	AWMP Ver 2 Model QA/QC				
Item	**Date**	**Model / AWMP Version**	**Problem / Issue**	**Change (changes affecting input tables in BOLD)**	**Updated Model Version**
1	8/2/2012	MS V1.0 / AWMPV2.0	ERM found that the pH used in the model did not match that proposed in Version 2 of the AWMP	The Mine Site model was updated (email from Peter Hinck to Fred Marinelli on 7/19/12) to match AWMP V2. However, subsequent discussion of the AWMP modeling parameters has led to this change being dropped from the proposed model. **Cat1SP_pH_Geomem no longer used in modeling**	MS AWMPV2.1
2	8/2/2012	MS V1.0 / AWMPV2.0	ERM identified a greater-than-expected mass removal in the Cat 1 PRB	This issue is associated with the percolation through the Category 1 geomembrane, which was updated in the 7/19/12 email submittal to match the distribution proposed in the AWMP V2. The design flow of the PRB was not updated at the same time, resulting in longer-than-intended retention times in the PRB, and therefore greater-than-intended mass removal. **Cat1SP_PRB_Design_Flow value changed to 2.5 gpm**	MS AWMPV2.1
3	8/2/2012	MS V1.0 / AWMPV2.0	Additional model outputs are necessary to facilitate the impacts analysis	Barr added additional results reporting and standards checking functionality in the surface water portion of the model.	MS AWMPV2.1
4	8/2/2012	MS V1.0 / AWMPV2.0	Barr found during internal QA/QC that the flow lines carrying wall rock mass to the West Pit in the flow chart were combined into one defined function in the model. Task 2 QA/QC needed those flow lines separated into water flows and direct mass transfers.	The functions, which were the addition of all wall rock flow lines for a rock category, were changed into 2 functions which separated mass flux in flowing water and direct transfers via wall rock inundation. These are now two distinct elements to facilitate the Task 2 QA/QC.	MS AWMPV2.1
5	8/2/2012	MS V1.0 / AWMPV2.0	Barr found during internal QA/QC that the groundwater inflow to the West Pit was not properly accounted for in the water balance, although the mass balance was correct.	Barr corrected the West Pit water balance equations.	MS AWMPV2.1
6	8/2/2012	MS V1.0 / AWMPV2.0	Barr found during internal QA/QC that the calculation of added alkalinity and calcium to the pit outflow as a result of pH adjustment in the limestone channel was not correct.	Barr updated the calculations relating to limestone dissolution.	MS AWMPV2.1
7	8/2/2012	MS V1.0 / PS V1.0 / AWMPV2.0	Internal QA/QC has identified several small inconsistencies in the model flowcharts (not the models themselves).	Barr marked up the flowcharts used for the Task 2 QA/QC control volume identification.	MS AWMPV2.1 / PS AWMPV2.1

	AWMP Ver 2 Model QA/QC				
Item	**Date**	**Model / AWMP Version**	**Problem / Issue**	**Change (changes affecting input tables in BOLD)**	**Updated Model Version**
8	8/2/2012	PS V1.0 / AWMPV2.0	Plant Site mass balance: first Plant Site control volume mass balance did not appear to close when using the initially provided flows and concentrations to calculate mass loading rates	Barr has shown (and discussed with Fred Marinelli on 8/1/12) that the model output flows and concentrations cannot be used to replicate GoldSim's mass loading results due to the complex differential equation solutions performed in GoldSim. An alternative means of performing the control volume calculations is to use GoldSim-reported water flow rates and GoldSim-reported constituent mass flux rates along with stored water volumes and constituent masses.	PS AWMPV2.1
9	8/2/2012	PS V1.0 / AWMPV2.0	Barr could not do a direct comparison of Existing Conditions and Project Conditions without the two models being in one model. Critical for the impact analysis.	Barr incorporated the Existing Conditions Model INTO the Project (Base) model so that there is only 1 model to transfer now rather than 2 separate models.	PS AWMPV2.1
10	8/2/2012	PS V1.0 / AWMPV2.0	Barr found during internal QA/QC that the defined volume in river nodes MLC-3 and MLC-2 were incorrect (MLC-3 referenced the MLC-2 volume and vice-versa).	Barr changed the volume definition of river nodes MLC-3 and MLC-2 in both the Project portion of the model and the Existing portion of the model.	PS AWMPV2.1
11	8/2/2012	PS V1.0 / AWMPV2.0	Barr found during internal QA/QC that 2 of the flow lines in the flow chart (surface runoff and tailings basin runoff to MLC-3) were combined into one defined function in the model. Task 2 QA/QC needed those two flow lines separate.	The function, which was the addition of two separate flow lines, was changed into 2 functions which separated runoff from natural areas and the tailings basin. These are now two distinct flow lines to facilitate the Task 2 QA/QC.	PS AWMPV2.1
12	8/2/2012	PS V1.0 / AWMPV2.0	Barr found that the MODFLOW model of the FTB in closure did not match the AWMPV2.0 (reduced infiltration from the pond in Cell 1E/2E).	Barr updated the predictive MODFLOW simulation of the closure period and updated several tables of the work plan related to directions of flow and depths to the water table. **Updated Plant Site tables 1-25, 1-27, 1-29, 1-31, 1-34, 1-35, 1-37, and 1-39 are included in tabs in this spreadsheet.**	PS AWMPV2.1
13	8/8/2012	MS AWMPV2.1	Barr found during internal QA/QC that the West Pit outflow mass balance model combines the controlled outflow and any pit overtopping.	Barr changed the mass balance of the West Pit so that overtopping flows (unlikely) bypass the passive treatment and contribute directly to SW-004a.	MS AWMPV2.2

	AWMP Ver 2 Model QA/QC				
Item	**Date**	**Model / AWMP Version**	**Problem / Issue**	**Change (changes affecting input tables in BOLD)**	**Updated Model Version**
14	8/8/2012	MS AWMPV2.1	Barr identified in response to agency questions that not all WWTF interactions between the Mine Site and Plant Site were accounted for in the WWTF water and mass balance.	Barr added an inflow of Plant Site brine to the West EQ Pond (flow and chemistry). Barr added an outflow of sludge water (flow and chemistry) to the CPS pond. These portions of the model are inactive while coordination between the WWTF design team and modelers is ongoing. **New Mine Site Tables 1-38, 1-39, and 1-40 will be included in tabs in this spreadsheet. New input variable Sludge_Water_Out will be defined as a percent of the total WWTF flow.**	MS AWMPV2.2
15	8/8/2012	MS AWMPV2.1	Barr found during internal QA/QC that the West Pit surficial aquifer flow calculations contained an error in the flows for Section 2 (between Dunka Road and the Property Boundary).	Barr edited the cell flows vector calculation in the West Pit surficial aquifer (\Flowpath_Models\WP_Surf\Cell_Flows\Flows)	MS AWMPV2.2
16	8/9/2012	MS AWMPV2.1	Based on comments from reviewers and Barr staff, PRB modeling was determined to be overly complicated.	Barr edited the modeling of the Category 1 stockpile PRB to be a constant removal efficiency (ex. 50% removal for SO4) irrespective of flow rates or retention time.	MS AWMPV2.2
17	8/10/2012	MS AWMPV2.1	During detailed West Pit treatment wetland design it was determined that the West Pit water elevation needs to be increased slightly.	Barr added a new variable representing the elevation that the West Pit water returns to after annual discharge. **WP_Outlet_Elev_New value set to 1575'** Barr also edited the equation for WP_Seasonal_Discharge to account for the current timestep inflows in calculating the desired outflow	MS AWMPV2.2
18	8/15/2012	MS AWMPV2.2	Barr found during internal QA/QC that the East Pit wetland outflow to the surficial aquifer was defined differently in the flowpath and pit water balances	Barr edited the water balance calculation (EPCP_GW_Outflow) and aquifer (EP_at_Aquifer) to both initiate seepage when water levels reach the aquifer, without respect to pit pump-and-treat.	MS AWMPV2.3
19	8/15/2012	PS AWMPV2.1	Mitigation measure at Tailings Basin	Barr has made significant edits to the features at the toes of the Tailings Basin, namely converting from a PRB system to a Wetland treatment system	PS AWMPV2.2

	AWMP Ver 2 Model QA/QC				
Item	**Date**	**Model / AWMP Version**	**Problem / Issue**	**Change (changes affecting input tables in BOLD)**	**Updated Model Version**
20	8/15/2012	PS AWMPV2.1	Barr found during internal QA/QC that the inputs of Table 1-49 did not differentiate runoff area of the embankments of the existing Tailings Basin between Cell 2W and Cell 2E.	The areas which were under Cell 2W were divided into Cell 2W and Cell 2E. See included table 1-49.	PS AWMPV2.2
21	8/15/2012	PS AWMPV2.1	During review of the tailings humidity cells, it was determined that the rates currently being used were not appropriate.	SRK suggested a new method and new distributions were created. These have not yet been checked by the agencies so the distributions are in the "proposal" stage. See included tables 1-13 and 1-14.	PS AWMPV2.2
22	8/15/2012	PS AWMPV2.1	ERM found that the sulfate concentration cap for the tailings was not checking correctly. The calcium release rate was changed from a ratio to Na to a ratio to SO4 using CDF056. This change was captured in the release of Ca, but was not changed in the calculation of the sulfate cap.	The error in the model was fixed.	PS AWMPV2.2
23	8/15/2012	MS AWMPV2.2	Barr found during internal QA/QC that the East Pit wetland outflow to the surficial aquifer was defined differently in the flowpath and pit water balances	Barr edited the water balance calculation (EPCP_GW_Outflow) and aquifer (EP_at_Aquifer) to both initiate seepage when water levels reach the aquifer, without respect to pit pump-and-treat.	MS AWMPV2.3
24	8/16/2012	MS AWMPV2.2	Barr found during internal QA/QC that the East Pit wetland overflow to the West Pit did not appropriately calculate flows during low-inflow periods.	Barr changed the calculation for EPCP_Wetland_Outflow so that outflow equals inflow if the starting water level for the month is equal to the outlet elevation.	MS AWMPV2.3
25	8/16/2012	MS AWMPV2.2	Barr found during internal QA/QC that the flow lines carrying wall rock mass to the East Pit in the flow chart were combined into one defined function in the model. Task 2 QA/QC needed those flow lines separated into water flows and direct mass transfers.	The functions, which were the addition of all wall rock flow lines for a rock category, were changed into 5 functions which separated mass flux in flowing water and direct transfers via wall rock inundation to the 3 East Pit mass storage nodes. These are now 5 distinct elements to facilitate the Task 2 QA/QC.	MS AWMPV2.3
26	8/16/2012	MS AWMPV2.2	Barr found during internal QA/QC that there was an inconsistency between the stockpile liner leakage flows used for the stockpile and GW flowpath water balances.	Barr changed the calculations for the source zone recharge ("S") terms for the following flowpaths: EPCat23_Surf, OSP_Surf, OSLA_Surf. Flow into the flowpath now equals the stockpile outflow rate.	MS AWMPV2.3

	AWMP Ver 2 Model QA/QC				
Item	Date	Model / AWMP Version	Problem / Issue	Change (changes affecting input tables in BOLD)	Updated Model Version

	AWMP Ver 2 Model QA/QC				
Item	Date	Model / AWMP Version	Problem / Issue	Change (changes affecting input tables in BOLD)	Updated Model Version

Table 1-13 Distribution Parameters for Flotation Fine Tailings Release

Constituent	*Method*	*Source*	*Units*	*Distribution*	*Mean/Mode*	*St. Dev.*	*Minimum*	*Maximum*
Ag	S ratio	Aqua Regia	mg Ag / mg S	Beta	1.54E-04	1.49E-05	1.35E-04	2.54E-04
Al	Ca ratio	Anorthite Formula	mg Al / mg Ca	Constant	1.35E+00	0.00E+00	0.00E+00	0.00E+00
Alk	NOT MODELED THIS WAY				0.00E+00	0.00E+00	0.00E+00	0.00E+00
As	S ratio	Aqua Regia	mg As / mg S	Beta	1.96E-03	2.53E-04	1.67E-03	4.89E-03
B	Cap	Whistle Mine	mg/L	Constant	1.00E-01	0.00E+00	0.00E+00	0.00E+00
Ba	K ratio	Aqua Regia	mg Ba / mg K	Beta	2.66E-02	1.27E-03	1.83E-02	3.06E-02
Be	K ratio	Aqua Regia	mg Be / mg K	Beta	1.03E-04	1.51E-05	8.13E-05	2.32E-04
Ca	SO4 rate ratio	HCT	mg Ca / mg SO4	Beta	1.18E+00	3.03E-01	8.17E-01	3.46E+00
Cd	Zn rate ratio	2/3 HCT (2)	mg Cd / mg Zn	Beta	1.65E-02	1.20E-02	1.01E-03	5.84E-02
Cl	No release	N/A	mg/L	Constant	0	0.00E+00	0.00E+00	0.00E+00
Co	Ni rate ratio	2/3 HCT (2)	mg Co / mg Ni	Beta	8.29E-02	3.91E-02	2.24E-02	2.06E-01
Cr	Cap	Whistle Mine	mg/L	Constant	1.00E-02	0.00E+00	0.00E+00	0.00E+00
Cu	S ratio	Aqua Regia	mg Cu / mg S	Beta	9.30E-02	1.46E-02	5.29E-02	1.46E-01
F	NOT MODELED THIS WAY				0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe	S ratio	Pyrrhotite microprobe	mg Fe / mg S	Beta	1.62E+00	8.72E-02	1.49E+00	1.92E+00
K	SO_4 rate ratio	HCT	mg K / mg SO_4	Beta	2.63E-01	6.37E-02	1.71E-01	7.51E-01
Mg	SO_4 rate ratio	HCT	mg Mg / mg SO_4	Beta	2.18E-01	4.69E-02	1.62E-01	7.94E-01
Mn	Ni rate ratio	HCT	mg Mn / mg Ni	Beta	4.68E+00	2.08E+00	2.07E+00	9.31E+00
Na	SO_4 rate ratio	HCT	mg Na / mg SO_4	Beta	8.20E-02	1.77E-02	6.03E-02	2.64E-01
Ni	S ratio	Pyrrhotite microprobe	mg Ni / mg S	Beta	5.63E-03	6.65E-03	5.65E-04	4.00E-02
Pb	S ratio	Aqua Regia	mg Pb / mg S	Beta	2.67E-03	6.16E-04	1.93E-03	9.32E-03
Sb	S ratio	Aqua Regia	mg Sb / mg S	Beta	1.08E-04	3.50E-05	6.67E-05	1.99E-04
Se	SO_4 rate ratio	HCT	mg Se / mg SO_4	Beta	1.79E-05	5.29E-06	1.29E-05	6.09E-05
SO_4	Rate	HCT	mg SO_4/kg/week	Beta	1.23E+01	3.83E+00	0.00E+00	1.65E+01
Tl	S ratio	Aqua Regia	mg Tl / mg S	Beta	7.15E-05	7.35E-06	5.97E-05	1.41E-04
V	K ratio	Aqua Regia	mg V / mg K	Beta	2.53E-02	2.61E-03	7.01E-03	3.17E-02
Zn	Ni rate ratio	2/3 HCT (2)	mg Zn / mg Ni	Beta	3.35E-01	3.70E-01	3.31E-02	1.60E+00

Al	Na ratio	Albite Formula	mg Al / mg Na	Constant	1.17E+00	0.00E+00	0.00E+00	0.00E+00
Fe	Mg ratio	Olivine microprobe	mg Fe / mg Mg	Beta	1.87E+00	6.75E-01	1.19E+00	4.51E+00

Notes

- HCT indicates average rates from tailings humidity cells over the entire testing period.
- Aqua Regia indicates ratios from whole tailings testing.
- Cat 2/3 HCT (2) indicates average rates from Category 2/3 humidity cells over Condition 2, as defined in Large Table 1.
- All distributions from humidity cell data and aqua regia data represent the full range of the observed values, with no weighting. Distributions are shown in Large Figure 42 to Large Figure 45.
- Distributions from microprobe data represent the full range of the observed ratios for each mineral, with no weighting. Distributions are shown in Large Figure 21 and Large Figure 22.
- Constituents not shown above are modeled according to the mineral solubility methods described in Section 10.1.1.

Table 1-14 Distribution Parameters for Flotation Coarse Tailings Release

Constituent	*Method*	*Source*	*Units*	*Distribution*	*Mean/Mode*	*St. Dev.*	*Minimum*	*Maximum*
Ag	S ratio	Aqua Regia	mg Ag / mg S	Beta	2.05E-04	3.41E-05	1.42E-04	5.45E-04
Al	Ca ratio	Anorthite Formula	mg Al / mg Ca	Constant	1.35E+00	0.00E+00	0.00E+00	0.00E+00
Alk	NOT MODELED THIS WAY				0.00E+00	0.00E+00	0.00E+00	0.00E+00
As	S ratio	Aqua Regia	mg As / mg S	Beta	1.82E-03	3.31E-04	9.17E-04	5.09E-03
B	Cap	Whistle Mine	mg/L	Constant	1.00E-01	0.00E+00	0.00E+00	0.00E+00
Ba	K ratio	Aqua Regia	mg Ba / mg K	Beta	2.74E-02	1.81E-03	2.01E-02	4.02E-02
Be	K ratio	Aqua Regia	mg Be / mg K	Beta	9.77E-05	9.41E-06	5.71E-05	1.53E-04
Ca	SO4 rate ratio	HCT	mg Ca / mg SO4	Beta	9.58E-01	3.34E-01	3.00E-01	1.60E+00
Cd	Zn rate ratio	2/3 HCT (2)	mg Cd / mg Zn	Beta	1.65E-02	1.20E-02	1.01E-03	5.84E-02
Cl	No release	N/A	mg/L	Constant	0	0.00E+00	0.00E+00	0.00E+00
Co	Ni rate ratio	2/3 HCT (2)	mg Co / mg Ni	Beta	8.29E-02	3.91E-02	2.24E-02	2.06E-01
Cr	Cap	Whistle Mine	mg/L	Constant	1.00E-02	0.00E+00	0.00E+00	0.00E+00
Cu	S ratio	Aqua Regia	mg Cu / mg S	Beta	2.11E-01	5.25E-02	2.95E-03	7.00E-01
F	NOT MODELED THIS WAY				0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe	S ratio	Pyrrhotite microprobe	mg Fe / mg S	Beta	1.62E+00	8.72E-02	1.49E+00	1.92E+00
K	SO_4 rate ratio	HCT	mg K / mg SO_4	Beta	2.60E-01	8.16E-02	0.00E+00	4.91E-01
Mg	SO_4 rate ratio	HCT	mg Mg / mg SO_4	Beta	1.82E-01	3.32E-02	9.68E-02	5.46E-01
Mn	Ni rate ratio	HCT	mg Mn / mg Ni	Beta	3.37E+00	1.32E+00	1.80E+00	1.00E+01
Na	SO_4 rate ratio	HCT	mg Na / mg SO_4	Beta	6.86E-02	2.40E-02	3.58E-02	2.57E-01
Ni	S ratio	Pyrrhotite microprobe	mg Ni / mg S	Beta	5.63E-03	6.65E-03	5.65E-04	4.00E-02
Pb	S ratio	Aqua Regia	mg Pb / mg S	Beta	2.88E-03	7.68E-04	1.18E-03	1.08E-02
Sb	S ratio	Aqua Regia	mg Sb / mg S	Beta	1.10E-04	3.06E-05	5.45E-05	2.50E-04
Se	SO_4 rate ratio	HCT	mg Se / mg SO_4	Beta	1.75E-05	3.51E-06	0.00E+00	2.41E-05
SO_4	Rate	HCT	mg SO_4/kg/week	Beta	1.18E+01	2.17E+00	8.46E+00	1.74E+01
Tl	S ratio	Aqua Regia	mg Tl / mg S	Beta	9.44E-05	1.27E-05	6.67E-05	1.86E-04
V	K ratio	Aqua Regia	mg V / mg K	Beta	1.81E-02	2.66E-03	1.81E-03	3.00E-02
Zn	Ni rate ratio	2/3 HCT (2)	mg Zn / mg Ni	Beta	3.35E-01	3.70E-01	3.31E-02	1.60E+00

Al	Na ratio	Albite Formula	mg Al / mg Na	Constant	1.17E+00	0.00E+00	0.00E+00	0.00E+00
Fe	Mg ratio	Olivine microprobe	mg Fe / mg Mg	Beta	1.87E+00	6.75E-01	1.19E+00	4.51E+00

Notes

- HCT indicates average rates from tailings humidity cells over the entire testing period.
- Aqua Regia indicates ratios from whole tailings testing.
- Cat 2/3 HCT (2) indicates average rates from Category 2/3 humidity cells over Condition 2, as defined in Large Table 1.
- All distributions from humidity cell data and aqua regia data represent the full range of the observed values, with no weighting. Distributions are shown in Large Figure 46 to Large Figure 49.
- Distributions from microprobe data represent the full range of the observed ratios for each mineral, with no weighting. Distributions are shown in Large Figure 21 and Large Figure 22.
- Constituents not shown above are modeled according to the mineral solubility methods described in Section 10.1.1.

Table 1-25 Percentage of Seepage from Each Dam that Flows to Each Toe of the Tailings Basin

	North Dam				*East Dam*				*South Dam*			
Time (yrs)	*North*	*North-West*	*West*	*South*	*North*	*North-West*	*West*	*South*	*North*	*North-West*	*West*	*South*
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.001	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7.001	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
8	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
9	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
10	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
11	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
12	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
13	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
14	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
15	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
16	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
17	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
18	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
18.001	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
19	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
20	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
20.001	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
21	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
22	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
23	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
24	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
25	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
30	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
35	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
40	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
45	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
50	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
500	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0

Notes

Year 0 represents existing conditions, Year 7 is the year before Cell 1E and Cell 2E merge, Year 18 represents the beginning of closure activities, Year 20 represents final closure.

Gray cells indicate that the feature does not exist at that time.

Table 1-27 Percentage of Seepage from Each NorthMet Tailings Beach that Flows to Each Toe of the Tailings Basin

	North Beach				*East Beach*				*South Beach*				*Closure Beach*			
Time (yrs)	*North*	*North-West*	*West*	*South*	*North*	*North-West*	*West*	*South*	*North*	*North-West*	*West*	*South*	*North*	*North-West*	*West*	*South*
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.001	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7.001	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	1.2	4.9	93.9	0.0	0.0	0.0	0.0
8	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	1.2	4.9	93.9	0.0	0.0	0.0	0.0
9	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	1.2	4.9	93.9	0.0	0.0	0.0	0.0
10	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	1.2	4.9	93.9	0.0	0.0	0.0	0.0
11	99.9	0.1	0.0	0.0	100.0	0.0	0.0	0.0	0.0	1.1	4.3	94.7	0.0	0.0	0.0	0.0
12	99.7	0.3	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.9	3.7	95.4	0.0	0.0	0.0	0.0
13	99.6	0.4	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.8	3.1	96.2	0.0	0.0	0.0	0.0
14	99.4	0.6	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.6	2.5	96.9	0.0	0.0	0.0	0.0
15	99.3	0.7	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.5	1.8	97.7	0.0	0.0	0.0	0.0
16	99.1	0.9	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.3	1.2	98.5	0.0	0.0	0.0	0.0
17	99.0	1.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.2	0.6	99.2	0.0	0.0	0.0	0.0
18	98.8	1.2	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
18.001	98.8	1.2	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	29.3	40.8	24.5	5.4
19	98.8	1.2	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	29.0	41.4	23.9	5.7
20	98.8	1.2	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	28.7	42.0	23.3	6.0
20.001	98.8	1.2	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	28.7	42.0	23.3	6.0
21	98.8	1.2	0.0	0.0	100.0	0.0	0.0	0.0	0.1	0.0	0.0	99.9	30.6	40.6	22.5	6.3
22	98.9	1.1	0.0	0.0	100.0	0.0	0.0	0.0	0.3	0.0	0.0	99.7	32.4	39.2	21.7	6.6
23	98.9	1.1	0.0	0.0	100.0	0.0	0.0	0.0	0.4	0.0	0.0	99.6	34.3	37.8	21.0	6.9
24	99.0	1.0	0.0	0.0	100.0	0.0	0.0	0.0	0.5	0.0	0.0	99.5	36.2	36.4	20.2	7.2
25	99.0	1.0	0.0	0.0	100.0	0.0	0.0	0.0	0.6	0.0	0.0	99.4	38.1	35.0	19.4	7.5
30	99.2	0.8	0.0	0.0	100.0	0.0	0.0	0.0	1.3	0.0	0.0	98.7	47.4	28.0	15.5	9.1
35	99.4	0.6	0.0	0.0	100.0	0.0	0.0	0.0	1.9	0.0	0.0	98.1	56.8	21.0	11.7	10.6
40	99.6	0.4	0.0	0.0	100.0	0.0	0.0	0.0	2.5	0.0	0.0	97.5	66.1	14.0	7.8	12.1
45	99.8	0.2	0.0	0.0	100.0	0.0	0.0	0.0	3.2	0.0	0.0	96.8	75.5	7.0	3.9	13.7
50	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	3.8	0.0	0.0	96.2	84.8	0.0	0.0	15.2
500	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	3.8	0.0	0.0	96.2	84.8	0.0	0.0	15.2

Notes

Year 0 represents existing conditions, Year 7 is the year before Cell 1E and Cell 2E merge, Year 18 represents the beginning of closure activities, Year 20 represents final closure.

Gray cells indicate that the feature (unsaturated fine tailings, dams, and the existing pond in Cell 1E) does not exist at that time.

Table 1-29 Average Depth to the Phreatic Surface Within Unsaturated Areas

Time (yrs)	North Dam		East Dam		South Dam		Closure Beach (feet)
	Dam (feet)	Beach (feet)	Dam (feet)	Beach (feet)	Dam (feet)	Beach (feet)	
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.001	44.8	4.0	0.0	0.0	0.0	0.0	0.0
1	44.8	4.0	0.0	0.0	0.0	0.0	0.0
2	44.8	4.0	0.0	0.0	0.0	0.0	0.0
3	52.4	6.7	0.0	0.0	0.0	0.0	0.0
4	60.1	9.5	0.0	0.0	0.0	0.0	0.0
5	67.7	12.2	0.0	0.0	0.0	0.0	0.0
6	75.4	15.0	0.0	0.0	0.0	0.0	0.0
7	83.0	17.7	0.0	0.0	0.0	0.0	0.0
7.001	83.0	17.7	6.0	3.0	77.7	16.3	0.0
8	89.4	19.4	6.0	3.0	77.7	16.3	0.0
9	95.9	21.2	6.0	3.0	77.7	16.3	0.0
10	102.3	22.9	6.0	3.0	77.7	16.3	0.0
11	103.5	23.0	6.0	3.0	76.2	16.8	0.0
12	104.7	23.0	6.0	3.0	74.8	17.2	0.0
13	105.9	23.1	6.0	3.0	73.3	17.7	0.0
14	107.1	23.2	6.0	3.0	71.9	18.1	0.0
15	108.3	23.3	6.0	3.0	70.4	18.6	0.0
16	109.5	23.3	6.0	3.0	68.9	19.1	0.0
17	110.7	23.4	6.0	3.0	67.5	19.5	0.0
18	111.9	23.5	6.0	3.0	66.0	20.0	0.0
18.001	111.9	23.5	6.0	3.0	66.0	20.0	11.1
19	112.5	26.1	6.0	3.0	67.7	21.6	12.8
20	113.2	28.7	6.0	3.0	69.4	23.3	14.5
20.001	113.2	28.7	6.0	3.0	69.4	23.3	14.5
21	114.5	32.3	6.0	3.0	70.6	24.7	16.3
22	115.8	35.9	6.0	3.0	71.8	26.1	18.1
23	117.1	39.6	6.0	3.0	73.0	27.6	19.9
24	118.4	43.2	6.0	3.0	74.2	29.0	21.7
25	119.7	46.8	6.0	3.0	75.5	30.4	23.5
30	126.1	64.9	6.0	3.0	81.5	37.5	32.6
35	132.6	83.0	6.0	3.0	87.6	44.6	41.6
40	139.1	101.1	6.0	3.0	93.6	51.6	50.6
45	145.5	119.2	6.0	3.0	99.7	58.7	59.7
50	152.0	137.3	6.0	3.0	105.7	65.8	68.7
500	152.0	137.3	6.0	3.0	105.7	65.8	68.7

Notes

Year 0 represents existing conditions, Year 7 is the year before Cell 1E and Cell 2E merge, Year 18 represents the beginning of closure activities, Year 20 represents fi

Gray cells indicate that the feature (unsaturated fine tailings, dams, and the existing pond in Cell 1E) does not exist at that time.

A minimum value of 3 feet in the beaches and 6 feet in the dams was used

Table 1-31 Seepage Quantity and Direction from the NorthMet Flotation Tailings Pond

Time (yrs)	*Pond_Seepage_Rate (in/yr)*	*Pond_Seepage_Direction[N] (%)*	*Pond_Seepage_Direction[NW] (%)*	*Pond_Seepage_Direction[W] (%)*	*Pond_Seepage_Direction[S] (%)*	*Pond_Saturated_Volume (acre-ft)*
0	46.0	100.0	0.0	0.0	0.0	12796
0.001	14.6	100.0	0.0	0.0	0.0	23460
1	14.6	93.1	7.0	0.0	0.0	29772
2	14.6	86.1	13.9	0.0	0.0	35065
3	19.3	82.4	17.6	0.0	0.0	40429
4	24.0	78.8	21.2	0.0	0.0	46293
5	28.7	75.1	24.9	0.0	0.0	51295
6	33.4	71.5	28.5	0.0	0.0	57216
7	38.1	67.8	32.2	0.0	0.0	63615
7.001	38.1	67.8	32.2	0.0	0.0	153589
8	33.7	62.7	29.2	3.0	5.1	162136
9	29.3	57.7	26.2	6.0	10.1	174637
10	24.9	52.6	23.2	9.0	15.2	183622
11	25.4	53.2	21.9	9.0	16.0	190235
12	25.9	53.7	20.5	8.9	16.8	196909
13	26.4	54.3	19.2	8.9	17.7	203076
14	26.9	54.8	17.8	8.9	18.5	209297
15	27.4	55.4	16.5	8.8	19.3	213773
16	27.9	56.0	15.1	8.8	20.1	217619
17	28.4	56.5	13.8	8.7	21.0	221968
18	28.9	57.1	12.4	8.7	21.8	225692
18.001	28.9	57.1	12.4	8.7	21.8	183101
19	27.1	58.5	11.8	8.4	21.3	186270
20	25.2	60.0	11.2	8.0	20.8	189891
20.001	6.5	60.0	11.2	8.0	20.8	189891
50	6.5	81.0	0.0	0.0	19.0	189891
500	6.5	81.0	0.0	0.0	19.0	189891

Notes

Values at year 0 represent the existing conditions of the pond in Cell 2E

Table 1-34 **Depth to the Water Table in the Existing LTVSMC tailings**

	Cell 2W			*Cell 1E*			*Cell 2E*		
Time (yrs)	*Coarse Tailings (ft)*	*Fine Tailings (ft)*	*Other (ft)*	*Coarse Tailings (ft)*	*Fine Tailings (ft)*	*Other (ft)*	*Coarse Tailings (ft)*	*Fine Tailings (ft)*	*Other (ft)*
0	125.4	114.9	96.4	42.6	39.0	0.0	28.3	36.8	42.4
0.001	125.4	114.9	96.4	42.6	39.0	0.0	28.3	36.8	42.4
1	121.9	106.1	92.7	39.0	37.6	0.0	27.8	18.4	35.1
2	118.3	97.4	89.0	35.5	36.2	0.0	27.4	0.0	27.8
3	119.0	92.1	89.5	34.9	35.9	0.0	21.9	0.0	28.0
4	119.8	86.8	90.0	34.3	35.5	0.0	16.4	0.0	28.3
5	120.5	81.5	90.4	33.8	35.2	0.0	11.0	0.0	28.5
6	121.3	76.2	90.9	33.2	34.8	0.0	5.5	0.0	28.8
7	122.0	70.9	91.4	32.6	34.5	0.0	0.0	0.0	29.0
7.001	122.0	70.9	91.4	32.6	34.5	0.0	0.0	0.0	29.0
8	120.8	70.8	91.1	25.0	23.0	0.0	0.0	0.0	32.2
9	119.6	70.7	90.9	17.5	11.5	0.0	0.0	0.0	35.5
10	118.4	70.6	90.6	9.9	0.0	0.0	0.0	0.0	38.7
11	118.0	69.3	90.9	9.4	0.0	0.0	0.0	0.0	39.0
12	117.5	67.9	91.2	9.0	0.0	0.0	0.0	0.0	39.2
13	117.1	66.6	91.5	8.5	0.0	0.0	0.0	0.0	39.5
14	116.6	65.2	91.7	8.1	0.0	0.0	0.0	0.0	39.8
15	116.2	63.9	92.0	7.6	0.0	0.0	0.0	0.0	40.1
16	115.7	62.5	92.3	7.1	0.0	0.0	0.0	0.0	40.3
17	115.3	61.2	92.6	6.7	0.0	0.0	0.0	0.0	40.6
18	114.8	59.8	92.9	6.2	0.0	0.0	0.0	0.0	40.9
18.001	114.8	59.8	92.9	6.2	0.0	0.0	0.0	0.0	40.9
19	116.3	60.7	93.4	4.9	0.0	0.0	0.0	0.0	41.1
20	117.8	61.7	93.9	3.6	0.0	0.0	0.0	0.0	41.4
20.001	117.8	61.7	93.9	3.6	0.0	0.0	0.0	0.0	41.4
21	119.1	62.6	94.4	7.4	0.0	0.0	0.0	0.0	41.8
22	120.3	63.5	94.9	11.2	0.0	0.0	0.0	0.0	42.1
23	121.6	64.5	95.3	15.0	0.0	0.0	0.0	0.0	42.5
24	122.8	65.4	95.8	18.8	0.0	0.0	0.0	0.0	42.9
25	124.1	66.3	96.3	22.6	0.0	0.0	0.0	0.0	43.2
30	130.3	70.9	98.7	41.7	0.0	0.0	0.0	0.0	45.0
35	136.6	75.6	101.1	60.7	0.0	0.0	0.0	0.0	46.9
40	142.9	80.2	103.5	79.7	0.0	0.0	0.0	0.0	48.7
45	149.1	84.8	105.9	98.8	0.0	0.0	0.0	0.0	50.5
50	155.4	89.4	108.3	117.8	0.0	0.0	0.0	0.0	52.3
500	155.4	89.4	108.3	117.8	0.0	0.0	0.0	0.0	52.3

Notes

Year 0 represents existing conditions, Year 7 is the year before Cell 1E and Cell 2E merge, Year 18 represents the beginning of closure activities, Year 20 represents final closure.

Gray cells indicate that the feature does not exist at that time.

Table 1-35 **Seepage Direction from each zone in Cell 2W**

	Coarse Tailings (%)				*Fine Tailings (%)*				*Other (%)*			
Time (yrs)	*North*	*North-West*	*West*	*South*	*North*	*North-West*	*West*	*South*	*North*	*North-West*	*West*	*South*
0	0.7	37.4	44.6	17.3	1.4	50.2	47.2	1.2	11.3	39.9	44.2	4.6
0.001	0.7	37.4	44.6	17.3	1.4	50.2	47.2	1.2	11.3	39.9	44.2	4.6
1	0.4	36.1	45.9	17.7	0.7	49.5	48.8	1.1	6.5	45.4	42.6	5.6
2	0.0	34.8	47.2	18.0	0.0	48.7	50.4	0.9	1.7	50.8	41.0	6.5
3	0.0	32.7	49.8	17.5	0.0	47.6	51.5	0.8	1.5	49.7	42.1	6.6
4	0.0	30.6	52.4	17.0	0.0	46.5	52.7	0.8	1.4	48.6	43.2	6.7
5	0.0	28.5	55.0	16.5	0.0	45.5	53.8	0.7	1.2	47.6	44.4	6.9
6	0.0	26.4	57.6	16.0	0.0	44.4	55.0	0.7	1.1	46.5	45.5	7.0
7	0.0	24.3	60.2	15.5	0.0	43.3	56.1	0.6	0.9	45.4	46.6	7.1
7.001	0.0	24.3	60.2	15.5	0.0	43.3	56.1	0.6	0.9	45.4	46.6	7.1
8	0.0	25.2	59.5	15.3	0.0	43.7	55.8	0.5	1.2	45.2	46.8	6.8
9	0.0	26.2	58.8	15.0	0.0	44.2	55.4	0.4	1.5	45.1	47.0	6.4
10	0.0	27.1	58.1	14.8	0.0	44.6	55.1	0.3	1.8	44.9	47.2	6.1
11	0.0	26.8	58.4	14.8	0.0	44.4	55.3	0.3	1.9	44.5	47.4	6.2
12	0.1	26.6	58.6	14.7	0.0	44.2	55.5	0.2	2.0	44.0	47.6	6.3
13	0.1	26.3	58.9	14.7	0.0	44.0	55.8	0.2	2.1	43.6	47.8	6.5
14	0.2	26.1	59.2	14.6	0.0	43.8	56.0	0.2	2.2	43.2	48.0	6.6
15	0.2	25.8	59.5	14.6	0.1	43.6	56.2	0.1	2.4	42.7	48.2	6.7
16	0.3	25.5	59.7	14.5	0.1	43.4	56.4	0.1	2.5	42.3	48.4	6.8
17	0.3	25.3	60.0	14.5	0.1	43.2	56.7	0.0	2.6	41.8	48.6	7.0
18	0.4	25.0	60.3	14.4	0.1	43.0	56.9	0.0	2.7	41.4	48.8	7.1
18.001	0.4	25.0	60.3	14.4	0.1	43.0	56.9	0.0	2.7	41.4	48.8	7.1
19	0.4	25.0	59.9	14.7	0.1	43.2	56.7	0.0	2.7	41.4	48.6	7.3
20	0.4	25.0	59.5	15.1	0.1	43.5	56.4	0.0	2.7	41.4	48.4	7.5
20.001	0.4	25.0	59.5	15.1	0.1	43.5	56.4	0.0	2.7	41.4	48.4	7.5
21	0.9	25.2	58.7	15.2	0.4	43.9	55.7	0.0	3.0	41.2	48.2	7.6
22	1.3	25.4	57.9	15.4	0.7	44.3	55.0	0.0	3.3	41.0	47.9	7.7
23	1.8	25.6	57.1	15.5	1.0	44.7	54.3	0.0	3.5	40.9	47.7	7.9
24	2.3	25.8	56.3	15.6	1.3	45.1	53.6	0.0	3.8	40.7	47.5	8.0
25	2.8	26.0	55.5	15.8	1.6	45.5	52.9	0.0	4.1	40.5	47.3	8.1
30	5.1	27.0	51.4	16.4	3.0	47.5	49.4	0.1	5.5	39.6	46.1	8.7
35	7.5	28.1	47.4	17.1	4.5	49.5	45.9	0.1	6.9	38.8	45.0	9.4
40	9.9	29.1	43.3	17.8	6.0	51.5	42.4	0.1	8.3	37.9	43.9	10.0
45	12.2	30.1	39.3	18.4	7.4	53.5	38.9	0.2	9.7	37.0	42.7	10.6
50	14.6	31.1	35.2	19.1	8.9	55.5	35.4	0.2	11.1	36.1	41.6	11.2
500	14.6	31.1	35.2	19.1	8.9	55.5	35.4	0.2	11.1	36.1	41.6	11.2

Notes

Year 0 represents existing conditions, Year 7 is the year before Cell 1E and Cell 2E merge, Year 18 represents the beginning of closure activities, Year 20 represents final closure.

Table 1-37 **Seepage Direction from each zone in Cell 2E**

	Coarse Tailings (%)				Fine Tailings (%)				Dams (%)				Pond (%)			
Time (yrs)	North	North-West	West	South	North	North-West	West	South	North	North-West	West	South	North	North-West	West	South
0	94.6	5.4	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
0.001	94.6	5.4	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
1	48.1	52.0	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
2	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
3	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
4	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
5	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
6	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
7	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
7.001	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
8	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
9	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
10	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
11	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
12	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
13	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
14	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
15	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
16	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
17	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
18	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
18.001	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
19	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
20	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
20.001	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
21	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
22	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
23	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
24	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
25	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
30	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
35	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
40	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
45	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
50	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0
500	1.5	98.5	0.0	0.0	100.0	0.0	0.0	0.0	98.6	1.4	0.0	0.0	100.0	0.0	0.0	0.0

Notes

Year 0 represents existing conditions, Year 7 is the year before Cell 1E and Cell 2E merge, Year 18 represents the beginning of closure activities, Year 20 represents final closure.

Gray cells indicate that the feature (unsaturated fine tailings, dams, and the existing pond in Cell 1E) does not exist at that time.

Table 1-39 **Seepage Direction from each zone in Cell 1E**

	Coarse Tailings (%)				*Fine Tailings (%)*				*Dams (%)*				*Pond (%)*			
Time (yrs)	*North*	*North-West*	*West*	*South*	*North*	*North-West*	*West*	*South*	*North*	*North-West*	*West*	*South*	*North*	*North-West*	*West*	*South*
0	62.7	4.5	0.0	32.8	41.1	16.3	0.0	42.6	0.0	0.0	0.0	0.0	27.4	16.6	10.4	45.6
0.001	62.7	4.5	0.0	32.8	41.1	16.3	0.0	42.6	0.0	0.0	0.0	0.0	27.4	16.6	10.4	45.6
1	33.1	18.6	0.0	48.3	28.1	24.3	0.0	47.7	0.0	0.0	0.0	0.0	21.0	20.3	10.4	48.5
2	3.5	32.7	0.0	63.8	15.1	32.2	0.0	52.7	0.0	0.0	0.0	0.0	14.5	23.9	10.3	51.3
3	2.8	37.0	0.7	59.5	12.4	32.1	1.4	54.1	0.0	0.0	0.0	0.0	12.0	22.1	12.5	53.4
4	2.1	41.3	1.3	55.2	9.7	32.0	2.8	55.5	0.0	0.0	0.0	0.0	9.5	20.2	14.8	55.5
5	1.5	45.7	2.0	50.9	6.9	31.9	4.2	57.0	0.0	0.0	0.0	0.0	7.0	18.4	17.0	57.6
6	0.8	50.0	2.6	46.6	4.2	31.8	5.6	58.4	0.0	0.0	0.0	0.0	4.5	16.5	19.3	59.7
7	0.1	54.3	3.3	42.3	1.5	31.7	7.0	59.8	0.0	0.0	0.0	0.0	2.0	14.7	21.5	61.8
7.001	0.1	54.3	3.3	42.3	1.5	31.7	7.0	59.8	0.0	0.0	0.0	0.0	2.0	14.7	21.5	61.8
8	0.1	45.9	5.4	48.7	1.5	31.7	7.0	59.8	0.0	0.0	0.0	0.0	2.0	14.7	21.5	61.8
9	0.0	37.4	7.4	55.1	1.5	31.7	7.0	59.8	0.0	0.0	0.0	0.0	2.0	14.7	21.5	61.8
10	0.0	29.0	9.5	61.5	1.5	31.7	7.0	59.8	0.0	0.0	0.0	0.0	2.0	14.7	21.5	61.8
11	0.0	25.4	8.3	66.3	1.5	31.7	7.0	59.8	0.0	0.0	0.0	0.0	2.0	14.7	21.5	61.8
12	0.0	21.8	7.1	71.1	1.5	31.7	7.0	59.8	0.0	0.0	0.0	0.0	2.0	14.7	21.5	61.8
13	0.0	18.1	5.9	75.9	1.5	31.7	7.0	59.8	0.0	0.0	0.0	0.0	2.0	14.7	21.5	61.8
14	0.0	14.5	4.8	80.7	1.5	31.7	7.0	59.8	0.0	0.0	0.0	0.0	2.0	14.7	21.5	61.8
15	0.0	10.9	3.6	85.6	1.5	31.7	7.0	59.8	0.0	0.0	0.0	0.0	2.0	14.7	21.5	61.8
16	0.0	7.3	2.4	90.4	1.5	31.7	7.0	59.8	0.0	0.0	0.0	0.0	2.0	14.7	21.5	61.8
17	0.0	3.6	1.2	95.2	1.5	31.7	7.0	59.8	0.0	0.0	0.0	0.0	2.0	14.7	21.5	61.8
18	0.0	0.0	0.0	100.0	1.5	31.7	7.0	59.8	0.0	0.0	0.0	0.0	2.0	14.7	21.5	61.8
18.001	0.0	0.0	0.0	100.0	1.5	31.7	7.0	59.8	0.0	0.0	0.0	0.0	2.0	14.7	21.5	61.8
19	0.0	0.0	0.0	100.0	1.5	31.7	7.0	59.8	0.0	0.0	0.0	0.0	2.0	14.7	21.5	61.8
20	0.0	0.0	0.0	100.0	1.5	31.7	7.0	59.8	0.0	0.0	0.0	0.0	2.0	14.7	21.5	61.8
20.001	0.0	0.0	0.0	100.0	1.5	31.7	7.0	59.8	0.0	0.0	0.0	0.0	2.0	14.7	21.5	61.8
21	0.0	0.0	0.0	100.0	1.5	31.7	7.0	59.8	0.0	0.0	0.0	0.0	2.0	14.7	21.5	61.8
22	0.0	0.0	0.0	100.0	1.5	31.7	7.0	59.8	0.0	0.0	0.0	0.0	2.0	14.7	21.5	61.8
23	0.0	0.0	0.0	100.0	1.5	31.7	7.0	59.8	0.0	0.0	0.0	0.0	2.0	14.7	21.5	61.8
24	0.0	0.0	0.0	100.0	1.5	31.7	7.0	59.8	0.0	0.0	0.0	0.0	2.0	14.7	21.5	61.8
25	0.0	0.0	0.0	100.0	1.5	31.7	7.0	59.8	0.0	0.0	0.0	0.0	2.0	14.7	21.5	61.8
30	0.0	0.0	0.0	100.0	1.5	31.7	7.0	59.8	0.0	0.0	0.0	0.0	2.0	14.7	21.5	61.8
35	0.0	0.0	0.0	100.0	1.5	31.7	7.0	59.8	0.0	0.0	0.0	0.0	2.0	14.7	21.5	61.8
40	0.0	0.0	0.0	100.0	1.5	31.7	7.0	59.8	0.0	0.0	0.0	0.0	2.0	14.7	21.5	61.8
45	0.0	0.0	0.0	100.0	1.5	31.7	7.0	59.8	0.0	0.0	0.0	0.0	2.0	14.7	21.5	61.8
50	0.0	0.0	0.0	100.0	1.5	31.7	7.0	59.8	0.0	0.0	0.0	0.0	2.0	14.7	21.5	61.8
500	0.0	0.0	0.0	100.0	1.5	31.7	7.0	59.8	0.0	0.0	0.0	0.0	2.0	14.7	21.5	61.8

Notes

Year 0 represents existing conditions, Year 7 is the year before Cell 1E and Cell 2E merge, Year 18 represents the beginning of closure activities, Year 20 represents final closure.

Gray cells indicate that the feature (unsaturated fine tailings, dams, and the existing pond in Cell 1E) does not exist at that time.

Table 1-49 Contributing Areas to each Surface Water Evaluation Point

Surface Water Evaluation Point	*Incremental Tributary Area (sq mi)**				
	Surface Water			*Groundwater*	
	Natural Areas	*Cell 2W Dams*	*Cell 2E Dams*	*Non-Modeled Flow Path*	*Modeled Flow Path*
PM-12	18.97	0	0	18.97	0
PM-12.2	14.12	0	0	14.12	0
PM-12.3	41.28	0	0	41.28	0
PM-12.4	11.38	0	0	10.94	0.44
PM-13	8.91	0	0	6.22	5.66
MLC-3	1.36	0	0.04	0.73	0.00
MLC-2	2.17	0	0	1.08	2.42
TC-1	1.94	0.16	0.08	0	0
PM-19	1.76	0	0	0	3.00
UC-1	0	0.03	0	0	0
PM-11	2.97	0.37	0	0	0

Notes

* Surface runoff areas are equal to or greater than the sum of groundwater areas. This is due to runoff from the Tailings Basin, where recharge is not applied because it is accounted for in seepage.

** 0.44 mi2 of Modeled Flow Path area has been moved from Evaluation Point PM-12.4 to PM-13 to simplify the model.