

AWMP Ver 2 Model QA/QC

Date	Model / AWMP Version	Problem	Change (changes affecting input tables in BOLD)	Updated Model Version
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
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
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
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
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

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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
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
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
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
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
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

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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 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

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

Time (yrs)	North Dam				East Dam				South Dam			
	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

Time (yrs)	North Beach				East Beach				South Beach				Closure Beach			
	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 fir
 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

<i>Time (yrs)</i>	<i>Pond_Seepage_Rate (in/yr)</i>	<i>Pond_Seepage_Direction[N] (%)</i>	<i>Pond_Seepage_Direction[NW] (%)</i>	<i>Pond_Seepage_Direction[W] (%)</i>	<i>Pond_Seepage_Direction[S] (%)</i>	<i>Pond_Saturated_Volume (acre-ft)</i>
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

Time (yrs)	Cell 2W			Cell 1E			Cell 2E		
	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

Time (yrs)	Coarse Tailings (%)				Fine Tailings (%)				Other (%)			
	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

Time (yrs)	Coarse Tailings (%)				Fine Tailings (%)				Dams (%)				Pond (%)			
	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

Time (yrs)	Coarse Tailings (%)				Fine Tailings (%)				Dams (%)				Pond (%)			
	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.