

MEMORANDUM

To: Mr. David Swisher Date: August 23, 2012
Copy To: Rick Hoos File No.: NB101-390/3-A.01
From: Una McCullagh Cont. No.: NB12-00424
Re: Thor Lake Project TMF Water Balance - Update for MVEIRB

The feasibility level water balance analysis has been updated for the Avalon Rare Metals Inc. (Avalon) Thor Lake Project for the revised Tailings Management Facility (TMF) operating scenario and flows. In response to the undertakings from the August technical sessions, this memo provides the preliminary flow sheet (Figure 1) for the updated water balance and summarizes the changes that have been incorporated into the water balance with respect to earlier versions as presented in the Developers Assessment Report (DAR) on Figure 4.7-10.

As reported in the July 2012 letter to MVEIRB "SEA1011-001: Avalon Thor Lake Project - Summary of Changes to Project Description", a number of modifications/optimizations were made to the project. The changes/updates that have the greatest effect on the water balance include:

- Current plan is to commission paste backfill plant during Year 1 to be at full production by Year 2. Previously paste backfilling commenced after Year 4.
- Total tailings volume reduced from 4.67 million m³ to 3.37 million m³ due to the resulting increased paste backfill and concentrate production ratios
- Further reduction in tailings water resulting from an increase in tailings slurry solids content from 50% to 65%
- Added treated Mine Water and Plant Site Runoff as separate stream to TMF
- Removed reclaim system from TMF (instead internal recycle in the plant resulting in increased slurry solids content)
- Optimizations to layout and deposition strategy resulting in updates to the runoff areas and runoff coefficients
- Updates to meteorological inputs (Knight Piésold memo Cont. No. NB12-00307)

Figure 1 illustrates the distribution of water through the Flotation Plant and TMF. The flows represent the average annualized flows over the life of operations (i.e. 20 years), including the average total annual volumes (thousand m³/yr) and average annual flow rates (m³/hr) for each component of the water balance. In summary the following compares the key TMF flows to those reported in the DAR:

- Total water with Tailings: 115,500 m³/yr, versus 536,600 m³/yr previously
- Water locked in Voids: 84,300 m³/yr, versus 128,200 m³/yr previously
- Total Facility Precipitation Runoff: 320,700 m³/yr, versus 365,700 m³/yr previously
- Total Facility Evaporation: 213,300 m³/yr, versus 360,500 m³/yr previously
- Mine Water/Plant Runoff to TMF: 170,000 m³/yr, versus 0 m³/yr previously
- Recycle from TMF to Plant: 0 m³/yr, versus 261,500 m³/yr previously

- Total Facility Seepage loss: 1,800 m³/yr, versus 3,600 m³/yr previously
- Total Discharge to Drizzle Lake: 321,300 m³/yr, versus 148,300 m³/yr previously

NOTES:

1. The results of the updated water balance are preliminary. Some of the actual volumes may change slightly as the operating plan is optimized. The variation is not expected to be significant.
2. The updated water balance has a net surplus of water discharged vs. inputs which accounts for displacement of the existing lakes due to tailings solids.
3. The values reported above for the previous water balance are based on the average total annual volumes over the life of operations, i.e. average of combined years 1 - 4 and years 5 - 20.

Year 20 - Operating Levels

In response to an additional request during the technical sessions, the following outlines the operating levels/volumes at the end of operations (Year 20):

- Minimum Crest Elevation: 252.0 m
- Spillway Invert Elevation: 250.0 m
- Maximum Operating Level: 249.3 m
- Normal Operating Level: 248.5 m

- Volume between Max Operating Level and Spillway: 179,500 m³ (El. 249.3 m to 250.0 m)
- Operating Volume (i.e. between normal and max levels): 154,900 m³ (EL. 248.5 m to 249.3 m)

- Peak 30 day Process, Mine and plant runoff inputs: 21,310 m³
- Peak runoff month in Year 20 (April): 97,000 m³
- Environmental Design Storm Volume: 52,400 m³

The peak monthly input of 118,310 m³ is well below the available operating volume in Year 20 (154,900 m³). The fact that tailings discharge to the TMF will only occur 35% of the time creates additional flexibility in assuring clarification of these flows. To add to this, the available storage above the Maximum operating level of 179,000 m³ is in excess of the peak monthly inflows combined with the EDS. This provides added conservatism and flexibility approaching the end of operations when the TMF is nearing its capacity.

In summary, the TMF will have more than adequate capacity and flexibility to manage flows and maintain a 30 day retention time, if required based on water quality, including at the end of operations. Prior to year 20, capacity for water management and retention is significantly greater.

We trust this provides you with sufficient information. Please feel free to contact us with any questions or comments.

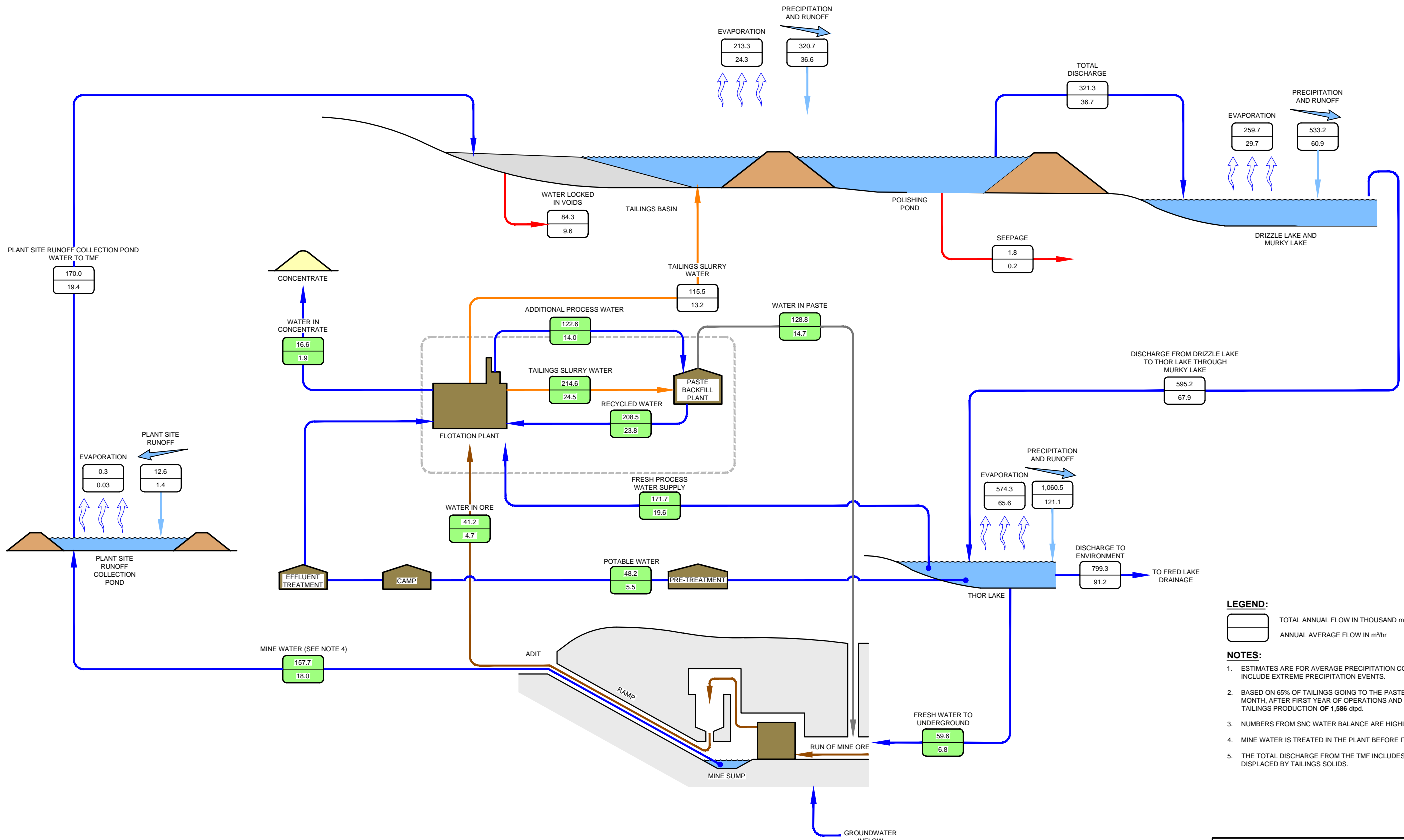
Signed: 
Una McCullagh, P.Eng.
Project Engineer

Approved: 
Kevin Hawton, P.Eng.
Specialist Engineer/Project Manager

Attachments:

Figure 1 Rev 0 Water Balance Flow Sheet - Average Precipitation Conditions (Years 1-20)

/ubm



LEGEND:
 [White Box] TOTAL ANNUAL FLOW IN THOUSAND m³/yr
 [Green Box] ANNUAL AVERAGE FLOW IN m³/hr

- NOTES:**
- ESTIMATES ARE FOR AVERAGE PRECIPITATION CONDITIONS AND DO NOT INCLUDE EXTREME PRECIPITATION EVENTS.
 - BASED ON 65% OF TAILINGS GOING TO THE PASTE BACKFILL PLANT PER MONTH, AFTER FIRST YEAR OF OPERATIONS AND AN AVERAGE TOTAL TAILINGS PRODUCTION OF 1,586 dtpd.
 - NUMBERS FROM SNC WATER BALANCE ARE HIGHLIGHTED IN GREEN.
 - MINE WATER IS TREATED IN THE PLANT BEFORE IT ENTERS THE RCP.
 - THE TOTAL DISCHARGE FROM THE TMF INCLUDES THE VOLUME OF THE LAKES DISPLACED BY TAILINGS SOLIDS.

AVALON RARE METALS INC.	
THOR LAKE PROJECT	
WATER BALANCE FLOW SHEET	
AVERAGE PRECIPITATION CONDITIONS	
(YEARS 1-20)	
<i>Knight Piésold</i> CONSULTING	P/A NO. NB101-390/3 REF NO. NB12-00424 FIGURE 1
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