	0%	0%	0%	1%	19%	35%	17%	9%	9%	6%	3%	1%	100%
Monthly Evaporation (mm)	5	4.5	9.5	21	72	86.5	90	61.5	32	14.5	6	2	404.5
Incremental ice thickness on pond (m)	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	1.6
Water Inputs (m3/hr)													Averages
Mine groundwater	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00
Recirculated drill u/g water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sewage water	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
Tailings transport water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plantsite Tailings, etc. (Hatch)	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238
DMS transport water	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
WR transport water	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Precipitation on pond	0.87	0.68	0.54	0.41	0.86	1.33	1.58	1.27	1.16	1.00	0.95	0.97	0.97
Runoff from catchment	0.00	0.00	0.00	0.14	2.71	4.99	2.42	1.28	1.25	0.85	0.48	0.14	1.19
Seepage from diversion ditch	0.00	0.00	0.00	0.14	2.67	4.91	2.39	1.26	1.23	0.83	0.48	0.14	1.17
Seepage reclaim	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Subtotal	267	267	267	267	272	277	273	270	270	269	268	267	270
Water Losses (m3/hr)													
Pond evapor.	0	0	0.66	1.46	5.00	6.01	6.25	4.27	2.22	1.01	0.42	0.14	2.34
Tailing voids	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72
DMS voids	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
WR voids	0.2	0.2	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Paste Voids	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Process water low level treatment	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00
Mine water low level treatment	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Truck wash low level treatment	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Seepage	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Water reclaim to process plant (Hatch)	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71
Subtotal	255	255	256	256	260	261	261	259	257	256	255	255	257
Net water surplus (deficit)	12	12	11	11	13	17	11	11	13	13	13	12	12
Environmental water treatment	0	0	0	0	25	25	25	25	25	25	25	25	25
Operational pond volume	64,000												
Incremental pond volume	8,494	8,378	8,031	7,564	(8,646)	(5,774)	(9,434)	(9,865)	(8,521)	(8,338)	9,194	8,916	
Seasonal pond volume	72,494	80,872	88,903	96,467	87,821	82,047	72,613	62,748	54,228	45,890	55,084	64,000	

WOLVERINE TAILINGS FACILITY WATER BALANCE - FINAL OPERATIONS - WITH DIVERSIONS - AVERAGE YEAR

DATA

	Daily tonnage (tpd)	% Solids		
		Transport	Starter	Final
Tailings production	268	15.630%	75%	80%
DMS production	186	90%	85%	85%
WR production	23	97%	85%	85%
Paste production	680	76%	76%	76%
Paste plant bypass	18	0.4%	75%	80%

Annual Precipitation (mm)	570
Runoff Coefficient	0.23
Water pond area	0.08
Catchment runoff area (sq.km.)	0.16
DMS & beach area (sq.km)	0.125
Uphill catchment area (sq.km.)	1.05
% Diversion ditch seepage	0.15

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-15	-16	-12	-8	2	9	11	8	2	-7	-10	-18	
Monthly percent of annual evap.	8%	6%	5%	4%	7%	11%	14%	11%	10%	9%	8%	8%	100%
Average Monthly Precipitation (mm)	42.8	33.2	26.5	20.0	42.3	65.3	77.7	62.3	57.1	48.8	46.7	47.4	569.9
Average monthly runoff (% of annual)	0%	0%	0%	1%	19%	35%	17%	9%	9%	6%	3%	1%	100%
Monthly Evaporation (mm)	5	4.5	9.5	21	72	86.5	90	61.5	32	14.5	6	2	404.5
Incremental ice thickness on pond (m)	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	1.6
Water Inputs (m3/hr)													Averages
Mine groundwater	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00
Recirculated drill u/g water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sewage water	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
Tailings transport water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plantsite Tailings, etc.	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238
DMS transport water	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
WR transport water	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Precipitation on pond	4.75	3.68	2.95	2.22	4.70	7.25	8.63	6.92	6.34	5.42	5.18	5.26	5.28
Runoff from catchment	0.00	0.00	0.00	0.29	5.54	10.20	4.95	2.62	2.54	1.73	0.99	0.29	2.43
Seepage from diversion ditch	0.00	0.00	0.00	0.29	5.45	10.04	4.88	2.58	2.50	1.70	0.98	0.29	2.39
Seepage reclaim	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Subtotal	271	270	269	269	282	294	285	278	278	275	273	272	276
Water Losses (m3/hr)													
Pond evapor.	1	1	1.65	3.65	12.50	15.02	15.63	10.68	5.56	2.52	1.04	0.35	5.85
Tailing voids	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72
DMS voids	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
WR voids	0.2	0.2	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Paste Voids	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Process water low level treatment	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00
Mine water low level treatment	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Truck wash low level treatment	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Seepage	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Water reclaim to process plant (Hatch)	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71
Subtotal	256	256	257	259	267	270	271	266	261	257	256	255	261
Net water surplus (deficit)	15	14	13	10	14	24	14	13	17	18	17	17	16
Environmental water treatment	0	0	0	0	31	31	31	31	31	31	31	31	31
Operational pond volume	64,000												
Incremental pond volume	10,911	10,207	9,051	7,508	(11,938)	(5,253)	(12,188)	(13,188)	(10,028)	(9,669)	12,514	12,072	
Seasonal pond volume	74,911	85,118	94,169	101,678	89,739	84,486	72,298	59,110	49,082	39,413	51,928	64,000	

WOLVERINE TAILINGS FACILITY WATER BALANCE - FINAL OPERATIONS - WITH DIVERSIONS - 100 YEAR WET

DATA

	Daily tonnage (tpd)	% Solids		
		Transport	Starter	Final
Tailings production	268	15.630%	75%	80%
DMS production	186	90%	85%	85%
WR production	23	97%	85%	85%
Paste production	700	76%	76%	76%
Paste plant bypass	18	0.4%	75%	80%

Annual Precipitation (mm)	795
Runoff Coefficient	0.25
Water pond area	0.08
Catchment runoff area (sq.km.)	0.16
DMS & beach area (sq.km)	0.125
Uphill catchment area (sq.km.)	1.05
% Diversion ditch seepage	0.15

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-15	-16	-12	-8	2	9	11	8	2	-7	-10	-18	
Monthly percent of annual evap.	8%	6%	5%	4%	7%	11%	14%	11%	10%	9%	8%	8%	100%
Average Monthly Precipitation (mm)	59.6	46.2	37.0	27.9	59.0	91.0	108.4	86.9	79.6	68.0	65.1	66.1	794.8
Average monthly runoff (% of annual)	0%	0%	0%	1%	19%	35%	17%	9%	9%	6%	3%	1%	100%
Monthly Evaporation (mm)	5	4.5	9.5	21	72	86.5	90	61.5	32	14.5	6	2	404.5
Incremental ice thickness on pond (m)	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	1.6
Water Inputs (m3/hr)													Averages
Mine groundwater	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00
Recirculated drill u/g water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sewage water	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
Tailings transport water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plantsite Tailings, etc.	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238
DMS transport water	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
WR transport water	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Precipitation on pond	6.63	5.14	4.11	3.10	6.55	10.11	12.04	9.65	8.85	7.56	7.23	7.34	7.36
Runoff from catchment	0.00	0.00	0.00	0.44	8.44	15.54	7.55	4.00	3.88	2.63	1.51	0.44	3.70
Seepage from diversion ditch	0.00	0.00	0.00	0.44	8.30	15.30	7.43	3.93	3.82	2.59	1.49	0.44	3.64
Seepage reclaim	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Subtotal	273	271	270	270	290	307	293	284	283	279	276	274	281
Water Losses (m3/hr)													
Pond evapor.	1	1	1.65	3.65	12.50	15.02	15.63	10.68	5.56	2.52	1.04	0.35	5.85
Tailing voids	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72
DMS voids	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
WR voids	0.2	0.2	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Paste Voids	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Process water low level treatment	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00
Mine water low level treatment	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Truck wash low level treatment	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Seepage	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Water reclaim to process plant (Hatch)	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71
Subtotal	256	256	257	259	267	270	271	266	261	257	256	255	261
Net water surplus (deficit)	17	16	14	12	22	37	23	18	22	22	20	19	20
Environmental water treatment	0	0	0	0	40	40	40	40	40	40			40
Operational pond volume	64,000												
Incremental pond volume	12,261	11,254	9,889	8,358	(13,096)	(2,196)	(12,664)	(15,894)	(12,957)	(13,471)	14,729	13,786	
Seasonal pond volume	76,261	87,515	97,404	105,763	92,667	90,471	77,807	61,913	48,955	35,484	50,214	64,000	

WOLVERINE TAILINGS FACILITY WATER BALANCE - FINAL OPERATIONS - WITH DIVERSIONS - 100 YEAR DRY

DATA

	Daily tonnage (tpd)	% Solids		
		Transport	Starter	Final
Tailings production	268	15.630%	75%	80%
DMS production	186	90%	85%	85%
WR production	23	97%	85%	85%
Paste production	680	76%	76%	76%
Paste plant bypass	18	0.4%	75%	80%

Annual Precipitation (mm)	279
Runoff Coefficient	0.23
Water pond area	0.08
Catchment runoff area (sq.km.)	0.16
DMS & beach area (sq.km)	0.125
Uphill catchment area (sq.km.)	1.05
% Diversion ditch seepage	0.15

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-15	-16	-12	-8	2	9	11	8	2	-7	-10	-18	
Monthly percent of annual evap.	8%	6%	5%	4%	7%	11%	14%	11%	10%	9%	8%	8%	100%
Average Monthly Precipitation (mm)	20.9	16.2	13.0	9.8	20.7	31.9	38.0	30.5	27.9	23.9	22.8	23.2	278.9
Average monthly runoff (% of annual)	0%	0%	0%	1%	19%	35%	17%	9%	9%	6%	3%	1%	100%
Monthly Evaporation (mm)	5	4.5	9.5	21	72	86.5	90	61.5	32	14.5	6	2	404.5
Incremental ice thickness on pond (m)	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	1.6
Water Inputs (m3/hr)													Averages
Mine groundwater	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00
Recirculated drill u/g water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sewage water	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
Tailings transport water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plantsite Tailings, etc. (Hatch)	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238.15	238
DMS transport water	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
WR transport water	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Precipitation on pond	2.33	1.80	1.44	1.09	2.30	3.55	4.23	3.39	3.10	2.65	2.54	2.58	2.58
Runoff from catchment	0.00	0.00	0.00	0.14	2.71	4.99	2.42	1.28	1.25	0.85	0.48	0.14	1.19
Seepage from diversion ditch	0.00	0.00	0.00	0.14	2.67	4.91	2.39	1.26	1.23	0.83	0.48	0.14	1.17
Seepage reclaim	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Subtotal	269	268	268	268	274	280	275	272	272	271	270	269	271
Water Losses (m3/hr)													
Pond evapor.	1	1	1.65	3.65	12.50	15.02	15.63	10.68	5.56	2.52	1.04	0.35	5.85
Tailing voids	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72
DMS voids	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
WR voids	0.2	0.2	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Paste Voids	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Process water low level treatment	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00
Mine water low level treatment	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Truck wash low level treatment	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Seepage	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Water reclaim to process plant (Hatch)	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71	223.71
Subtotal	256	256	257	259	267	270	271	266	261	257	256	255	261
Net water surplus (deficit)	13	12	11	9	6	10	5	7	11	13	14	14	10
Environmental water treatment	0	0	0	0	21	21	21	21	21	21			21
Operational pond volume	64,000												
Incremental pond volume	9,165	8,852	7,968	6,479	(10,280)	(7,933)	(11,551)	(10,221)	(6,792)	(5,499)	9,886	9,925	
Seasonal pond volume	73,165	82,018	89,986	96,464	86,185	78,252	66,701	56,480	49,688	44,189	54,075	64,000	

WOLVERINE TAILINGS FACILITY WATER BALANCE - POST-CLOSURE - WITH DIVERSIONS - AVERAGE YEAR

DATA

	Daily tonnage (tpd)	% Solids		
		Transport	Starter	Final
Tailings production	0	15.630%	75%	80%
DMS production	0	90%	85%	85%
WR production	0	97%	85%	85%
Paste production	0	76%	76%	76%
Paste plant bypass	0	0.4%	75%	80%

Annual Precipitation (mm)	570
Runoff Coefficient	0.23
Water pond area	0.125
Catchment runoff area (sq.km.)	0.16
DMS & beach area (sq.km)	0.125
Uphill catchment area (sq.km.)	1.05
% Diversion ditch seepage	0.15

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-15	-16	-12	-8	2	9	11	8	2	-7	-10	-18	
Monthly percent of annual evap.	8%	6%	5%	4%	7%	11%	14%	11%	10%	9%	8%	8%	100%
Average Monthly Precipitation (mm)	42.8	33.2	26.5	20.0	42.3	65.3	77.7	62.3	57.1	48.8	46.7	47.4	569.9
Average monthly runoff (% of annual)	0%	0%	0%	1%	19%	35%	17%	9%	9%	6%	3%	1%	100%
Monthly Evaporation (mm)	5	4.5	9.5	21	72	86.5	90	61.5	32	14.5	6	2	404.5
Incremental ice thickness on pond (m)	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	1.6
Water Inputs (m3/hr)													Averages
Mine groundwater	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Recirculated drill u/g water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sewage water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tailings transport water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plantsite Tailings, etc.	0.00	0	0	0	0	0	0	0	0	0	0	0	-
DMS transport water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
WR transport water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Precipitation on pond	7.42	5.76	4.61	3.47	7.34	11.33	13.49	10.81	9.91	8.47	8.10	8.22	8.24
Runoff from catchment	0.00	0.00	0.00	0.29	5.54	10.20	4.95	2.62	2.54	1.73	0.99	0.29	2.43
Seepage from diversion ditch	0.00	0.00	0.00	0.29	5.45	10.04	4.88	2.58	2.50	1.70	0.98	0.29	2.39
Seepage reclaim	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Subtotal	8	6	5	5	19	32	24	17	15	12	11	9	14
Water Losses (m3/hr)													
Pond evapor.	1	1	1.65	3.65	12.50	15.02	15.63	10.68	5.56	2.52	1.04	0.35	5.85
Tailing voids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
DMS voids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
WR voids	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Paste Voids	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Process water low level treatment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Mine water low level treatment	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Truck wash low level treatment	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Seepage	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96
Water reclaim to process plant (Hatch)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Subtotal	1	2	3	5	14	16	17	12	7	4	2	1	7
Net water surplus (deficit)	7	4	2	0	5	16	7	5	9	9	9	8	7
Environmental water treatment	0	0	0	0	14	14	14	14	14	14			14
Operational pond volume	-												
Incremental pond volume	4,719	3,223	1,769	(68)	(5,893)	1,825	(4,550)	(6,242)	(3,317)	(3,331)	6,138	5,727	
Seasonal pond volume	4,719	7,941	9,710	9,642	3,749	5,574	1,025	(5,217)	(8,534)	(11,865)	(5,727)	-	

WOLVERINE TAILINGS FACILITY WATER BALANCE - POST-CLOSURE - WITH DIVERSIONS - 100 YEAR WET

DATA

	Daily tonnage (tpd)	% Solids		
		Transport	Starter	Final
Tailings production	0	15.630%	75%	80%
DMS production	0	90%	85%	85%
WR production	0	97%	85%	85%
Paste production	0	76%	76%	76%
Paste plant bypass	0	0.4%	75%	80%

Annual Precipitation (mm)	795
Runoff Coefficient	0.25
Water pond area	0.125
Catchment runoff area (sq.km.)	0.16
DMS & beach area (sq.km)	0.125
Uphill catchment area (sq.km.)	1.05
% Diversion ditch seepage	0.15

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-15	-16	-12	-8	2	9	11	8	2	-7	-10	-18	
Monthly percent of annual evap.	8%	6%	5%	4%	7%	11%	14%	11%	10%	9%	8%	8%	100%
Average Monthly Precipitation (mm)	59.6	46.2	37.0	27.9	59.0	91.0	108.4	86.9	79.6	68.0	65.1	66.1	794.8
Average monthly runoff (% of annual)	0%	0%	0%	1%	19%	35%	17%	9%	9%	6%	3%	1%	100%
Monthly Evaporation (mm)	5	4.5	9.5	21	72	86.5	90	61.5	32	14.5	6	2	404.5
Incremental ice thickness on pond (m)	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	1.6
Water Inputs (m3/hr)													Averages
Mine groundwater	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Recirculated drill u/g water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sewage water	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
Tailings transport water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plantsite Tailings, etc.	0.00	0	0	0	0	0	0	0	0	0	0	0	-
DMS transport water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
WR transport water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Precipitation on pond	10.35	8.03	6.42	4.85	10.24	15.80	18.81	15.08	13.82	11.81	11.30	11.47	115.00
Runoff from catchment	0.00	0.00	0.00	0.44	8.44	15.54	7.55	4.00	3.88	2.63	1.51	0.44	3.70
Seepage from diversion ditch	0.00	0.00	0.00	0.44	8.30	15.30	7.43	3.93	3.82	2.59	1.49	0.44	3.64
Seepage reclaim	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Subtotal	12	10	8	7	29	48	35	25	23	19	16	14	21
Water Losses (m3/hr)													
Pond evapor.	1	1	1.65	3.65	12.50	15.02	15.63	10.68	5.56	2.52	1.04	0.35	5.85
Tailing voids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
DMS voids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
WR voids	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Paste Voids	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Process water low level treatment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Mine water low level treatment	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Truck wash low level treatment	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Seepage	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96
Water reclaim to process plant (Hatch)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Subtotal	1	2	3	5	14	16	17	12	7	4	2	1	7
Net water surplus (deficit)	11	8	5	3	15	32	19	13	17	15	14	13	14
Environmental water treatment	0	0	0	0	27	27	27	27	27	27			27
Operational pond volume	-												
Incremental pond volume	7,692	5,723	3,942	2,002	(8,851)	3,491	(6,196)	(10,394)	(7,783)	(8,817)	10,046	9,147	
Seasonal pond volume	7,692	13,415	17,357	19,359	10,507	13,998	7,802	(2,592)	(10,375)	(19,193)	(9,147)	-	

WOLVERINE TAILINGS FACILITY WATER BALANCE - POST-CLOSURE - WITH DIVERSIONS - 100 YEAR DRY

DATA

	Daily tonnage (tpd)	% Solids		
		Transport	Starter	Final
Tailings production	0	15.630%	75%	80%
DMS production	0	90%	85%	85%
WR production	0	97%	85%	85%
Paste production	0	76%	76%	76%
Paste plant bypass	0	0.4%	75%	80%

Annual Precipitation (mm)	279
Runoff Coefficient	0.23
Water pond area	0.125
Catchment runoff area (sq.km.)	0.16
DMS & beach area (sq.km)	0.125
Uphill catchment area (sq.km.)	1.05
% Diversion ditch seepage	0.15

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-15	-16	-12	-8	2	9	11	8	2	-7	-10	-18	
Monthly percent of annual evap.	8%	6%	5%	4%	7%	11%	14%	11%	10%	9%	8%	8%	100%
Average Monthly Precipitation (mm)	20.9	16.2	13.0	9.8	20.7	31.9	38.0	30.5	27.9	23.9	22.8	23.2	278.9
Average monthly runoff (% of annual)	0%	0%	0%	1%	19%	35%	17%	9%	9%	6%	3%	1%	100%
Monthly Evaporation (mm)	5	4.5	9.5	21	72	86.5	90	61.5	32	14.5	6	2	404.5
Incremental ice thickness on pond (m)	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	1.6
Water Inputs (m3/hr)													Averages
Mine groundwater	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Recirculated drill u/g water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sewage water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tailings transport water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plantsite Tailings, etc. (Hatch)	0.00	0	0	0	0	0	0	0	0	0	0	0	-
DMS transport water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
WR transport water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Precipitation on pond	3.63	2.82	2.25	1.70	3.59	5.54	6.60	5.29	4.85	4.15	3.97	4.03	4.04
Runoff from catchment	0.00	0.00	0.00	0.14	2.71	4.99	2.42	1.28	1.25	0.85	0.48	0.14	1.19
Seepage from diversion ditch	0.00	0.00	0.00	0.14	2.67	4.91	2.39	1.26	1.23	0.83	0.48	0.14	1.17
Seepage reclaim	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Subtotal	4	3	3	2	9	16	12	8	8	6	5	5	7
Water Losses (m3/hr)													
Pond evapor.	1	1	1.65	3.65	12.50	15.02	15.63	10.68	5.56	2.52	1.04	0.35	5.85
Tailing voids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
DMS voids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
WR voids	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Paste Voids	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Process water low level treatment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Mine water low level treatment	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Truck wash low level treatment	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Seepage	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96
Water reclaim to process plant (Hatch)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Subtotal	1	2	3	5	14	16	17	12	7	4	2	1	7
Net water surplus (deficit)	3	2	0	-2	-4	0	-5	-3	1	3	3	3	0
Environmental water treatment	0	0	0	0	0	0	0	0	0	0			0
Operational pond volume	-												
Incremental pond volume	1,991	1,106	76	(1,557)	(3,024)	(171)	(3,515)	(2,525)	790	1,900	2,438	2,492	
Seasonal pond volume	1,991	3,097	3,173	1,616	(1,408)	(1,579)	(5,094)	(7,619)	(6,829)	(4,930)	(2,492)	-	

WOLVERINE TAILINGS FACILITY WATER BALANCE - POST-CLOSURE - WITHOUT DIVERSIONS - AVERAGE YEAR

DATA

	Daily tonnage (tpd)	% Solids		
		Transport	Starter	Final
Tailings production	0	15.630%	75%	80%
DMS production	0	90%	85%	85%
WR production	0	97%	85%	85%
Paste production	0	76%	76%	76%
Paste plant bypass	0	0.4%	75%	80%

Annual Precipitation (mm)	570
Runoff Coefficient	0.23
Water pond area	0.125
Catchment runoff area (sq.km.)	1.05
DMS & beach area (sq.km)	0.125
Uphill catchment area (sq.km.)	0
% Diversion ditch seepage	0

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-15	-16	-12	-8	2	9	11	8	2	-7	-10	-18	
Monthly percent of annual evap.	8%	6%	5%	4%	7%	11%	14%	11%	10%	9%	8%	8%	100%
Average Monthly Precipitation (mm)	42.8	33.2	26.5	20.0	42.3	65.3	77.7	62.3	57.1	48.8	46.7	47.4	569.9
Average monthly runoff (% of annual)	0%	0%	0%	1%	19%	35%	17%	9%	9%	6%	3%	1%	100%
Monthly Evaporation (mm)	5	4.5	9.5	21	72	86.5	90	61.5	32	14.5	6	2	404.5
Incremental ice thickness on pond (m)	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	1.6
Water Inputs (m3/hr)													Averages
Mine groundwater	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Recirculated drill u/g water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sewage water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tailings transport water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plantsite Tailings, etc.	0.00	0	0	0	0	0	0	0	0	0	0	0	-
DMS transport water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
WR transport water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Precipitation on pond	7.42	5.76	4.61	3.47	7.34	11.33	13.49	10.81	9.91	8.47	8.10	8.22	8.24
Runoff from catchment	0.00	0.00	0.00	1.91	36.33	66.92	32.50	17.21	16.70	11.34	6.50	1.91	15.94
Seepage from diversion ditch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Seepage reclaim	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Subtotal	8	6	5	6	44	79	46	29	27	20	15	11	25
Water Losses (m3/hr)													
Pond evapor.	1	1	1.65	3.65	12.50	15.02	15.63	10.68	5.56	2.52	1.04	0.35	5.85
Tailing voids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
DMS voids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
WR voids	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Paste Voids	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Process water low level treatment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Mine water low level treatment	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Truck wash low level treatment	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Seepage	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96
Water reclaim to process plant (Hatch)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Subtotal	1	2	3	5	14	16	17	12	7	4	2	1	7
Net water surplus (deficit)	7	4	2	1	31	63	30	17	21	17	13	9	18
Environmental water treatment	0	0	0	0	36	36	36	36	36	36			36
Operational pond volume	-												
Incremental pond volume	4,719	3,223	1,769	893	(3,663)	19,420	(4,240)	(13,615)	(10,946)	(13,649)	9,403	6,688	
Seasonal pond volume	4,719	7,941	9,710	10,603	6,939	26,360	22,119	8,504	(2,442)	(16,091)	(6,688)	(0)	

WOLVERINE TAILINGS FACILITY WATER BALANCE - POST-CLOSURE - WITHOUT DIVERSIONS - 100 YEAR WET

DATA

	Daily tonnage (tpd)	% Solids		
		Transport	Starter	Final
Tailings production	0	15.630%	75%	80%
DMS production	0	90%	85%	85%
WR production	0	97%	85%	85%
Paste production	0	76%	76%	76%
Paste plant bypass	0	0.4%	75%	80%

Annual Precipitation (mm)	795
Runoff Coefficient	0.25
Water pond area	0.125
Catchment runoff area (sq.km.)	1.05
DMS & beach area (sq.km)	0.125
Uphill catchment area (sq.km.)	0
% Diversion ditch seepage	0

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-15	-16	-12	-8	2	9	11	8	2	-7	-10	-18	
Monthly percent of annual evap.	8%	6%	5%	4%	7%	11%	14%	11%	10%	9%	8%	8%	100%
Average Monthly Precipitation (mm)	59.6	46.2	37.0	27.9	59.0	91.0	108.4	86.9	79.6	68.0	65.1	66.1	794.8
Average monthly runoff (% of annual)	0%	0%	0%	1%	19%	35%	17%	9%	9%	6%	3%	1%	100%
Monthly Evaporation (mm)	5	4.5	9.5	21	72	86.5	90	61.5	32	14.5	6	2	404.5
Incremental ice thickness on pond (m)	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	1.6
Water Inputs (m3/hr)													Averages
Mine groundwater	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Recirculated drill u/g water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sewage water	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
Tailings transport water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plantsite Tailings, etc.	0.00	0	0	0	0	0	0	0	0	0	0	0	-
DMS transport water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
WR transport water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Precipitation on pond	10.35	8.03	6.42	4.85	10.24	15.80	18.81	15.08	13.82	11.81	11.30	11.47	115.50
Runoff from catchment	0.00	0.00	0.00	2.91	55.36	101.98	49.53	26.22	25.45	17.29	9.91	2.91	24.30
Seepage from diversion ditch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Seepage reclaim	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Subtotal	12	10	8	9	67	119	70	43	41	31	23	16	37
Water Losses (m3/hr)													
Pond evapor.	1	1	1.65	3.65	12.50	15.02	15.63	10.68	5.56	2.52	1.04	0.35	5.85
Tailing voids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
DMS voids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
WR voids	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Paste Voids	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Process water low level treatment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Mine water low level treatment	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Truck wash low level treatment	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Seepage	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Water reclaim to process plant (Hatch)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Subtotal	1	1	2	4	13	16	16	11	6	3	2	1	6
Net water surplus (deficit)	11	8	6	5	54	104	54	32	35	28	21	15	31
Environmental water treatment	0	0	0	0	62	62	62	62	62	62	62	62	62
Operational pond volume	-	-	-	-	-	-	-	-	-	-	-	-	-
Incremental pond volume	7,692	6,083	4,302	3,825	(5,752)	30,005	(6,025)	(21,930)	(19,710)	(24,842)	15,382	10,970	
Seasonal pond volume	7,692	13,775	18,077	21,902	16,150	46,155	40,130	18,200	(1,510)	(26,352)	(10,970)	-	

WOLVERINE TAILINGS FACILITY WATER BALANCE - POST-CLOSURE - WITHOUT DIVERSIONS - 100 YEAR DRY

DATA

	Daily tonnage (tpd)	% Solids		
		Transport	Starter	Final
Tailings production	0	15.630%	75%	80%
DMS production	0	90%	85%	85%
WR production	0	97%	85%	85%
Paste production	0	76%	76%	76%
Paste plant bypass	0	0.4%	75%	80%

Annual Precipitation (mm)	279
Runoff Coefficient	0.23
Water pond area	0.125
Catchment runoff area (sq.km.)	1.05
DMS & beach area (sq.km)	0.125
Uphill catchment area (sq.km.)	0
% Diversion ditch seepage	0

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-15	-16	-12	-8	2	9	11	8	2	-7	-10	-18	
Monthly percent of annual evap.	8%	6%	5%	4%	7%	11%	14%	11%	10%	9%	8%	8%	100%
Average Monthly Precipitation (mm)	20.9	16.2	13.0	9.8	20.7	31.9	38.0	30.5	27.9	23.9	22.8	23.2	278.9
Average monthly runoff (% of annual)	0%	0%	0%	1%	19%	35%	17%	9%	9%	6%	3%	1%	100%
Monthly Evaporation (mm)	5	4.5	9.5	21	72	86.5	90	61.5	32	14.5	6	2	404.5
Incremental ice thickness on pond (m)	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	1.6
Water Inputs (m3/hr)													Averages
Mine groundwater	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Recirculated drill u/g water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sewage water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tailings transport water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plantsite Tailings, etc. (Hatch)	0.00	0	0	0	0	0	0	0	0	0	0	0	-
DMS transport water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
WR transport water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Precipitation on pond	3.63	2.82	2.25	1.70	3.59	5.54	6.60	5.29	4.85	4.15	3.97	4.03	4.04
Runoff from catchment	0.00	0.00	0.00	0.94	17.78	32.75	15.91	8.42	8.17	5.55	3.18	0.94	7.80
Seepage from diversion ditch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Seepage reclaim	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Subtotal	4	3	2	3	21	38	23	14	13	10	7	5	12
Water Losses (m3/hr)													
Pond evapor.	1	1	1.65	3.65	12.50	15.02	15.63	10.68	5.56	2.52	1.04	0.35	5.85
Tailing voids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
DMS voids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
WR voids	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Paste Voids	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Process water low level treatment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Mine water low level treatment	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Truck wash low level treatment	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Seepage	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Water reclaim to process plant (Hatch)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Subtotal	1	1	2	4	13	16	16	11	6	3	2	1	6
Net water surplus (deficit)	2	2	0	-2	8	23	6	3	7	7	6	4	5
Environmental water treatment	0	0	0	0	11	11	11	11	11	11			11
Operational pond volume	-												
Incremental pond volume	1,631	1,106	76	(1,087)	(1,872)	8,501	(3,303)	(6,073)	(2,884)	(3,091)	4,036	2,962	
Seasonal pond volume	1,631	2,737	2,813	1,726	(147)	8,354	5,051	(1,023)	(3,907)	(6,998)	(2,962)	-	