



Stantec

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File: 1039597.

Breakwater Resources Ltd.
Suite 2000
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Attention: Robert Carreau, Vice President CSR and Sustainability

Dear Mr. Carreau:

Reference: Interventions on Water Licence Renewal Hearing - Water Quality Monitoring

As per your request, Jacques Whitford Stantec Limited has reviewed the intervention documents filed by Environment Canada (EC), Indian and Northern Affairs Canada (INAC) and the Government of Nunavut, Department of Environment (DoE), particularly as those documents relate to water quality and water quality monitoring requirements during the anticipated five-year renewal term of the Nanisivik Water Licence (the Licence).

The three interventions are generally very similar in their perspectives. Key themes are summarized below, with comments as to the validity and basis of the interventions. Where the interveners filed more than one document (for example, a non-technical summary and a supporting technical document), this letter references the technical document.

1. Five Year Term

All three interveners recommend a five-year period of monitoring, with monitoring frequency during at least the first two years (2009 and 2010) on a biweekly basis. Contingent on a review of data showing satisfactory conditions and trends after two years, the interveners indicate that they would support monthly sampling thereafter (2011-2013). Again, contingent upon a review of data showing satisfactory conditions and trends, the interveners indicate that they could support termination of the monitoring program at the end of 2013, although an extension is not ruled out. The five year term, with a review and possible reduction of sampling frequency and parameter suites after two years seems reasonable.

2. Parameters to Monitor

EC recommends that a "full suite" of parameters should be analyzed for Stations 159-4, 159-6, 159-17 and NML-30 for a minimum of the first two years of the Post Closure monitoring period (2009-2010). The "full suite" would include total and dissolved metals (ICP scan), Total Dissolved Solids (TDS), major ions, Total Suspended Solids (TSS), conductivity, pH, temperature and hardness. After the first two years, and contingent upon a review of data, a lesser suite of parameters may be acceptable, and frequency may be reduced to monthly from biweekly.

INAC recommends analysis of metals (presumably total metals) including aluminum, arsenic, cadmium, copper, iron, lead, nickel, mercury, molybdenum and zinc, as well as ammonia, nitrate, alkalinity, sulphate,

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conductivity, dissolved oxygen, pH, TSS, radium-226 and visible oil and grease, at Stations 159-4, 159-6, NML-23, 159-17 and 159-15.

While the Nanisivik Mine was operating, it was under both federal and territorial jurisdictions. Monitoring requirements for operating mines in Canada are currently driven primarily by requirements under the *Metal Mining Effluent Regulation (MMER)* of the *Fisheries Act*, with provincial and territorial monitoring requirements usually reflecting federal requirements (for example, the present authorized limits for metals discharged at a Final Discharge Point at Nanisivik are approximately one half the equivalent values identified in Schedule 4 of MMER).

The perspective of EC that the post-closure monitoring period should include both dissolved and total concentrations of a full suite of trace elements seems unnecessary; under *MMER*, all metals concentrations are reported as “total”. The request for a “full ICP scan” of trace elements also seems unnecessary in light of monitoring requirements imposed on operating mines. Among the suite of trace elements prescribed under *MMER* (i.e., arsenic, copper, lead, nickel, zinc and radium-226), several (including arsenic, copper, nickel and radium-226) were routinely measured, but were not problematic during the operating life of the mine.

Further, the Environmental Effects Monitoring (EEM) program that was carried out in August 2004, provides trace element scans for Stations in Twin Lakes Creek. At that time the analytical data for many trace elements (i.e., antimony, arsenic, beryllium, bismuth, chromium, nickel, selenium, silver, tellurium, thallium, uranium, and vanadium) were at levels close to or below detection limits. Concentrations of several major elements related to “hardness” or salinity (i.e., calcium, magnesium, strontium, sodium, potassium, lithium) were moderately elevated in association with the effluent treatment processes then operating. Of the remaining trace elements, cadmium, lead and zinc showed variation related to either mine effluent discharge or natural mineralization, and are considered to be ideal tracer elements with respect to potential toxicity and as indicators of geochemical stability at the West Twin Disposal Area (WTDA) and elsewhere. Therefore, Jacques Whitford Stantec Limited recommended a post-closure monitoring plan that focused on those trace elements (i.e., cadmium, lead and zinc) that are of primary concern based upon the mineral deposits that were exploited at the site, and for which the monitoring history during the operating life of the mine demonstrated sensitivity.

Based upon the information presented by the interveners, Jacques Whitford Stantec Limited believes that a benchmark for the “full scan” data sought by EC has already been provided through the EEM program, and now recommends a standard water quality monitoring parameter suite that includes the following:

- Total cadmium, lead and zinc
- Major cations (calcium, magnesium, sodium, potassium, ammonia, and the derived parameter hardness)
- Major anions (chloride, sulphate, bicarbonate, carbonate, nitrate+nitrite, and the derived parameter alkalinity)
- TSS
- Specific conductivity (a surrogate for total dissolved solids)
- pH

There would be no intention to reduce this sampling suite at any time during the five-year Post-Closure monitoring period.

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3. TPH Analysis

EC has recommended analysis of TPH at Stations 159-6 and NML-30. DoE has also requested inclusion of TPH to water quality monitoring at the landfill (NML-29). INAC has requested monitoring of TPH at Station 159-4, however, this was based upon an error in Appendix C to the Water Quality Monitoring Report provided by Jacques Whitford Stantec Limited (this error has been corrected in the re-issued version of the report). The data reported as TPH were in fact misplaced data reporting magnesium concentrations; there does not appear to be any reason for routine analysis of TPH at Station 159-4.

The water quality monitoring data for the Landfill (NML-30), where concern about TPH in leachate is perhaps greatest, show that in approximately 24 samples analyzed since 2004, one sample from 2006 showed a trace (0.6 µg/L) of ethylbenzene, one sample from 2007 showed a trace (1.1 µg/L) of o-xylene, and one sample from 2007 showed traces of F3 and F4 hydrocarbons (0.3 and 4.2 mg/L respectively). All other sample results for hydrocarbons (including TPH and BTEX) were non-detectable. Since 2004, the landfill has been closed and stabilized, with cover added so that the contents of the landfill have become and will remain entombed in permafrost. Therefore, Jacques Whitford Stantec Limited does not believe that there is a need for routine analysis of TPH at any sampling station.

Taking into consideration the interventions made by EC and INAC, Jacques Whitford Stantec Limited recommends that the water and sediments at each sampling station should be inspected on each sampling occasion for the presence of sheens. If a visible sheen is observed on the water surface, or is released when sediments are disturbed, then a water sample should be collected for TPH analysis. This is consistent with current and past Licences issued to the proponent.

4. Station 159-9

INAC noted that Station 159-9 (Twin Lakes Creek Stream Crossing) was removed as a sampling location from the proposed suite of stations, and seeks its reinstatement on the grounds that "it is applicable for assessing reclamation activity in the West Pit mining area". As 159-9 is upstream of the former West Open Pit, the meaning of this statement is unclear to Jacques Whitford Stantec Limited. Possibly INAC is referring to the WTDA, in which case Station 159-4 provides direct monitoring of releases from that decommissioned facility. Station 159-10 is downstream of the West Open Pit mining area (and the natural sulphides outcropping) and will continue to be monitored.

5. Final Discharge Points

DoE has recommended that in addition to Station 159-4 (the final discharge point from the former WTDA), Stations 159-17 (mouth of Chris Creek) and 159-6 (mouth of Twin Lakes Creek) should be added as final discharge points.

The designation of a sampling station as a final discharge point involves two key considerations.

- First, a final discharge point represents the final point of institutional control exercised by the proponent over effluent water quality. This criterion applies to Station 159-4, the final outfall from the WTDA, but does not apply to Stations 159-6 or 159-17, since the Nanisivik Mine has never exercised such control over water quality at those locations, and other significant considerations (such as the effects of natural mineralized outcrops) may significantly impact water quality.

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- Second, water quality at a final discharge point must meet criteria outlined in Section D (6) of the Licence. While it is reasonable to expect CanZinco to manage water quality where effluent is released from its facilities (i.e., the WTDA), it is not reasonable to expect CanZinco to exercise such control on water quality where that control is not within its capacity.

Stations 159-6 and 159-17 are located within watersheds that contain surface outcrops of natural mineralization, and where water quality conditions prior to mine development were documented by BC Research (1975) to periodically exceed the values presently included in the Licence.

Therefore, Jacques Whitford Stantec Limited recommends that Station 159-4 remain a final discharge point, but that Stations 159-6 and 159-17 not be so designated.

6. Contingency Plan for Water Quality

EC has requested CanZinco provide a contingency management plan for water quality, to provide adequate response if allowances are exceeded or if abnormal trends are observed in the monitoring results. DoE has similarly requested a contingency plan to outline actions to be taken in the event water quality monitoring results show exceedances and are not meeting the effluent quality requirements to be set out in the water licence.

INAC has requested that CanZinco should establish trigger levels for all parameters without compliance criteria whereby an investigation or contingency measure would be required at the site. The trigger level would be site specific and would be related to historical background levels, recognizing that the CCME guidelines for the protection of aquatic life may be lower than historic and background data.

Jacques Whitford Stantec Limited understands that comprehensive contingency plans have been identified for each of the major components of the Nanisivik Final Closure and Reclamation Plan (FCRP), that these were submitted to the NWB as Appendices to the FCRP, were approved, and are on file at the NWB registry. References appear below:

- *Appendix A: Engineering Design of Reclamation Surface Covers, BGC Engineering Inc., February 2004*
- *Appendix B: Assessment of Surface Cell and Test Cell Taliks, BGC Engineering Inc., February 6, 2004*
- *Appendix C: Quarry Development and Reclamation Plan, BGC Engineering Inc., February 6, 2004*
- *Appendix E: Nanisivik Mine Rock Piles and Open Pits Closure Plan, Gartner Lee Limited, February 2004*
- *Appendix J: West Twin Disposal Area Closure Plan, BGC Engineering Inc., March 2004*
- *Appendix L: Nanisivik Mine Landfill Closure Plan, Gartner Lee Limited, February 2004*

February 18, 2009
Mr. Robert Carreau
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Closing

This letter has been prepared by Malcolm Stephenson Ph.D., and was reviewed by Tania Noble Sharpe, M.Eng., for the sole benefit of Breakwater Resources Ltd./CanZinco Limited, and may not be relied upon by any other person or entity without the express written consent of Jacques Whitford Stantec Limited and Breakwater Resources Ltd./CanZinco Limited. Jacques Whitford Stantec Limited accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We trust that the above information fulfills your needs at this time. Should you require additional information, please do not hesitate to contact us.

JACQUES WHITFORD STANTEC LIMITED

(Original Signed By)

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