Mackenzie Valley Review Board

Note to File

EA1011-001
Avalon Rare Metals Inc., Thor Lake Rare Earth Element Project

Re: Technical Clarification Meeting Minutes – November 29, 2012
The following document lists meeting minutes of a 21-Nov-12 meeting between Review Board staff and Avalon Rare Metals Inc. representatives regarding water quality issues related to the environmental assessment of Avalon's Thor Lake Rare Earth Element Project.

Correspondence related to this assessment should be directed to:
Paul Mercredi, Environmental Assessment Officer
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Sincerely,

Paul Mercredi
Environmental Assessment Officer
Mackenzie Valley Review Board

Meeting Minutes

November 21, 2012
10:00 am - 11:30 am
Mackenzie Valley Review Board Main Office

Attendees

Review Board

- Vern Christensen (ED, MVEIRB)
- Paul Mercredi (File Lead EAO, MVEIRB)
- Chuck Hubert (Senior EAO, MVEIRB)
- Simon Toogood (EAO, MVEIRB)
- Zabey Nevitt (ED, MVLWB)
- Ralph Grismala (Technical Advisor for MVEIRB)
- John Donihee (Legal Counsel, MVEIRB)

Avalon

- David Swisher (VP Operations, Avalon)
- Mark Wiseman (VP Sustainability, Avalon)
- Richard Pratt (VP and Legal Counsel, Avalon)
- Kelly Cumming (Northern Relations Manager, Avalon)
- Rick Hoos (EBA Engineering)

Northern Project Management Office (NPMO)

- Manik Duggar

AGENDA

The following is not a verbatim transcript.

1. **Round table of introductions.**

2. **Reason for the meeting:**
   - The Review Board and Avalon called the meeting to discuss and clarify technical matters related to Avalon's response to the Review Board's letter of 26-Oct-12.
   - Avalon and the Review Board determined that a face to face meeting was an efficient method to clarify outstanding concerns and issues.

3. Discussion of information requests

The Review Board reiterated each question from a 19-Nov-12 email from Chuck Hubert (attached) so that Avalon could clarify their response to the Review Board's 26-Oct-12 letter.

1) Avalon's 31-Oct-12 responses to the Review Board's 26-Oct-12 questions are unclear with respect to Avalon's intent with respect to the in-plant water treatment system. Please clarify the following details.

   a) **Question from the Review Board** - Is the "currently proposed" in-plant water treatment system part of the flotation plant production processes designed to improve mineral recovery, or is it a system designed specifically for the purpose of improving the water quality?

Response – Avalon

- The in-plant water treatment system is for both the removal of reagents [mineral recovery] and for treatment of water to the TMF.
- The reason for the in-plant water treatment system is for the purpose of recycling water in the plant which minimizes freshwater intake.
- Further, the reason for the in-plant water treatment system was based on meeting both water quality discharge requirements (if and when needed) and recycle more water internally in the plant.

Follow up question – Review Board

- When was the in-plant water treatment plant first proposed?

Response - Avalon

- Discussed and proposed during the technical session, with regard to Avalon's commitment to treat, if necessary.

   b) **Question from the Review Board** - Avalon states that it plans to use the in-plant water treatment system to treat water from the underground mine and recycled process water. Is Avalon also committing to treat the tailings from the flotation plant prior to discharge in the TMF?

Response – Avalon

- Avalon will do so if required, and has committed to if required.
- In the first year after commencing operations (after construction), Avalon will have a full year before discharging waste water from TMF to assess its quality. If required to meet SSWQOs, Avalon will use the in-plant water treatment system to treat effluent from the flotation plant prior to discharge to the TMF.

Follow up Question – Review Board

- To clarify, the in-plant waste water treatment system is a "contingent commitment"?

Response – Avalon

- Yes, the in-plant waste water treatment system is a contingent commitment that will be implemented if SSWQOs are not met. There will be over a year of operations before any water requires discharge, during that first year monitoring will direct decisions on whether to treat or not to treat using the in-plant water treatment system.

c) **Question from the Review Board** - If the in-plant water treatment system will treat water flowing into the flotation plant and out from the flotation plant, please present a schematic diagram of the flows through the in-plant water treatment system.

- Avalon commits to providing an updated schematic of the waste water treatment process and will provide the document following the meeting.

2) **Question from the Review Board** - If Avalon is not committing to treat the tailings from the flotation plant prior to discharge in the TMF, how does Avalon intend to meet the proposed SSWQOs? Avalon's modeling based on the untreated tailings effluent indicate exceedance of several elements, notably cerium and lanthanum.

Response Avalon

- If required to meet SSWQOs, Avalon will use the in-plant water treatment system to treat effluent from the flotation plant prior to discharge to the TMF.

Follow-up Question – Review Board

- Should the contingency commitment be not implemented (the in-plant water treatment system) there is a concern that SSWQOs for Lanthanum and Cerium may not be met.

Response - Avalon

- Avalon is of the opinion that they can meet proposed SSWQOs without treatment at the TMF.
- What Avalon presented was a worst case scenario with respect to waste water that did not take into account multiple dilution factors.
- Avalon asserts that tailing waste water is diluted by treated mine water and runoff water, and the quality is further improved by settling time: these factors dilute the concentration of the lanthanum and cerium, and would allow SSWQOs to be met. However, if concentrations of cerium and lanthanum remain too high to meet the SSWQOs, the contingency commitment of the in-plant water treatment system will be implemented.
- As discussed in the Technical Sessions, water hardness also plays a large factor in the water quality. Considering that Drizzle lake hardness is a magnitude higher than the parameters utilized by Avalon in developing the SSWQOs, provides further assurances of the conservative nature of the proposed SSWQOs.

- Avalon spoke to the topic of natural CCME exceedances of certain parameters in various mine-site lakes, and how this potentially relates to setting SSWQOs.

Follow up – Review Board

- To clarify, the SSWQOs presented by Avalon during the EA process - are they draft? In other words, is Avalon committing to meeting the numerical limits in the proposed SSWQOs for the mine operations?

Response - Avalon

- They are proposed. Final SSWQOs will result from negotiations with the appropriate regulatory authorities as part of the permitting process.

Follow-up – Review Board

- To summarize, is Avalon considering increasing the limits of the proposed SSWQOs? Or is this not the case based on the contingency commitment being put in place?

Response - Avalon

- SSWQOs could be changed during the water licensing phase. However, Avalon is confident that they can meet SSWQOs as proposed now.

3) **Question by Review Board** - Avalon's response to the Review Board's question 3 stated that the alternative in-plant water treatment system designed by Newterra "has been demonstrated to be effective", but no data were presented. Please provide substantiation for the statement of effectiveness.

- Avalon can provide data on the treatment information relating to the Newterra plant to Review Board following meeting.

4) **Question by Review Board** - Hypothetically, if concentrations in the TMF built up to a level such that Avalon could not meet the SSWQOs or other water quality objectives, what mitigation actions would Avalon take to avoid exceeding its discharge restrictions. What length of time would be required to implement those mitigation actions?

Response - Avalon

- If exceedances were found Avalon would implement the contingency commitment (in-plant waste water treatment system). Avalon would monitor and test waste water for a full year from start of operations prior to discharging waste water however, it is likely that 6 months of monitoring would suffice. This could also take the form of a treatment plant after the TMF, just prior to discharge into Drizzle Lake – this is not the first option, but it is an option.

Follow-up – Review Board

- Is that window, from detection of a problem to meaningful mitigation, at any point in mine life or just within Year 1?

Response - Avalon

- At any point in mine life, Avalon has the ability to detect water quality that may lead to exceedance of proposed site-specific water quality objectives, monitor that water quality for 6-months while preparing for construction of a contingency treatment plant, and initiate and complete a 6-month construction phase, culminating in treatment of water to a quality that achieves SSWQOs.

5) **Question from the Review Board** - Avalon has stated that "it is logical to assume that the influent water quality from the mine to the in-plant water treatment system will be much cleaner than the tailing water". It would be helpful for Avalon to present data or other basis to support this hypothesis so that interested parties can compare the concentrations, including REE concentrations, to the concentrations in other flows in the water balance. If the mine water concentrations are estimated, please explain the basis for the estimates.

Response - Avalon

- Ground water data from one sample, provided during EA process [4-May-12], is the best information that Avalon has. This identifies that the groundwater is cleaner water then the tailings water.
- Avalon asserts that the sample for groundwater contained concentrations below the proposed SSWQOs.

6) **Question from the Review Board** - Avalon has stated that "The primary purpose of the in-plant treatment system will be to treat any incoming mine-water ..." What are the expected concentrations of the water that will be discharged to the runoff collection pond and subsequently to the TMF? Has Avalon tested the effectiveness of the proposed in-plant water treatment system on the mine water or on any proxy for the mine water such as simulated mine water?

Response - Avalon

- The results of the treatment system are based on the tailings only which have the highest concentration of contaminants. There are other sources of water entering the waste water stream such as mine water that will dilute the tailings.

7) **Question from the Review Board** - The table of REE concentrations that Avalon presented in its 31 Oct 2012 response contain incorrect SSWQO values for hafnium, holmium, thulium, and zirconium. These values were previously corrected in Avalon's Oct 2012 response to MVRB IR 2.03. Avalon should update the full table to include the corrected values to minimize future confusion.

Response by Avalon

Avalon will update the table and provide it to the Board following the meeting.

Additional Questions generated during the meeting

1. **Review Board Question** - Is water quality data for the water treatment plant presented by Avalon generated by the pilot plant process?

Response - Avalon

- Yes, the pilot plant was a worst case scenario which used more reagents then required.
- Avalon has new data from a new pilot plant test with more recent data.

- Avalon will provide data on Drizzle Lake, influent and effluent water for the new pilot plant data.

2. **Question from Review Board** – Regarding effluent quality data from the pilot plant – the results for thulium are three times greater than the proposed SSWQOs.

Response – Avalon

- Treated effluent will undergo a 4x dilution factor which will allow SSWQOs to be met.
- The proposed SSWQOs for thulium is below current detection limits.

3. **Question from Avalon** - Can the Review Board move the timeline for the Public Hearing? Can the Board move the public hearing date to the soonest possible time, earlier in February?

Response - Review Board

- The Review Board does not have an answer at this time but will provide Avalon with a response.

Paul Mercredi

From: Chuck Hubert
Sent: Monday, November 19, 2012 12:12 PM
To: dswisher@avalonraremetals.com
Cc: Vern Christensen, Executive Director; Paul Mercredi; Grismala, Ralph (RGrismala@icfi.com); John Donihee (jdonihee@mross.com); Kathy Racher (racherk@wlwb.ca); 'Zabey Nevitt' (zabey@mvlwb.com)
Subject: Nov 21 10 am - meeting to clarify and substantiate Avalon Oct 31 responses

Hello David:

This email is sent on behalf of Vern Christensen. I understand that Vern has spoken with you regarding a proposed meeting on Wednesday of this week. We believe that a meeting with you to clarify and substantiate outstanding issues from your October 31 Response document would be valuable. In addition, a face to face meeting will be more effective than additional correspondence.

The meeting is proposed for Wednesday November 21 from 10 am - noon.

Participants at the meeting will include:

- Vern Christensen
- Paul Mercredi
- Chuck Hubert
- Ralph Grismala (ICF Marbek technical advisor to the Board via teleconference)
- John Donihee (Board counsel via teleconference)
- Kathy Racher (Land and Water Board)
- Zabey Nevitt (Land and Water Board)

Please include your water quality technical advisors (Jim Stronach?) at this meeting. Review Board staff will prepare minutes of the meeting and forward a draft to you for your review. Final meeting minutes will be posted to the public registry.

Questions that the Board needs clarification on include the following. These questions will form the agenda for the meeting:

1. Avalon's 31Oct12 responses to the Review Board's 26Oct12 questions are ambiguous with respect to Avalon's intent with respect to the in-plant water treatment system. Please clarify the following details.
    a. Is the "currently proposed" in-plant water treatment system part of the flotation plant production processes designed to improve mineral recovery, or is it a system designed specifically for the purpose of improving the water quality?
    b. Avalon states that it plans to use the in-plant water treatment system to treat water from the underground mine and recycled process water. Is Avalon also committing to treat the tailings from the flotation plant prior to discharge in the TMF?
    c. If the in-plant water treatment system will treat water flowing into the flotation plant and out from the flotation plant, please present a schematic diagram of the flows through the in-plant water treatment system.
2. If Avalon is not committing to treat the tailings from the flotation plant prior to discharge in the TMF, how does Avalon intend to meet the proposed SSWQOs. Avalon's modeling based on the untreated tailings effluent indicate exceedance of several elements, notably cerium and lanthanum.

3. Avalon's response to the Review Board's question 3 stated that the alternative in-plant water treatment system designed by Newterra "has been demonstrated to be effective", but no data were presented. Please provide substantiation for the statement of effectiveness.
4. Hypothetically, if concentrations in the TMF built up to a level such that Avalon could not meet the SSWQOs or other water quality objectives, what mitigation actions would Avalon take to avoid exceeding its discharge restrictions. What length of time would be required to implement those mitigation actions?
5. Avalon has stated that "it is logical to assume that the influent water quality from the mine to the in-plant water treatment system will be much cleaner than the tailing water". It would be helpful for Avalon to present data or other basis to support this hypothesis so that interested parties can compare the concentrations, including REE concentrations, to the concentrations in other flows in the water balance. If the mine water concentrations are estimated, please explain the basis for the estimates.
6. Avalon has stated that "The primary purpose of the in-plant treatment system will be to treat any incoming mine-water ..." What are the expected concentrations of the water that will be discharged to the runoff collection pond and subsequently to the TMF? Has Avalon tested the effectiveness of the proposed in-plant water treatment system on the mine water or on any proxy for the mine water such as simulated mine water?
7. The table of REE concentrations that Avalon presented in its 31 Oct 2012 response contain incorrect SSWQO values for hafnium, holmium, thulium, and zirconium. These values were previously corrected in Avalon's Oct 2012 response to MVRB IR 2.03. Avalon should update the full table to include the corrected values to minimize future confusion.

We believe this meeting will be an effective way to discuss and seek clarification on the questions listed above. See you then.

Thanks,

Chuck Hubert
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