

November 13, 2013

Phyllis Beaulieu
Manager of Licensing
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1J0

Dear Ms. Beaulieu,

Re: 1AR-NAN0914 – Application for Water Licence Amendment

Please find attached an application to amend and renew Water Licence 1AR-NAN0914. The application is submitted by Canzinco Ltd. and comprises the following documentation:

- Application for Water Licence Amendment, including:
 - Appendix A: Executive summary of Water Licence amendment application (English)
 - Appendix B: Executive summary of Water Licence amendment application (Inuktitut)
 - Appendix C: Canzinco shareholder resolution appointing directors
 - Appendix D: Site location map
 - Appendix E: Correspondence related to Nunavut Planning Commission conformity determination
 - Appendix F: Correspondence related to Nunavut Impact Review Board screening requirements
 - Appendix G: Geotechnical monitoring schedule 2014-2018
 - Appendix H: Water quality monitoring schedule 2014-2018
 - Appendix I: Contaminated soil remediation progress
 - Appendix J: Petroleum hydrocarbon contaminated soils risk-based remedial options analysis
 - Appendix K: Concordance table related to supplementary information requirements for hydrocarbon-impacted soil storage and landfarm treatment facilities
 - Appendix L: Site layout map
 - Appendix M: Letter of credit
 - Appendix N: Canzinco appointment of officer
 - Appendix O: Canzinco certificate of amendment
 - Appendix P: Compliance assessment and status report

We trust that the appended materials meet the requirements for a Water Licence amendment application. Any questions related to the application can be directed to the undersigned at telephone 604 318 5795 or by email at johan.skoglund@nyrstar.com.

Sincerely,



Johan Skoglund
Group Manager Environment

Resources for a changing world

Nyrstar Canada (Holdings) Ltd.

2840 - 650 West Georgia Street
PO Box # 11552
Vancouver, BC V6B 4N8

T 1 604 336.8300
F 1 604 336 8329
info@nyrstar.com
nyrstar.com

Application for Water Licence Amendment



Application for Water Licence Amendment

Canzinco Ltd.

Application Submission Date: 13 November 2013

P.O. BOX 119
GJOA HAVEN, NUNAVUT
XOB 1J0
TEL: (867) 360-6338
FAX: (867) 360-6369

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NUNAVUT IMALIRIYIN KATIMAYIT
NUNAVUT WATER BOARD
OFFICE DES EAUX DU NUNAVUT

Johan Skoglund is authorized to act on behalf of Canzinco Ltd. Please refer to Appendix C for an authorization letter.

3. NAME OF PROJECT

Has the name of the project changed? **No**

4. LOCATION OF UNDERTAKING

Does the proposed amendment change the location of the amended undertaking? **No**

Provide the project extents and camp locations. Identify proposed changes.

Project Extents

Latitude: (73°02' N) Longitude: (84°32' W)

Camp Location(s)

N/A. There is no camp associated with the former Nanisivik mine.

5. MAP

Does the proposed amendment change the location of any of the main components of the undertaking? **No**

A site Location Map is attached in Appendix D. The location of the undertaking remains the same as under the existing licence.

NTS Map Sheet No.: 48 C/02

6. NATURE OF INTEREST IN THE LAND

Does the proposed amendment change the nature of the interest in the land? **No**

Check any of the following that are applicable to the proposed undertaking (at least one box under the 'Surface' header must be checked).

Sub-surface

☐ Mineral Lease from Nunavut Tunngavik Incorporated (NTI)
Date (expected date) of issuance: _____ Date of expiry: _____

☐ Mineral Lease from Indian and Northern Affairs Canada (INAC)
Date (expected date) of issuance: _____ Date of expiry: _____

Surface

☒ Crown Land Use Authorization from Indian and Northern Affairs Canada (INAC). Canzinco holds several surface leases issued by INAC. The leases have expired but have not been surrendered. Canzinco is actively working with the Aboriginal Affairs and Northern Development (AANDC) to consolidate and establish surface leases appropriate to the ongoing monitoring activities completed under licence 1AR-NAN0914.

Lease No. <u>48 C/1-5-2</u>	Date of issuance: <u>8 Aug 1984</u>	Date of expiry: <u>31 May 2004</u>
Lease No. <u>48 C/1-6-2</u>	Date of issuance: <u>4 May 1987</u>	Date of expiry: <u>31 Oct 2006</u>
Lease No. <u>48 C/1-7-2</u>	Date of issuance: <u>4 May 1987</u>	Date of expiry: <u>31 Oct 2006</u>
Lease No. <u>48 C/1-8-13</u>	Date of issuance: <u>1 Jan 2003</u>	Date of expiry: <u>31 Dec 2007</u>
Lease No. <u>48 C/1-9-3</u>	Date of issuance: <u>12 Mar 1996</u>	Date of expiry: <u>31 Dec 1999</u>

☐ Inuit Owned Land (IOL) Authorization from Kitikmeot Inuit Association (KIA)
Date (expected date) of issuance: _____ Date of expiry: _____

☐ IOL Authorization from Kivalliq Inuit Association (KivIA)
Date (expected date) of issuance: _____ Date of expiry: _____

☐ IOL Authorization from Qikiqtani Inuit Association (QIA)
Date (expected date) of issuance: _____ Date of expiry: _____

☒ Commissioner's Land Use Authorization

The majority of Canzinco's leases on Commissioner's Land has been surrendered; however discussions with the Government of Nunavut Land Administration Department identified eight leases which are yet to be surrendered. These leases are listed below. Canzinco is actively working with the GN Land Administration to surrender or, as appropriate, renew leases required for the ongoing monitoring activities completed under licence 1AR-NAN0914.

Lease No. <u>L-8008T</u>	Date of issuance: <u>1 Sept 1989</u>	Date of expiry: <u>01 Sept 2019</u>
Lease No. <u>L-8677T</u>	Date of issuance: <u>26 Sept 1989</u>	Date of expiry: <u>31 Dec 2010</u>
Lease No. <u>L-40041T</u>	Date of issuance: <u>1 Jan 1990</u>	Date of expiry: <u>31 Dec 1999</u>
Lease No. <u>L-40042T</u>	Date of issuance: <u>1 Jan 1990</u>	Date of expiry: <u>31 Dec 1999</u>
Lease No. <u>L-40043T</u>	Date of issuance: <u>1 Jan 1990</u>	Date of expiry: <u>31 Dec 1999</u>
Lease No. <u>LC-40044T</u>	Date of issuance: <u>1 Jan 1990</u>	Date of expiry: <u>31 Dec 1999</u>
Lease No. <u>LC-40163T</u>	Date of issuance: <u>1 Jan 1990</u>	Date of expiry: <u>31 Dec 1999</u>
Lease No. <u>L-2455T</u>	Date of issuance: <u>1 June 1979</u>	Date of expiry: <u>31 May 1994</u>

☒ Other: Lease No. L-9195300 with the Department of Fisheries and Oceans

Date of issuance: 22 March 2001 Date of expiry: 31 December 2003

Is the name of the entity(s) holding authorizations the same as that considered in the existing water licence? **Yes**

7. NUNAVUT PLANNING COMMISSION (NPC) DETERMINATION

Indicate the land use planning area in which the existing project is located.

- ☒ North Baffin
☐ South Baffin
☐ Akunnig

- ☐ Keewatin
☐ Sanikiluaq
☐ West Kitikmeot

Does the proposed amendment change the land use planning area? **No**

Was a land use plan conformity determination required from NPC prior to the issuance of the existing water licence? **Yes.** A positive land use plan conformity determination was issued by NPC on 19 June 2008. A copy of the conformity determination is provided in Appendix E.

Does the proposed amendment change the original NPC conformity determination or the need to obtain one?
No

If No, provide written confirmation from NPC confirming that a land use plan conformity review is not required.

Please refer to Appendix E for correspondence with the NPC in regards to the need for a land use plan conformity review.

8. NUNAVUT IMPACT REVIEW BOARD (NIRB) DETERMINATION

Was a screening determination required from NIRB prior to the issuance of the existing water licence? **Yes**

The original Canzinc Ltd. "Closure and Reclamation Plan for the Nanisivik Mine" project proposal (NIRB File No.: 02MC117) was screened by the NIRB. A screening decision issued on 7 October 2002 determined that the proposed project could proceed subject to the NIRB's recommended project-specific terms and conditions.

Canzinc's 2008 water licence renewal application was reviewed by the NIRB and found to be exempt from the requirement for further screening subject to the terms and conditions recommended in the original 7 October 2002 Screening Decision Report.

The original NIRB Screening Decision Report (File No. 02MC117) and all related file information are available from the NIRB's online public registry at the following location:

<http://ftp.nirb.ca/01-SCREENINGS/COMPLETED%20SCREENINGS/2002-TO%20BE%20COMPLETED/02MC117-CanZinc%20Limited-Nanisivik/>

Does the proposed amendment change the original NIRB screening determination or the need to obtain one? **No**

If No, provide written confirmation from NIRB confirming that a screening determination is not required.

Please refer to Appendix F for correspondence with the NIRB in regards to the need for a screening determination.

9. DESCRIPTION OF UNDERTAKING

Does the proposed amendment change the description of the undertaking? **Yes**

The nature and overall scope of the undertakings remain the same as those authorized through Water Licence 1AR-NAN0914, i.e. post-closure monitoring of rehabilitated mining areas and reclamation of contaminated soil at the former fuel tank farm. The location of these activities also remains unchanged.

Based on the results of the post-closure monitoring completed to date and in order to improve the efficiency of the soil remediation activities, the following amendments are proposed:

- The geotechnical monitoring program pursuant to Part I of the existing Water Licence has demonstrated that completed surface reclamation covers and other geotechnical installations are performing in accordance with their design intents. Importantly, geothermal monitoring data collected to date indicates that installed thermal covers achieve their design objectives by confining the active thaw layer within the covers and maintaining the underlying waste materials in a frozen state. Given the successful results to date, Canzinc proposes an amendment to Schedule I of the existing Water Licence resulting in a reduced monitoring schedule. Further details about the results of the geotechnical monitoring program to date and the proposed new monitoring schedule are provided in a memo from Canzinc's geotechnical engineer (BGC Engineering) included as Appendix G to this application.
- Similar to the geotechnical monitoring, the results of the water quality monitoring program have demonstrated stable conditions and confirmed that implemented closure and rehabilitation measures perform as expected. Monitoring results in the 159-4 compliance station, at the outflow from the former tailing storage facility, have generally remained near or below analytical detection limits which are significantly below the discharge limits established in the existing Water Licence. Based on the positive monitoring results to date, an amendment to Schedule I of the existing Water Licence is proposed including a reduction in monitoring stations, sampling frequency and analytical parameters. Further details about the results of the water quality monitoring completed to date and the proposed new monitoring program are provided in a memo from Canzinc's water quality consultant (Stantec Consulting) included as Appendix H to this application.
- Reclamation of the former fuel tank farm has been undertaken as per the methodology established in the Abandonment and Reclamation Plan (Stantec 8 January 2010; approved by Nunavut Water Board on 26 April 2010) for this work. Key closure and reclamation activities completed under this plan has included: decommissioning and removal of petroleum storage tanks and associated infrastructure; delineation of contaminated soil; construction of soil treatment facilities; and excavation and treatment of contaminated

soil.

At the end of the 2013 remediation season, all activities associated with tank decommissioning, soil contamination delineation and treatment facility construction have been completed and only very minor excavation works remain. As such, future works under a renewed Licence will primarily be associated with the treatment and management of excavated contaminated soil and applying the soil quality remediation objectives (SQROs) determined in the Abandonment and Reclamation Plan the amount of soil that remains to be treated is approximately 10,300 m³. The starting quantity of contaminated soil exceeding the SQROs was approximately 17,000 m³ meaning that almost 7,000 m³ of soil has been successfully treated since the remediation efforts commenced. It's worth noting that the total quantity of soil requiring treatment (i.e. 17,000 m³) is significantly higher than the volume foreseen in the 2010 Abandonment and Reclamation Plan (8,000 m³). Applying the existing soil treatment approach established in the Abandonment and Reclamation Plan (i.e. nutrient amended landfarming) and based on the soil treatment rates achieved to date, it is estimated that the remediation works will be completed at the end of the 2016 field season. Further information about the soil remediation works completed to date are provided in a memo from Canzinco's remediation consultant (SRK Consulting) included as Appendix I to this application.

Consultation with key stakeholders with current and future interests in the Nanisivik dock site has revealed potential land use conflicts in the areas used for soil remediation. Specifically, the conflict is a result of the potential construction of a Department of National Defence (DND) Naval Facility, which is planned to be initiated in August 2014. In order to assist the DND in implementing their construction plans, Canzinco has developed an alternative remediation approach which would expedite the evacuation of the contaminated soil from the DND's construction area. In brief, this alternative approach involves the transfer of the contamination soil to an ecologically non-sensitive area, elimination of exposure pathways by capping the materials with clean soil and, simultaneously to these risk management activities, the pursuit of studies to demonstrate that the residual low levels of soil contamination do not pose risks to human health or the environment. The details of this approach are described in a memo from Hemmera included as Appendix J to this application.

In order to facilitate making the area available for DND, Canzinco requests as part of the Licence amendment application that the remediation methodology for the contaminated soil be modified as per the preferred remedial approach outlined in Section 5.0 of Appendix J. With respect to the implementation of this approach, Canzinco proposes that all soils with residual petroleum hydrocarbon concentrations exceeding existing SQROs be transferred to the 'Upper Treatment Area' currently used for landfarming. This area meets the location selection criteria recommended on page 15 of Hemmera's memo. The location of the Upper Treatment Area is shown on the plan included in Appendix I. Furthermore, Canzinco proposes an amendment to Part J.2 of the Water Licence requiring the development and submission to the Water Board for approval a new Abandonment

and Reclamation Plan that reflects the preferred remedial approach described in Appendix J. The contents of this Plan are proposed to include:

- Requirements for the transfer and placement of contaminated soil in the Upper Treatment Area, including consideration of contaminant levels, geotechnical stability, cover thickness and material specifications, and desired landforms;
- A monitoring and maintenance plan intended to assess the rate of hydrocarbon attenuation in the encapsulated soil and to monitor geotechnical stability,
- A contingency plan;
- A plan for developing site specific Soil Quality Remediation Objectives; and
- A detailed schedule for all tasks and activities.

10. OPTIONS

Does the proposed amendment change any of the alternative methods and locations that were considered to carry out the project? **Yes**

Provide a brief explanation of the alternative methods or locations that were considered to carry out the project. Identify proposed changes.

Alternative methods and locations for the remediation of the petroleum hydrocarbon contaminated soil have been considered and the options analysis is presented in Appendix J.

11. CLASSIFICATION OF PRIMARY UNDERTAKING

Indicate the primary classification of undertaking for the existing licence by checking one of the following boxes:

- | | |
|---|--|
| <input checked="" type="checkbox"/> Industrial | <input type="checkbox"/> Agricultural |
| <input type="checkbox"/> Mining and Milling (includes exploration/drilling/exploration camps) | |
| <input type="checkbox"/> Conservation | |
| <input type="checkbox"/> Municipal (includes camps/lodges) | <input type="checkbox"/> Recreational |
| <input type="checkbox"/> Power | <input type="checkbox"/> Miscellaneous (describe below): |

Does the proposed amendment change the classification of primary undertaking? **No**

Information in accordance with applicable Supplemental Information Guidelines (SIG) must be updated and submitted with an Application for Amendment. Indicate which SIG(s) are applicable to your application.

- ☐ Hydrostatic Testing
- ☐ Tannery
- ☐ Tourist / Remote Camp
- ☒ Landfarm & On-Site Storage of Hydrocarbon Contaminated Soil
- ☐ Onshore Oil and Gas Exploration Drilling
- ☐ Mineral Exploration / Remote Camp
- ☐ Advanced Exploration
- ☐ Mine Development
- ☐ Municipal
- ☐ General Water Works
- ☐ Power

A Concordance Table providing references to information addressing the requirements of the SIG for Landfarm & On-Site Storage of Hydrocarbon Contaminated Soil is included in Appendix K.

12. WATER USE

Indicate, using the boxes below, the types of water use(s) approved in the existing licence.

- | | |
|---|---|
| <input type="checkbox"/> To obtain water for camp/ municipal purposes | <input type="checkbox"/> To divert a watercourse |
| <input checked="" type="checkbox"/> To obtain water for industrial purposes | <input type="checkbox"/> To modify the bed or bank of a watercourse |
| <input type="checkbox"/> To cross a watercourse | <input type="checkbox"/> Flood control |
| <input type="checkbox"/> To alter the flow of, or store water | |
| <input type="checkbox"/> Other: _____ | |

Does the proposed amendment change the type(s) of water use(s)?

☐ Yes ☒ No

If Yes, indicate using the boxes below, the proposed change(s) to the type(s) of water use(s) noting any water use(s) that are to be added, continued, or removed.

- | | |
|---|---|
| <input type="checkbox"/> To obtain water for camp/ municipal purposes | <input type="checkbox"/> To divert a watercourse |
| <input type="checkbox"/> To obtain water for industrial purposes | <input type="checkbox"/> To modify the bed or bank of a watercourse |
| <input type="checkbox"/> To cross a watercourse | <input type="checkbox"/> Flood control |
| <input type="checkbox"/> To alter the flow of, or store water | |
| <input type="checkbox"/> Other: _____ | |

13. QUANTITY OF WATER INVOLVED

Does the proposed amendment change the source of water? ☐ Yes ☒ No

Indicate the water source(s). Identify proposed changes:

The existing Water Licence authorizes the withdrawal of fresh water for domestic use from East Twin Lake and water use for the purposes of mitigation from East Twin Lake, West Twin Creek and Chris Creek. Please refer to the Site Layout Map in Appendix L for a description of the location of the water bodies in question.

Does the proposed amendment change the quality of the water source and/or its available capacity?

☐ Yes ☒ No

Describe the quality of the water source(s) and the available capacity(s). Identify any changes.: N/A

Does the proposed amendment change the overall quantity of water to be used?

☐ Yes ☒ No

Provide the overall estimated quantity to be used. Identify proposed changes. Less than 100 m³/day.

Under the existing Water Licence, no uses of water occurred in 2009, 2010, 2011 or 2012 and only very minor quantities of water (approximately 20 m³ in total) were used in 2013. Given that the vast

majority of the reclamation works have been completed, future water use needs will remain low and any potential water withdrawals would be small to insignificant in nature.

Does the proposed amendment change the quantity of water to be used from each source?

☐ Yes ☒ No

Provide the estimated quantity(s) of water to be used from each source. Identify proposed changes. : N/A

Does the proposed amendment change the quantity of water to be used for each purpose?

☐ Yes ☒ No

Provide the estimated quantities to be used for each purpose (camp, drilling, etc.). Identify proposed changes.: N/A

Does the proposed amendment change the method(s) of extraction?

☐ Yes ☒ No

Describe the method(s) of extraction. Identify proposed changes. N/A

Does the proposed amendment change the quantity(s) of water returned to source(s)?

☐ Yes ☒ No

Estimated quantity(s) of water returned to source(s). Identify proposed changes. N/A

Does the proposed amendment change the quality(s) of water returned to source(s)?

☐ Yes ☒ No

Describe the quality(s) of water(s) returned to source(s). Identify any changes. N/A

14. WASTE

Check the appropriate box(s) to indicate the types of waste(s) approved in the existing licence.

- | | |
|--|--|
| <input checked="" type="checkbox"/> Sewage | <input type="checkbox"/> Waste oil |
| <input checked="" type="checkbox"/> Solid Waste | <input type="checkbox"/> Greywater |
| <input checked="" type="checkbox"/> Hazardous (disposal offsite) | <input checked="" type="checkbox"/> Sludges (disposal offsite) |
| <input checked="" type="checkbox"/> Bulky Items/Scrap Metal | <input checked="" type="checkbox"/> Contaminated soil |
| <input type="checkbox"/> Animal Waste | |
| <input type="checkbox"/> Other (describe): | |

Does the proposed amendment change the type(s) of waste(s) to be generated or deposited?

☒ Yes ☐ No

If Yes, indicate using the boxes below, the proposed change(s) to the type(s) of waste(s) to be generated and/or deposited noting the addition, removal or continued generation and/or disposal of waste(s).

Waste types which will no longer be generated and therefore do not need to be included in an

amended Licence:

☒ Sludges

Waste types which will continue to be generated and therefore need to be included in an amended Licence:

☒ Hazardous (disposal off-site at approved facility)

☒ Bulky Items/Scrap Metal

☒ Sewage

☒ Contaminated soil

☒ Solid Waste

With respect to Bulky Items/Scrap Metal, approximately 30 m³ of concrete, rebar, cable and other inert non-hazardous waste materials have accumulated on site. In order to dispose of this waste and any similar materials generated through on-going activities, Canzinco is seeking an amendment to Part F Conditions Applying to Waste Disposal and Management of the Water Licence to allow for the disposal of scrap metal and other bulky non-hazardous materials in an on-site landfill. It is proposed that the amended Licence includes a requirement to develop and submit to the Water Board for approval a Solid Waste Management Plan and Landfill Closure Plan.

15. QUANTITY AND QUALITY OF WASTE INVOLVED

Does the proposed amendment change the quantity(s) of the types of wastes involved?

☒ Yes ☐ No

Refer to Appendix I for a description of the quantities of contaminated soil remaining to be remediated. With respect to sewage, hazardous waste, solid waste and scrap metal, only were minor quantities of these waste fractions are generated/remain to be disposed of. Refer to the table at the end of Block 15 for quantity estimates associated with these waste streams.

Does the proposed amendment change the composition(s) of the types of wastes involved?

☐ Yes ☒ No

Does the proposed amendment change the method(s) of treatment for the types of waste involved?

☐ Yes No ☒

Does the proposed amendment change the method(s) of disposal for the types of waste involved?

☒ Yes ☐ No

Refer to Appendix J for a description of methods of disposal for contaminated soil.

For each type of waste indicated in Block 14, describe its composition, quantity in cubic meters/day, method of treatment and method of disposal.

Type of Waste	Composition	Quantity Generated	Treatment Method	Disposal Method
Sewage	Minor quantities of sewage are generated from the remediation activities at the dock site	Less than 1 m ³ per year.	N/A	The sewage is disposed of in the Arctic Bay landfill.
Hazardous Waste	Empty aerosol cans, batteries and other potentially hazardous waste generated from the soil remediation activities	Less than 1 m ³ per year.	N/A Placed in secure storage awaiting shipment to an approved disposal facility	Off-site at approved disposal facilities
Solid Waste	Packaging, food waste and other general garbage generated from the remediation activities at the dock site	Less than 5 m ³ per year.	N/A	Solid waste is disposed on in the Arctic Bay landfill.
Bulky Items/ Scrap metal	Cables, metal parts and other scrap encountered across the mine site has been collected in a designated area near the former industrial complex. Waste concrete is stored at the	Approximately 25 m ³ of scrap metal and 5 m ³ of waste concrete.	N/A	Disposal in on-site landfill under a Solid Waste Management Plan and Landfill Closure Plan.

	dock site.			
Contaminated Soil	Petroleum hydrocarbons	Approximately 10,300 m ³ remaining to be remediated	As per Appendix J	As per Appendix J

16. OTHER AUTHORIZATIONS

Does the proposed amendment change the need for other authorizations in addition to the sub-surface and surface land use authorizations provided in Block 6?

☐ Yes ☒ No

If Yes, indicate any additional authorizations required, which authorizations are no longer required, and which authorizations continue to be required.

For each provide the following:

Authorization: _____

Administering Agency: _____

Project Activity: _____

Date (expected date) of issuance: _____ *Date of expiry:* _____

17. PREDICTED ENVIRONMENTAL IMPACTS OF UNDERTAKING AND PROPOSED MITIGATION MEASURES

Does the proposed amendment change the predicted environmental impacts of the undertaking or the mitigation measures?

☐ Yes ☒ No

Describe direct, indirect, and cumulative impacts related to water and waste. Identify any changes.

18. WATER RIGHTS OF EXISTING AND OTHER WATER USERS

Was compensation paid and/or an agreement(s) for compensation been entered into with any existing or other users of water during consideration of the existing licence?

☐ Yes ☒ No

If Yes, provide the names, addresses and the nature of water use by those persons or properties.

Does the proposed amendment adversely affect any known persons or property including those that hold licences for water use in precedence to the application, domestic users, in-stream users, authorized waste depositors, owners of property, occupiers of property, and/or holders of outfitting concessions, registered trapline holders, and holders of other rights of a similar nature?

☐ Yes ☒ No

If Yes, provide the names, addresses and the nature of water use of those persons or properties.

Advise the Board if compensation has been paid and/or an agreement(s) for compensation has been reached with any existing or other water users with respect to the proposed amendment.

19. INUIT WATER RIGHTS

Was compensation paid/ or an agreement(s) for compensation been entered into with any Designated Inuit Organization (DIO) during consideration of the existing licence?

☐ Yes ☒ No

If Yes, which DIO(s) _____

Does the proposed amendment substantially affect the quality, quantity or flow of waters flowing through Inuit Owned Land (IOL)?

☐ Yes ☒ No

If Yes, advise the Board if negotiations have commenced or an agreement to pay compensation for any loss or damage has been reached with one or more DIO(s) with respect to the proposed amendment.

20. CONSULTATION - *Provide a summary of any consultation meetings including when the meetings were held, where and with whom. Include a list of concerns expressed and measures to address concerns.*

In-person consultation meetings involving a selection of key stakeholders were held in July 2013. The purpose of the meetings were to present the scope and results of the reclamation and monitoring work completed at Nanisivik since 2009, as well as to inform about and solicit feedback regarding the Licence amendment being sought by Canzinc. In addition, telephone conferences with representatives from the Department of National Defence (DND) and the Department of Fisheries and Oceans (DFO) were held in October and November 2013. The purpose of these interactions were to discuss and seek feedback on alternative remediation approaches for the contaminated soil at the dock site. A summary of the consultation meetings are provided below:

Stakeholder: Government of Nunavut		Location: Iqaluit	Date: 10 July 2013
Attendees:	<ul style="list-style-type: none"> ▪ Agnes Simonfalvy, Environment Coordinator, Department of Economic Development & Transportation ▪ Lou Kamermans, Socio-Economic Environmental Assessment Coordinator, Department of Economic Development & Transportation ▪ Justin Buller, Environmental Assessment Coordinator & Scientist, Department of Environment ▪ Robert Eno, Director, Department of Environment ▪ Grant Hipfner, Fiscal Advisor, Department of Finance ▪ Bill Westwell, Senior Manager, Municipal Planning, Department of Community and Government Services ▪ Cindy Kieu, Legal Counsel, Department of Justice ▪ Johan Skoglund, Group Manager Environment, Nyrstar ▪ Arlene Laudrum, Principal Consultant, SRK Consulting 		

Concerns and Responses	Canzinco met with representatives of the GN to provide a project update and to discuss the planned renewal of Canzinco's Water Licence. No significant concerns were raised by the GN representatives attending the meeting.
Stakeholder: Aboriginal Affairs and Northern Development Canada	
Location: Iqaluit	
Date: 10 July 2013	
Attendees:	<ul style="list-style-type: none"> ▪ David Abernethy, Regional Coordinator, Nunavut Water Resources Division ▪ Murray Ball, Manager Water Resources ▪ Brian Tattuinee, Land Specialist, Nunavut regional Office ▪ Jeff Mercer, Manager, Lands Administration ▪ Paul Budkewitsch, District Geologist, Mineral Resources ▪ Ian Parsons, Regional Coordinator, Nunavut Regional Office ▪ Karen Costello, Director, Resource Management ▪ Yongshu Fan, Senior Environmental Assessment Coordinator, Environment Canada, Environmental Assessment North ▪ Carey Ogilvie, Head, Environment Canada, Environmental Assessment North ▪ Johan Skoglund, Group Manager Environment, Nyrstar ▪ Arlene Laudrum, Principal Consultant, SRK Consulting
Concerns and Responses	The AANDC advised that Canzinco holds several surface leases which need to be cancelled or renewed. Following the meeting, a process has been initiated to consolidate, renew and adapt Canzinco's leases to suit the current post-closure monitoring activities (see Block 6).
Stakeholder: Hamlet of Arctic Bay	
Location: Arctic Bay	
Date: 10 July 2013	
Attendees:	<ul style="list-style-type: none"> ▪ Frank May, Mayor ▪ Geela Arnagumajaq-Ejangraq, Deputy Mayor ▪ Emma Byukuluk, Councilor ▪ Susanna Barnlabas, Councilor ▪ Olayuk Noqitarvik, Councilor ▪ Valerie Taqtu Qaunraq, Acting Senior Administrative Officer ▪ Mishak Allurut, Translator ▪ Johan Skoglund, Group Manager Environment, Nyrstar ▪ Arlene Laudrum, Principal Consultant, SRK Consulting ▪ Geoff Claypool, BGC Consulting
Concerns and Responses	<p>The Hamlet members expressed concern about the marine life near the port facility and queried whether current and past activities had impacted seals and other animals living in this area. Canzinco representatives explained that current activities are likely to be of low impact as there are no effluent discharges into the sea from the port area and that the ongoing remediation activities are aimed at removing sources of contamination which may otherwise migrate into the ocean.</p> <p>The Hamlet members asked about the Nanisivik airport and the potential for fuel</p>

	storage facilities remaining at the airport to impact the Hamlet’s fresh water sources. Canzinco representatives responded that the airport is under the administration of GN Department of Transportation and that the mine is not responsible for rehabilitation of this area.	
Stakeholder: Arctic Bay Hunters and Trappers Organisation (HTO)		Location: Arctic Bay
		Date: 11 July 2013
Attendees:	<ul style="list-style-type: none">▪ Andrew Taqtu - Chairperson▪ Qaumajuq Oyukuluk, Vice Chairman▪ Andrew Muckpa, Member▪ Doreen Irqaqsaq-Taqtu, Manager▪ Mishak Allurut, Translator▪ Johan Skoglund, Group Manager Environment, Nyrstar▪ Arlene Laudrum, Principal Consultant, SRK Consulting	
Concerns and Responses	<p>The HTO members asked about the remediation work being completed at the port site. Canzinco representatives provided an overview of the work being completed including a description of remediation methods, remaining work etc.</p> <p>HTO members explained that the mine site is generally not used for hunting activities and that the reclaimed mining areas are rarely accessed for hunting purposes.</p>	
Stakeholder: DFO and DND		Location: By phone
		Date: October/ November 2013
Attendees:	<ul style="list-style-type: none">▪ Lawrence Swift, Director Real Property, Safety and Security, Central & Arctic Region, DFO▪ Dave Burden, Regional Director General, Central & Arctic Region, DFO▪ Kevin Bill, Regional Environmental Coordinator, DFO▪ Andrea Cyr, Director Real Property, DFO▪ George Fenn, Central & Arctic Region, DFO▪ Diane Orange, Assistant Deputy Minister, Human Resources and Corporate Services, DFO▪ Rodney Watson, Project Manager Nanisivik Naval Facility, DND▪ Laura D’Costa, Project Officer Contaminated Sites, DND▪ Ranjeet Gupta, Director Environmental Engineering, DND▪ David Knight, DND▪ Louis LeMay, Technical Specialist Project Management, Defence Construction Canada▪ Heather Jones, Health Canada▪ Johan Skoglund, Group Manager Environment, Nyrstar▪ Arlene Laudrum, Principal Consultant, SRK Consulting▪ Doug Bright, Business Leader Environmental Risk Assessment, Hemmera	

Concerns and Responses	<p>At the initiative of Canzinc, three telephone conferences were held on October 17, October 24 and November 1. The purpose of this dialogue was to understand the DND's construction plans for the Nanisivik Naval Facility, discuss potential land use conflicts with respect to the ongoing soil remediation and the DND's construction plans, and to obtain the DND's and DFO's feedback on alternative soil remediation strategies that may alleviate potential land use conflicts.</p> <p>The remediation approach described in Appendix J and for which Canzinc is seeking approval was presented to the DFO and DND. The following feedback was received:</p> <ul style="list-style-type: none"> • The DFO expressed support for the proposed remediation approach. • The DND requested that an option analysis be included in Canzinc's Licence application to evaluate all feasible options for management of the contaminated soil. <ul style="list-style-type: none"> ➤ Response: An option analysis is included in Appendix J.
------------------------	--

Given the consultation meetings already undertaken by Canzinc (as described above) and that these meetings did not identify any significant stakeholder concerns, Canzinc requests that any public hearings being required by the Board as part of the Licence application process be conducted in writing.

21. SECURITY INFORMATION

Does the proposed amendment change the financial security assessment?

☐ Yes ☒ No

Does the proposed amendment change the estimate of the total financial security for final reclamation?

☐ Yes ☒ No

Canzinc maintains a detailed model for estimation of environmental liabilities at Nanisivik. The model utilises unit rates and other cost data sourced from the contractors, consultants and other external providers involved in the on-going reclamation of the former Nanisivik mine site. Based on this model, outstanding costs associated with the remediation of the dock area and post-closure monitoring for water quality and geotechnical stability are estimated at approximately \$2 million. While a significant amount of reclamation work has been completed in terms of decommissioning of the tank farm and soil remediation, due to the increase in the amount of soil requiring remediation in addition to overall cost escalations the cost estimate remains at the same level at that predicted in the application for the existing Water Licence.

Provide an estimate of the total financial security for final reclamation equal to the total outstanding reclamation liability for land and water combined sufficient to cover the highest liability over the life of the undertaking. Estimates of reclamation costs must be based on the cost of having the necessary reclamation work done by a third party contractor if the operator defaults. The estimate must also include contingency factors appropriate to the particular work to be undertaken. Identify any changes in the financial security assessment resulting from the proposed amendment.

Where applicable, the financial security assessment should be prepared in a manner consistent with the principals respecting mine site reclamation and implementation found in the Mine Site Reclamation Policy for Nunavut, Indian and Northern Affairs Canada, 2002.

22. FINANCIAL INFORMATION

Is the statement of financial security the same as that considered in the existing water licence?

☒ Yes ☐ No

Provide an updated statement of financial security.

A copy of the irrevocable standby letter of credit supplied as financial security under the current Water Licence is provided in Appendix M.

If the applicant is a business entity please answer the questions below:

Is the list of the officers of the company the same as those considered in the existing water licence?

☐ Yes ☒ No

Provide a list of the officers of the company.

Please refer to Appendix C for information about the Directors of Canzinco Ltd.

Please refer to Appendix N for Appointment of Officers for Canzinco Ltd. Only one officer has been appointed for Canzinco Ltd.

Is the Certificate of Incorporation or evidence of registration of the company name the same?

☒ Yes ☐ No

A copy of the Certificate of Incorporation for Canzinco is provided in Appendix O.

23. STUDIES UNDERTAKEN TO DATE

List and attach updated studies, reports, research etc.

Studies and reports relevant to this Water Licence amendment application are provided in the following Appendices:

- Appendix G – Geotechnical Monitoring Schedule 2014-2018
- Appendix H – Water Quality Monitoring Schedule 2014-2018
- Appendix I – Contaminated Soil Remediation Progress
- Appendix J – Petroleum Hydrocarbon Contaminated Soils Risk-Based Remedial Options Analysis

Provide a compliance assessment and status report including a response to any inspector's reports. The licensee must contact the NWB for licence specific direction in completing the assessment and report.

A Compliance Assessment and Status Report is provided in Appendix P.

If in non-compliance, a licence may not be issued until compliance is achieved. If in non-compliance, attach

plans/reports for consideration. Application will not be processed if significant issues of non-compliance exist.

24. PROPOSED TIME SCHEDULE

When are proposed amendments scheduled to be undertaken: 2014 to 2019.

Does the proposed amendment change the time schedule considered in the existing licence for any phase of development?

☒ Yes ☐ No

Indicate the start and completion dates for each applicable phase of development (construction, operation, closure, and post closure). Identify proposed changes.

Construction

Proposed Start Date: N/A Proposed Completion Date:
(month/year) (month/year)

Operation

Proposed Start Date: N/A Proposed Completion Date:
(month/year) (month/year)

Closure

Proposed Start Date: 2014 Proposed Completion Date: 2019
(month/year) (month/year)

Post - Closure

Proposed Start Date: 2014 Proposed Completion Date: 2019
(month/year) (month/year)

For each applicable phase of development indicate which season(s) activities occur.

Construction

☐ Winter ☐ Spring ☐ Summer ☐ Fall ☐ All season

Operation

☐ Winter ☐ Spring ☐ Summer ☐ Fall ☐ All season

Closure

☐ Winter ☐ Spring ☒ Summer ☐ Fall ☐ All season

Post - Closure

☐ Winter ☐ Spring ☒ Summer ☐ Fall ☐ All season

25. PROPOSED TERM OF LICENCE

On what date does the existing licence expire? March 31, 2014

Is the Licensee applying for a combined renewal and amendment of the existing licence?

☒ Yes ☐ No

If Yes, indicate the proposed term of the renewal (maximum of 25 years): 5 years

Requested date of renewal issuance: April 1, 2014 Requested Expiry Date: March 31, 2019

(The requested date of renewal issuance must be at least three (3) months from the date of application for a type B water licence and at least one (1) year from the date of application for a type A water licence, to allow for processing of the water licence application. These timeframes are approximate and do not account for the time to complete any pre-licensing land use planning or development impact requirements, time for the applicant to prepare and submit a water licence application in accordance with any project specific guidelines issued by the NWB, or the time for the applicant to respond to requests for additional information. See the NWB's *Guide 5: Processing Water Licence Applications* for more information)

26. ANNUAL REPORTING

Will the proposed amendment change the content of annual reports or the annual report template?

☐ Yes ☒ No

27. CHECKLIST

The following must be included with the application for Amendment for the water licensing process to begin.

Completed Application for Water Licence Amendment form.

☒ Yes ☐ No If no, date expected _____

Information addressing Supplement Information Guideline (SIG), where applicable (see Block 11)

☒ Yes ☐ No If no, date expected _____

Compliance Assessment / Status Report (see Block 23).

☒ Yes ☐ No If no, date expected _____

Indication of Renewal Requirement (see Block 25)

☒ Yes ☐ No If no, date expected _____

English Summary of Amendment Application.

☒ Yes ☐ No If no, date expected _____

Inuktitut and/or Inuinnaqtun Summary of Amendment Application.

☒ Yes ☐ No If no, date expected _____

Application fee of \$30.00 CDN (Payee Receiver General for Canada).

☒ Yes ☐ No If no, date expected _____

Water Use Fee Deposit of \$30.00 CDN (Payee Receiver General for Canada). The actual water use fee will be calculated by the NWB based upon the amount of water authorized for use in accordance with the Regulations at the time of issuance of the licence.

☒ Yes ☐ No If no, date expected _____

28. SIGNATURE

Johan Skoglund
Name (Print)

Group Manager Environment
Title (Print)

Johan Skoglund
Signature

13 Nov 2013
Date

Appendix A

Executive summary of Water Licence amendment application (English)

Appendix A: Executive Summary of 1AR-NAN0914 Water Licence Application Amendment

This document provides a summary of Canzinco's application for amendment of Water Licence 1AR-NAN0914 related to the former Nanisivik mine site.

Operations at the Nanisivik mine were terminated in 2002 and all mining areas and associated infrastructure were successfully closed and rehabilitated over the period 2002 to 2008. The existing Water Licence 1AR-NAN0914 issued in 2009 authorizes Canzinco Ltd. to conduct post-closure monitoring of reclaimed mining areas and to close and remediate a former fuel tank farm located at the Nanisivik dock site. The nature and overall scope of the undertakings included in Canzinco's application for an amended Water Licence are identical to those authorized through the existing Water Licence 1AR-NAN0914. The amendment application also does not propose any changes to the licensee, the location of the undertakings, or the type and quantity of water uses. The proposed Water Licence amendment does not affect water rights or licenses held by others.

While the purpose of the Water Licence remains the same, several changes to the conditions of the Water Licence are being proposed as part of the amendment application. In general, the changes seek to establish revised post-closure monitoring requirements that reflect the successful closure of the mine and to improve the efficiency of the soil remediation activities conducted at the dock site. Key amendments proposed by Canzinco are summarised below and described in more detail in the application documentation.

- Geotechnical monitoring data collected under the existing Water Licence has demonstrated that completed surface reclamation covers and other geotechnical installations are performing well and in accordance with their design intent. On the basis of the successful results achieved to date, Canzinco proposes that the geotechnical monitoring program specified in Part I of the Water Licence be modified and reduced to better reflect the monitoring needs applicable at this stage of post-closure.
- Similar to the geotechnical monitoring, the results of the water quality monitoring program have demonstrated stable conditions and confirmed that implemented closure and rehabilitation measures perform as expected. Monitoring results in the 159-4 compliance station, at the outflow from the former tailing storage facility, have remained significantly below the discharge limits established in the existing Water Licence. Based on the positive monitoring results to date, it is proposed the water quality monitoring program specified in Part I of the Water Licence be modified and reduced to better reflect the monitoring needs applicable at this stage of post-closure.
- Reclamation of the former fuel tank farm has been undertaken as per the requirements specified in the Water Licence and the methodology established in the Abandonment and Reclamation Plan for this work. While these activities have progressed well, increases in the estimated quantities of contaminated soil and lower than expected soil treatment rates have necessitated extensions to the time schedule for the remediation works. Applying the soil treatment approach approved through the existing Water Licence, it is estimated the soil remediation will be completed by the end of the 2016 field season. In order to improve the efficiency of the soil remediation and to address potential land use conflicts associated with the Department of National Defence's planned use of the dock site, an alternative remediation approach has been developed by Canzinco and is included as part of the Licence amendment application. In brief, this alternative approach involves the transfer of the contaminated soil to an ecologically non-sensitive area (at the dock site), elimination of exposure pathways by capping the

materials with clean soil and, simultaneously to these risk management activities, the pursuit of studies to demonstrate that the residual low levels of soil contamination do not pose risks to human health or the environment. In line with this modification, Canzinc proposes an amendment to Part J.2 of the Water Licence requiring the development and approval (by the Water Board) of a new Abandonment and Reclamation Plan for the contaminated soil at the dock site.

A number of stakeholder consultation activities have been conducted by Canzinc as part of the preparation of the Water Licence amendment application. The purpose of these activities has been to present the scope and results of the reclamation and monitoring work completed at Nanisivik since 2009 and to seek feedback on the Licence amendments being sought by Canzinc. Key stakeholders engaged as part of the consultation activities include the Aboriginal Affairs and Northern Development Canada, the Government of Nunavut, the Hamlet of Arctic Bay, the Arctic Bay Hunters and Trappers Organisation, the Department of Fisheries and Oceans, and the Department of National Defence. The comments and feedback received through the stakeholder consultations have been incorporated and addressed in the Water Licence amendment application. Given the consultation activities already undertaken by Canzinc and that these engagements did not identify any significant stakeholder concerns, Canzinc requests that any public hearings being required by the Water Board as part of the Licence application process be conducted in writing.

Canzinc proposes that the amended Water Licence be issued for a term of five years. The existing Water Licence expires on March 31, 2014.

Appendix B

Executive summary of Water Licence amendment application (Inuktitut)

- ርዕሰ ኃላፊዎች ወይም የክልላዊ የቴክኖሎጂ ርዕሰ ኃላፊዎች ለፈጠራ ልማት ለሚያስችሉ የክልላዊ ጥናቶች ምርመራ ማድረግ ይችላሉ። የክልላዊ የቴክኖሎጂ ርዕሰ ኃላፊዎች ለፈጠራ ልማት ለሚያስችሉ የክልላዊ ጥናቶች ምርመራ ማድረግ ይችላሉ። የክልላዊ የቴክኖሎጂ ርዕሰ ኃላፊዎች ለፈጠራ ልማት ለሚያስችሉ የክልላዊ ጥናቶች ምርመራ ማድረግ ይችላሉ።
- ከፍተኛ የቴክኖሎጂ ምርመራ ማድረግ ይችላሉ። የክልላዊ የቴክኖሎጂ ርዕሰ ኃላፊዎች ለፈጠራ ልማት ለሚያስችሉ የክልላዊ ጥናቶች ምርመራ ማድረግ ይችላሉ። የክልላዊ የቴክኖሎጂ ርዕሰ ኃላፊዎች ለፈጠራ ልማት ለሚያስችሉ የክልላዊ ጥናቶች ምርመራ ማድረግ ይችላሉ።

Appendix C

Canzinco shareholder resolution appointing directors

**RESOLUTIONS OF THE SOLE SHAREHOLDER
OF**

**CANZINCO LTD.
(the "Corporation")**

Financial Statements

Receipt of the financial statements of the Corporation for the financial year ended December 31, 2012 as approved by the directors is acknowledged.

Election of Directors

RESOLVED THAT the following persons are elected the directors of the Corporation, to hold office until the close of the next annual meeting of the shareholders.

Graham Buttenshaw
Johan Skoglund

Exemption From Audit Requirements

RESOLVED THAT the Corporation not appoint an auditor in respect of the financial year of the Corporation ending on December 31, 2013.

Confirmation of Acts

RESOLVED THAT all acts, contracts, by-laws, proceedings, appointments and elections made, done and taken by the directors and officer of the Corporation since the date of the last annual resolutions of the shareholder are approved and confirmed.

These resolutions are consented to by the sole shareholder of the Corporation pursuant to Section 142 of the *Canada Business Corporations Act*, as evidenced by the signature below.

DATED as of June 30, 2013.

BREAKWATER RESOURCES LTD.

Per: _____

Authorized Signatory

Appendix D

Site location map

V:\1218\active\1218109521_environmental\3_draft_figures\SITE LOCATION.dwg



SITE LOCATION **WATER QUALITY MONITORING** **NANISIVIK MINE, NUNAVUT**

Job No.: 121810952
Scale: 1 : 250,000
Date: 2013 03 11
Dwn. By: JL
App'd By: MS

Dwg. No.:
A-1



Stantec

Client: BREAKWATER RESOURCES LTD.

Appendix E

Correspondence related to Nunavut Planning Commission conformity determination



June 19, 2008

Phyllis Beaulieu
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU
FAX (867) 360-6369

Jeffrey Howell
A/Manager
Indian and Northern Affairs Canada
P.O. Box 100
Iqaluit, Nunavut X0A 0H0
Fax # (867) 975-4286

Leslie Payette
Nunavut Impact Review Board
P.O. Box 1360
Cambridge Bay, NU
FAX (867) 983-2574

Nunavut Water
Board

JUN 19 2008

Public Registry

Dear Ms. Beaulieu, Mr. Howell, Ms. Payette,

**Re: [NWB 1AR NAN0208 Nanisivik Project – Canzico Limited – Site
Reclamation, Nanisivik Mine, Nanisivik, North Baffin, Nunavut**

The NPC has completed its review of the above noted project proposal. It conforms to the North Baffin Regional Land Use Plan (NBRLUP), subject to the attached.

By this letter and additional enclosures, the NPC is forwarding the project proposal with this determination to NIRB for screening.

The applicant has undertaken to comply with the attached requirements. The authorizing agencies to which this letter is addressed are responsible under the *Nunavut Land Claims Agreement* to implement any of the attached requirements by incorporating the requirements directly, or otherwise ensuring that they must be met, in the terms and conditions of any authorizations issued.

My office would be pleased to discuss with these agencies how best to implement these requirements and to review any draft authorizations that the agencies wish to provide for that purpose.

And, this conformity determination applies only to the above noted applications as submitted. Therefore, the proponent must ensure other applications for a permit under this project proposal not listed above are forwarded to NPC for a conformity

determination against the NBRLUP, and notify the NPC immediately if any material to the project proposal is changed before authorizations are issued.

Yours truly,

A handwritten signature in black ink, appearing to read 'Tommy Owljoot', written in a cursive style.

Tommy Owljoot
Regional Planner, NPC

Robert Carreau, Canzico Limited



FAX TRANSMISSION

DATE: May 28/08

FROM: ~~TO:~~ NAME: Mr. Robert Carreau

DEPARTMENT: CAN JINCO

FAX NUMBER: 416-363-1315

Number of pages to follow: 3

Original to follow: Yes X No

Comments: File # NWB IAR-NAN6268 - Re-fax

TO: ~~FROM:~~ Brian Aglukark, Director, Regional Planning
Annie Ollie, Interpreter/Administrator
Bobby Suluk, Co-ordinator, Regional Planning
Tommy Owlfoot, Regional Planner X

Nunavut Planning Commission
P.O. Box 419
Arviat, Nunavut
XOC OEO
Office: (867) 857-2242
Fax: (867) 857-2243

Please note:
The documents accompanying this transmission may contain confidential information. If you receive this transmission in error, kindly notify us immediately and return the original to the sender as soon as possible.

NUNAVUT PLANNING COMMISSION
APPLICATION TO DETERMINE CONFORMITY
WITH THE NORTH BAFFIN REGIONAL LAND USE PLAN

NUNAVUT PLANNING COMMISSION
BOX 419, Arviut, Nunavut
X0C-0E0

All applicants for a project proposal shall comply with the requirements listed below. The relevant sections of the plan are noted in each requirement.

GENERAL

2. **Environmental Protection:** s3.13.8: The applicant undertakes to prevent any new occurrences of pollution, garbage and contamination at the site of the development.

Yes

No

4. **New Site Restoration and Clean Up:** s3.13.1 and Appendix H, s1: The applicant undertakes to clean up the site and restore the site to its natural condition to the greatest extent possible.

Yes

No

5. **Old Site Restoration and Clean Up:** s3.13.2: The applicant undertakes to clean up the site and restore the site to its original condition to the greatest extent possible, including any work required due to the applicant's action prior to this application.

Yes

No

22. **Code of Good Conduct for Land Users:** Appendix H: The applicant undertakes to adhere to the code of Good Conduct at all times.

Yes

No

I, Robert Carreau for CanZinc Ltd (name of applicant), certify that the information I have given in this application is true and correct and hereby make the above undertakings which form part of my application for a project proposal within the meaning of the Nunavut Land Claims Agreement.

Date:

June 19/07

Signature of Applicant:

[Signature]

Skoglund, Johan

From: Christopher Tickner <ctickner@nunavut.ca>
Sent: Wednesday, June 12, 2013 1:49 PM
To: Skoglund, Johan
Cc: Brian Aglukark
Subject: NPC conformity determination requirements for renewal of water license 1AR-NANA0914 (Reclamation and Post-Closure Monitoring of the Nanisivik Mine Site)

Good afternoon Mr. Skoglund,

RE: NPC conformity determination requirements for renewal of water license 1AR-NANA0914 (Reclamation and Post-Closure Monitoring of the Nanisivik Mine Site)

Sharon Ehloak has forwarded the attached letter to me for response.

I understand that you are seeking clarification from the Nunavut Planning Commission (NPC) with regards to its conformity determination process and, in particular, if proponents are required to secure land use plan conformity determinations directly from the NPC and, if so, what type of information and/or application forms and guidance are available for assisting proponents with submissions. Further, you would like to know if information provided in a Nunavut Water Board (NWB) water license application is generally sufficient for the NPC to carry out its conformity determination process.

Generally, where a proposed project occurs within an approved NPC Land Use Plan region and requires an authorization or license, the project proposal is forwarded directly to the NPC by the authorising/licensing agency. Upon receipt, the NPC will review the project proposal for conformity with the approved land use plan(s) and provide its determination directly to the authorizing/licensing agency. The proponent will be copied on the NPC's determination.

The NPC does not have a specific application form and relies on the information submitted to the authorising/licensing agency. The NPC will contact the proponent directly should additional information be required. In most instances the information submitted to the authorising/licensing agency is sufficient for the NPC to carry out its conformity determination process.

With regards to the project proposal described in the attached letter, it is worth noting that the NPC issued a positive conformity determination as part of the original water license application. Another conformity determination will only be required if the scope of the original project has changed. A determination as to whether the scope of the project has changed will be made by the NPC upon receipt of the renewal application from the NWB. I would be pleased to discuss what may constitute a change in scope prior to submission should you require.

In order to expedite the NPC process, I would encourage you to copy Brian Aglukark, Director of Implementation (copied with this email) and me when the application is submitted to the NWB.

Please don't hesitate to contact me should you have any questions.

Regards,

Christopher

Christopher Tickner MCIP, RPP

Senior Planner
Nunavut Planning Commission
P.O. Box 2101 Cambridge Bay, NU X0B 0C0
Phone: (867) 983-4634
Fax: (867) 983-4626
Website: www.nunavut.ca



May 30th, 2013

Ms. Sharon Ehloak
Executive Director
Nunavut Planning Commission
Cambridge Bay, NU

By email: sehaloak@nunavut.ca

Dear Ms. Ehloak

**Re: NPC Conformity Determination Requirements for Renewal of Water Licence
1AR-NANA0914 (Reclamation and Post-Closure Monitoring of the Nanisivik Mine Site)**

Background

On March 31st, 2014, CanZinco Limited's "Type A" water licence (1AR-NANA0914) for reclamation and post-closure monitoring activities at the former Nanisivik Mine will expire. A water licence renewal is required in order to complete the remaining reclamation work and to continue monitoring the site. CanZinco's parent company, Nyrstar Canada (Holdings) Ltd., has begun preliminary work in advance of its application to the Nunavut Water Board (NWB). Nyrstar anticipates submitting an application to the NWB in early August, 2013. The proposed scope and requirements of the new licence are likely to be similar to that of the existing licence. Specifically, a renewed licence would authorize Nyrstar to continue to:

- Discharge effluent from the West Twin Disposal Area;
- Conduct geotechnical and water quality monitoring; and
- Complete remediation of petroleum hydrocarbon (PHC) contaminated soil in the former fuel tank farm area.

Nyrstar is of the opinion that a "Type B" water licence with a three-year term would be an appropriate regulatory authorization to facilitate the remaining reclamation work, while also permitting the monitoring necessary for confirming stable hydrological and geotechnical conditions. Under the new licence, Nyrstar expects to replicate the water quality monitoring program such as has been implemented since 2009. With respect to geotechnical monitoring, there may be an opportunity to focus future geotechnical monitoring on the crucial active period of July to September as the winter and spring monitoring currently carried out has established stable geothermal trends.

NPC Involvement and Requirements in the Water Licensing Process

The site of the former Nanisivik Mine is located in the area subject to the *North Baffin Regional Land Use Plan*, and previous water licence applications for undertakings at Nanisivik have been reviewed by the NPC for conformity with the land use plan. While Nyrstar expects the current licence renewal to also require review by the NPC, clarification is being sought in relation to certain aspects of the NPC's conformity determination process. Specifically:

- The NWB's guidelines¹ advise proponents to secure land use plan conformity determinations directly from the NPC as part of the pre-application process. Does this align with the NPC's understanding or does the NPC have to wait for a water licence application to be forwarded to it from the NWB before it can commence the conformity determination?
- If Nyrstar is able to address land use planning matters with the NPC in the *pre-application* stage, we seek clarification regarding the information needed to carry out the conformity determination. Will the NPC require a completed draft water licence application, or will a more abbreviated information package suffice? If the latter is the case, could you please provide Nyrstar with any relevant application forms/guidance documents to assist in preparing our submission to the NPC.

I thank you in advance for considering this matter and look forward to your response.

Sincerely,



Johan Skoglund
Group Environment Manager, Americas

Copied:

Arlene Laudrum, SRK Consulting
Patrick Duxbury, RT Associates

¹ NWB Guide #5 - Processing Water Licence Applications (2010)

Appendix F

Correspondence related to Nunavut Impact Review Board screening requirements



NIRB File No.: 02MC117
NWB File No. 1AR-NANA0914

June 10, 2013

Johan Skoglund
Group Environment Manager, Americas
Nyrstar
2840 – 650 West Georgia Street
P.O. Box #11552
Vancouver, BC V6B 4N8

Sent via email: johan.skoglund@nyrstar.com

Re: Queries Regarding Nunavut Impact Review Board (NIRB) Screening Requirements Associated with Renewal of Water Licence 1AR-NANA0914

Dear Johan Skoglund:

On May 30, 2013 the Nunavut Impact Review Board (NIRB or Board) received correspondence from Nyrstar Canada (Holdings) Ltd., the parent company of the current Type “A” Water Licensee, CanZinco (the Proponent or Applicant) under Water Licence 1AR-NANA0914 issued by the Nunavut Water Board (NWB). In your correspondence you indicated that the Proponent is working on the renewal application for the Water Licence and posed the following specific questions regarding the timing and requirements that may be associated with the NIRB’s screening of the renewal application:

- Whether all activities for Nyrstar’s proposed undertaking are subject to screening or just those which may vary from those previously screened in 2008;
- Must the NIRB wait until a water licence application is forwarded to it from the NWB before commencing the screening;
- If Nyrstar is able to work within the pre-application stage, will a draft water licence application be required? Can NIRB’s information requirements for project screening be satisfied through means other than a water licence application; and
- Recognizing the timelines for consideration of a water licence renewal and that the current licence will expire on March 31, 2014, what is the NIRB’s estimate of time that it would likely take to conduct the project screening, and any suggestions for expediting the screening process.

At the outset, please note that the NIRB's activities in respect of previously screened activities are guided by Article 12, Section 12.4.3 of the Nunavut Land Claims Agreement (NLCA), which states as follows:

12.4.3 Any application for a component or activity of a project proposal that has been permitted to proceed in accordance with these provisions shall be exempt from the requirement for screening by NIRB unless:

- (a) such component or activity was not part of the original proposal,; or*
- (b) its inclusion would significantly modify the project.*

Further, as described by the NIRB in the current Draft Technical Guide for Project Proponents, (NIRB April 2013)¹:

For activities and components included in project proposals that have previously been screened by the NIRB if the application involves the following, the application is exempt from screening and should not to be referred by the Authorizing Agency to the NIRB for screening:

- a. the same project activities as proposed in the original project proposal previously screened by the NIRB;*
- b. the activities will be taking place in the same area as specified in the original project proposal previously screened by the NIRB;*
- c. there have been no substantial changes to the environment or cumulative effects in the area of the project activities since the project proposal was screened by the NIRB;*
- d. no new or updated approved Land Use Plans have become applicable to the area of the project activities since the original project proposal was screened by the NIRB; and*
- e. there are no significant changes to the components, activities or project proposed in the application from those included in the original project proposal previously screened by the NIRB.*

Please be advised that the original CanZinco Limited "Closure and Reclamation Plan for the Nanisivik Mine" project proposal (NIRB File No.: 02MC117) was received by the NIRB from the NWB on March 1, 2002 and was screened by the Board in accordance with Part 4, Article 12 of the Nunavut Land Claims Agreement (NLCA). On October 7, 2002 the NIRB issued a 12.4.4(a) screening decision to the Minister of Indian Affairs and Northern Development and the NWB which indicated that the proposed project could proceed subject to the NIRB's recommended project-specific terms and conditions. Further, following a review of a water licence renewal application with the NWB associated with this project, on September 3, 2008 the

¹ Available online from the NIRB public registry at the following location:
<http://ftp.nirb.ca/04-GUIDES/03-NEW%20GUIDES/04-DRAFT%20TECHNICAL%20GUIDES/>

NIRB confirmed that the application was exempt from the requirement for further screening pursuant to Section 12.4.3 of the NLCA and the activities therein remained subject to the terms and conditions recommended in the original October 7, 2002 Screening Decision Report.

The original NIRB Screening Decision Report (File No. 02MC117) and all related file information are available from the NIRB's online public registry at the following location:

<http://ftp.nirb.ca/01-SCREENINGS/COMPLETED%20SCREENINGS/2002-TO%20BE%20COMPLETED/02MC117-CanZinco%20Limited-Nanisivik/>.

With this background, the NIRB has responded to your specific questions in the text below. Firstly, as noted under Article 12 section 12.4.3 of the NLCA only those components or activities of the renewal application that were not previously part of the project proposal screened in 2002 or that significantly modify the project from the project proposal that was previously screened in 2002 would be subject to screening by the NIRB. Therefore, components or activities included in the renewal application that were included in the scope of the project proposal screened in 2002 would not be rescreened by the NIRB.

With respect to your queries regarding whether the NIRB can conduct a type of "pre-application" determination of whether the project proposal as put forward in the renewal application is exempt from screening or whether the NIRB must wait to have the renewal application referred for screening from the NWB, the NIRB points out that as part of the integrated environmental assessment and licensing process established under the NLCA, the NIRB does not have jurisdiction to make "pre-application" determinations. In the absence of the full description of components and activities included in the renewal application, including items such as proposed amendments to the components and activities under the existing licence proposed to be included under the renewed licence, the NWB and the NIRB cannot make an assessment as to whether the conditions of Article 12, section 12.4.3 of the NLCA are met and the scope of components and activities proposed in the renewal application is within the scope of what was screened in 2002.

Consequently, until such time as the Applicant submits the fully developed renewal application to the NWB and the NWB refers the renewal application to the NIRB, the NIRB cannot predetermine the extent to which the exemption in Article 12, section 12.4.3 of the NLCA may apply. The NIRB wishes to highlight that at the time the NWB receives the renewal application, the NWB could determine that the conditions in section 12.4.3 of the NLCA are satisfied with respect to all activities in the renewal application, and would then not be required to forward the renewal application to the NIRB for screening. Alternatively upon receipt of the renewal application the NWB may wish to consult with the NIRB regarding the extent to which the components and activities proposed in the renewal application are exempt from screening, in which case the NWB would refer the application to the NIRB for its determination.

With respect to your question regarding timing if a NIRB screening is required, as set out in Article 12, section 12.4.5 of the NLCA, the NIRB screening process typically takes up to 45 days from the receipt of the project proposal for screening to the time when the NIRB issues a screening decision to the Minister. In terms of the NIRB process and timing after a screening decision is issued in respect of a project proposal, this is dependent on the outcome of the Board's screening decision to the Minister and which of the four options under Article 12, section 12.4.4 of the NLCA that is recommended by the NIRB.

Although the NIRB encourages potential Proponents to seek the direction and advice of the NIRB and the NWB throughout the process, for the reasons outlined above, until such time as the water licence renewal application is complete and submitted to the NWB, the NIRB cannot provide further guidance regarding the extent to which the proposed project components and activities would be exempt from the requirement for further screening. However, in the interim please feel free to contact Amanda Hanson, NIRB's Director of Technical Services at (867) 983-4615 or via email at ahanson@nirb.ca with any general questions you may have about the NIRB's screening process.

Sincerely,

A handwritten signature in black ink that reads "Ryan Barry". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Ryan Barry
Executive Director
Nunavut Impact Review Board

cc: Damien Côté, Nunavut Water Board
Phyllis Beaulieu, Nunavut Water Board
Patrick Duxbury, RT Associates Ltd.
Arlene Laudrum, SRK Consulting



May 30th, 2013

Mr. Ryan Barry
Executive Director
Nunavut Impact Review Board
P.O. Box 1360
Cambridge Bay, NU
X0B 0C0

By email: rbarry@nirb.ca

Dear Mr. Barry,

**Re: NIRB Screening Requirements for Renewal of Water Licence 1AR-NANA0914
(Reclamation and Post-Closure Monitoring of the Nanisivik Mine Site)**

Background

On March 31st, 2014, CanZinco Limited's "Type A" water licence (1AR-NANA0914) for reclamation and post-closure monitoring activities at the former Nanisivik Mine will expire. A water licence renewal is required in order to complete the remaining reclamation work and to continue monitoring the site. CanZinco's parent company, Nyrstar Canada (Holdings) Ltd., has begun preliminary work in advance of its application to the Nunavut Water Board (NWB). Nyrstar anticipates submitting an application to the NWB in early August, 2013. The proposed scope and requirements of the new licence are likely to be similar to that of the existing licence. Specifically, a renewed licence would authorize Nyrstar to continue to:

- Discharge effluent from the West Twin Disposal Area;
- Conduct geotechnical and water quality monitoring; and
- Complete remediation of petroleum hydrocarbon (PHC) contaminated soil in the former fuel tank farm area.

Nyrstar is of the opinion that a "Type B" water licence with a three-year term would be an appropriate regulatory authorization to facilitate the remaining reclamation work, while also permitting the monitoring necessary for confirming stable hydrological and geotechnical conditions. Under the new licence, Nyrstar expects to replicate the water quality monitoring program such as has been implemented since 2009. With respect to geotechnical monitoring, there may be an opportunity to focus future geotechnical monitoring on the crucial active period of July to September as the winter and spring monitoring currently carried out has established stable geothermal trends.

NIRB Involvement in the Water Licensing Process

Nyrstar is requesting clarification from the Nunavut Impact Review Board regarding the NIRB's possible role in the water licence renewal process. Because Nyrstar's Nanisivik operations are carried out under the requirements of a Type A Water Licence, licence renewal necessarily triggers a NWB public hearing. Consequently, the project proposal exemption list, as set out in Schedule 12-1 of the *Nunavut Land Claims Agreement*, will not apply in Nyrstar's case. However, despite the foregoing, Nyrstar is unsure whether its water licence application will be subject to NIRB screening. The reason for this uncertainty stems from the fact that Nyrstar will be seeking authorization from the NWB to conduct activities that are effectively the same as those

previously screened by the NIRB in September 3, 2008¹. Clarification on this important matter is requested. If, based on the foregoing information, you believe that a NIRB screening is not required as part of Nyrstar's upcoming water licence renewal application, then Nyrstar will seek confirmation of this opinion by way of an official letter from the NIRB which would be appended to Nyrstar's application to the NWB.

However, if you are of the opinion that a NIRB screening is required before Nyrstar can complete its water licence application, then we respectfully request that the NIRB clarify the following:

1. Whether all activities for Nyrstar's proposed undertaking are subject to screening, or just those which may vary from those previously screened in 2008.
2. The NWB's guidelines² direct proponents to deal directly with the NIRB to secure a development impact review determination as part of the pre-application process. Do you agree with this direction, or must the NIRB wait until a water licence application is forwarded to it from the NWB before commencing with screening?
3. If Nyrstar is able to work with the NIRB within the *pre-application stage*, will a draft water licence application be required? Can NIRB's information requirements for project screening be satisfied through means other than a water licence application? If so, could you please forward any relevant guidelines and forms.
4. Recognizing that the current water licence expires on March 31, 2014 and the time typically required to process a water licence application, Nyrstar would appreciate if NIRB could offer an estimate of the time that it would likely take to conduct the project screening. Any suggestions on how to expedite the NIRB screening process would also be of considerable value to Nyrstar.

I thank you for your consideration of these aforementioned matters and I look forward to your response.

Sincerely,



Johan Skoglund
Group Environment Manager, Americas

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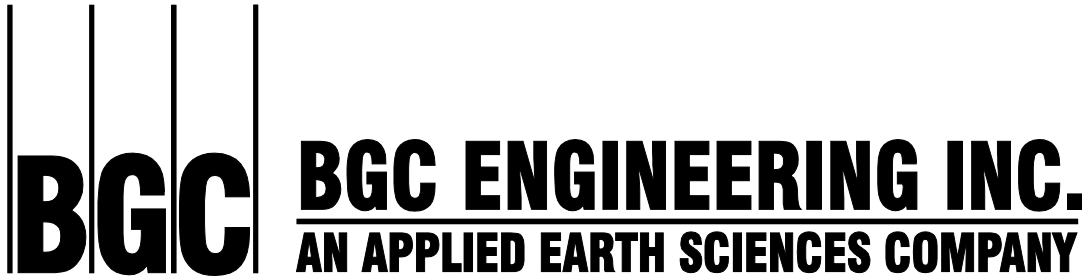
Arlene Laudrum, SRK Consulting
Patrick Duxbury, RT Associates

¹ This determination was a verbatim replication of NIRB's previous October 7, 2002 Screening Decision (NIRB file No.: 02MC117)

² Guide #5 - Processing Water Licence Applications

Appendix G

Geotechnical monitoring schedule 2014-2018



Suite 200 - 1121 Centre St. NW, Calgary, AB Canada T2E 7K6
Telephone (403) 250-5185 Fax (403) 250-5330

BGC Project Memorandum

To:	Nyrstar	Doc. No.:
Attention:	Johan Skoglund	cc:
From:	Geoff Claypool	Date: September 16, 2013
Subject:	2014-2018 Geotechnical Monitoring Schedule Nanisivik Mine, NU	
Project No.:	0255-023-04	

Dear Johan,

As per your request, BGC Engineering Inc. (BGC) has undertaken a review of the geotechnical monitoring requirements for the now reclaimed Nanisivik Mine site. This review is being conducted in support of the application for the new Water License, which is anticipated to be in place in time for the 2014 monitoring season. This memorandum provides the following information:

- A description of the monitoring program implemented since completion of the majority of reclamation construction activities (2006 through 2012);
- A brief review of the results of the monitoring program, and their significance with respect to performance of the reclamation measures and assumptions and analyses undertaken during the development of the reclamation plan; and,
- A proposed monitoring schedule for the term of the next Water License, which is assumed to be for a five year duration (2014-2018).

As per the Nanisivik Mine Reclamation and Closure Monitoring Plan (GLL 2004)¹, the various surface reclamation covers constructed around the Nanisivik Mine site were instrumented, both pre- and post-construction, to assess the effectiveness of the reclamation measures and to validate the results of various analyses undertaken while developing the reclamation

¹ Gartner Lee Limited. 2004. Nanisivik Mine Reclamation and Closure Monitoring Plan. Prepared for CanZinco Ltd. February 2004.

K:\Projects\0255 CanZinco\023 2013 Nanisivik\04 WL Renewal Support\2014-2017 Monitoring Schedule\Nanisivik Geotechnical Monitoring Schedule 2014-2018.docx

plan. A conceptual monitoring plan was included in GLL (2004) outlining the monitoring schedule during the Reclamation and Closure periods. The majority of the instrumentation was installed in 2005 and the monitoring plan was implemented in 2006, although monitoring of previously installed instruments continued throughout the construction period in 2004 and 2005. Since 2009, geotechnical monitoring has been conducted as per the schedule included in the current Water License (1AR-NAN0914) which was based on the monitoring schedule proposed in BGC (2008)². Most instruments have been monitored on a bi-weekly basis between June and September with additional quarterly readings obtained typically in April and December or January. The monitoring data is reviewed in an ongoing basis by BGC and a comprehensive assessment of the monitoring data, and its significance with respect to the performance of the reclamation measures, is included in the Annual Geotechnical Inspection report submitted to Nyrstar. The most recent comprehensive review of the geotechnical and geothermal monitoring data was provided in BGC (2013)³. This Annual Geotechnical Inspection report is subsequently submitted by Nyrstar to the Nunavut Water Board as a component of the annual report required in the Water License.

Based on the monitoring data collected since the majority of the permafrost aggradation covers were completed in 2005, the following main conclusions are drawn:

- The surface reclamation covers are performing as anticipated. The geothermal monitoring data collected to-date indicates that the covers are generally achieving their design objectives by confining the active layer within the cover and maintaining the underlying tailings in a frozen state (see Figure 1). The monitoring data indicates that performance of the covers continues to improve with time, despite the warmer than average climate conditions experienced by the site since the covers were constructed.
- Freeze-back of the Surface Cell and Test Cell taliks is occurring as expected. The monitoring data collected to-date indicates that cooling of the subsurface profile is continuing. In the Surface Cell, the upper 15 to 20 m of the subsurface profile is frozen back in most areas (see Figures 2 and 3). The monitoring data collected to date validates the results of the talik freeze-back modeling undertaken during the development of the West Twin Disposal Area (WTDA) reclamation plan (see Figure 4).
- In the Test Cell, the freeze-back is also occurring, with at least the upper 10 m of the subsurface profile frozen in the centre of the talik (see Figure 5).
- The freeze-back of the Surface Cell talik has resulted in elevated pore pressures in the centre of the talik (see Figure 6). This was expected and validates the

² BGC Engineering Inc. 2008. Proposed 2008-2012 Geotechnical Monitoring Schedule. Prepared for Breakwater Resources Ltd. May, 2008.

³ BGC Engineering Inc. 2013. 2012 Annual Geotechnical Inspection, Nanisivik Mine, NU. Prepared for Nyrstar, February, 2013.

assumptions made regarding talik pore pressures in the Surface Cell during the development of the reclamation plan. The increasing pore pressures are not considered to negatively impact the stability of the West Twin Dike due to the continued downward advancement of the freezing front and the confinement of the pore pressures within the centre of the talik, away from the dike. The pore pressures remain well below trigger levels previously developed as illustrated on Figure 6. The trigger levels signify pore pressures which may be of concern with respect to dyke stability.

- The freeze-back of the Test Cell talik has resulted in only minor increases in pore pressures within the Test Cell talik (see Figure 7). The piezometric data from the Test Cell suggests hydrogeologic connection exists between the Test Cell talik and the Reservoir. This validates the assumptions made during the development of the contaminant loading model component of the WTDA reclamation plan.
- The West Twin Dike and its foundation remain in a perennially frozen state and no indications of instability have been observed (see Figure 8).
- The landfill has frozen back and the cover confines the annual active layer thaw from migrating into the underlying waste materials (see Figure 9). Similar observations with respect to freeze-back of underlying waste and backfill materials and cover performance have been noted at the Industrial Complex.
- The East Open Pit waste rock backfill has frozen back and the cover confines the annual active layer thaw from migrating into the underlying waste materials (see Figure 10). Similar observations with respect to freeze-back of underlying mine wastes and cover performance have been noted at the Oceanview and West Open Pits.

Given the encouraging results of the monitoring program and the positive performance of the reclamation measures observed to-date, it is considered appropriate to reduce the monitoring schedule for the term of the next Water License. A proposed geotechnical monitoring schedule for the term of the next Water License is provided in Table 1 and is summarized below:

- Thermistors will be monitored bi-weekly or monthly between July 1 and September 1, based on the following rationale:
 - Data will be collected bi-weekly from thermistors providing information from the active layer between July 1 and September 1.
 - Data will be collected monthly from thermistors providing information only on freeze-back of the underlying mine waste.
- Vibrating wire piezometers will be monitored on a monthly basis, between July 1 and September 1.
- Frost gauges will be monitored on a bi-weekly basis between July 1 and September 1.
- Water levels at the West Twin Outlet Wall should be recorded on a weekly basis between July 1 and September 1.

- No data collection is proposed to be undertaken outside the July 1 to September 1 window. Data collected from thermistors previously during this time period has shown to be consistently cooling and typically only yields geothermal information when the geothermal profile is at its coolest, especially in the upper 15 m of the depth profile. As such, it is recommended that the quarterly readings typically undertaken during December and April be discontinued.
- Thermocouples will no longer be monitored since many are malfunctioning and the data collected in recent years has been shown to be inconsistent and unreliable. This should be expected given the age of the instruments, many of which were installed more than 20 years ago. Also, the thermocouples are located in areas that have been frozen back for many years. Hence, the data collected from these sites are of limited value.
- No samples will be collected from the groundwater monitoring wells installed in the Surface Cell and Test Cell taliks. All of the monitoring wells are currently inoperable due to malfunctioning heat trace and blocked or bent well casings. Given the encouraging water quality of both the Surface Cell discharge and the outflow from the Reservoir, the water quality in the taliks is not considered to be of critical importance at this time. Should water quality in either the Surface Cell or the outflow from the Reservoir decline in the future, the need for groundwater monitoring may be revisited.
- The air temperature probe installed on the Surface Cell in 2012 should continue to collect site specific air temperature data for the duration of the next Water License. This data will supplement climate data collected at the Arctic Bay airport.

Monitoring data will continue to be forwarded to BGC immediately after collection for review and assessment. Additionally, the reclamation measures will continue to be inspected on an annual basis throughout the remainder of the Closure Period by a qualified geotechnical engineer. The inspection observations and the monitoring data will be included in the Annual Geotechnical Monitoring Report, along with a comprehensive assessment of the significance of the data with respect to the reclamation measures.

It should be noted that the monitoring schedule proposed herein is based on the expectation that the reclamation measures will continue their current trend of good and improving performance. In the unlikely event that performance is observed to be not as expected, the monitoring schedule may be altered accordingly.

CLOSURE

BGC Engineering Inc. (BGC) prepared this document for the account of Nyrstar. The material in it reflects the judgment of BGC staff in light of the information available to BGC at the time of document preparation. Any use which a third party makes of this document or any reliance on decisions to be based on it is the responsibility of such third parties. BGC accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this document.

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This memorandum presents a proposed geotechnical instrument monitoring schedule for the Nanisivik Mine, NU for the term of the next Water License. We trust the information provided herein meets your requirements and expectations. Should you have any questions or comments regarding the information provided herein, please contact the undersigned at your convenience.

Respectfully submitted,

BGC Engineering Inc.

Per:

Original Signed By

Geoff Claypool, M.Eng., P.Eng.
Senior Geological Engineer

Reviewed by:

Original Signed By

James W. Cassie M.Sc., P.Eng.
Vice President, Specialist Geotechnical Engineer

TABLES

Table 1 -
Recommended 2014-2018 Geotechnical and Geothermal Instrument Reading Schedule

				1-Jul	8-Jul	15-Jul	23-Jul	1-Aug	8-Aug	15-Aug	22-Aug	1-Sep
West Twin Dyke												
TC12	Thermocouple		Not functioning									
TC13A	Thermocouple		Not functioning									
TC31	Thermocouple		Not functioning									
TC32	Thermocouple		Not functioning									
TC33	Thermocouple		Not functioning									
BGC03-33	Thermistor	Monthly										
BGC03-34	Thermistor	Monthly										
BGC05-09	Thermistor	Bi-weekly										
BGC05-15	Thermistor	Bi-weekly										
BGC05-17	VW Piezo.	Monthly										
Surface Cell												
BGC02-03	Thermistor		Not functioning									
BGC03-07	Thermistor	Monthly										
BGC03-09	Thermistor	Monthly										
BGC03-10	Thermistor	Bi-weekly										
BGC03-11	Thermistor		Not functioning									
BGC03-12	Vibrating Wire Piezometer	Monthly										
BGC03-14	Vibrating Wire Piezometer	Monthly										
BGC03-15	Thermistor	Bi-weekly										
BGC03-20	Thermistor	Bi-weekly										
BGC03-21	Thermistor		Not functioning									
BGC03-32	Vibrating Wire Piezometer	Monthly										
BGC03-35	Vibrating Wire Piezometer	Monthly										
BGC03-36	Thermocouple	Monthly										
BGC03-37	Thermistor		Not functioning									
BGC05-05	Thermistor	Monthly										
BGC05-06	VW Piezo.	Monthly										
BGC05-07	VW Piezo.	Monthly										
BGC05-08	Contingency											
BGC05-10	VW Piezo.	Monthly										
BGC05-11	Monitoring Well		Not functioning									
BGC05-12	Monitoring Well		Not functioning									
BGC05-13	VW Piezo.	Monthly										
BGC05-14	Contingency											
BGC05-16	Contingency											
FG-1	Frost Gauge	Bi-weekly										
FG-2	Frost Gauge	Bi-weekly										
FG-3	Frost Gauge	Bi-weekly										
FG-4	Frost Gauge	Bi-weekly										
FG-5	Frost Gauge	Bi-weekly										
FG-6	Frost Gauge	Bi-weekly										

	Weekly Reading
	Monthly
	Bi-Weekly Reading

Table 1 -
Recommended 2014-2018 Geotechnical and Geothermal Instrument Reading Schedule

								1-Jul	8-Jul	15-Jul	23-Jul	1-Aug	8-Aug	15-Aug	22-Aug	1-Sep
Toe of West Twin Dyke																
BGC03-18	Thermocouple		Not functioning													
BGC03-19	Thermistor	Bi-weekly														
BGC05-26	Thermistor	Bi-weekly														
Test Cell																
BGC05-04	Thermistor	Bi-weekly														
BGC05-18	VW Piezo.	Monthly														
BGC05-19	Thermistor	Bi-weekly														
BGC05-20	VW Piezo.	Monthly														
BGC05-21	Monitoring Well		Not functioning													
BGC05-22	VW Piezo.	Monthly														
BGC05-23	Monitoring Well		Not functioning													
BGC05-24	VW Piezo.	Monthly														
BGC05-25	Contingency															
FG-7	Frost Gauge	Bi-weekly														
FG-8	Frost Gauge	Bi-weekly														
Test Cell Dyke																
BGC02-09	Thermistor		Not functioning													
BGC03-22	Thermistor	Monthly														
BGC05-29	Thermistor	Bi-weekly														
Toe of Test Cell Dyke																
BGC05-27	Thermistor	Bi-weekly														
BGC05-28	VW Piezo.	Monthly														
FG-9	Frost Gauge	Bi-weekly														
FG-10	Frost Gauge	Bi-weekly														
Oceanview Pit																
BGC05-01	Thermistor	Bi-weekly														
FG-16	Frost Gauge	Bi-weekly														
East Open Pit																
BGC05-02	Thermistor	Bi-weekly														
BGC05-03	Thermistor	Bi-weekly														
FG-13	Frost Gauge	Bi-weekly														
FG-14	Frost Gauge	Bi-weekly														
Landfill																
BGC05-30	Thermistor	Bi-weekly														
FG-11	Frost Gauge	Bi-weekly														
Area 14																
TC7	Thermocouple	Monthly														
FG-15	Frost Gauge	Bi-weekly														
Upper Dump Road																
FG-17	Frost Gauge	Bi-weekly														
West Open Pit																
BGC08-01	Thermistor	Bi-weekly														
Mill Cover																
BGC08-02	Thermistor	Bi-weekly														
Water Quality / Levels																
159-4	Water Level	Weekly														
159-4	Water Quality	Bi-weekly														
Spillway Inlet	Water Quality	Bi-weekly														

	Weekly Reading
	Monthly Reading
	Bi-Weekly Reading

FIGURES

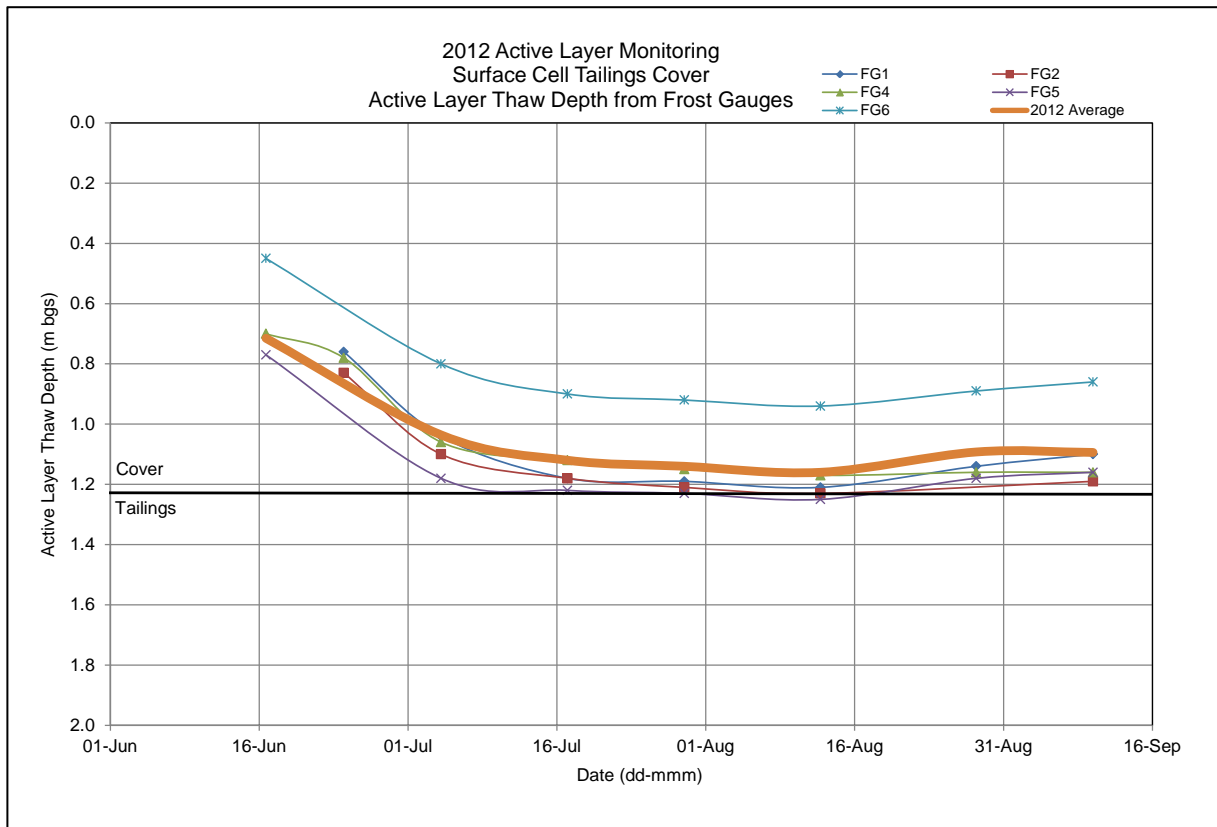


Figure 1. Cover Performance – 2012 Frost Gauge Plot from Surface Cell.

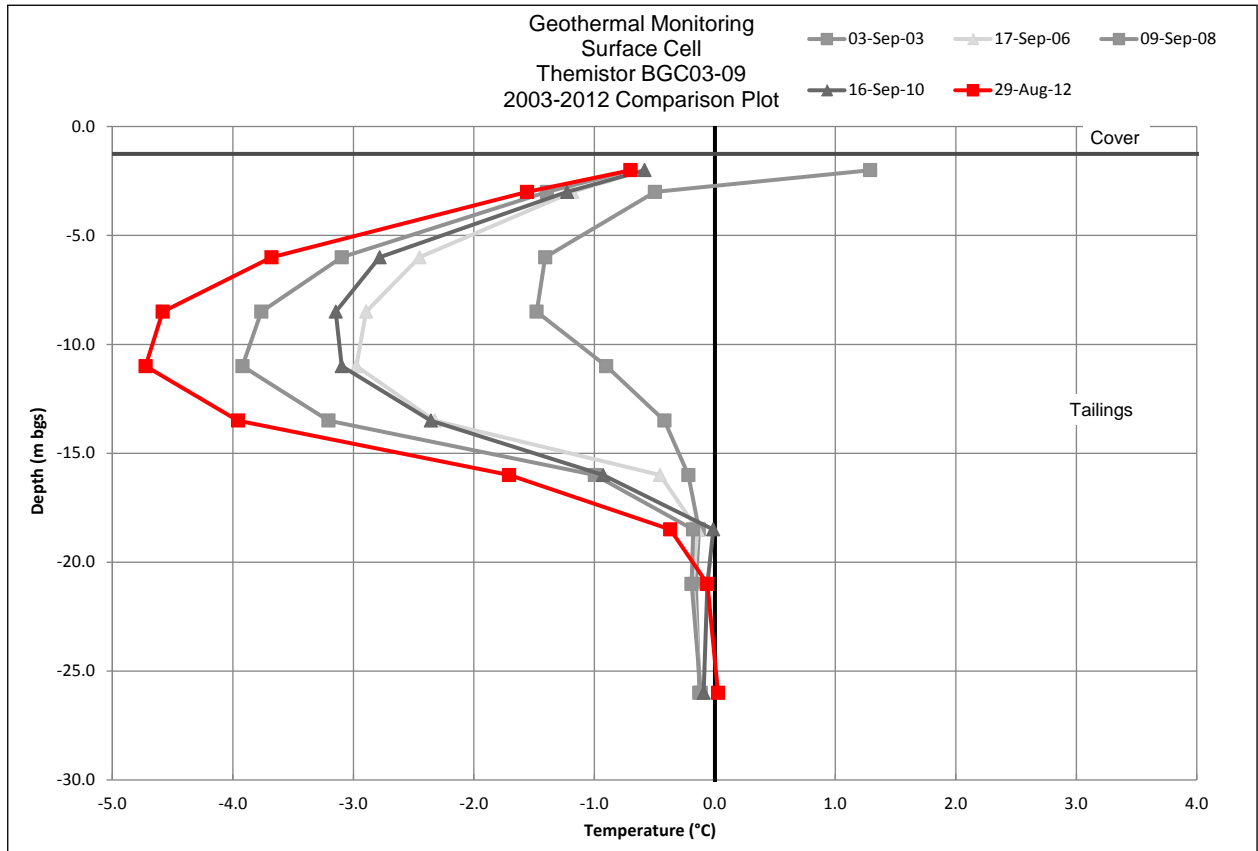


Figure 2. Surface Cell Talik Freeze-back – Thermistor 05-05 near Centre of Surface Cell Talik.

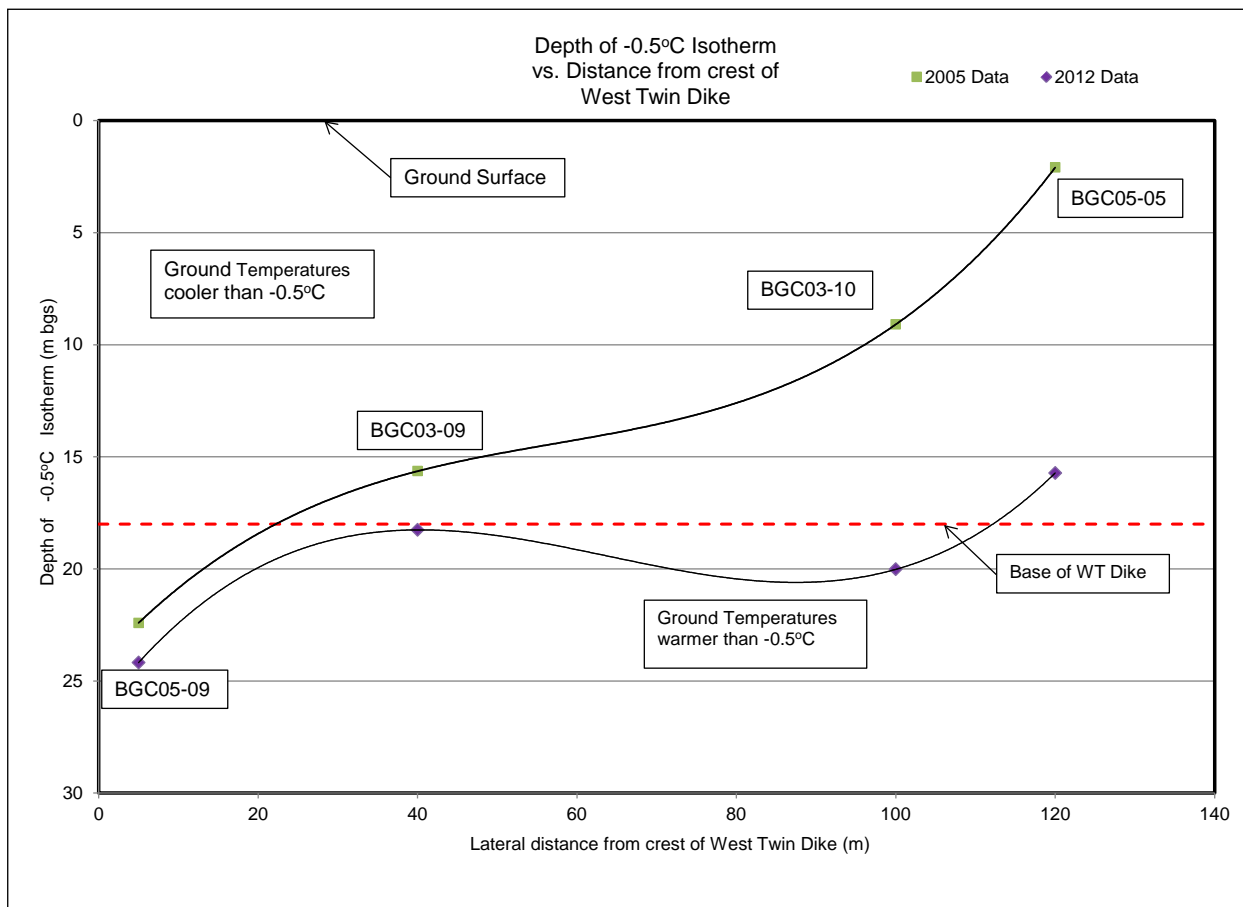


Figure 3. Surface Cell Talik Freeze-back – Downward progression of freeze-back with time and proximity to West Twin Dyke.

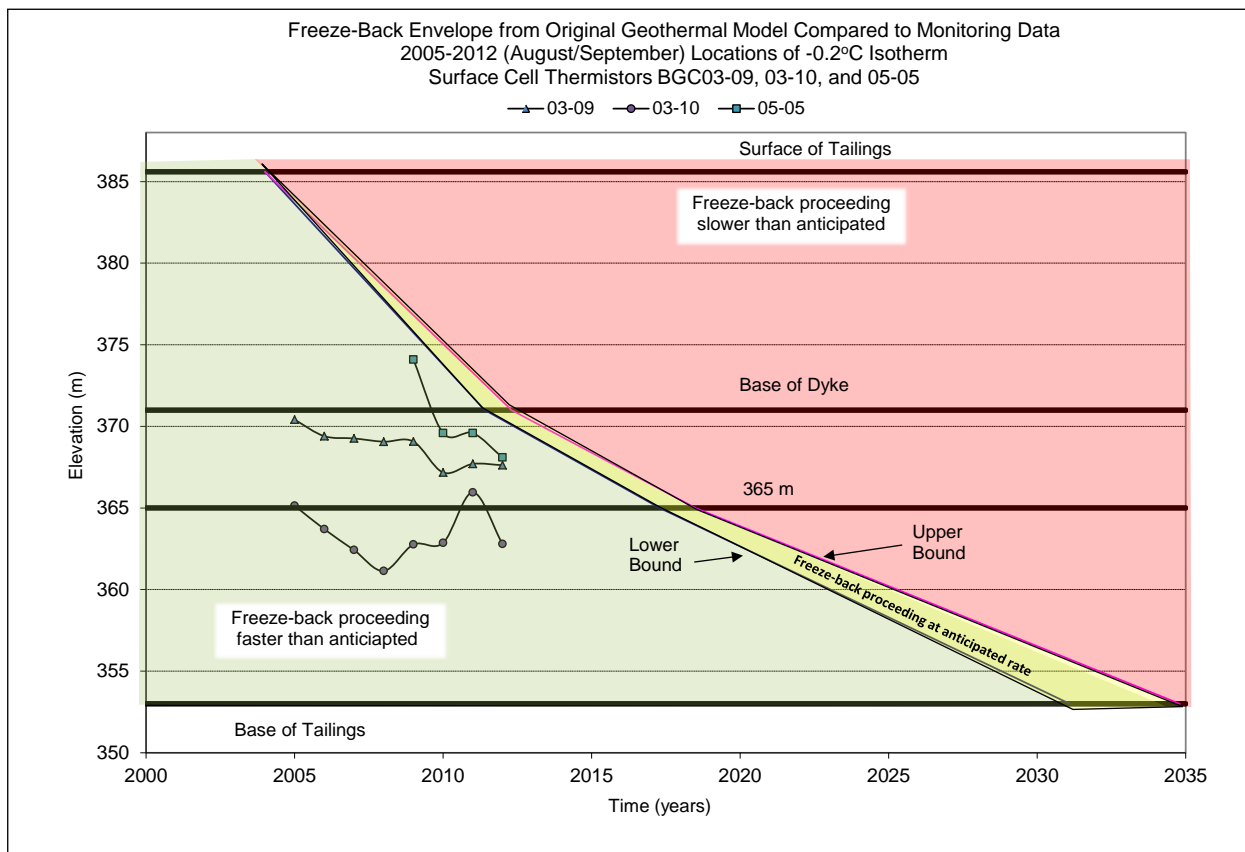


Figure 4. Surface Cell Talik Freeze-back – Comparison of observed freeze-back with previous model results.

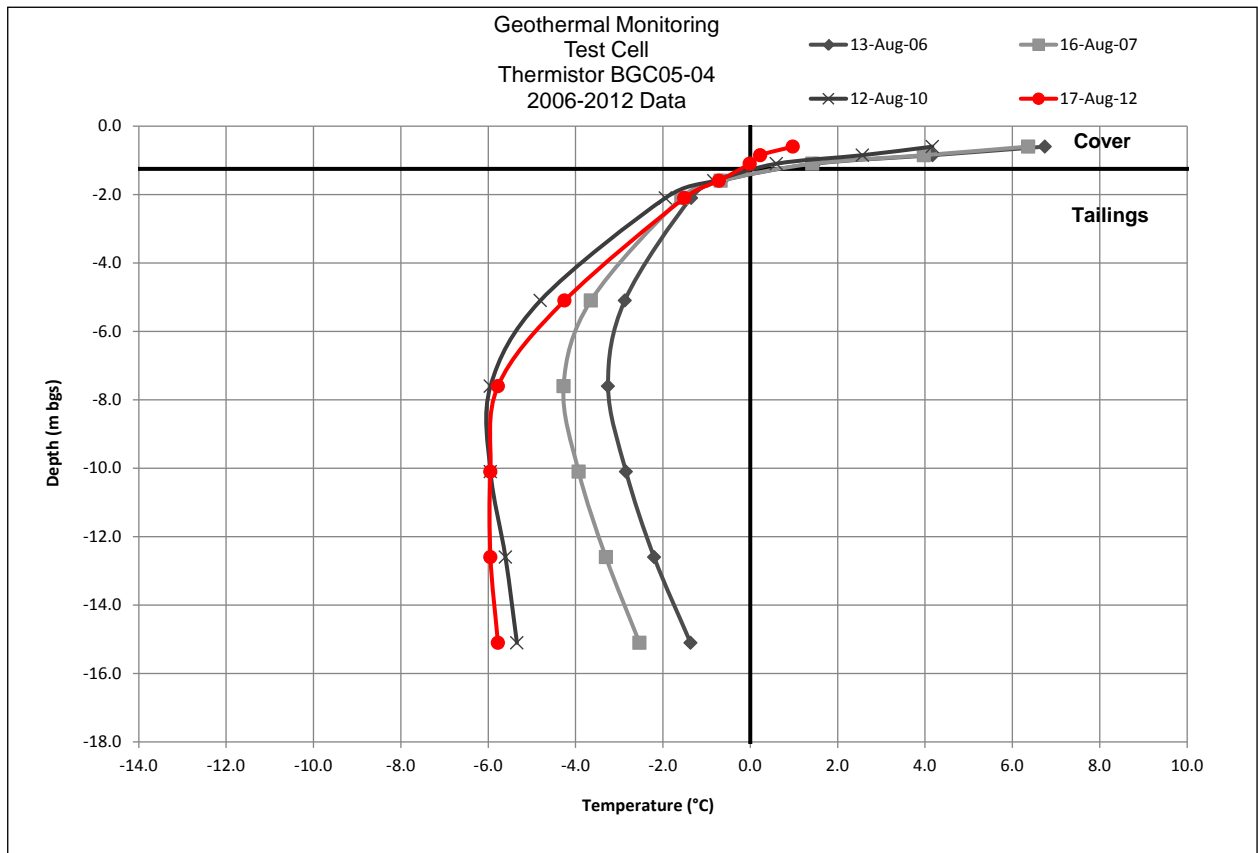


Figure 5. Test Cell Talik Freeze-back – Thermistor 05-19 near Centre of Test Cell Talik.

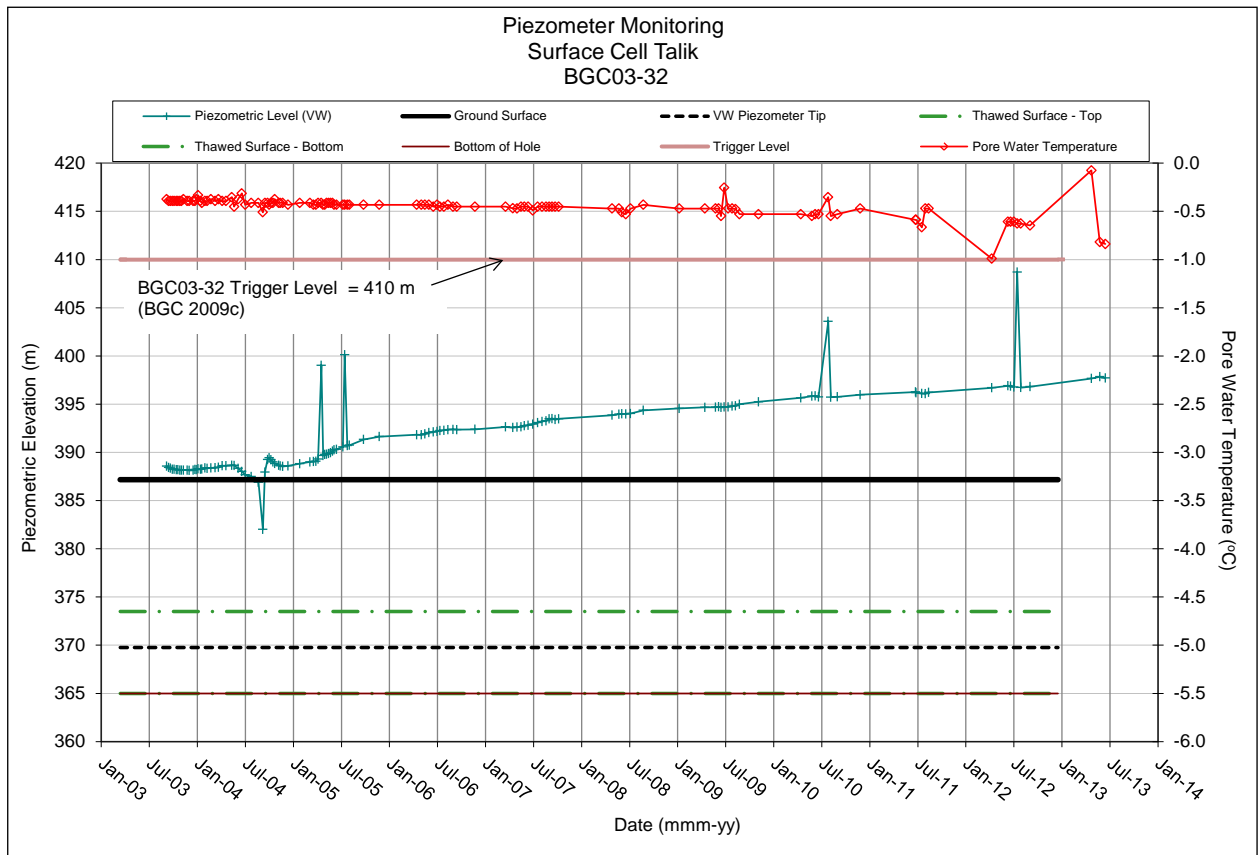
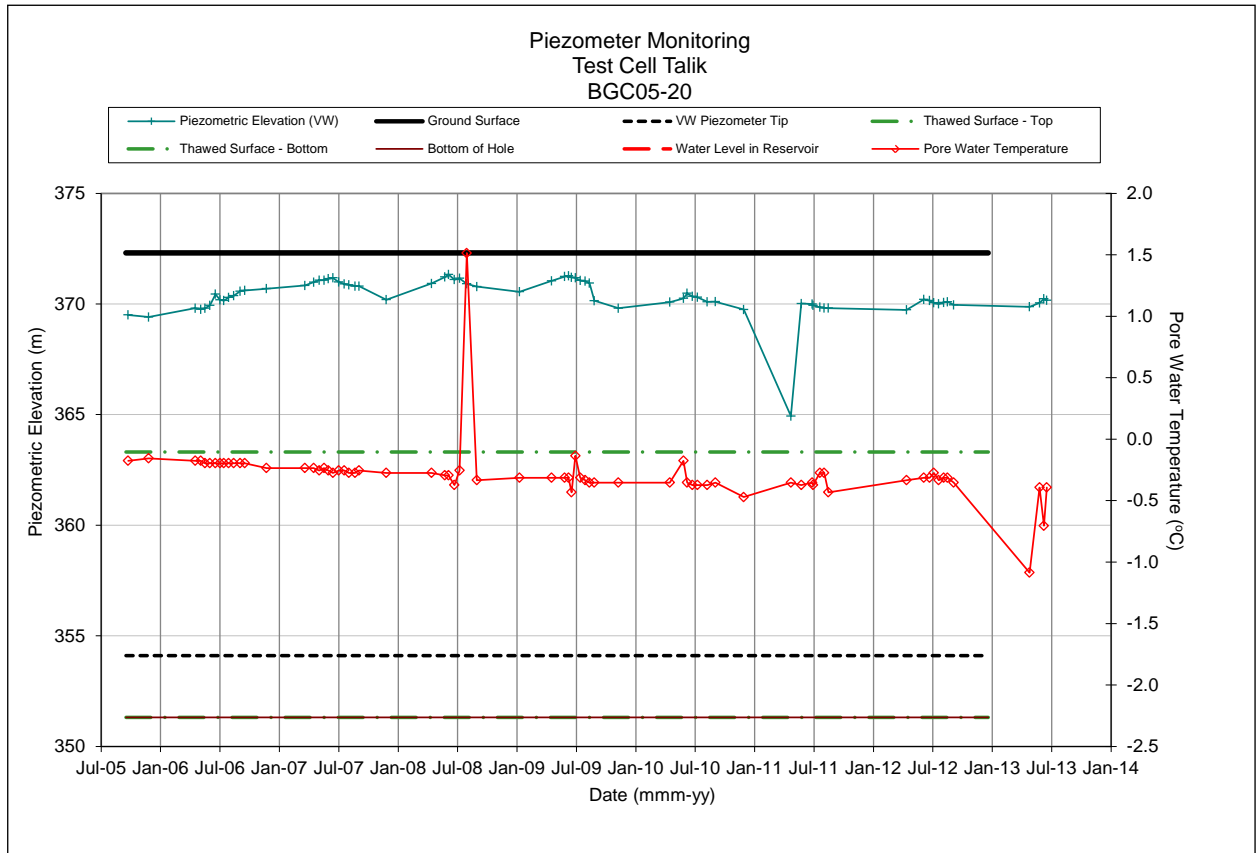


Figure 6. Pore Pressures in Surface Cell Talik.



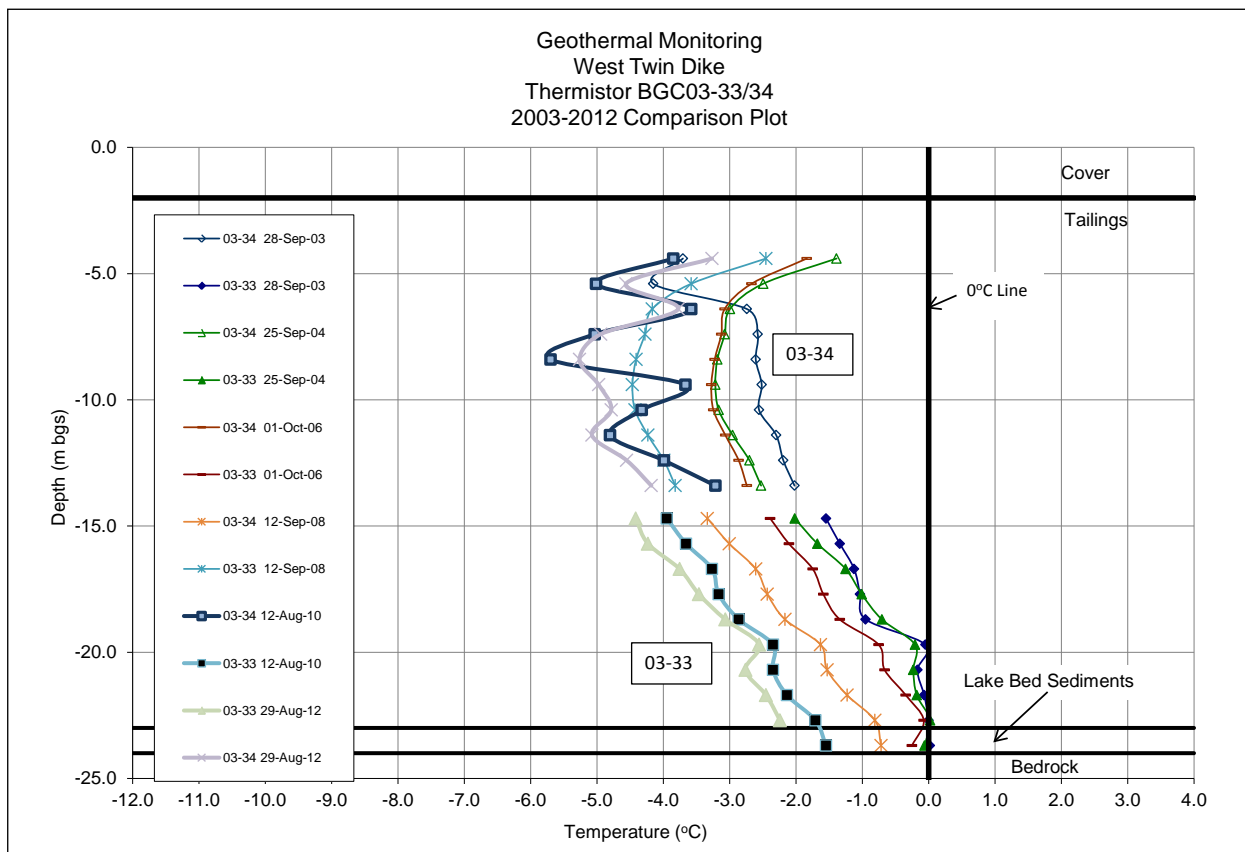


Figure 8. Freeze-back of West Twin Dyke Foundation – Thermistor 03-33/34.

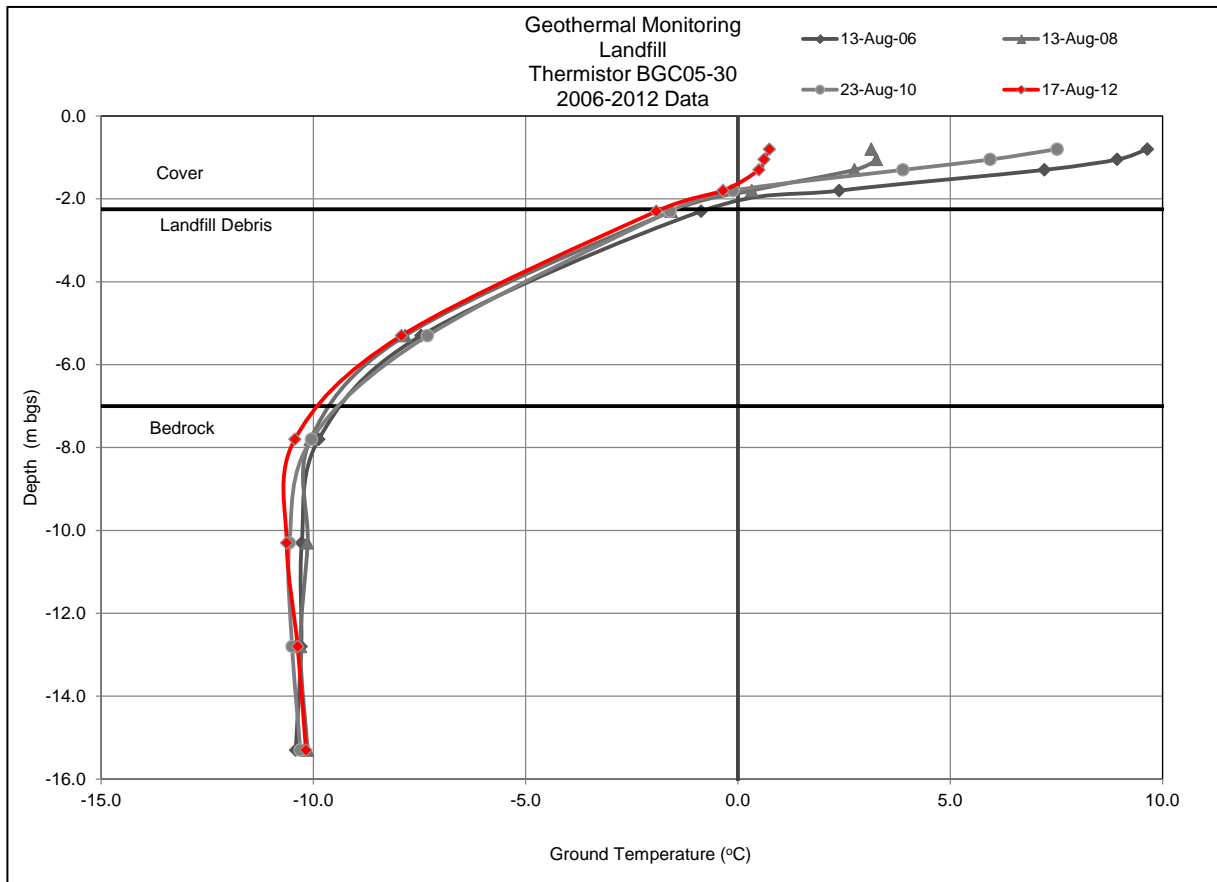


Figure 9. Freeze-back of Landfill – Thermistor 05-30.

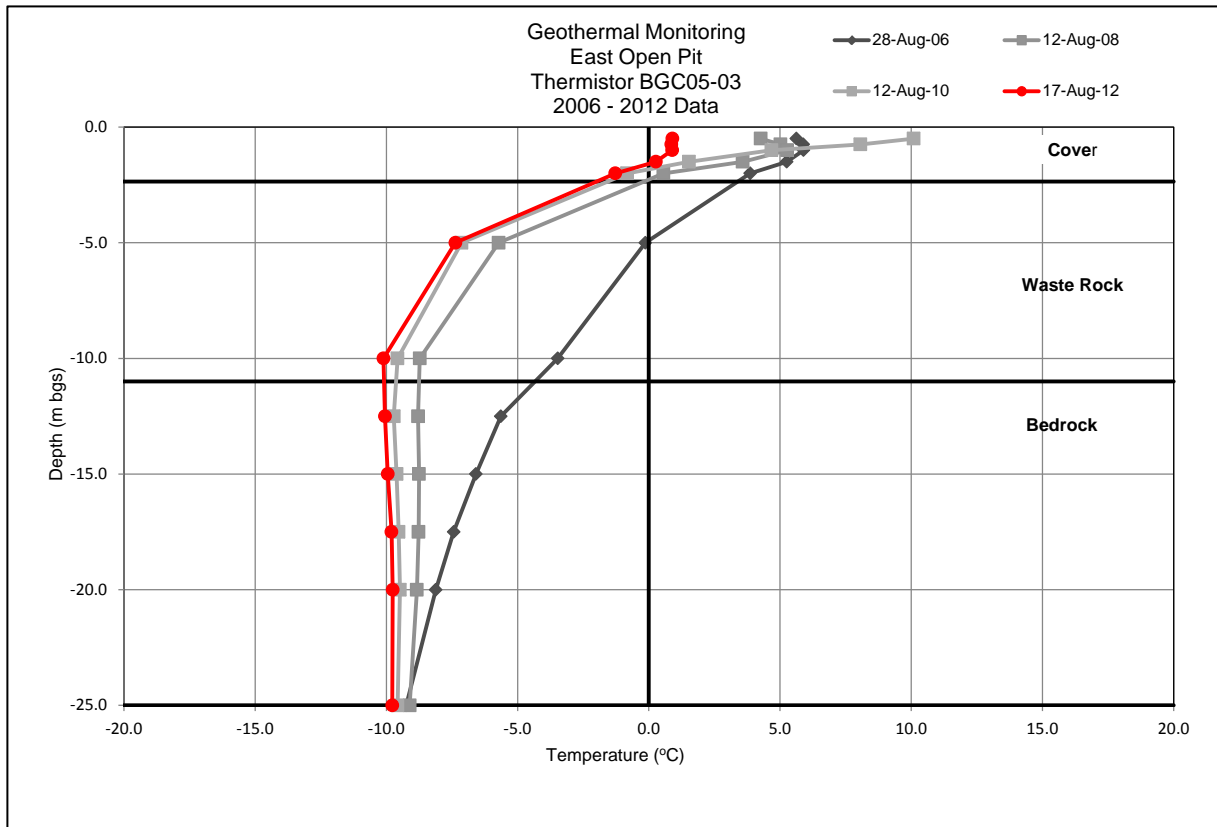


Figure 10. Freeze-back of East Open Pit Waste Rock Backfill – Thermistor 05-03.

Appendix H

Water quality monitoring schedule 2014-2018

Memo



Stantec

To:	Johan Skoglund, Group Environment Manager, Americas Nyrstar 2840 – 650 West Georgia Street PO Box #11552 Vancouver, BC V6B 4N8	From:	Malcolm Stephenson, Ph.D. Project Manager, Environmental Services Stantec Consulting Ltd. 845 Prospect Street Fredericton, NB E3B 2T7
File:	Nanisivik Mine 121810953	Date:	September 30, 2013

**RE: Addendum to: Final 2012 Annual Water Quality Monitoring Report,
Nanisivik Mine, Nunavut**

INTRODUCTION

This document is an addendum to the report: “Final 2012 Annual Water Quality Monitoring Report, Nanisivik Mine, Nunavut”, prepared by Stantec Consulting Ltd. (Stantec) on behalf of Nyrstar, dated March 25, 2013. Hereafter, the report will be referred to simply as “the 2012 Water Quality Monitoring Report”. This addendum should be read in conjunction with, and is subject to the same limitations as, the 2012 Water Quality Monitoring Report.

The former Nanisivik Mine (the Mine) is located in Nunavut on the Borden Peninsula, part of northern Baffin Island (see the 2012 Water Quality Monitoring Report for full details of the Mine location). The Mine was most recently issued a Water Licence (NWB1AR–NAN0914) by the Nunavut Water Board on April 1, 2009, expiring on March 31, 2014. The Water Licence was to cover reclamation and closure activities, and post closure monitoring for the Mine. Reclamation activities started at the Mine in 2002. On July 30, 2006, Environment Canada recognized the Mine as having achieved “closed mine status” under the *Metal Mining Effluent Regulations*. On October 1, 2008, reclamation of the site was completed and a post–closure monitoring period began. By the end of 2013, the Mine will have conducted a five year period of post–closure water quality monitoring under the present Water Licence, although it should be noted that such monitoring has been ongoing throughout the life of the Mine, and that the Mine was substantially reclaimed prior to the issuance of the present Water Licence.

The 2012 Water Quality Monitoring Report provides (Table 4) a list of the surface water quality sampling locations sampled through the monitoring program during 2012. This list is as defined in Schedule I, Table 2 of the Water Licence. Also sampled during 2012 and 2013 was an additional station at the outlet of East Twin Lake (identified as ELO). This station was added to confirm that some anomalous sulphate values were coming

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Reference: Addendum to: Final 2012 Annual Water Quality Monitoring Report, Nanisivik Mine, Nunavut

from East Twin Lake, and not from the mine tailings disposal area. Not sampled historically, as well as in 2012 (due to dry conditions), but appearing in Schedule I, Table 2 of the Water Licence, is one additional station, 159–21 (also identified as NML–29). Station locations are described in Table 1 of the 2012 Water Quality Monitoring Report, and are mapped on Drawing A2 of the report.

Analytical groups and monitoring frequency for water sampling stations are described in Table 4 of the 2012 Water Quality Monitoring Report, and this list is derived from Schedule I, Table 1 of the Water Licence.

As described above, the water quality monitoring program implemented since 2008 was compliant with the requirements laid out by Water Licence NWB1AR–NAN0914. As the mine has been reclaimed, and the monitoring completed under Water Licence was undertaken in order to confirm that conditions at the mine are stable and approximate conditions prior to mine development, it is reasonable to evaluate the results obtained prior to and subsequent to 2008 to determine whether such conditions have been achieved, and whether some reduction of sampling stations, sampling frequency, or analytical test groups might be appropriate in terms of ongoing monitoring subsequent to 2013.

The purpose of this document, therefore, is to re-evaluate the sampling stations and analytical test groups that have been monitored since 2008, and to make recommendations to Nyrstar regarding potential scope reductions for the surface water monitoring program that may be justified based upon data collected over the past five years.

ANALYTICAL TEST GROUPS

For clarity, and to ensure conformity with the analytical requirements of the Water Licence (see Schedule I, Table 1 of the Water Licence), Stantec developed three analytical test groups as follows:

- Group NAN–1, including total cadmium, lead and zinc; major cations (calcium, magnesium, sodium, potassium, ammonia and hardness); major anions (chloride, sulphate, bicarbonate, carbonate, nitrate+nitrite, and alkalinity); total suspended solids, specific conductance, and pH; with field measured specific conductance, pH, temperature, and visual observations for oil and grease (sheen).
- Group NAN–2, including total petroleum hydrocarbon analysis (also corresponding to measurement of “oil and grease”, but providing quantitative results rather than a crude gravimetric analysis). This requirement is met by performing Canada Wide Standard analysis of the F2 to F4 hydrocarbon fractions.

Reference: Addendum to: Final 2012 Annual Water Quality Monitoring Report, Nanisivik Mine, Nunavut

- Group NAN-4, a trace metal scan by inductively coupled plasma (ICP) instrumentation.

TWIN LAKES CREEK WATERSHED

Most of the mine development, as well as milling of ore, hauling of concentrate, shipping of concentrate, and tailings disposal took place within the Twin Lakes Creek watershed. The townsite of Nanisivik was also located within this watershed. A landfill was located on a watershed divide on the west side of this watershed, and will be discussed separately.

Monitoring stations within Twin Lakes Creek Watershed include (as per the Water Licence) NML-23 (Outflow from East Twin Lake), 159-4 (Outflow from West Twin Disposal Area), 150-10 (Twin Lakes Creek upstream of West Townsite Tributary), and 159-6 (Outlet of Twin Lakes Creek into Strathcona Sound).

Station NML-23

Figure E4 of the 2012 Water Quality Monitoring Report provides a summary of results for selected metals (cadmium, lead and zinc), as well as sulphate, total suspended sediment, and pH data for Station NML-23 since 1996. Occasional high values for metals that were observed prior to 2002 have not been seen since that time. Values observed during the post-closure phase (2008 to present) have been generally lower and more consistent than values seen during the closure phase (2005 - 2008). Results for most parameters have been within the non-regulatory station-specific action levels (see Table 3 in the 2012 Water Quality Monitoring Report) established as part of the water quality monitoring program, with the exception of sulphate concentrations, which have been variable between approximately 5 and 40 mg/L. The non-regulatory site-specific action level for sulphate at Station NML-23 was 25 mg/L, but this was established on the basis of limited data collected between 2004 and 2008. Stantec has identified exceedances of the action levels in annual monitoring reports, and recommended follow-up investigation as per the Contingency Plan for Water Quality Exceedances (see Appendix C of the 2012 Water Quality Monitoring Report). Field investigations in 2011 and 2013 have shown that one or more of the tributaries flowing into East Twin Lake may have high sulphate concentrations, but the pH is neutral (suggesting that any acidity produced along with sulphate from sulphide weathering is neutralized at source by associated carbonate minerals). As the catchment areas of East Twin Lake were not used for mining, and elevated zinc/lead are not present, it is likely that periodic high sulphate concentrations are a result of natural mineralization (e.g., pyrite, but not sphalerite/gelena) and weathering processes within the catchments.

Monitoring at Station NML-23 includes bi-weekly sampling with analysis for NAN-1. Based upon the good performance at NML-23 since 2004, while recognizing the importance of this "upstream" station as a baseline, it is suggested that the sampling frequency could be reduced to monthly following 2013.

Reference: Addendum to: Final 2012 Annual Water Quality Monitoring Report, Nanisivik Mine, Nunavut

Sampling conducted at Station ELO in 2011 and 2012 has provided results that are virtually identical to those at Station NML-23 (see Table D2-3 in Appendix D of the 2012 Water Quality Monitoring Report). On this basis, it is proposed that supplemental sampling at Station ELO can be discontinued after 2013, with Station NML-23 continuing to serve as the background monitoring station near the outlet of East Twin Lake.

Station 159-4

Station 159-4 corresponds to the final outflow point from the West Twin Disposal Area (where mine tailings were stored, and where entombment in permafrost is ongoing). Station 159-4 was the only station where specific regulatory requirements for water quality remained in place under the Water Licence (see Part F of the Water Licence and Table 2 of the 2012 Water Quality Monitoring Report).

Figure E1 of the 2012 Water Quality Monitoring Report provides a summary of results for selected metals (cadmium, lead and zinc), as well as sulphate, total suspended sediment, and pH data for Station 159-4 since 1996. Concentrations of most key parameters observed (*i.e.*, arsenic, cadmium, copper, lead, nickel and TSS) have generally remained near or below analytical detection limits, which are typically one or more orders of magnitude lower than the Water Licence limits. Concentrations of zinc, have been less than 0.2 mg/L since 2009, and with the exception of one outlier value (approximately 0.41 mg/L) have been below 0.2 mg/L since 2005. The regulated value for zinc is 0.5 mg/L. Measured pH values have been within the regulatory range of 6.0 to 9.5 since 2009. All parameters have shown stable trends since post-closure monitoring began in 2009.

Monitoring at Station 159-4 includes biweekly sampling for NAN-1, and twice annual sampling for the full suite of trace elements (NAN-4). As the trace element scan has not revealed any untoward results, it is suggested that only analysis for NAN-1 should be required going forward, and that the sampling frequency could be reduced to monthly.

Station 159-10

Station 159-10 is located below the former mine portal area (as well as a natural outcrop of the ore body that was mined, and is subject to erosion by Twin Lakes Creek), and above the former mill area.

Figure E3 of the 2012 Water Quality Monitoring Report provides a summary of results for selected metals (cadmium, lead and zinc), as well as sulphate, total suspended sediment, and pH data for Station 159-10 since 1996. Occasional high values in the historical record (for example, very high values of zinc, sulphate, and elevated cadmium in 2006) are the result of erosion and weathering of the mineral outcrop. Notwithstanding these natural events, values observed since 2009 have been stable, and within the non-regulatory site-specific action levels.

Reference: Addendum to: Final 2012 Annual Water Quality Monitoring Report, Nanisivik Mine, Nunavut

Monitoring at Station 159–10 includes biweekly sampling for NAN–1. As monitoring since 2009 has not revealed any untoward results, and this station served primarily to identify potential releases of metals and sulphate from the natural mineral outcrop located near the former mine portal, it is suggested that monitoring at this station could be discontinued.

Station 159–6

Station 159–6 is located at the mouth of Twin Lakes Creek, close to Strathcona Sound. Figure E2 of the 2012 Water Quality Monitoring Report provides a summary of results for selected metals (cadmium, lead and zinc), as well as sulphate, total suspended sediment, and pH data for Station 159–6 since 1996. Like Station 159–10, Station 159–6 is located below the natural mineral outcrop, and is subject to occasional irregularity of metal and sulphate concentrations due to the natural processes of erosion and weathering. Values of TSS and zinc exceeding the non-regulatory site-specific action levels were observed at Station 159–6 during the period from 2006 to 2008, corresponding to reclamation activities when large-scale excavation and earth moving was occurring within the Twin Lakes Creek watershed. From 2009 to present, however, concentrations of metals have been generally stable and lower than during mine operations or reclamation. Zinc concentrations at Station 159–6 are typically about one order of magnitude higher than zinc concentrations measured at Station 159–4, indicating that the former West Twin Disposal Area is not the primary source. Metals concentrations are generally slightly lower at Station 159–6 than at 159–10 (suggesting that effects of weathering on the exposed mineralization are diluted downstream), although concentrations of TSS are generally higher at Station 159–6 than at 159–10. Overall, water quality at Station 159–6 from 2009 onwards appears to be subject primarily to natural influences, and any influence of former mine infrastructure (e.g., the West Twin Disposal Area) is negligible.

Monitoring at Station 159–6 includes biweekly sampling for NAN–1 and NAN–2, as well as twice annual sampling for NAN–4. Monitoring since 2009 has not revealed any untoward results. However, stockpiled soils undergoing bioremediation for hydrocarbons near the former Tank Farm are situated such that overland flow would report to Twin Lakes Creek upstream of Station 159–6. Therefore, it is recommended that monitoring at 159–6 should continue on a monthly basis for the NAN–1 and NAN–2 test groups. Monitoring for the NAN-2 test group could potentially be discontinued once the stockpiled soils are either removed or deemed to be remediated.

CHRIS CREEK WATERSHED

The Chris Creek watershed is located east of Twin Lakes Creek, also flowing into Strathcona Sound. This watershed contained several areas of mineralization that were mined. Elevated concentrations of cadmium, lead and zinc were observed in Chris Creek prior to mining and this would be attributable to natural weathering of surface-exposed mineralization.

Reference: Addendum to: Final 2012 Annual Water Quality Monitoring Report, Nanisivik Mine, Nunavut

Monitoring stations within Chris Creek Watershed (as per the Water Licence) include 159–15 (located high in the watershed as a control station), 159–14 (Chris Creek downstream of K–Baseline), and 159–17 (Outlet of Chris Creek into Strathcona Sound). It is important to note that no significant mining activity took place below Station 159–14.

Review of trends at Stations 159–15, 159–14 and 159–17 (Figures E6, E5 and E7, respectively in Appendix E of the 2012 Water Quality Monitoring Report) shows that there is very little change in water quality between 159–15 (upstream of mining activities) and 159–17 (at the mouth of the creek). Moreover, concentrations of cadmium, lead and zinc in the water of Chris Creek are generally much lower than concentrations reported by BC Research (1975) prior to mine development. Concentrations of sulphate and zinc tend to be slightly higher during the period from 2010 to 2012 than was the case between 2005 and 2008, but this is the case at Station 159–15 (upstream) as well as at 159–17 (downstream) of mining and reclamation activities. This difference could potentially be attributable to relatively mild, wet summers that would accelerate weathering of natural mineralization within the watershed.

Monitoring within Chris Creek watershed comprises monthly sampling at each station for the NAN–1 test group, as well as twice annual sampling at Station 159–17 for the NAN–4 test group. It is suggested that monitoring in Chris Creek watershed could be reduced to a single station (159–14), with monthly sampling for the NAN–1 test group.

LANDFILL

A landfill was located on the western edge of the Twin Lakes Creek watershed, near the height of land, so that two potential drainage paths led from the landfill. Two monitoring stations (NML–29 to the east, and NML–30 to the west) were located at the landfill, which was decommissioned with thermal cover, and will become entombed in permafrost. Flow has rarely been observed at Station NML–29, so monitoring results are not available for this station.

Results for Station NML–30 show generally non–detectable levels of metals (cadmium, lead and zinc), as well as TSS, since 2009. Concentrations of sulphate have occasionally exceeded the non–regulatory site–specific action level since 2009, but these exceedances do not involve associated zinc or lead, and may be due to sulphide minerals (e.g., pyrite but not sphalerite/galena) contained in thermal cover material placed over the landfill. The runoff has neutral to slightly alkaline pH. By themselves, the sulphate concentrations are not grounds for concern. As in all monitoring since 2009, no detectable petroleum hydrocarbons were present in water at NML–30.

It is suggested that future sampling at Stations NML–29 and NML–30 be maintained on a monthly basis for the NAN–1 analytical group, recognizing that flow is rarely observed at NML–29. As no detectable petroleum hydrocarbons have been recorded in water collected at NML–30 since 2009, it is suggested that this analysis could be

Reference: Addendum to: Final 2012 Annual Water Quality Monitoring Report, Nanisivik Mine, Nunavut

discontinued. However, it is also noted that the analytical group NAN-1 includes field observations for the presence of sheen on water, and that in the event of sheen being observed in future, a sample could be collected for analysis of hydrocarbons in water.

SUMMARY OF RECOMMENDATIONS

There has been no detection of any hydrocarbon fraction (analysis using analytical test group NAN-2) during the post-closure monitoring period since 2008, nor have there been any visual observations of sheen at any of the monitoring locations. There were some low-level detections of hydrocarbon fractions prior to 2008 (*i.e.*, when the landfill was active) at NML-30. On this basis, it is recommended that consideration should be given to discontinuing the use of the analytical test group NAN-2 (representing petroleum hydrocarbons and/or oil and grease as per the Water Licence) at a majority of the monitoring points. However, observations for the presence of sheen on water should be maintained, and in the event that sheen is noted, water samples for petroleum hydrocarbon analysis (*i.e.*, NAN-2) should be collected.

Trace element scans (analysis using analytical test group NAN-4) have not shown any untoward results during the post-closure monitoring period since 2008. On this basis, and bearing in mind that the NAN-1 test group includes total cadmium, total lead and total zinc, it is recommended that the trace element scans could be discontinued.

Radium-226 is still listed as a regulated parameter for Monitoring Station 159-4 in Part F of the Water Licence, although it is not included as a parameter to be measured in any of the water quality monitoring groups listed in Table I of Schedule I of the Water Licence. If the recommendations provided here are followed, then it would be helpful of the Nunavut Water Board would reduce the list of regulated parameters at Station 159-4 to be consistent with the analytical test groups required to be measured at that station. This could potentially mean that the list of regulated parameters would be reduced to include total cadmium, total lead, total zinc, total suspended solids, and pH.

It is suggested that Stations 159-10, 159-15 and 159-17 are redundant and no longer require monitoring. Signals observed at Station 159-10 are also detected at Station 159-6 (the mouth of Twin Lakes Creek). For the stations located on Chris Creek, Station 159-14 integrates any residual effects of mining on water quality, but all three stations (159-15, 159-14 and 159-17) give very similar results, and water quality appears to be similar to conditions that existed prior to mine development.

On this basis, a suggested set of stations, analytical test groups, and monitoring frequency for water quality monitoring in 2014 and beyond is provided in Table 1. It is assumed in Table 1 that the next Water Licence will extend from 2014 to 2019 (*i.e.*, a five-year term), although the duration of the licence is a matter to be determined by the Nunavut Water Board.

Reference: Addendum to: Final 2012 Annual Water Quality Monitoring Report, Nanisivik Mine, Nunavut

Based on the foregoing discussion, the Effluent Quality Limits at Station 159–4 should also be revised. Table 2 provides a proposal for revised effluent quality limits at Station 159–4, based on the monitoring data collected between 2009 and 2012, and the recommended water quality test groups and schedule from Table 1.

Table 1 Recommended Water Quality Monitoring Test Groups and Schedule for 2014–2019

Station Number	Station Description	Analytical Test Groups	Monitoring Frequency
Twin Lakes Creek Watershed			
NML-23	Outflow from East Twin Lake	NAN-1	Monthly
159-4	Outflow from West Twin Disposal Area	NAN-1	Monthly
159-10	Twin Lakes Creek upstream of West Townsite Tributary	Discontinue Monitoring	
159-6	Mouth of Twin Lakes Creek	NAN-1 NAN-2	Monthly
Chris Creek Watershed			
159-15	Chris Creek upstream of Area 14	Discontinue Monitoring	
159-14	Chris Creek downstream of K-Baseline	NAN-1	Monthly
159-17	Mouth of Chris Creek	Discontinue Monitoring	
Landfill			
NML-29	East side of landfill	NAN-1	Monthly
NML-30	West side of landfill	NAN-1	Monthly
Notes: Group NAN-1 includes laboratory measurement of total cadmium, lead and zinc; major cations (calcium, magnesium, sodium, potassium, ammonia and hardness); major anions (chloride, sulphate, bicarbonate, carbonate, nitrate+nitrite, and alkalinity); total suspended solids, specific conductance, and pH, with field measurement of specific conductance, pH and temperature, and visual observation for hydrocarbon sheen.			

Table 2 Proposed Effluent Quality Limits for Station 159–4 after 2013

Substance	Monthly Mean	Composite Sample	Grab Sample
	Maximum Authorized Concentration (mg/L)	Maximum Authorized Concentration (mg/L)	Maximum Authorized Concentration (mg/L)
Total Cadmium (Cd)	0.005	0.008	0.01
Total Lead (Pb)	0.10	0.15	0.20
Total Zinc (Zn)	0.25	0.375	0.50
Total Suspended Solids (TSS)	15.00	22.50	30.00
pH	6.0-9.5		

September 30, 2013

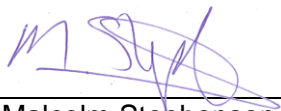
Johan Skoglund

Page 9 of 9

Reference: Addendum to: Final 2012 Annual Water Quality Monitoring Report, Nanisivik Mine, Nunavut

We trust that these suggestions and recommendations to Nyrstar will be helpful in discussion with the Nunavut Water Board regarding the terms and conditions of the Water Licence post 2013.

STANTEC CONSULTING LTD.



Malcolm Stephenson, Ph.D.
Project Manager,
Environmental Management
Phone: (506) 452-7000
Malcolm.Stephenson@stantec.com



Annick D. St-Amand, Ph.D.
Environmental Scientist, Chemist
Phone: (506) 452-7000
Annick.St-Amand@stantec.com

Appendix I

Contaminated soil remediation progress

Memo

To:	Johan Skoglund	Date:	November 13, 2013
Company:	Canzinc Ltd. c/o Nyrstar Canada (Holdings) Ltd.	From:	Arlene Laudrum
Copy to:		Project #:	1CB002.002
Subject:	Contaminated Soil Remediation Progress and Recommendations, Nanisivik Mine, Nunavut		

1 Introduction and Background

This memo provides a summary of the soil remediation activities completed at the former Nanisivik Mine site and recommendations for future activities.

Areas of petroleum and metal contaminated soil requiring remediation during mine closure and site reclamation were identified during the Environmental Site Assessment conducted in 2002 and 2003 (Gartner Lee Limited [GLL] 2004).

Soil reclamation activities began in April 2005. By October 1, 2008 reclamation activities specified in the *Nanisivik Mine 2004 Reclamation and Closure Plan* (Canzinc Ltd. 2004) had been completed (GLL 2008a, GLL 2008b, SRK Consulting (Canada) Inc. [SRK] 2009, BGC Engineering Inc. 2009). No activities were undertaken within the fuel tank farm during this period because, following mine closure, the fuel tank farm was operated by a third party and it was anticipated that ownership would be transferred to a third party. In August 2007, the Prime Minister of Canada announced that Nanisivik would be the future site of a military deep-water docking and refueling facility, and the fate of the existing facility became unknown. In June 2008, the Department of National Defence (DND) inspected the tank facility to determine if they could be used for their purposes. However, in February 2009, the DND requested that the fuel tank farm be decommissioned.

This document discusses the closure and rehabilitation completed under Water Licence 1AR-NAN0914 and provides recommendations for further work.

2 2009 Water Licence

The existing Water Licence 1AR-NAN0914 authorizes Canzinc Ltd. to conduct closure and reclamation activities and post-closure monitoring at the former Nanisivik Mine. The effective date of the Water Licence was May 21, 2009. The Water Licence expires March 31, 2014.

A requirement of the Water Licence, under Part J, Item 2, was to submit an Abandonment and Reclamation Plan specific to the fuel tank farm for approval from the Nunavut Water Board (NWB) by September 30, 2009. The plan was submitted and subsequently updated to address comments received from regulatory authorities and on April 26, 2010 the *Abandonment and Reclamation Plan, Fuel Tank Farm, Former Nanisivik Mine Site, Nunavut* (Jacques Whitford Stantec Limited [Stantec] 2010) was approved by the Nunavut Water Board (NWB).

The approved Abandonment and Reclamation Plan specified that the petroleum hydrocarbon contaminated soil in the tank farm area be remediated using landfarming methodologies in which nutrients are added to the soil to stimulate biological activity. The plan also established Soil Quality Remediation Objectives (SQROs) which were based on generic (i.e. not site-specific) soil quality guidelines for commercial land use established in the Canadian Council of Ministers of the Environment (CCME) *Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil* (CCME, 2008).

3 Progress 2009 to 2013

3.1 Activities

As per Part J of the Water Licence, the reclamation and closure of the mine continued with the decommissioning of the fuel tank farm at the dock and the treatment of petroleum hydrocarbon (PHC) contaminated soil.

Decommissioning of the fuel storage tanks was undertaken in May and June 2011. Prior to demolition, the tanks were placed in a gas free state, and waste liquids and sludge were collected and placed in drums. All scrap materials and PHC contaminated waste from the tank removal were shipped off-site for disposal. Further details are provided in the 2011 Annual Report (Nyrstar 2012).

Treatment facilities for PHC contaminated soil remediation were constructed in 2011 and 2012, as shown on the attached site plan. The cells are located in two areas referred to as the upper treatment area (UTA) and lower treatment area (LTA). Further information on the construction of the sixteen treatment cells is provided in the *Construction Summary Report, Nanisivik Mine* (WESA Inc. 2012) submitted to the NWB in November 2012.

In 2011, PHC contaminated soil was excavated to remove liners under the tanks. The soil was placed within the available treatment facilities or stockpiled above known areas of contamination. To provide supplementary treatment capacity, a temporary treatment facility was established within the tank farm footprint (the 'in-situ treatment area'). The contaminated soil in the treatment facilities were aerated mechanically every four days until winter closure. Further details are provided in the 2011 Annual Report (Nyrstar 2012).

In 2012, stockpiled PHC contaminated soil was relocated as additional treatment cells were constructed. Routine aeration of the soil continued. Nutrients were applied to encourage bio-remediation of hydrocarbons. A vibrating screen to separate gravel and boulders from the finer contaminated soil and improve aeration measures was mobilized to site in August. Soil previously excavated and stockpiled within the footprint of former fuel tank farm was screened. Further information on the 2012 remediation activities is provided in the *Nanisivik Mine Contaminated Soil Remediation 2012 Progress Report* (SRK and WESA, a division of BlueMetric Environmental Inc. 2013) submitted to the NWB with the 2012 Annual Report (Nyrstar 2013).

Key reclamation works undertaken at the site in 2013 included:

- Excavation of PHC contaminated soil,
- Remediation confirmation soil sampling from the base and walls of the excavated areas,
- Processing of the PHC contaminated soil through the vibrating screen,
- Modifying a portion of the concrete pad (former concentrate shed storage pad) to handle materials with PHC concentrations less than 2x the SQROs, and
- Treatment facility management and biopile performance monitoring.

Further information on the 2013 remediation activities is to be provided in the Contaminated Soil Remediation 2013 Progress Report prepared for submission to the NWB with the 2013 Annual Report by Nyrstar.

3.2 Volumes

Test pitting was undertaken in 2011 to delineate the PHC contaminated soil and refine the estimated quantity of contaminated soil requiring treatment. As reported in the 2011 Annual Report, the quantities of soil requiring treatment were approximately 17,000 m³ (Nyrstar 2012). This exceeded the 8,000 m³ assumed in the Abandonment and Reclamation Plan (Stantec 2010). Four areas of contamination were identified as shown on the attached site plan.

In 2012, 2,450 m³ of soil meeting the soil quality remediation objectives (SQRO) were removed from the in-situ treatment area. In 2013, 30 to 40% of the material excavated was rejected by the screener as gravel and boulders exhibiting no PHC contamination. The estimated volume of soil requiring

treatment (i.e. soil with PHC concentrations exceeding established SQROs) at the end of the 2013 season is listed below.

Location of PHC contaminated soil	2013 Volume
Below ground, remaining to be excavated	300 m ³
Stockpile within tank farm footprint ^a	5,000 m ³
Stockpiled on Pad	1,500 m ³
Upper Treatment Area	2,200 m ³
Lower Treatment Area	1,300 m ³
Total Volume of Soil Requiring Treatment	10,300 m³

^a Volume based on an August 2, 2013 survey by Underhill Geomatics Ltd. for WorleyParsons Canada and scaled up to account for additional material added on August 19, 2013.

Approximately 220 m³ of PHC contaminated soil is now being treated in each of the sixteen treatment cells. In contrast, the Abandonment and Reclamation Plan (Stantec 2010) had assumed that 400 to 500 m³ would be treated in each cell, twice that which is currently being managed in each of the cells. The as-built soil volume in each cell is attributed to the shallower depth of the biopiles (1.5 m versus 2+ m) as recommended by WESA to effectively remediate the soil.

3.3 Petroleum Hydrocarbon Concentrations in Soil

Assessment of the PHC contaminated soils undertaken when the tank farm was decommissioned resulted in the delineation of soils primarily contaminated with PHC Fraction 2 (nC10 to nC16) (PHC F2), consistent with the release of arctic diesel. The SQRO being applied at the site is 260 ppm for PHC F2 (Stantec 2010). Four areas of contamination were identified (see Figure 1).

Confirmatory samples collected from Area 1 in August 2013 met the SQROs for PHC. Residual PHC contamination remains to be excavated. It is estimated that 250 m³ remains to be excavated along the wall between Area 3 and at Area 2. An additional 50 m³ remains in the northern corner of Area 4. The stockpile of PHC contaminated soil on Area 2 restricted access to these materials in 2013.

Current concentrations of PHC F2 remaining to be excavated and in various stockpiles and biopiles are listed below.

PHC F2 Concentrations	Average mg/kg	Minimum Mg/kg	Maximum mg/kg
Below ground, remaining to be excavated	2,350	<10	6,450
Stockpile within tank farm footprint	590	230	1,100
Stockpiled on Pad	370	140	440
Upper and Lower Treatment Area biopiles	400	130	610

3.4 Rate of Remediation

Initial concentrations of PHC F2 in soil added to the treatment cells in 2011 averaged 1,115 ppm. Aeration of the soil commenced in August and continued until mid-September. Aeration recommenced again in late June 2012 and small quantities of nutrients were added in July 2012. Further nutrients were received on the 2012 sealift in late August and applied to the biopiles to optimize the bio-remediation process.

Analysis of the biopiles in the treatment cells indicates that PHC concentrations for F2 reduced from an average of 930 ppm following the application of nutrients in August 2012, to 300 ppm in August 2013. All of the original biopiles in the treatment cells were either relocated to the pad in small piles (8 to 10 m³) or screened and relocated onto Area 2 by August 2013. The treatment cells were reloaded as they became available.

Excavating and screening the PHC contaminated soil in 2013 reduced F2 concentrations from an in-situ average of 2,350 to an ex-situ average of 590 ppm.

The Abandonment and Reclamation Plan (Stantec 2010) assumed that the biopiles would meet the SQROs following one season of bio-remediation and aeration in the treatment cells. However, to date no biopiles have been remediated to meet the SQROs in a single season.

4 Projected Remediation Rates in 2014 and Beyond

Given the reduced levels of PHC concentrations in the biopiles currently being managed in the treatment cells, it is anticipated that this material will meet the SQROs in late August 2014. The soil currently stockpiled on the pad (1,500 m³) is anticipated to meet the SQROs by the end of July if routinely aerated.

The screened stockpile of fine soil in the in-situ treatment area of Area 2 is currently too large of a pile to safely aerate in-situ. Results from 2011 and 2012 have shown that the in-situ treatment area is capable of treating approximately 2,500 m³ per year. Contaminated soil known to underlay the stockpile cannot be excavated until the soil in the in-situ treatment area is removed.

It is anticipated that the soil remaining to be excavated will take two or more seasons to remediate to the SQROs being applied at site.

5 Discussion

As noted in section 3.2, the volume of PHC contaminated soil requiring treatment is higher than what was anticipated at the outset. Additionally, as stated in section 3.4, the rates of remediation foreseen in the Abandonment and Reclamation Plan (Stantec 2010) have not been achievable. Recognizing these obstacles the following measures were put in place by Canzinc to improve the efficiency of the remediation and treatment activities:

1. Utilizing a lined area within the footprint of the former tank farm to provide supplementary treatment capacity (the in-situ treatment area). This has allowed for the treatment of 2,450 m³ of PHC contaminated soil.
2. Processing of the soil through a vibrating screen to remove oversized materials (>10 cm) with negligible PHC contamination concentrations. By doing this, approximately 30% of the soil volume could be removed and treated as uncontaminated coarse rock. In addition, the aeration provided by passing the soil through the screener helped to reduce contaminant concentrations.
3. Utilizing a portion of the concrete pad to manage soil and rock with low levels of PHC contamination successfully improved material handling efficiency and allowed for improved remedial performance of a larger volume of materials than otherwise would have been achieved.

Notwithstanding these improvement measures, completing the soil remediation work in accordance with the remediation approach and to the SQROs established in the Abandonment and Reclamation Plan will require several more years. Based on the experience gathered through the 2012 and 2013 remediation, current projections indicate that landfarming of contaminated soil will need to continue throughout 2014, 2015 and 2016. The projections also indicate that use of the in-situ treatment area will be required during the 2014 and 2015 field seasons.

The foreseen timelines described above are likely to present conflicts with proposed re-development plans for the dock site, namely the DND's construction of a refueling facility. Based on Canzinc's understanding of the DND's plans, construction in the in-site treatment area is planned to commence by 2015.

Backfilling of the excavation pits in areas 1, 2 and 3 as proposed in the Abandonment and Reclamation Plan (Stantec 2010) appears to be in conflict with site re-development plans also.

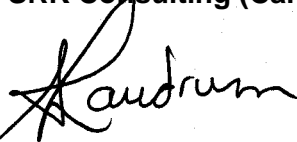
6 Recommendations

The following recommendations are made:

- In light of potential land use constraints associated with the re-development of the dock site for other purposes, it is recommended that alternative soil remediation options be studied and, if feasible, included in Canzinc's application for an amended Water Licence.
- Backfilling of excavations in areas that would constrain foreseen re-development of the site should not be undertaken. As such, SRK recommends that only Area 4 be backfilled.

Regards

SRK Consulting (Canada) Inc.



Arlene Laudrum, PGeo, FGC
Principal Consultant

Attachment

Figure 1: Site Plan

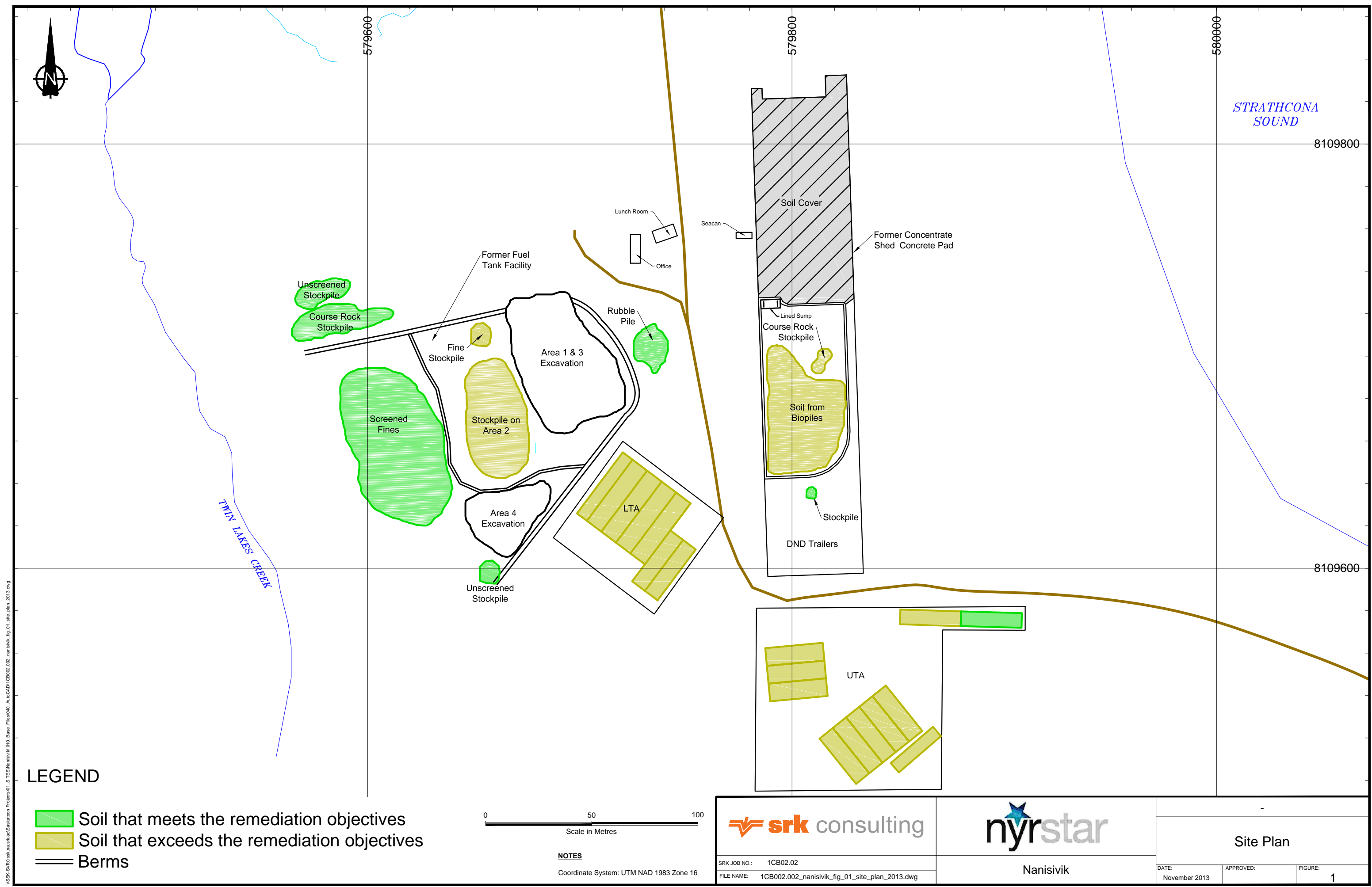
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
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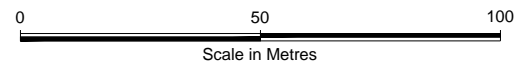
The opinions expressed in this report have been based on the information available to SRK at the time of preparation. SRK has exercised all due care in reviewing information supplied by others for use on this project. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information, except to the extent that SRK was hired to verify the data.



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LEGEND

-  Soil that meets the remediation objectives
-  Soil that exceeds the remediation objectives
-  Berms



NOTES
Coordinate System: UTM NAD 1983 Zone 16

 SRK JOB NO.: 1CB02.02 FILE NAME: 1CB002.002_nanisivik_fig_01_site_plan_2013.dwg	 Nanisivik	Site Plan		
		DATE: November 2013	APPROVED:	FIGURE: 1

Appendix J

Petroleum hydrocarbon contaminated soils risk-based remedial options analysis



Suite 250 – 1380 Burrard Street
Vancouver, BC V6Z 2H3
T: 604.669.0424
F: 604.669.0430
hemmera.com

November 12th, 2013
File: 1382-001.01

Canzinc Ltd.

2840 – 650 West Georgia Street
PO Box #11552,
Vancouver, British Columbia,
Canada
V6B 4N8

Attn: Johan Skoglund, Group Manager Environment
Tel. +1 604 336 8309; e-mail Johan.skoglund@nyrstar.com

Re: Petroleum Hydrocarbon Contaminated Soils at the Nanisivik Docksites, Nunavut – Risk-Based Remedial Options Analysis

1.0 INTRODUCTION AND OBJECTIVES

This letter report is intended to support the development of updated management plans for the disposition of petroleum hydrocarbon (PHC) contaminated soils that currently exist at the Nanisivik Docksites, Baffin Island, Nunavut. The management plans for these soils are subject to regulatory review and approvals especially by the Nunavut Water Board. The information provided herein is provided in support of an application by Canzinc for an amended Water Licence for the site. The information deemed to be relevant to site management and regulatory decisions is provided herein within the following major categories:

- (i) environmental issues associated with the residual PHC contamination, based on the soils in their current location and the expected ecological and human health risks;
- (ii) remedial options available for the PHC contaminated soils, the pros and cons of each, and with implications for future ecological and human health risk potential; and
- (iii) recommendations regarding preferred remedial options.

1.1 BACKGROUND AND CONTEXT

The Nanisivik lead-zinc mining and processing facility operated between 1976 and 2002 (over approximately 26 years), and was the first Canadian mine to operate north of the Arctic Circle. The site has been undergoing closure and reclamation since 2002.

A dock site was located approximately 3.7 km north of the mining and milling operations, on the shore of Strathcona Sound. During mining operations, the Nanisivik Docksit housed a tank farm consisting of several large and smaller above-ground storage tanks (ASTs), a large concentrate storage shed constructed on a cement slab-on-grade foundation, a load-out facility to transfer concentrate into ocean-going bulk freighters, and several laydown and storage areas.

The federal government announced in 2007 that the Nanisivik Docksit would be re-developed as a high arctic naval base, and various studies and planning has been completed since 2008 to facilitate this new use. All pre-existing infrastructure at the Docksit was removed during minesite decommissioning with the exception of the dock structure and the slab-on-grade foundation of the concentrate storage shed.

In 2011, Nyrstar assumed control of various assets and commitments from Canzinc Ltd. parent company Breakwater Resources, including those associated with the Nanisivik mine site in Nunavut. At this time, the Nanisivik mine site was undergoing post closure monitoring of rehabilitated mining areas and reclamation of contaminated soil at the former fuel tank farm at the Docksit.

The tank farm ("Fuel Tank Facility") at the Docksit has been a major focus of decommissioning and remediation efforts in the most recent years. Historical leaks from one or more of the above-ground storage tanks (ASTs) over the approximate three decades of use resulted in localized contamination of shallow soils, primarily within the seasonal active layer above permafrost. Accessible areas of petroleum hydrocarbon (PHC) contaminated soil, adjacent to the tank farm, were remediated prior to 2008-09. Further assessment of PHC contaminated soils was facilitated when the tank farm was decommissioned in 2011, resulting in the delineation of additional volumes of soils primarily contaminated by PHC fraction F2 [PHCs with an effective boiling point range spanned by nC10 (n-decane) and nC16], consistent with the release of arctic diesel.

Remediation of the former tank farm has been undertaken according to the methods described in the *Abandonment and Reclamation Plan* (Stantec; January 8th, 2010), which was approved by Nunavut Water Board on April 26th, 2010. The major remedial activities completed under this plan are as follows:

- (i) Decommissioning and removal of petroleum storage tanks and associated infrastructure;
- (ii) Delineation of contaminated soil;

- (iii) Construction of soil treatment facilities; and
- (iv) Excavation and treatment of contaminated soil.

All activities associated with the first three of these (tank decommissioning, soil contamination delineation, and treatment facility construction) were completed as planned by the end of the 2013 remediation season.

A minor portion of the PHC-contaminated soil excavation works remained to be completed on August 20th, 2013, after which adverse weather conditions precluded further remediation. In addition, the remaining portion of the soils being treated on site were confirmed to exhibit PHC concentrations - of Canada-Wide Standards (CWS) Fraction F2 - that slightly exceed the generic Canadian (CCME) soil quality guidelines that provide the basis for the soil quality remediation objectives (SQROs) defined in the 2010 *Abandonment and Reclamation Plan*.

In light of the current status of remediation, it is understood that future works to be completed under an amended Nunavut Water Board Licence will be primarily associated with the treatment and management of remaining contaminated soil.

2.0 CURRENT SITE CONDITIONS – PHC CONTAMINATED SOILS

The 2010 *Abandonment and Reclamation Plan* provided an estimate of approximately 8,000 m³ of *in situ* soil that exhibited a PHC CWS F2 concentration greater than its respective SQRO. The demolition of the tank farm in 2011 was accompanied by an improved ability to assess and delineate subsurface soil PHC contamination, leading to an increase in the estimated volume of contaminated soil to 17,000 m³.

The PHC-contaminated soil treatment approach used at the Site since 2011 follows the strategy established in the 2010 *Abandonment and Reclamation Plan*. The primary emphasis of the soil remedial efforts has been on 'landfarming' with nutrient amendment, wherein the soils are routinely turned and re-aerated during the arctic summer period, when there are fewer limitations associated with operating in sub-zero conditions. In 2012 and 2013, the treatment involved prior screening of soil to remove gravels and cobbles, to reduce the volume of fines for subsequent bioremediation.

PHC contaminated soil has been re-located on-Site to three areas as part of the bioremediation efforts: (i) a portion of the concrete pad of the former concentrate building; (ii) the Lower Treatment Area (LTA) located immediately south of the former tank farm berm; and (iii) the Upper Treatment Area (UTA) located south of the concentrate pad and the original mine access road. In addition, a portion of the PHC-contaminated soils has been treated within an excavated area inside the former berm area surrounding the tank farm, referred to as the *in situ treatment area*.

It is estimated that approximately 7,000 m³ of soils have been successfully remediated to below the PHC CWS F2 SQRO in 2012 and 2013, with approximately 10,000 m³ remaining at the Docksit with concentrations of PHC CWS F2 greater than the SQRO (SRK Consulting, 2013. *Memo on Contaminated Soil Remediation Progress*. The memo is provided in Appendix I of Canzinc's Water Licence amendment application). The average PHC CWS F2 concentration in soils stockpiled within the excavated areas is estimated to be 590 mg/kg. Soils present at the end of August 2013 in the LTA and UTA treatment areas have an average PHC CWS F2 concentration of 400 mg/kg (SRK Consulting, 2013).

In light of the soil treatment rates achieved to date, it is estimated that the remediation works will be completed at the end of the 2016 field season, provided that there is a continuation of the soil treatment approach established in the 2010 *Abandonment and Reclamation Plan* (i.e. nutrient amended landfarming). Further information about the soil remediation works completed to date are provided in a memo from Canzinc's remediation consultant (SRK Consulting) included as Appendix I to the Water Licence amendment application.

3.0 MANAGEMENT CONTEXT AND PHC REMEDIAL OBJECTIVES

As part of the development of remedial plans for the remediation of the Nanisivik mine site, risk-based site-specific remedial objectives (SSROs) were developed for the majority of contaminants of concern (lead, zinc, arsenic, cadmium and copper) in *lieu* of reliance on generic environmental quality criteria such as the Tier 1 CCME soil quality guidelines. SSROs were not developed for PHCs, however, and the currently approved work plan for the Docksit commits Canzinc to clean up the PHC contaminated soils to the PHC CWS (CCME) Tier 1 soil quality guideline for commercial land use.

The PHC CWS were developed in 1999-2000, and subsequently revised in 2008 based on detailed technical and other consultations completed five years after their original implementation (PHC CWS Five Year Review). The PHC CWS attempt to standardize and simplify the assessment and remediation of petroleum hydrocarbon contaminated soils and groundwater, in part by standardizing how PHCs are measured and evaluated from a human health and ecological risk assessment perspective. While petroleum hydrocarbon mixtures that may be released to the environment potentially comprise thousands of individual organic compounds, the PHC CWS approach is based on measuring contamination based on effective boiling point ranges (i.e. from more volatile to less volatile); i.e.-

- CWS Fraction 1, comprising all PHC constituents that elute in gas chromatography based on a boiling point type separation between the centre of the peaks for n-hexane (nC6) and n-decane (nC10);
- CWS Fraction 2, comprising all constituents that elute between nC10 and nC16;
- CWS Fraction 3, comprising all constituents that elute between nC16 and nC34; and
- CWS Fraction 4, comprising all constituents that elute after the centre of the nC34 peak.

As previously mentioned, the hydrocarbon contamination at the Docksit is primarily a result of losses of diesel, and exceedance of the generic CCME soil quality guidelines only represents a concern as it relates to the CWS Fraction 2 (CWS F2). While minor quantities of soil contaminated by lighter fraction hydrocarbons (i.e. CWS Fraction 1) remains on site, these soils are considered insignificant with regard to the identification and evaluation of soil management and remedial strategies.

The CWS F2 soil quality guidelines for various land use types and types of biota (including humans) for a commercial or industrial site (http://www.ccme.ca/assets/pdf/3_phc_tech_suppl_1.4_e.pdf; accessed November 5th, 2013) are summarized in Table 1:

Table 1: Summary of PHC CWS Tier 1 (generic) soil quality guidelines for F2 applicable to a commercial or industrial site

Exposure Pathway	Soil Quality Guideline for F2
Human Health – Direct Contact (ingestion plus dermal)	19,000 mg/kg
Human Health – Drinking Water Protection based on Groundwater Use	230 mg/kg
Human Health – Indoor Vapour Inhalation	23,000 mg/kg
Aquatic Life based on groundwater-mediated transport	RES**
Plants and Soil Invertebrates (Eco Direct Contact)	260 mg/kg
Management Limit (considers concerns such as free-phase formation, explosive hazard, and effects on the integrity of buried infrastructure).	1,000 mg/kg

** no value recommended by CCME since calculated value exceeds 30,000 mg/kg and solubility limit for PHC fraction (RES: Residual Free Phase)

Since no buildings currently exist at or are proposed for locations over top of PHC-contaminated soils, and since the subsurface environment is not a viable future source of potable water, the only applicable value from Table 1 at the Nanisivik Docksites is the Eco Direct Contact value of 260 mg/kg. This is the PHC F2 SQRO referenced in the 2010 *Abandonment and Reclamation Plan*.

The mine site proper was remediated prior to 2008 revisions to the PHC CWS: Meeting the Tier 1 objectives in place prior to 2008 was not problematic and, therefore, the development of risk-based Site Specific Remedial Objectives for CWS F2 was not considered to be a priority.

3.1 IMPLICATIONS FOR ECOLOGICAL AND HUMAN HEALTH RISKS

The CWS F2 commercial soil quality guideline of 260 mg/kg is based on a direct contact exposure scenario for soil invertebrates and plants. It should be noted that the derivation in 1999-2000 of the PHC CWS ecological direct contact soil quality guidelines, and five year revision, was based on ecotoxicity test data for temperate climate agronomic species and for vegetative communities, and productive capacity (inherent) assumptions that would not apply in a high arctic desert setting as is found at Nanisivik.

Development of a SSRO for PHC F2 in soil would be classified as a Tier 3 approach, wherein a quantitative site-specific risk assessment is completed in order to provide a more proximate estimate of the threshold concentrations of PHC F2 in soil beyond which risk to soil-associated arctic flora and fauna might occur.

With regard to the Nanisivik Docksites in its post-remediation state and its envisioned future use, there are two key exposure pathway/receptor combinations that need to be addressed:

- Direct soil contact with residual contamination by soil-associated flora and fauna; and
- Exposures of aquatic life in Twin Lakes Creek or Strathcona Sound arising from the groundwater mediated transport from soil source areas.

The majority of PHC constituents found in arctic diesel and within the F2 fraction are too hydrophobic to be appreciably transported in groundwater; thus, there is no generic CCME soil quality guideline for this exposure scenario (Table 1). This is consistent, furthermore, with information provided by Department of National Defence (DND) and Defence Construction Canada. Studies conducted by these parties prior to the demolition of the fuel tank farm concluded that the PHCs present within the soils were not entering adjacent surface water bodies at detectable concentrations and that the potential for aquatic ecological risks is low.

Risks to humans based on the transport of F2 hydrocarbons in soil vapour can be discounted at the Site, since no enclosed structures are present or will be built over the contaminated soils, and since the PHC F2 concentrations observed in Docksites soils are far lower than the F2 soil quality guidelines for human health protection (Table 1).

3.2 SITE REDEVELOPMENT AND MANAGEMENT CONSTRAINTS

An ability to manage beyond 2014 the further attenuation of PHCs in soils is constrained by plans for site re-development by DND, such that a shorter term solution beyond bioremediation may be needed. In particular, there are several logistical drivers for completion of the Docksites soil remediation work during the 2014 field season, and in particular prior to the end of August 2014.

4.0 POTENTIAL REMEDIAL OPTIONS

Canzinc's consultations with key federal government stakeholders that have a current and future interest in the Nanisivik Docksites have revealed potential land use conflicts in the areas that are currently being used for soil remediation. Such conflicts are specifically associated with the construction of the Department of National Defence (DND) Naval Facility, the initiation of which is currently proposed for August 2014. Canzinc has developed an alternative remediation approach in order to assist the DND in implementing their construction plans.

4.1 POSSIBLE REMEDIAL OPTIONS FOR CWS F2 CONTAMINATED SOILS AT THE DOCKSITE

Based on discussions between Canzinc, SRK, and Hemmera, a candidate list of possible remedial options for the CWS F2 contaminated soils was developed, and includes the following approaches:

1. Continuation of on-site bioremediation as described in the 2010 *Abandonment and Reclamation Plan*;
2. Development of alternative on-site soil remedial options to reduce the concentrations of or to immobilize the CWS F2 contamination – e.g., through soil washing, stabilization/cementation, application of highly aggressive oxidants or reductants, high temperature incineration, etc.
3. Re-location of the subject soils off-site to an appropriately designed and approved facility either –
 - a. Within a previously reclaimed area of the Nanisivik minesite (e.g. at or near the former Nanisivik townsite) or another location within a ~100 km radius southward towards the former Nanisivik Airport and Arctic Bay, or
 - b. Off-site via barge or ship to an appropriately licenced landfill close to marine shipping routes in southern Canada;
4. Reconfiguration of the soils on-site to curtain any ecological direct contact pathways; i.e., through placement in a manner that isolates any PHC F2 contaminated soils beneath an adequately thick layer of uncontaminated soil;
5. Leaving soils in their current location or nearby after recontouring to encourage ecological restoration, provided it can be confidently demonstrated through completion of a site-specific ecological risk assessment that the associated risks would be acceptably low.

The above-listed options may not be strictly exclusive; for example, completion of a site-specific risk assessment might be considered in concert with various soil re-location options. We are not aware of other possibilities.

4.2 IMPORTANT DECISION CRITERIA FOR EVALUATION OF OPTIONS

The following criteria were used to evaluate the relative merits and draw-backs of the possible options listed in Section 4.1, above:

1. Ability to achieve the environmental protection goals; i.e., curtail future possibilities of PHC F2 related risks to plants and soil-associated fauna based on direct contact exposures.
2. Degree of certainty about effectiveness in achieving objectives.
3. Timeliness to implement and achieve the protection goals: This is important especially in the context of DND's desire to re-develop various Docksite areas starting in August of 2014 without appreciable encumbrance from ongoing remedial activities or conditions.
4. Longevity of the solution.
5. Repercussions for other land uses and administrative/management entities, including long-term liability to entities other than Canzinc.
6. Anticipated direct costs: These have not been rigorously examined, but rather ranked qualitatively as high, medium, or low based on a conceptual understanding of the major cost drivers.
7. Environmental and socio-economic impact associated with implementation and any future Operations and Maintenance, which might include degree of greenhouse gas (GHG) production, wildlife disturbance, air quality and noise effects on humans and wildlife, habitat destruction, and implications for any of several social determinants of community and individual health and well-being.

Another important criterion is social acceptability. We have not ranked the possible options on this criterion, since doing so would pre-judge the outcome of discussions and consultations lead by the Nunavut Water Board regarding the License amendment application.

Technical feasibility is often included in similar analyses as an upfront pass/fail type of criterion; however, the above-listed options are all considered to be technically feasible to implement in theory, although some are likely to be highly impractical or prohibitively challenging to implement based on non-technical considerations such as time or cost constraints.

Different stakeholders typically place greater or lesser emphasis on different decision criteria. To simplify the remedial options analysis, all seven criteria as listed above were weighted equally, as a means of limiting introduction of bias, or the perception thereof, into the ranking process.

4.3 REMEDIAL OPTIONS ANALYSIS

Table 2 summarizes the rankings of the possible options listed in Section 4.1 based on the criteria discussed in Section 4.2. The rationale behind the rankings is briefly discussed below.

Table 2: Summary of Remedial Options Analysis. Options for each criterion were scored on a 5 point scale with a '5' indicating most desirable, and '1' indicating least desirable.

OPTION	Ability to achieve environmental protection goals	Degree of certainty	Timeliness to implement	Longevity of solution	Repercussions for other land uses and administrative/ management entities	Anticipated direct costs	Environmental and socio-economic impact	TOTAL FOR OPTION
1) Continuation of current approach	4	4	2	5	2	5	5	27
2) Development of solution based on alternative on-site soil remedial technologies	2	1	1	5	1	1	3	14
3a) Relocation of soils to appropriately designed/approved facility farther south on Baffin Island	4	4	2	4	1	2	1	18
3b) Relocation via marine transport to an appropriately licenced landfill in southern Canada	5	5	3	2	1	1	1	18
4) On-site soil reconfiguration based on risk management principles	5	5	5	3	3	5	5	31
5) Leave soils close to current locations based on evidence from completion of a site-specific risk assessment that ecological risks would be acceptably low	5	3	1	5	5	5	5	29

4.3.1 Continuation of the current approach

The primary draw-back associated with continuing on the current site remediation path is that it may take until 2016 or beyond until the PHC F2 contaminated soils experience a reduction in concentration to below the SQRO. Pending such a result, the soils would still be formally designated as contaminated by various interested parties, and the associated precautionary measures associated with this designation will constrain site re-development in the intervening period.

4.3.2 Alternative on-site soil remedial technologies

It is conceivable that the effectiveness of on-site soil remediation can be improved, especially based on the rate it may take to achieve the SQRO. There are a range of approaches that serve to destroy the F2 hydrocarbons or otherwise render them non-bioavailable that can be categorized as ranging from highly experimental to field validated. Nonetheless, alteration of the currently endorsed on-site soil remedial approach would have a number of important consequences:

- The degree of certainty in achieving the environmental protection goals is expected to be low, since the effectiveness of most candidate technologies is highly influenced by local site and soil conditions.
- The uncertainty about effectiveness suggests a need for prior evaluations of feasibility and desktop trials, which would delay full scale implementation. Selecting amongst the sometimes bewildering range of apparent options itself must be considered a potential time delay in site remediation.
- The costs are highly uncertain, pending further evaluation and ranking of concrete options and development of details around implementation; however, it is assumed that costs would be much higher than the current bioremediation approach.

4.3.3 Relocation of soils to a facility farther south on Baffin Island

This option is rated low on several criteria including timeliness, longevity of the solution (transfers potential issues to another geographic location and ecosystem, rather than focussing on a permanent solution), repercussions for other land uses and administrative frameworks, and environmental impact.

The previously reclaimed areas of the Nanisivik minesite, beyond the dock site, are Commissioners' Lands, for which special regulatory approvals would need to be issued if a contaminated soils landfill were to be developed. Re-location of the soils to a 'greenfields' site nearby on Baffin Island (i.e., a natural site that has had minimal prior human influence) would require extensive consultations and approvals by many regulatory and stakeholder groups. Perhaps more importantly, this is one of the least favourable options from an environmental and socio-economic impact assessment perspective, based on increased

potential for a relatively large number of ecological and socio-economic effects, not limited to but potentially including:

- Loss of habitat at the recipient location,
- Implications for at-risk species,
- Wildlife disturbance and strikes associated with increased trucking activity,
- Potential depression of the active layer of permafrost,
- Temporary noise and air quality issues associated with the soil relocation.

Additionally, the cost implications associated with off-site transfer of soil are high and unlikely to be justified from a cost/benefit perspective.

4.3.4 Relocation via marine transport to an appropriately licenced landfill in southern Canada

It is our understanding that no suitable secure landfill has been developed and approved for acceptance of hydrocarbon contaminated soils in the eastern Arctic, although DND has established several dedicated facilities serving similar purposes at other arctic sites where former military bases were located. Relocation of the soils via marine transport to a southern Canadian licenced landfill would be cost prohibitive, and result in a substantial increase in greenhouse gas (GHG) production for transport of soils that may pose no real ecological risks. Furthermore, the potential for environmental impacts associated with the mode of transportation and final disposition would probably far exceed the potential for environmental impacts based solutions that do not externalize possible problems to other geographies, ecosystems, and communities.

4.3.5 On-site soil reconfiguration based on risk management principles

This options scores favourably from the perspective of ability to ensure environmental protection goals, degree of certainty in the solution, timelines to complete, costs, and associated environmental and socio-economic impact. With regard to environmental and socio-economic impact, the soils would be capped at a location that is already substantially disturbed and is encumbered for other ecological and human uses based on the ongoing use of the site. The longevity of the solution depends on two factors: (i) the ability to maintain an adequately thick cover of uncontaminated soil in the face of erosional and mass soil wasting processes over longer time periods; and (ii) the rate at which PHC F2 hydrocarbons will decrease in concentration (i.e. the realized persistence half-life) if the soils are consolidated and capped. Future biodegradation of PHC F2 concentrations in the subject soils resulting in F2 concentrations below those that might cause ecological risks is anticipated, and this would eliminate the need for a clean soil cover as a risk management measure. The timelines associated with this are uncertain, however.

The primary draw-back of this option is the perception by the future site custodian (DND) that the risk-management of the soils firstly comprises a long-term financial liability to the federal crown, and secondly could interfere with as-yet-to-be determined site development activities if secured at the current location of the Upper Treatment Area (UTA). In comparing with other options, this concern is likely to be no greater than experienced by other custodial parties with oversight of locations where an off-site repository might be built.

4.3.6 Leave soils close to current locations based on evidence from completion of a site-specific risk assessment that ecological risks would be acceptably low

Demonstration of acceptably low ecological risk assessment potential would be accompanied by a high degree of confidence that the environmental protection goals have been achieved as part of decommissioning of the tank farm. This would be a highly favourable option, to the extent that a site-specific risk assessment demonstrates acceptably low risks in terms of an absence of future site encumbrances and absence of any environmental and socioeconomic impacts associated with implementing the option. The degree of certainty is moderate, however, since the outcome of the site-specific risk-assessment should not be pre-judged: it is conceivable that arctic plants present at the site are at least as sensitive to PHC F2 as suggested by application of the CWS Tier 1 guidelines.

The draw-back of implementing this option in isolation from other possible options is that it will be challenging to complete a site-specific risk assessment, discuss the interpretations, and refine various risk management objectives within timelines that will meet DND's stated needs for various site re-development activities.

5.0 PREFERRED REMEDIAL OPTION

Base on the options analysis, the preferred option for management of residual PHC F2 contaminated soils is (i) on-site management in a manner that confidently precludes exposure potential for soil-associated flora and fauna; followed by (ii) re-contouring of the soil deposits to encourage site ecological restoration under the presumption that a quantitative site-specific risk assessment focussed on the CWS F2 contaminated soil masses will demonstrate the ecological risks to be acceptably low. It would not be helpful to implement the second of these options in the absence of the first, since completion of a site-specific risk assessment and the associated risk management decisions cannot be reasonably completed by August of 2014, and over-reliance on an SSRO approach could delay timely access to the site by DND for re-development.

Shorter term implementation of risk management for the soil masses of interest via covering with uncontaminated soil, however, would provide an immediate assurance that ecological risks will be acceptably low, pending the completion of future work to demonstrate that either or both of the following is true:

- (i) The risks associated with exposures of ecologically relevant arctic flora and soil fauna to the soils are acceptably low; and/or
- (ii) PHC F2 concentrations in the soils re-located on site and then subjected to risk management through covering will continue to decline such that no soils exceed the CWS F2 Tier 1 values that are the basis of the 2010 *Abandonment and Reclamation Plan* SQGO.

A presumption or demonstration of unacceptably high ecological risks (e.g. as might emerge from comparison of the Site soil F2 concentrations with CCME Tier 1 values) simply means that some form of risk management should be considered. Such risk management can take a number of forms, but general falls into two major categories:

- (i) Destruction or removal of the contaminants (e.g. through bioremediation, physical excavation and off-site disposal); or
- (ii) Reduction or curtailment of the contaminant exposure potential for the humans or ecological receptors of concern. Based on environmental risk assessment principles, reduction or curtailment can take the form of (a) excluding the receptors from the area of concern, (b) modifying the contaminant source to reduce flux and movement toward/into the receptor, or (c) modifying the exposure path to reduce or curtail exposures at the potential point of exposure.

A common approach in North America for managing risks to soil invertebrate and plant communities from contaminated soils is to render the exposure pathway incomplete through the encapsulation of the contaminated soil beneath a layer of clean soil that is a suitable, adequately productive growing medium.

Risks to plants are only plausible to the extent that contamination – at levels greater than effects threshold – exists within the rooting zone (rhizosphere). Soil invertebrates, particularly in an arctic environment, occupy a more shallow depth within the soil than plants. Depending on the ecological and meteorological conditions at the site, erosion potential, and degree of contact risk posed by the contaminated soil mass, the placement of a 0.3 m to 1.0 m cap should be sufficient to eliminate risks to soil associated flora and fauna based on direct exposure pathways.

It is recommended that the proposed risk management approach for F2 hydrocarbon contaminated soils at the Site would include the following elements:

- (i) Transfer of the remaining *in situ* and stockpiled soils at the Site with residual F2 contamination to a Site location that meets the following conditions:
 - In an area that will not constrain those future Site activities that might occur within the next decade or so.
 - Not in an ecologically sensitive area or one that has high value from an ecological or socio-cultural perspective.
 - In an area that is as far or farther from surface water bodies (Twin Lakes Creek, Strathcona Sound) than under the current conditions.
 - Removed from areas of atypical hydrological activity especially during spring thaw.
 - In an area that is relatively insensitive to alterations in permafrost, depth of the active layer, or changes in soil stability associated with these.
- (ii) Collection of a representative set of samples for characterization of PHC concentrations to define baseline conditions.
- (iii) Capping of the soil deposit with 0.5 m of clean soil.
- (iv) Development and execution of a monitored natural attenuation approach for the capped soil, comprising the re-evaluation of PHC concentrations at appropriate intervals (5 yr and 10 yr post remediation) that will (i) facilitate the calculation of persistence half-life estimates, and (ii) identify when the soils no longer exceed relevant ecological risk-based thresholds for F2 hydrocarbons.

- (v) Limited desktop calculations of groundwater-mediated transport using the same Domenico and Robbins model that underlies the PHC CWS to provide assurance that there will be no unacceptable risks to aquatic life.

It is further recommended that Canzinc simultaneously pursue studies that will allow the development of a PHC F2 SSRO using field plots and the plant species present at the Site. It is expected that this work would provide sufficient evidence over a one to two year period to apply for a relaxation of imposed commitments to carry out field monitoring at various intervals as part of the risk management and monitored natural attenuation approach.

The ability to develop an SSRO is constrained by the challenges associated with collecting representative soil samples, and the timelines that would be needed to conduct the necessary ecotoxicity testing (in the laboratory or field) relative to timelines associated with Site remediation and transfer of use. A risk management approach involving capping of the minimally contaminated soils, however, is a viable approach based on risk assessment principles, provided that it is acceptable to the regulatory agencies such as the Nunavut Water Board, as well as future site users.

There are at least two possible approaches for completion of risk-based remediation of F2 contaminated soils:

- (i) Use of **laboratory toxicity testing** of representative Site soil samples:

Alberta Environment has developed an approach for developing SSROs for PHCs in soil that involves collection of Site soils and subjecting them to a subset of the battery of plant and soil invertebrate laboratory ecotoxicity tests used to derive the PHC CWS. There is precedent for this approach for other projects and in other Canadian jurisdictions as well.

There is a regulatory expectation that such laboratory toxicity tests will include a test organism (both a plant and soil invertebrate) that has been demonstrated to be sensitive to PHCs. The most sensitive plant species used to develop the PHC CWS Tier 1 values was northern wheatgrass. The earthworm 28-day reproductive test is often used as a sensitive species and endpoint in such tests.

Such laboratory toxicity testing has the potential to result in derivation of a higher ecologically acceptable F2 threshold in soil especially if (i) the hydrocarbons are less bioavailable in these soils in comparison with spiked soils used to derive the CWS (e.g. as might occur if the Site hydrocarbon is “aged”); and/or (ii) the hydrocarbon mixture is significantly different than the fractionated Federated Crude Oil used in the development of the CWS (e.g. contains a lower proportion of more toxic compounds such as aromatics).

A clear drawback of this approach is that it still relies on more southerly agronomic species to define effects thresholds that are clearly not present at the Site and may not be adequately representative of Site flora and fauna.

Another drawback of this approach is that the opportunity for collection of representative site soils may be limited until after thaw in the summer of 2014 (late June and beyond). This would not provide sufficient time to develop an SSRO relative to Site remedial needs for access to the site by DND for re-development.

(ii) Field based evaluation of soil F2 concentration – resident plant taxa responses:

It is possible to produce very credible soil concentration – response relationship data using field plots at the Site of interest. The approach involves either using the existing contaminant concentrations gradients that exist in surface soils or establishing a series of experimental plots that span an exponential range of soil concentrations from background/reference to the maximum documented concentration. Biological response data can include plant species richness, colonization success, survival and growth of transplants, and so on. Once the site-specific concentration – response relationship has been elucidated, the nomination of relevant ecologically protection thresholds becomes relatively straight forward, subject to discussions with various interested parties, including regulators.

This approach would take even longer to complete and derive an SSRO than the laboratory-based approach. However, the results would best represent the local ecological setting.

6.0 CLOSURE

I trust this remedial options analysis your requirements. If you have any questions regarding this work plan please do not hesitate to call the undersigned.

Prepared by:
Hemmera

A handwritten signature in black ink, appearing to read 'Doug Bright', with a long horizontal flourish extending to the right.

Doug Bright, Ph.D.
Practice Lead – Environmental Risk Assessment
250.388.3584 (ext. 606); cell 250.920.9489
dbright@hemmera.com

7.0 STATEMENT OF LIMITATIONS

Hemmera agrees to perform for Nyrstar ("Client") the professional services ("Services") described in Hemmera proposal dated September 27, 2013 ("Proposal"), attached and incorporated herein. Because of the uncertainties inherent in the Services contemplated, time schedules are only estimated schedules and are subject to revision unless otherwise specifically described in the Proposal. As full consideration for the performance of Services, Client shall pay to Hemmera the compensation provided for in the Proposal.

Hemmera shall perform the Services in a manner consistent with the level of care and skill normally exercised by members of the environmental science profession practicing under similar conditions at the time the work was performed. Client recognizes that opinions relating to environmental, geologic, and geotechnical conditions are based on limited data and that actual conditions may vary from those encountered at the times and locations where the data are obtained, despite the use of due professional care. Any opinions provided represent a reasonable review of the information available to Hemmera within the established Scope, work schedule and budgetary constraints. It is possible that the levels of contamination or hazardous materials may vary across the Site, and hence currently unrecognised contamination or potentially hazardous materials may exist at the Site.

No warranty, expressed or implied, is given concerning the presence or level of contamination on the Site, except as specifically noted in provided Reports. Any conclusions and recommendations provided are based upon applicable legislation existing at the time the Report is drafted. Any changes in the legislation may alter the conclusions and/or recommendations contained in the Report. Regulatory implications discussed in a Report shall be based on the applicable legislation existing at the time the Report is written. While providing the Services, Hemmera is likely to rely in good faith on information provided by others as noted, and we shall assume that the information provided by those individuals is both factual and accurate. Hemmera accepts no responsibility for any deficiency, mis-statement or inaccuracy in our Reports resulting from the information provided by those individuals.

Hemmera shall be responsible to Client for Services provided by Hemmera and the services of Hemmera subcontractors. Hemmera shall not be responsible for the acts or omissions of other parties engaged by Client nor for their construction means, methods, techniques, sequences, or procedures, or their health and safety precautions and programs. This agreement shall not create any rights or benefits to parties other than Client and Hemmera. No third party shall have the right to rely on Hemmera opinions rendered in connection with the Services without Hemmera written consent and the third party's agreement to be bound to the same conditions and limitations as Client. Any use that a third party makes of these opinions, or any reliance on or decision made based on it, is the responsibility of such third parties. Hemmera accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on these opinions.

The liability of Hemmera to Nyrstar shall be limited to injury or loss caused by the negligent acts of Hemmera. The total aggregate liability of Hemmera related to this agreement shall not exceed the lesser of the actual damages incurred, or the total fee of Hemmera for Services rendered on this project.

Appendix K

**Concordance table related to supplementary information
requirements for hydrocarbon-impacted soil storage and
landfarm treatment facilities**

Appendix K: Concordance table related to supplementary information requirements for hydrocarbon-impacted soil storage and landfarm treatment facilities

SIG Section	Requirement	Location(s)
I. General Information		
	<p>The following general information should be included in the Application.</p> <ol style="list-style-type: none"> 1. Date of Application. 2. Name and mailing address of the Applicant. 3. Contact information including phone number(s), fax number(s) and email address(es). 4. Name(s) of Facility operator(s) and alternate management personnel. 5. Number of years the Applicant is requesting for a water license. 	<ol style="list-style-type: none"> 1. Application cover page 2. Application, Block 1 and 2. 3. Application, Block 1. 4. Application, Block 2. 5. Application, Block 25.
II. Technical Information Required to Process the Application		
	<p>Current Engineered Drawings, Facility Design Plans, a Facility Operations and Maintenance Plan (including, but not limited, to a Spill Contingency Plan developed in accordance with the Board's "Guidelines for Contingency Planning" (1987)) and a Site Monitoring Plan will be required to process the Application. All Engineered Drawings shall be stamped by a qualified Professional Engineer registered to practice in Nunavut.</p>	<p>Nanisivik Mine 2004 Reclamation and Closure Plan, Appendix F. Nanisivik Mine Reclamation and Closure Monitoring Plan, Gartner Lee Limited, February 2004.</p> <p>Water Licence 1AR-NAN0914 – 2012 Annual Report, Appendix J. Spill Contingency Plan, May 2012.</p>
Site Assessment Consideration	<p>The Applicant shall provide details of the site topography, hydrology and permafrost regime, including the following:</p> <ol style="list-style-type: none"> 1. Current detailed topographical site survey diagrams, map(s) and/or aerial photos, of sufficient scale to clearly show all pertinent drainage features, and which clearly illustrate the location of the following: <ol style="list-style-type: none"> a. Soil, fuel and chemical storage locations; b. Soil landfarm active treatment locations; c. Site drainage patterns; d. Adjacent surface water bodies that could be affected by the proposed undertaking, particularly fish-bearing waters; e. Facility site access routes; f. Surface and subsurface environmental monitoring sites; and g. Traditional land use areas used for recreation, camping, fishing, etc. 2. The slope of land underlying the Facility. 	<p>Abandonment and Reclamation Plan, Fuel Tank Farm, Former Nanisivik Mine Site, Stantec, January 2010.</p> <ul style="list-style-type: none"> • Site Plan and Proposed Bio-Pile Locations, Drawing No. 1056201-1 <p>Water Licence 1AR-NAN0914 - 2012 Annual Report, Appendix H. Construction Summary Report, WESA Inc., November 2012</p> <ul style="list-style-type: none"> • Site Plan 2012, Figure 1. <p>Abandonment and Reclamation Plan, Fuel Tank Farm, Former Nanisivik Mine Site, Stantec, January 2010.</p> <ul style="list-style-type: none"> • Section 6.2

Appendix K: Concordance table related to supplementary information requirements for hydrocarbon-impacted soil storage and landfarm treatment facilities

SIG Section	Requirement	Location(s)
Site Assessment Consideration (continued)	<p>3. A hydrological/climatic assessment of the site that includes the following:</p> <ul style="list-style-type: none"> a. Precipitation and temperature profiles for the area; b. Details concerning the local drainage basin; c. Information regarding direction, path of water flow and potential seepage in area of the undertaking; d. A discussion concerning the likelihood of flood events that could disrupt operations or threaten water quality, and whether the local landforms may encourage or discourage such events (i.e. a Facility situated in an active flood plain). <p>4. A description of the soil underlying the site that includes:</p> <ul style="list-style-type: none"> a. The physical and chemical characteristics of the material underlying Facility; b. The depth of the permafrost active layer; and c. A discussion of any permafrost characteristics that may impact on the construction and operation of the Facility (i.e. frost heaving, presence of ice lenses, evidence of permafrost degradation). <p>5. Information regarding the conformity of the undertaking with any applicable Municipal zoning or land use planning ordinances.</p>	<p>Abandonment and Reclamation Plan, Fuel Tank Farm, Former Nanisivik Mine Site, Stantec, January 2010.</p> <ul style="list-style-type: none"> • Section 6.1 • Section 6.3.1 • Section 6.4.3 <p>Abandonment and Reclamation Plan, Fuel Tank Farm, Former Nanisivik Mine Site, Stantec, January 2010.</p> <ul style="list-style-type: none"> • Section 6.3.3 • Section 6.3.4 <p>Abandonment and Reclamation Plan, Fuel Tank Farm, Former Nanisivik Mine Site, Stantec, January 2010.</p> <ul style="list-style-type: none"> • Section 6.3.5
Soil Storage and Landfarm Treatment Design Considerations	<p>The Applicant shall provide details of design and construction of all components of the Soil Storage and Landfarm Treatment Facility prior to its construction, including the following:</p> <p>1. Comprehensive design details, including the dimensions, materials of construction and installation/construction procedures of all Facility components are required as part of the Application. Drawings of the design, stamped by an engineer licensed to practice in Nunavut, are also required. The design details should depict and describe the following components:</p> <ul style="list-style-type: none"> a. Retaining structures (dimensions, materials of construction, etc.); b. Geo-synthetic liners (properties, installation details, etc); c. Sumps, pumps, storage ponds/tanks and any other devices used to manage excess runoff water and/or leachate; d. Existing and any proposed drainage modifications, such as berms (natural or constructed) and diversion ditches; and 	<p>Abandonment and Reclamation Plan, Fuel Tank Farm, Former Nanisivik Mine Site, Stantec, January 2010.</p> <ul style="list-style-type: none"> • Section 6.4.1 • Section 6.4.2 • Site Plan and Proposed Bio-Pile Locations, Drawing No. 1056201-1 <p>Water Licence 1AR-NAN0914 - 2012 Annual Report, Appendix H. Construction Summary Report, WESA Inc., November 2012.</p> <ul style="list-style-type: none"> • Section 2 • Section 3 • Section 4 • Section 5

Appendix K: Concordance table related to supplementary information requirements for hydrocarbon-impacted soil storage and landfarm treatment facilities

SIG Section	Requirement	Location(s)
Soil Storage and Landfarm Treatment Design Considerations (continued)	<p>e. Water quality and environmental monitoring stations and associated equipment (design, placement, etc).</p> <p>2. Information regarding the installation of barriers to prevent access to the site.</p> <p>3. A discussion considering the placement of the Facility in relation to water bodies.</p> <p>4. A discussion considering flood risks/maximum probable precipitation events in regards to the Facility placement and design.</p> <p>5. The consideration of alternative methods of soil storage or remediation, in the event that circumstances are not suitable, for example because of environmental constraints, available human resources, etc.</p>	<ul style="list-style-type: none"> • Section 7 • Figures 1 to 5 <p>Abandonment and Reclamation Plan, Fuel Tank Farm, Former Nanisivik Mine Site, Stantec, January 2010.</p> <ul style="list-style-type: none"> • Section 6.4.5 <p>Abandonment and Reclamation Plan, Fuel Tank Farm, Former Nanisivik Mine Site, Stantec, January 2010.</p> <ul style="list-style-type: none"> • Section 6.1 • Section 6.4.6 <p>Abandonment and Reclamation Plan, Fuel Tank Farm, Former Nanisivik Mine Site, Stantec, January 2010.</p> <ul style="list-style-type: none"> • Section 6.4.3 <p>Abandonment and Reclamation Plan, Fuel Tank Farm, Former Nanisivik Mine Site, Stantec, January 2010.</p> <ul style="list-style-type: none"> • Section 6.4.7
Operations and Maintenance Considerations	<p>The Applicant shall provide details of the Operations and Maintenance Plan to be implemented at the Facility regarding the acceptance of material at the Facility, the procedures to be utilized in the treatment, or storage, of the hydrocarbon-impacted soil, the criteria to be attained prior to soil being deemed remediated, and the ultimate deposition of any treated soils. This shall include the following:</p> <p>1. The procedures to determine if soils may be accepted at the Facility, including but not limited to:</p> <ul style="list-style-type: none"> a. Chemical, physical and biological characterization of the soils and the associated hydrocarbon and metal contaminant concentrations; b. Treatability studies, to determine the viability of landfarm treatment; and c. Sampling frequency and number of samples per volume of soil accepted. <p>2. The procedures to be utilized during active landfarming operations in the active treatment cells, including but not limited to:</p> <ul style="list-style-type: none"> a. Treatment cell development and material placement therein; b. Contaminated soil thickness in treatment cells; c. Method of mechanical aeration in treatment cells; 	<p>Abandonment and Reclamation Plan, Fuel Tank Farm, Former Nanisivik Mine Site, Stantec, January 2010.</p> <ul style="list-style-type: none"> • Section 5.4 • Section 5.6 <p>Abandonment and Reclamation Plan, Fuel Tank Farm, Former Nanisivik Mine Site, Stantec, January 2010.</p> <ul style="list-style-type: none"> • Section 5.5 • Section 6.1 • Section 6.5

Appendix K: Concordance table related to supplementary information requirements for hydrocarbon-impacted soil storage and landfarm treatment facilities

SIG Section	Requirement	Location(s)								
Operations and Maintenance Considerations (continued)	<p>d. Oversize material management;</p> <p>e. Surface water management, leachate containment and/or treatment, and site grade planning;</p> <p>f. Process water management, and treatment prior to discharge;</p> <p>g. Site volume and operational monitoring programs;</p> <p>h. Dust control programs; and</p> <p>i. Staff operational training programs.</p> <p>3. The Applicant must provide a soil quality remedial objective, as defined by the Canadian Council of Ministers of the Environment (“CCME”) or by other applicable agency, to which the Applicant is intending to achieve.</p> <p>4. A conceptual decommissioning and reclamation plan is required with the Application, which should contain the following information:</p> <p>a. Details regarding the ultimate deposition of any treated soils; and</p> <p>b. A disposal plan for soils contaminated with bioremediation-unsuitable compounds, or for soils that do not respond well to the proposed landfarming treatment.</p>	<p>Water Licence 1AR-NAN0914 - 2012 Annual Report, Appendix H. Construction Summary Report, WESA Inc., November 2012.</p> <ul style="list-style-type: none">Section 3.2 <p>Water Licence 1AR-NAN0914 - 2012 Annual Report, Appendix J. Spill Contingency Plan, May 2012</p> <p>Abandonment and Reclamation Plan, Fuel Tank Farm, Former Nanisivik Mine Site, Stantec, January 2010.</p> <ul style="list-style-type: none">Section 4.0 <p>Abandonment and Reclamation Plan, Fuel Tank Farm, Former Nanisivik Mine Site, Stantec, January 2010.</p> <ul style="list-style-type: none">Section 6.6Section 6.4.7.								
Surface and Groundwater Monitoring Programs	<p>A comprehensive Surface and Groundwater Monitoring Plan to be implemented at the Facility is required with the Application. This Plan shall include the following:</p> <p>1). Locations (including GPS coordinates) of all proposed Monitoring Stations;</p> <p>2) Chemical, physical and biological parameters to be monitored;</p> <p>3) Sampling frequency;</p> <p>4) Baseline monitoring programs currently in progress, or contemplated during the term of the license under consideration; and</p> <p>5) QA/QC Programs to be implemented as part of the Monitoring Program.</p>	<table><tr><th>Monitoring Location</th><th>GPS Coordinates</th><th>Type of Monitoring</th><th>Monitoring Frequency</th></tr><tr><td>159-6</td><td>579450 E 81097200 N NAD83, UTM Zone 16</td><td>Surface</td><td>Monthly</td></tr></table> <p>Abandonment and Reclamation Plan, Fuel Tank Farm, Former Nanisivik Mine Site, Stantec, January 2010.</p> <ul style="list-style-type: none">Table 3 <p>Application, Appendix H: Water quality monitoring schedule 2014-2018.</p> <p>Nanisivik Mine 2004 Reclamation and Closure Plan, Appendix F. Nanisivik Mine Reclamation and Closure Monitoring Plan, Gartner Lee Limited, February 2004.</p> <p>Quality Assurance / Quality Control Plan for Surface Water Monitoring Samples, former Nanisivik Mine Site, Nunavut. Stantec, October 20, 2009.</p>	Monitoring Location	GPS Coordinates	Type of Monitoring	Monitoring Frequency	159-6	579450 E 81097200 N NAD83, UTM Zone 16	Surface	Monthly
Monitoring Location	GPS Coordinates	Type of Monitoring	Monitoring Frequency							
159-6	579450 E 81097200 N NAD83, UTM Zone 16	Surface	Monthly							

Appendix L

Site layout map

Appendix M

Letter of credit

***** LETTER OF CREDIT ISSUANCE ADVICE *****

DATE : DECEMBER 6, 2012

TO : *cdn Corp*
ONTARIO INTL TRADE
SERVICES,
61 FRONT STREET WEST, 4TH FLOOR,
TORONTO, ONTARIO, CANADA, M5H 1H1
18572

APPLICANT : BREAKWATER RESOURCES LTD.
ON BEHALF OF CANZINCO LTD.
95 WELLINGTON ST. WEST, SUITE 950,
TORONTO, ONTARIO, CANADA M5J 2N7

STANDBY
LETTER OF CREDIT NO. : S18572/341828

YOUR REF. NO. : S18572/341828

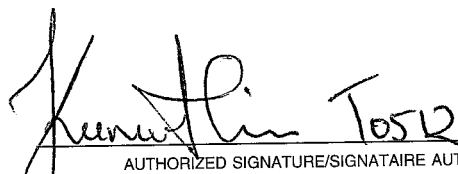
L/C AMOUNT : NOT EXCEEDING CAD 2,000,000.00

EXPIRY DATE : MARCH 31, 2014

WE HAVE TODAY ISSUED THE ABOVE LETTER OF CREDIT, A COPY OF WHICH IS ENCLOSED FOR YOUR FILES.

*We will
Collect courier
Charges from GWS
CAD 30.00*

*Please Collect issuance
Commission &
inform the client
according*


AUTHORIZED SIGNATURE/SIGNATAIRE AUTORISÉ


AUTHORIZED SIGNATURE/SIGNATAIRE AUTORISÉ

DATE OF ISSUE: DECEMBER 6, 2012

IRREVOCABLE STANDBY LETTER OF CREDIT
NO: S18572/341828

AMOUNT: NOT EXCEEDING CAD 2,000,000.00
DATE OF EXPIRY: MARCH 31, 2014

TO:
HER MAJESTY THE QUEEN IN RIGHT OF
CANADA AS REPRESENTED BY THE
MINISTER OF INDIAN AFFAIRS AND
NORTHERN DEVELOPMENT CANADA

APPLICANT:
BREAKWATER RESOURCES LTD.
ON BEHALF OF CANZINCO LTD.
95 WELLINGTON ST. WEST, SUITE 950,
TORONTO, ONTARIO, CANADA M5J 2N7

DEAR SIR(S) :

BENEFICIARY'S NAME AND ADDRESS: HER MAJESTY THE QUEEN IN RIGHT OF CANADA, AS
REPRESENTED BY THE MINISTER OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT CANADA,
PAYABLE TO THE RECEIVER GENERAL OF CANADA, C/O P.O BOX 100, BLDG. 918, IQALUIT,
NUNAVUT, CANADA X0A 0H0

ATTN: REGIONAL DIRECTOR GENERAL, NUNAVUT REGIONAL OFFICE

RE: SECURITY PURSUANT TO WATER LICENCE 1AR-NAN0914

AT THE REQUEST AND FOR THE ACCOUNT OF BREAKWATER RESOURCES LTD., ON BEHALF OF
CANZINCO LTD. (THE "APPLICANT"), WE, THE BANK OF NOVA SCOTIA, HEREBY ESTABLISH
IN YOUR FAVOUR OUR IRREVOCABLE STANDBY LETTER OF CREDIT NO. S18572/341828
("LETTER OF CREDIT" OR "CREDIT") FOR SUMS NOT EXCEEDING IN THE AGGREGATE
CAD2,000,000.00 (CANADIAN DOLLARS TWO MILLION).

THIS CREDIT IS AVAILABLE WITH US FOR DRAWING AT SIGHT, WITHOUT ENQUIRY AS TO
WHETHER YOU HAVE A RIGHT AS BETWEEN YOURSELF AND THE APPLICANT TO MAKE SUCH
DEMAND AND WITHOUT RECOGNIZING ANY CLAIM OF THE APPLICANT OR OBJECTION BY THE
APPLICANT, AGAINST PRESENTATION TO US, BY YOU OR YOUR DULY AUTHORIZED
REPRESENTATIVE OR AGENT, OF THE FOLLOWING DOCUMENTS:

1. A SIGHT DRAFT, PAYABLE TO THE RECEIVER GENERAL OF CANADA, DRAWN ON THE BANK
OF NOVA SCOTIA, ONTARIO INTERNATIONAL TRADE SERVICES, 61 FRONT STREET WEST, 4TH
FLOOR, TORONTO, ONTARIO, CANADA M5H 1H1; AND
2. THE ORIGINAL OF THIS IRREVOCABLE STANDBY LETTER OF CREDIT NO. S18572/341828


AUTHORIZED SIGNATURE/SIGNATAIRE AUTORISÉ


AUTHORIZED SIGNATURE/SIGNATAIRE AUTORISÉ

~~FOR ENDORSEMENT OF PAYMENT THEREON; AND~~

3. A STATEMENT SIGNED BY AN OFFICIAL OF THE DEPARTMENT OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT CANADA CERTIFYING

A) THAT THE SIGNATORY IS AN OFFICIAL OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT CANADA AND HAS THE AUTHORITY TO SIGN THE STATEMENT ON BEHALF OF THE MINISTER OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT CANADA ('THE MINISTER'), AND

B) EITHER

I) THAT THE MINISTER IS ENTITLED TO APPLY THE AMOUNT DRAWN, BEING ALL OR PART OF THE SECURITY POSTED AND MAINTAINED PURSUANT TO WATER LICENSE 1AR-NAN0914 TYPE 'A' ISSUED BY THE NUNAVUT WATER BOARD, WHETHER AS ORIGINAL ISSUED OR AS AMENDED, RENEWED OR REPLACED FROM TIME TO TIME, OR

II) THAT THIS CREDIT IS DUE TO EXPIRE IN THIRTY (30) DAYS OR LESS AND THAT THE APPLICANT HAS NOT REPLACED THIS CREDIT BY POSTING WITH THE MINISTER OTHER SECURITY SATISFACTORY TO THE MINISTER.

PARTIAL DRAWINGS ARE PERMITTED.

THIS CREDIT IS EFFECTIVE FROM DECEMBER 6, 2012 AND SHALL EXPIRE AT OUR COUNTERS AT 5:00 P.M ON MARCH 31, 2014 (THE 'INITIAL EXPIRY DATE'). THIS CREDIT SHALL BE RENEWED AUTOMATICALLY WITHOUT AMENDMENT FOR AN ADDITIONAL ONE-YEAR PERIOD FROM THE INITIAL EXPIRATION DATE AND FOR AN ADDITIONAL ONE-YEAR PERIOD FROM EACH FUTURE EXPIRATION DATE (EACH SUCH EXPIRATION DATE, THE OPERATIVE EXPIRATION DATE), UNLESS AT LEAST NINETY (90) DAYS PRIOR TO THE OPERATIVE EXPIRATION DATE WE NOTIFY YOU IN WRITING BY REGISTERED MAIL OR COURIER THAT WE ELECT NOT TO CONSIDER THIS CREDIT RENEWED FOR SUCH ADDITIONAL PERIOD.

THE WATER LICENCE IS REFERRED TO HEREIN FOR REFERENCE PURPOSES AND DOES NOT FORM PART OF THE TERMS OF THIS CREDIT.

WE HEREBY AGREE THAT ALL DRAFTS DRAWN UNDER AND IN COMPLIANCE WITH THE TERMS OF THIS CREDIT SHALL BE DULY HONoured BY US IF PRESENTED FOR PAYMENT ON OR BEFORE THE OPERATIVE EXPIRATION DATE.

THIS CREDIT IS SUBJECT TO THE UNIFORM CUSTOMS AND PRACTICE FOR DOCUMENTARY CREDITS (2007 REVISION), INTERNATIONAL CHAMBER OF COMMERCE, PUBLICATION NO. 600. NOTWITHSTANDING ARTICLE 36 OF SAID PUBLICATION, IF THIS CREDIT EXPIRES DURING AN INTERRUPTION OF BUSINESS AS DESCRIBED IN ARTICLE 36, WE AGREE TO EFFECT PAYMENT IF THIS CREDIT IS DRAWN ON US WITHIN THIRTY(30) DAYS AFTER RESUMPTION OF BUSINESS.

 10513
AUTHORIZED SIGNATURE/SIGNATAIRE AUTORISÉ

 20176
AUTHORIZED SIGNATURE/SIGNATAIRE AUTORISÉ

23814-3 (08/12) THE BANK OF NOVA SCOTIA/LA BANQUE DE NOUVELLE-ÉCOSSE

(ISSUING BANK NOTE: RETAIN IF ISSUED BY BRIEF CABLE/FULL CABLE/SWIFT)
(NOTE À LA BANQUE ÉMETTRICE : À CONSERVER SI AVIS BREF/COMPLÉT ÉMIS PAR CABLE/SWIFT)

1 - ORIGINAL
2 - CUSTOMER/CLIENT

Appendix N

Canzino appointment of officer

RESOLUTIONS OF THE DIRECTORS

OF

CANZINCO LTD.
(the "Corporation")

Appointment of Officers

RESOLVED THAT the following person is appointed to the office set out opposite her name below:

Name

Office

Katey Grist

Secretary

This resolution is consented to by all of the directors of the Corporation, pursuant to Section 117 of the *Canada Business Corporations Act*, as evidenced by the signatures below.

DATED as of June 30, 2013.



JOHAN SKOGLUND



GRAHAM BUTTENSHAW

Appendix O

Canzino certificate of amendment



**Certificate
of Amendment**

**Canada Business
Corporations Act**

**Certificat
de modification**

**Loi canadienne sur
les sociétés par actions**

CANZINCO LTD.

228206-2

Name of corporation-Dénomination de la société

Corporation number-Numéro de la société

I hereby certify that the articles of the above-named corporation were amended

Je certifie que les statuts de la société susmentionnée ont été modifiés :

(a) under section 13 of the *Canada Business Corporations Act* in accordance with the attached notice;

☐

a) en vertu de l'article 13 de la *Loi canadienne sur les sociétés par actions*, conformément à l'avis ci-joint;

(b) under section 27 of the *Canada Business Corporations Act* as set out in the attached articles of amendment designating a series of shares;

☐

b) en vertu de l'article 27 de la *Loi canadienne sur les sociétés par actions*, tel qu'il est indiqué dans les clauses modificatrices ci-jointes désignant une série d'actions;

(c) under section 179 of the *Canada Business Corporations Act* as set out in the attached articles of amendment;

☒

c) en vertu de l'article 179 de la *Loi canadienne sur les sociétés par actions*, tel qu'il est indiqué dans les clauses modificatrices ci-jointes;

(d) under section 191 of the *Canada Business Corporations Act* as set out in the attached articles of reorganization.

☐

d) en vertu de l'article 191 de la *Loi canadienne sur les sociétés par actions*, tel qu'il est indiqué dans les clauses de réorganisation ci-jointes.

Director - Directeur

February 27, 1997/le 27 février 1997

Date of Amendment - Date de modification



Consumer and
Corporate Affairs Canada

Consommation et
Affaires commerciales Canada

Canada Business
Corporations Act

Loi régissant les sociétés
par actions de régime fédéral

FORM 4
ARTICLES OF AMENDMENT
(SECTION 27 OR 177)

FORMULE 4
CLAUSES MODIFICATRICES
(ARTICLES 27 OU 177)

1 -- Name of corporation -- Dénomination de la société EAST WEST CARIBOU MINING LIMITED	2 -- Corporation No. -- N° de la société 228206-2
3 -- The articles of the above-named corporation are amended as follows: Les statuts de la société mentionnée ci-dessus sont modifiés de la façon suivante :	

The name of the corporation is changed to:

CANZINCO LTD.

Date Feb. 25, 1997	Signature 	Title -- Titre CHIEF FINANCIAL OFFICER
7530-21-936-1387 (01-93) 46		FOR DEPARTMENTAL USE ONLY - À L'USAGE DU MINISTÈRE SEULEMENT Filed - Déposée FEB 27 1997

Appendix P

Compliance assessment and status report

Appendix P: Compliance Assessment and Status Report

Licence Condition		Status of Compliance	
PART A: SCOPE, DEFINITIONS AND ENFORCEMENT			
1. SCOPE			
A.1 a.	This Licence authorizes CanZinco Ltd. ("Licensee") to conduct closure and reclamation activities and post-closure monitoring, associated with the Industrial undertakings at the Nanisivik Mine in the Qikiqtani Region of Nunavut, (73°02' N, 84°32' W) as follows: Post-closure monitoring commencing in 2009 and continuing for a period of five years unless otherwise approved by the Board, including; i. Water quality monitoring; ii. Geotechnical monitoring; iii. Inspection and maintenance of engineered structures and earthworks; iv. Closure and reclamation of the Fuel Tank Farm and associated hydrocarbon contaminated soils; and v. Completion of any further reclamation and closure activities approved by the Board in writing.	~	N/A
A.1 b.	This Licence is issued subject to conditions contained herein with respect to the taking of Water and the depositing of Waste of any type in any Waters or in any place under any conditions where such Waste or any other Waste that results from the deposits of such Waste may enter any Waters. Whenever new Regulations are made or existing Regulations are amended by the Governor in Council under the Act, or other statutes imposing more stringent conditions relating to the quantity, type or manner under which any such Waste may be so deposited, this Licence shall be deemed to be subject to such requirements.	~	N/A
A.1 c.	Compliance with the terms and conditions of this Licence does not absolve the Licensee from responsibility for compliance with all applicable legislation, guidelines and directives.	~	N/A
2. DEFINITIONS			
A.2	The Licensee shall refer to Schedule A for definitions of terms used in this Licence.	~	N/A
3. ENFORCEMENT			
A.3 a.	Licensee to the enforcement measures and the penalties provided for in the Act.	~	N/A
A.3 b.	All inspection and enforcement services regarding this Licence will be provided by Inspectors appointed under the Act.	~	N/A
A.3 c.	For the purpose of enforcing this Licence and with respect to the use of Water and Deposit or Discharge of Waste by the Licensee, Inspectors appointed under the Act, hold all powers, privileges and protections that are conferred upon them by the Act or by other applicable law.	~	N/A
PART B: GENERAL CONDITIONS			
B.1	The amount of Water use fees shall be determined in accordance with section 9(b) of the <i>Regulations</i> .	~	N/A
B.2	Payment of fees shall be made in accordance with section 9(6)(b) of the <i>Regulations</i> .	✓	In compliance.
B.3	The Licensee shall file an Annual Report with the Board no later than March 31 in the year following the calendar year being reported. The Annual Report shall be developed in accordance with Schedule B.	✓	Annual reports for 2009, 2010, 2011 and 2012 are available on the NWB public registry.
B.4	Compliance dates specified in the Licence may be modified at the discretion of the Chief Executive Officer.	~	N/A
B.5	The Licensee shall ensure a copy of this Licence, all records, books of account, or other documents are maintained at any place in Canada for a period of not less than five years from the effective date of this licence.	✓	In compliance.
B.6	Any communication with respect to this Licence shall be made in writing to the attention of: Manager of Licensing Nunavut Water Board P. O. Box 119 Gjoa Haven, NU X0B 1J0 Telephone: (867) 360-6338 Fax: (867) 360-6369 Email: licensing@nunavutwaterboard.org	~	N/A

Appendix P: Compliance Assessment and Status Report

Licence Condition			Status of Compliance
B.7	Any notice made to an Inspector shall be made in writing to the attention of: Water Resources Officer Nunavut District, Nunavut Region P.O. Box 100 Iqaluit, NU X0A 0H0 Telephone: (867) 975-4295 Fax: (867) 979-6445	~	N/A
B.8	The Licensee shall submit one (1) paper copy and one (1) electronic copy of all reports, studies, and plans to the Board or as otherwise requested by the Board. Reports or studies submitted to the Board by the Licensee shall include an executive summary in English and Inuktitut.	✓	2009: Partial compliance. No Inuktitut summary of QA/QC Plan or Fuel Tank Farm A&R Plan or annual monitoring report summaries. 2010: Non-compliant. No Inuktitut summary of annual monitoring report summaries. 2011: In compliance. 2012: In compliance.
B.9	The Licensee shall ensure that any document(s) or correspondence submitted by the Licensee to the Board is received by the Manager of Licensing.	~	N/A
B.10	The Licensee shall install and maintain signs that identify Water Supply Facilities, and Waste Disposal Facilities. The signs shall be posted in English and Inuktitut.	x	No longer applicable.
B.11	The Licensee shall, for all plans submitted under this Licence, include a proposed timetable for implementation. Plans submitted cannot be undertaken without subsequent written Board approval and direction. The Board may alter or modify a plan if necessary to achieve the legislative objectives and will notify the Licensee in writing of acceptance, rejection or alteration of the plan.	✓	In compliance.
B.12	In the event that a plan is not found acceptable to the Board, the Licensee shall provide a revised version to the Board for review within thirty (30) days of notification by the Board.	✓	In compliance.
B.13	Every plan to be carried out pursuant to the terms and conditions of this Licence shall, once approved become a part of this Licence, and any additional terms and conditions imposed upon approval of a plan by the Board become part of this Licence. All terms and conditions of the Licence shall be contemplated in the development of a plan where appropriate.	~	See section on additional conditions and restrictions.
B.14	The Licensee shall review the plans and manuals referred to in this Licence as required by changes in operation, site conditions, monitoring and/or technology and modify the plans and manuals to reflect these changes. Revisions to plans and manuals are to be submitted as an Addendum with the Annual Report required in Part B, Item 3, and include a complete list of revisions detailing where significant content changes have been made.	✓	In compliance.
B.15	Licence is assignable as provided in section 44 of the Act.	~	N/A
B.16	The expiry or cancellation of this Licence does not relieve the Licensee from any obligation imposed by the Licence as provided in section 45 of the Act.	~	N/A
PART C: CONDITIONS APPLYING TO SECURITY			
C.1	The Licensee shall furnish and maintain security with the Minister, in the amount of \$2.0 million dollars, in the form that is satisfactory to the Minister.	✓	Irrevocable Standby Letter of Credit for 2,000,000 CAD issued by Scotiabank December 6, 2012 (reference no. S18572/341828).
C.2	The Licensee shall furnish and maintain such further or other amounts as may be required by the Board, based on updated annual estimates of current mine reclamation liability.	~	N/A
C.3	The Licensee may submit to the Board for approval in writing, a request for a reduction to the amount of security. The submission shall include supporting evidence to justify the request.	~	Not yet applicable.
C.4	Subject to Part C, Item 2 and Part C, Item 3, the security referred to in Part C, Item 1 shall be maintained until such time as it is fully or in part refunded by the Minister pursuant to sub section 76(5) of the Act. This clause shall survive the expiry of this Licence or renewals thereof and until full and final reclamation has been completed to the satisfaction of the Minister.	✓	In compliance.
PART D: CONDITIONS APPLYING TO CONSTRUCTION			
D.1	The Licensee shall prevent any chemicals, fuel or wastes associated with the undertaking from entering any water body.	✓	In compliance.

Appendix P: Compliance Assessment and Status Report

Licence Condition			Status of Compliance
D.2	The Licensee shall minimize disturbance to terrain, permafrost and drainage during movement of contractor's equipment and personnel around the site during construction activities.	✓	In compliance.
D.3	The Licensee shall not store material on the surface of frozen streams or lakes except what is for immediate use.	✓	In compliance.
D.4	The Licensee shall locate equipment storage areas on gravel, sand or other durable land, a distance of at least thirty (30) metres above the ordinary high water mark of any water body in order to minimize impacts on surface drainage and water quality.	✓	In compliance.
D.5	The Licensee shall undertake necessary corrective measures to mitigate impacts on surface drainage resulting from the Licensee's activities.	✓	In compliance.
D.6	The Licensee shall limit any in-stream activity to low water periods. In-stream activity is prohibited during periods when fish migration may be expected.	✓	In compliance.
D.7	Prior to the construction of any dams, dykes or structures intended to contain, withhold, divert or retain Water or Wastes, final design and construction drawings signed and stamped by an Engineer shall be submitted to the Board, for approval in writing.	✓	In compliance.
D.8	The construction of engineered earthworks shall be supervised and field checked by a qualified Engineer. Construction records shall be maintained and made available at the request of the Board.	✓	In compliance.
D.9	review, within ninety (90) days following completion of all new structures designed to contain, withhold divert or retain Water or Wastes. The Report shall be prepared by a qualified Engineer(s) in accordance with Schedule D, Item 1.	✓	In compliance.
D.10	The Licensee shall use fill material for construction from an approved source, which has been demonstrated not to produce Acid Rock Drainage and to be non-Metal Leaching.	✓	In compliance.
D.11	The Licensee shall implement sediment and erosion control measures prior to and during Construction and Operations where necessary, to prevent entry of sediment into Water.	✓	In compliance.
D.12	The Licensee shall inspect daily all construction activities for signs of erosion.	✓	In compliance.
D.13	The Licensee shall minimize disturbance to terrain, permafrost and drainage during movement of the Licensee's and its contractor's equipment and personnel around the site during construction activities.	✓	In compliance.
PART E: CONDITIONS APPLYING TO WATER USE AND MANAGEMENT			
E.1	The Licensee shall obtain all fresh Water for domestic use from East Twin Lake, and Water use for the purposes of mitigation may be obtained from East Twin Lake, West Twin Creek and/or Chris Creek, or as otherwise approved by the Board in writing.	✓	In compliance.
E.2	The total volume of fresh Water for all uses shall not exceed one-hundred (100) cubic metres per day.	✓	In compliance.
E.3	The Licensee shall equip all Water intake hoses with a screen of an appropriate mesh size to ensure that fish are not entrained and shall withdraw Water at a rate such that fish do not become impinged on the screen.	✓	In compliance.
E.4	Streams cannot be used as a water source unless authorized and approved by the Board in advance in writing.	✓	In compliance.
E.5	If the Licensee requires water in sufficient volume that the source water body may be drawn down the Licensee shall, at least thirty (30) days prior to commencement of use of water, submit to the Board for approval in writing, the following: volume required, hydrological overview of the water body, details of impacts, and proposed mitigation measures.	~	N/A
E.6	The Licensee shall not remove any material from below the ordinary high water mark of any water body unless authorized.	✓	In compliance.
E.7	The Licensee shall implement measures to prevent the generation and deposition of dust and/or sediment into Water arising from road use.	✓	In compliance.

Appendix P: Compliance Assessment and Status Report

Licence Condition				Status of Compliance																																												
PART F: CONDITIONS APPLYING TO WASTE DISPOSAL AND MANAGEMENT																																																
F.1	Effluent being discharged from the West Twin Disposal Area at monitoring station 159-4 shall be directed to Twin Lakes Creek and not exceed the following Effluent quality limits:			✓	In compliance.																																											
	<table><tr><th rowspan="2">Substance</th><th>Monthly Mean</th><th>Composite Sample</th><th>Grab Sample</th></tr><tr><th>Maximum Authorized Concentration (mg/L)</th><th>Maximum Authorized Concentration (mg/L)</th><th>Maximum Authorized Concentration (mg/L)</th></tr><tr><td>Total Arsenic (As)</td><td>0.25</td><td>0.375</td><td>0.50</td></tr><tr><td>Total Copper (Cu)</td><td>0.10</td><td>0.15</td><td>0.20</td></tr><tr><td>Total Lead (Pb)</td><td>0.10</td><td>0.15</td><td>0.20</td></tr><tr><td>Total Nickel (Ni)</td><td>0.50</td><td>0.75</td><td>1.00</td></tr><tr><td>Total Zinc (Zn)</td><td>0.25</td><td>0.375</td><td>0.50</td></tr><tr><td>Total Suspended Solids (TSS)</td><td>15.00</td><td>22.50</td><td>30.00</td></tr><tr><td>Total Radium 226 (226Ra)</td><td>0.37 Bq/L</td><td>0.74 Bq/L</td><td>1.11 Bq/L</td></tr><tr><td>Total Cadmium (Cd)</td><td>0.005</td><td>0.008</td><td>0.01</td></tr><tr><td>pH</td><td colspan="3">6.0-9.5</td></tr></table>					Substance	Monthly Mean	Composite Sample	Grab Sample	Maximum Authorized Concentration (mg/L)	Maximum Authorized Concentration (mg/L)	Maximum Authorized Concentration (mg/L)	Total Arsenic (As)	0.25	0.375	0.50	Total Copper (Cu)	0.10	0.15	0.20	Total Lead (Pb)	0.10	0.15	0.20	Total Nickel (Ni)	0.50	0.75	1.00	Total Zinc (Zn)	0.25	0.375	0.50	Total Suspended Solids (TSS)	15.00	22.50	30.00	Total Radium 226 (226Ra)	0.37 Bq/L	0.74 Bq/L	1.11 Bq/L	Total Cadmium (Cd)	0.005	0.008	0.01	pH	6.0-9.5		
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	Total Cadmium (Cd)	0.005	0.008			0.01																																										
pH	6.0-9.5																																															
F.2	Where a visible sheen of Oil and Grease has been observed under Part I, Item 2, the Maximum Authorized Concentration in a Grab Sample shall not exceed 30 mg/L.			✓	In compliance.																																											
F.3	The Licensee shall remove from the project site, all hazardous Wastes generated through the course of the undertaking, for disposal at an approved hazardous waste disposal facility.			✓	In compliance.																																											
F.4	The Licensee shall maintain records of all Waste backhauled.			✓	In compliance.																																											
PART G: CONDITIONS APPLYING TO MODIFICATIONS																																																
G.1	The Licensee may, without written consent from the Board, carry out Modifications provided that such Modifications are consistent with the terms of this Licence and the following requirements are met:			✓	In compliance.																																											
G.1 a.	The Licensee has notified the Board in writing of such proposed Modifications at least sixty (60) days prior to beginning the Modifications to include requirements of Part G, Item 3;																																															
G.1 b.	Such Modifications do not place the Licensee in contravention of the Licence or the Act;																																															
G.1 c.	Such Modifications are consistent with the NIRB Screening Decision;																																															
G.1 d.	The Board has not, within sixty (60) days following notification of the proposed Modifications, informed the Licensee that review of the proposal will require more than sixty (60) days; and																																															
G.1 e.	The Board has not rejected the proposed Modifications.																																															
G.2	Modifications for which any of the conditions referred to in Part G, Item 1 have not been met can be carried out only upon approval from the Board in writing.			~	N/A																																											
G.3	Applications for modifications shall contain:			✓	In compliance.																																											
G.3 a.	A description of the facilities and/or works to be constructed;																																															
G.3 b.	The proposed location of the structure(s);																																															
G.3 c.	Identification of any potential impacts to the receiving environment;																																															
G.3 d.	A description of any monitoring required, including sampling locations, parameters measured and frequencies of sampling;																																															
G.3 e.	Schedule for construction;																																															
G.3 f.	Drawings of engineered structures stamped by a Professional Engineer; and																																															
G.3 g.	Proposed sediment and erosion control measures.																																															
G.4	The Licensee shall provide as-built plans and drawings of the Modifications referred to in this Licence within ninety (90) days of completion of the Modification. These plans and drawings shall be stamped by an Engineer.			~	N/A																																											
PART H: CONDITIONS APPLYING TO EMERGENCY RESPONSE AND SPILL CONTINGENCY PLANNING																																																
H.1	The Licensee shall prevent any chemicals, petroleum products or unauthorized Wastes associated with the project from entering Water.			✓	In compliance.																																											
H.2	The Licensee shall provide secondary containment for fuel and chemical storage as required by applicable standards and acceptable industry practice.			✓	In compliance.																																											
H.3	The Licensee shall prevent any chemicals, petroleum products or Wastes associated with the project from entering into Water.			✓	In compliance.																																											
H.4	All sumps and fuel caches shall be located at a distance of at least thirty (30) metres from the ordinary high water mark of any adjacent water body and inspected on a regular basis.			✓	In compliance.																																											

Appendix P: Compliance Assessment and Status Report

Licence Condition		Status of Compliance
H.5	Licensee shall ensure that any equipment maintenance and servicing be conducted only in designated areas and shall implement special procedures (such as the use of drip pans) to manage motor fluids and other waste and contain potential spills.	✓ In compliance.
H.6	If, during the period of this Licence, an unauthorized Discharge of Waste and or Effluent occurs, or if such Discharge is foreseeable, the Licensee shall:	~ N/A
H.6 a.	Employ as required, Emergency Response and Spill Contingency measures;	
H.6 b.	Report the incident immediately via the 24-Hour Spill Reporting Line (867) 920-8130 and to the Inspector at (867) 975-4295; and	
H.6 c.	For each discharge occurrence, submit a detailed report to the Inspector, no later than thirty (30) days after initially reporting the event, which includes the reference spill report number and a summary of information provided during initial reporting, the final estimated amount and type of spilled product, the GPS location of the spill, and the measures taken to contain, clean up and restore the spill site.	
PART I: CONDITIONS APPLYING TO THE MONITORING PROGRAM		
I.1	The Licensee shall undertake the Monitoring Program as provided in Tables 1, 2, and 3 of Schedule I.	✓ In compliance.
I.2	If a visible sheen of Oil and Grease is present upon inspection at all sampling locations, during each sampling date, the Licensee shall obtain additional samples to be analysed for Oil and Grease to comply with Part F, Item 2.	✓ In compliance.
I.3	The Licensee shall confirm the locations and GPS coordinates for all monitoring stations referred to in Schedule I with an Inspector.	✓ In compliance.
I.4	The Licensee shall install and maintain signs that identify the monitoring stations. The signs shall be posted in English and Inuktitut.	✓ In compliance.
I.5	The Licensee shall undertake a geotechnical inspection, to be carried out annually by a Geotechnical Engineer, during the months of July, August or September and reported as set out in Part I, Item 6. The inspection shall be conducted in accordance with the <i>Canadian Dam Safety Guidelines</i> , where applicable and be consistent with the "2008 Annual Geotechnical Inspection" (BGC Engineering Inc., January 30, 2009), taking into account all major earthworks and any changes to the project.	✓ In compliance.
I.6	The Licensee shall submit to the Board, within the Annual Report required by Part B, Item 3, a report of the Geotechnical Engineer's Inspection carried out under Part I, Item 5. The Report shall include a cover letter from the Licensee, outlining an implementation plan to address the recommendations of the Geotechnical Engineer.	✓ In compliance.
I.7	The Licensee shall submit to the Board, within the Annual Report required by Part B, Item 3, a detailed "Annual Water Quality Review" which includes, analysis of results and comparison to regulatory standards, approved plans, and demonstration of stability for termination of post-closure monitoring program where merited.	✓ In compliance.
I.8	The Licensee shall submit to the Board for approval in writing, within three (3) months of issuance of the Licence, a "Comprehensive Contingency Plan" to include:	✓ In compliance.
I.8 a.	Consolidation of contingency measures as provided in the Appendices to the 2004 Reclamation Plan and Closure Plan(s);	Submitted Geotechnical and Water Quality Contingency Plans October 1, 2009 in response to items a, b and d. Translated summaries submitted October 23, 2009.
I.8 b.	Levels established and the methodology used in the establishment of contingency levels for water quality monitoring parameters and the geotechnical monitoring program, must be established whereby defined abatement and mitigation actions would be undertaken for any exceedance of such levels or criteria, taking into account historical background conditions;	
I.8 c.	Mitigation and monitoring that addresses any environmental issues that may develop during reclamation of the Main Fuel Tank Farm; and	Submitted October 20, 2009 and approved April 26, 2010.
I.8 d.	Reporting requirements.	
I.9	All sampling, sample preservation and analyses shall be conducted in accordance with the methods prescribed in the current edition of " <i>Standard Methods for the Examination of Water and Wastewater</i> " or by other such methods approved by an Analyst.	✓ In compliance.

Appendix P: Compliance Assessment and Status Report

Licence Condition			Status of Compliance
I.10	All analyses shall be performed in an accredited laboratory according to ISO/IEC Standard 17025. The accreditation shall be current and in good standing.	✓	In compliance.
I.11	The Licensee shall submit a revised "Quality Assurance/ Quality Control (QA/QC) Plan". The QA/QC Plan shall be modified to include up to date sampling methods to all applicable standards, acceptable to an accredited laboratory as required by Part I, Item 9 and Part I, Item 10. The Plan shall include a covering letter from the accredited laboratory confirming acceptance of the Plan for analyses to be performed under this Licence.	✓	Submitted October 20, 2009. Approved November 6, 2009.
I.12	The Monitoring Program may be modified, without a public hearing, at the discretion of the Chief Executive Officer. Requests for changes to the Program must be forwarded to the NWB in writing and include a comprehensive trend and comparative analysis to previously collected data, including background monitoring data for all sample parameters and locations, and provide a rationale acceptable to the NWB to support the request.	~	N/A
PART J: CONDITIONS APPLYING TO ABANDONMENT, RECLAMATION AND CLOSURE			
J.1	The Licensee shall continue to implement the Nanisivik Mine 2004 Reclamation Plan and Closure Plan as approved by the Board on July 6, 2004 including the monitoring requirements to confirm objectives, or as subsequently revised to incorporate design changes and adaptive engineering required and implemented during Construction and on the basis of actual site conditions and monitoring results over the implementation period or as otherwise required by this Licence. The plan included:	✓	In compliance.
J.1 a.	Nanisivik Mine 2004 Reclamation Plan and Closure Plan;		
J.1 b.	Engineering Design of Surface Reclamation Covers Report;		
J.1 c.	Surface Cell and Test Cell Taliks Report;		
J.1 d.	Quarry Development and Reclamation Plan;		
J.1 e.	Detailed Design of the West Twin Dyke Spillway Report;		
J.1 f.	Rock Piles and Open Pits Closure Plan;		
J.1 g.	Closure Monitoring Plan;		
J.1 h.	2003 Phase III Environmental Site Assessment Report;		
J.1 i.	Human Health and Ecological Risk Assessment Report;		
J.1 j.	West Twin Disposal Area Closure Plan;		
J.1 k.	Waste Disposal Plan; and		
J.1 l.	Landfill Closure Plan.		
J.2	The Licensee shall submit to the Board for approval in writing, by September 30, 2009, Abandonment and Reclamation Plan specific to the Fuel Tank Farm, prepared in accordance with the <i>Mine Site Reclamation Guidelines for the Northwest Territories, 2007</i> and consistent with the <i>INAC Mine Site Reclamation Policy for Nunavut, 2002</i> . The Plan shall include:	✓	Submitted October 20, 2009. Approved April 26, 2010.
J.2 a.	Detailed engineering designs, stamped by an Engineer, for the closure (where applicable);		
J.2 b.	Details on the collection and disposal of hydrocarbon residues within all tanks and pipes;		
J.2 c.	The process of dismantling and disposing of all tanks, pipes, pumps and liners including final disposal location;		
J.2 d.	Description of the final desired landscape;		
J.2 e.	Discuss potential closure issues and liabilities including anticipated costs of all remediation activities;		
J.2 f.	Identify a plan to delineate, treat and dispose of hydrocarbon contaminated soils located within, beneath and adjacent to the Fuel Tank Farm;		
J.2 g.	Confirmation of Soil Quality Remediation Objectives (SQRO's) for the tank farm area;		
J.2 h.	Consideration for disposal of liquid and/or hazardous waste in accordance with Government of Nunavut requirements or guidelines;		
J.2 i.	Confirmatory soil analysis for Total Petroleum Hydrocarbons (TPH);		
J.2 j.	Decontamination and removal procedures for the tank and liner;		
J.2 k.	Spill Contingency measure in accordance with <i>Spill Contingency Planning and Reporting Regulations</i> developed under the <i>Environmental Protection Act (Nunavut)</i> ; and		
J.2 l.	Detailed implementation schedule for all tasks and activities.		

Appendix P: Compliance Assessment and Status Report

Licence Condition		Status of Compliance	
Additional Conditions and Restrictions			
Approval - Abandonment and Reclamation Plan, Fuel Tank Farm, Former Nanisivik Mine Site, Nunavut, Type "A" Water Licence 1AR-NAN0914, Part J, Item 2			
1	Refer to GN DOE's guidelines <i>Environmental Guideline for Contaminated Site Remediation (updated March 2009)</i> , for assessment and remediation of the site;	✓	In compliance.
2	Refer to Environment Canada's document <i>Federal Guidelines for Landfarming Petroleum Hydrocarbon Contaminated Soils</i> (2006), when carrying out the soil remediation activity;	✓	In compliance.
3	Provide a more detailed Gantt Chart (timeline) for the project, upon retaining a contractor;	✓	Submitted to DFO December 9, 2010. Timeline updates submitted with 2011 and 2012 annual reports.
4	Provide to the Board and DFO for review, the contractor's Spill Contingency Plan; and	✓	Submitted May 10, 2012.
5	Any additional waste generated at the site through the reclamation activities shall be removed from the site to a licensed disposal facility.	✓	In compliance.