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STAFF REPORT

Company: Imperial Oil Resources N.W.T. Limited	
Location: Norman Wells, NT	Application: S13L1-007
Date Prepared: November 15-30, 2014	Meeting Date: December 3-4, 2014
Subject: Type A Water Licence Renewal Application	

1. PURPOSE

To receive direction from the Board on outstanding issues from proceedings of Imperial Oil Resources N.W.T. Limited's (IORL) Type A Water Licence (WL) renewal.

2. BACKGROUND

IORL has been producing oil at Norman Wells NWT since the 1920's and has operated facilities at Norman Wells under the Proven Area Agreement since 1944. When the *Mackenzie Valley Resource Management Act (MVRMA)* came into force in 1998, the Sahtu Land and Water Board (SLWB) was established to regulate land and water within its management area. Since the *MVRMA* came in to force, IORL has conducted its Norman Wells Operations pursuant to the terms and conditions of two water licences issued by the SLWB, S99L1-003 and S03L1-001 (the current licence).

Water licence S03L1-001 expires on March 25, 2015. Consequently, IORL has applied to the Board for the renewal of this Type A water licence. IORL's renewal application, S13L1-007, was deemed complete on October 1, 2013, initiating this Type A water licence renewal process.

A Preliminary Screening was undertaken by the SLWB in April 1999, and was subsequently approved by the Board on April 28th, 1999. Because the application is for renewal of a current water licence with no modifications to the development, the application is exempt from preliminary screening in accordance with Section 2 and Schedule I, Part I, paragraph 2 of the *Exemption List Regulations* made pursuant to subsection 143(1) of the *MVRMA*.

In Schedule III of IORL's licence renewal application, the proponent described the undertaking at its Norman Wells Operation as follows:

Imperial Oil Resources NWT Limited (IORL) produces petroleum from wells drilled in the vicinity of Norman Wells. Operational areas associated with its activities at Norman Wells include: the Central Processing Facility (CPF), the Natural Islands (Goose, Bear & Frenchy's) and the Artificial Islands (1-Rayuka, 2-Rampart, 3-Dehcho, 4-Ekwe, 5-Itch K'ee & 6-Little Bear). These locations are collectively located within the area described as the Norman Wells Proven Area. In addition to processing petroleum, the CPF also generates electricity and natural gas. Imperial currently supplies natural gas used by the Town; however, as supplies have been declining, this natural gas service will cease in 2014. Provision of electricity to NTPC for use by the Town is expected to continue for the foreseeable future.

As part of these activities, IORL (a) obtains water from the Mackenzie River on an ongoing basis and (b) routinely conducts maintenance activities in and around the banks of the Mackenzie River. Water from the Mackenzie is required for process cooling and reservoir pressure maintenance. Regular maintenance work in and around the banks of the River is required to control erosion, and protect, replace and repair equipment.

Further to what was identified as the undertaking in the proponent's application, IORL manages several waste streams at the Norman Wells Operation as identified in the Waste Management Plan that forms a part of their renewal application. This includes coolant water released to the river, surface water, the biocell, the waste storage yard, contaminated soil and groundwater management, and domestic waste.

As part of the renewal application Imperial Oil also submitted new or updated submissions of the following:

- An updated Environmental Protection Plan
- A Traditional Knowledge Study
- A Waste Management Plan
- A Flowline Integrity Management Plan
- An Engagement Plan
- A Groundwater Management Plan

Based on section 34 of the *MVMRA*, or section 2.1 of the Sahtu Land Use Plan (Plan), the Plan does not apply to lands within the boundaries of a local government. Based on all available map and GIS information, Imperial Oil operates entirely within municipal boundaries and is therefore not subject to the Land Use Plan. The small portion outside the municipal boundaries is within the river and has no Imperial Oil infrastructure.

The Process

IORL submitted an application for a ten-year renewal of their existing Water Licence on August 27, 2013. Imperial Oil began community consultation for this renewal process in November 2012; seeking input and meeting with community organizations from each of the five Sahtu communities.

As per the Board's *Engagement and Consultation Policy* (June 2013), IORL submitted an Engagement Plan and a log outlining their engagement to date; which includes questions and concerns that arose and their commitments to address them.

The renewal application consisted of 20 sections which gave a broad overview of all their operations, management procedures, and monitoring programs to date. Imperial has not requested a change to the amount of water being withdrawn from the Mackenzie River or noted any changes to the operations themselves.

The Renewal Application was deemed complete on October 1, 2013 and circulated by the Board to 33 organizations; requesting a reply by November 18, 2013. The SLWB received responses from seven organizations¹. All comments were submitted through the Online Review System and included responses from Imperial Oil.

Technical Information sessions were held in Norman Wells on January 15-17, 2014 to provide an opportunity for parties to clarify issues and request additional information before submitting public hearing interventions. Discussions revolved around the requested Licence amendments made by Imperial Oil in their renewal application, water quality management, the Surveillance Network Program (SNP), contaminated soil management, flowline integrity management, and closure and reclamation. The technical sessions were attended by representatives from numerous organizations².

Numerous action items and commitments were documented at the sessions in addition to five formal information requests (IRs) which were circulated by the Board on January 20, 2014 with request for information to be submitted by February 3, 2014.

¹ Review comments received from Aboriginal Affairs and Northern Development Canada (AANDC), Government of Northwest Territories – Environment and Natural Resources (GNWT-ENR), Environment Canada (EC), Sahtu Renewable Resource Board (SRRB), Yamoga Land Corp. Letters indicating no concerns or comments were received from Department of Fisheries and Oceans (DFO) and GNWT – Health. Letters of support were received from Canadian Helicopters, Global Technical Systems, Norman Wells Chamber of Commerce, and JFSL (Review Comments and Proponent Responses 18-Dec-2014).

² Technical sessions attended by IORL, the National Energy Board (NEB), SRRB, EC, Norman Wells Land Corporation (NWLC), Norman Wells Renewable Resources Council (NWRRC), GNWT-ENR, GNWT-Health, Yamoga Land Corporation, Fort Good Hope Renewable Resource Council, Fort Good Hope Metis Land Corporation, and AANDC.

- GNWT-ENR IR #1: Release of Community Water Monitoring Program Research Questions/Data;
- GNWT-ENR IR #2: Provide Background information on PAH/TPH and its relationship;
- IORL IR #1: Review of EQC for TPH according to the Board's Water and Effluent Quality Management Policy;
- IORL IR #2: Map of SNP Locations and Surface Water Discharges; and
- IORL IR #3: Define Closure and Reclamation Facilities and document contaminated soil management practices in the Waste Management Plan.

The Board circulated five additional information requests³ on February 6, 2014 to Aboriginal Affairs and Northern Development Canada (AANDC) and IORL to seek clarification on concerns that were raised regarding the security being held for the Norman Wells operation:

- AANDC IR#1: Current Security Held for Imperial Oil's Norman Wells Operations;
- AANDC IR#2: Mine Site Reclamation Policy;
- IORL IR#4: Provide a Security Estimate;
- IORL IR#5: Evidence of Financial Capacity; and
- IORL IR#6: Security for Norman Wells Operations.

The Board circulated an additional two information requests⁴ to AANDC on March 21, 2014 which were to be submitted to the Board by April 9, 2014:

- AANDC IR#3: Details on Crown Trust Account to Secure Closure and Reclamation Costs for Imperial Oil Resources Limited Norman Wells Operations; and
- AANDC IR#4: The Norman Wells Proven Area Agreement.

IORL's response to information request #4 questioned the Board's jurisdiction with respect to requiring a closure cost estimate. The issues presented in the various IORL submissions and in the "Position" filed on March 28, 2014 included the following:

- The authorities and role of the SLWB as set out in the *MVRMA*;
- IORL water use and waste deposit in relation to the scope of the appurtenant undertaking subject to the licence;
- The effect of NEB authorities on Board jurisdiction;
- The effect of the Proven Area Agreement (PAA) on Board jurisdiction;
- SLWB authority over the regulation of groundwater; and

³ These information requests were presented to the Board in Staff Report #1 on March 13, 2014

⁴ These information requests were presented to the Board in Staff Report #2 on April 29, 2014.

- SLWB authority over closure and reclamation including the determination of security in relation to the scope of the appurtenant undertaking.

The Board instructed IORL to prepare its legal submissions on these jurisdictional matters on March 13, 2014 and to file them by March 28, 2014. The Board initiated a process through which a ruling on the scope of the SLWB jurisdiction⁵ could be made and circulated a letter to the distribution list on March 24, 2014 outlining the Board's Jurisdictional Ruling Process and informing parties wishing to file their own jurisdictional arguments to do so by April 11, 2014. Responses were received from AANDC on behalf of the Attorney General of Canada, from counsel representing the Government of the Northwest Territories (GNWT), and from the Sahtu Secretariat Incorporated (SSI). IORL was given until April 22 to respond to those submissions.

The Board issued its ruling on May 15, 2014 and determined that:

After careful review of the arguments and reply filed by the parties participating in this ruling, the Sahtu Land and Water Board (the Board or the SLWB) has decided that its jurisdiction extends to all licensed activities involving the use of water or the deposit of waste at the Norman Wells Operation of Imperial Oil Resources Limited (IORL).

The Board is of the view that its authorities do not conflict with those granted to the National Energy Board (NEB) under its legislation and that these regulatory regimes are complementary. More specifically, the SLWB is of the opinion that it has jurisdiction to regulate the closure and reclamation of the appurtenant undertaking, at the end of project life, including project effects on groundwater. The Board finds that these authorities are not affected by the Proven Area Agreement. The Board's jurisdiction applies to the Norman Wells Operations and is not displaced by NEB authorities which operate independently, within the jurisdiction granted to that Board by Parliament.

The SLWB has explicit jurisdiction to determine the appropriate amount of security, for closure and reclamation of the licensed undertaking under section 72.11 of the Mackenzie Valley Resource Management Act (MVRMA), in a manner consistent with the Northwest Territories Waters Regulations⁶.

⁵ Two items of clarification were: A request for the SLWB to clarify its jurisdiction over the closure and reclamation of the Norman Wells Operations, and a request for the SLWB to clarify its jurisdiction over financial security for the closure and reclamation of the IORL Norman Wells Operations.

⁶ Ruling of the Sahtu Land and Water Board in the Matter of: An application for the renewal of a Type 'A' Licence S13L1-007 for its Norman Wells Operation by Imperial Oil Resources N.W.T. Limited. May 15, 2014.

Due to IORL's concerns over confidentiality of information related to the preparation of the liability estimate, matters related to closure and reclamation costs were not part of the public hearing process, but was deferred to a separate written process agreed to by all parties. IORL, AANDC, and the GNWT were directed to work with Board staff and counsel to develop a process to address the preparation of a final closure and reclamation cost for the renewed licence in an appropriate manner. The GNWT, AANDC and the SLWB met with IORL on a number of occasions to discuss and review the security estimate based on the oil and gas version of RECLAIM.⁷

IORL withdrew their May 30, 2014 request for confidentiality with regard to the estimate and submitted a closure cost estimate on September 26, 2014. Comments from AANDC and GNWT on the security estimate were received by October 27, 2014.

Notice of Public Hearing was issued February 18, 2014 with interventions from parties wishing to present at the hearing due on March 7, 2014. The Board received interventions from three parties (AANDC, EC and GNW-ENR), as well as a fourth expressing interest in presenting at the Hearing. A summary of each party's interventions with corresponding responses from IORL were presented in Staff Report 2 April 29, 2014. A Pre-Hearing Conference between interveners, IORL, Board staff and legal counsel took place on June 4, 2014.

There was a Public Hearing held, in accordance with Section 72.15(2) of the *MVRMA*, in the community of Norman Wells on June 12 and 13, 2014. The Public Hearing was advertised throughout the Sahtu Settlement Area. Written interventions were received from EC, AANDC, and GNWT-ENR. IORL provided a written response to these interventions. English and North Slavey translation services were provided at the public hearing and the proceeding was recorded and transcribed.

During the course of the public hearing, the Applicant and Intervenors were required to provide six undertakings⁸ to the Board by June 25, 2014:

1. GNWT – Map of land ownership of the Proven Area;
2. IORL – Sampling and monitoring for hydrocarbon sheens;
3. AANDC – Rationale for proposed EQC for total petroleum hydrocarbons;
4. AANDC & GNWT – Identification of metals to incorporate into the SNP;
5. IORL – Information regarding total suspended solids; and
6. IORL – Information regarding testing and analysis of surface water releases at all bunkers.

⁷ Version 7.0 of RECLAIM was developed by Brodie Consulting Ltd. on behalf of AANDC.

⁸ These undertakings were presented to the Board as part of Staff Report #3 on July 22, 2014.

3. DISCUSSION

The conditions set forth in the WL have been imposed in order to address the Board's statutory responsibilities and the concerns that arose during the regulatory process. This document focuses on the major issues that resulted in changes to the WL. Issues related to effluent quality criteria (EQC) are discussed below in section 3.1 and a more detailed analysis for EQC determinations is provided in Appendix A. Issues related to security are discussed below in section 3.2 and a more detailed analysis is provided in Appendix B. Issues related to other WL conditions are discussed in section 3.3.

In drafting the licence, changes were made to the previous WL based on the following overriding principles:

- To provide for the conservation, development, and utilization of land and water resources in a manner that will provide the optimum benefit generally for all Canadians and in particular for residents of Sahtu, as per section 58.1 of the *MVRMA*;
- To achieve consistency with policies and guidelines adopted by the Mackenzie Valley Land and Water Board (MVLWB), namely: the *Water and Effluent Quality Management Policy* (2011), the *Guidelines for Developing a Waste Management Plan* (2011), and the *Engagement Guidelines for Applicants and Holders of Water Licences and Land Use Permits* (2013);
- To ensure overall clarity of the licence requirements;
- To achieve consistency with existing type A water licences; and
- To address recommendations from reviewers and the Applicant.

In order to improve clarity, the overall structure of the WL has been changed and a table of contents has been included. Details related to all management plans, reports, and the security deposit referenced in the main body of the Licence have been moved into the Schedules appended to the Licence. The purpose of this change is to allow the reader to easily locate provisions relating to specific plans and reports. In addition, the Board will have the ability to efficiently amend the detailed requirements specified in the Schedules, if appropriate, during the term of the WL.

Minor changes that were made to the formatting and style of the WL include:

- Ensuring all defined words/phrases are capitalized (such words are also capitalized in these Reasons For Decision);
- Ensuring all internal references are accurate; and
- Generally using the word "revise" for plans in this WL, rather than amend (which is used by the Board to refer to amending conditions, schedules, or the SNP), modify

(which is associated with the specific definition of Modification stated in this Licence), or update (which is used to refer to a particular type of revision).

3.1 Water Quality and Effluent Quality Criteria

Since IORL's previous renewal, the SLWB adopted the *Water Quality and Effluent Management Policy* (2011, the Policy) which requires a review of the licensed effluent quality criteria (EQC) to ensure they are set in accordance with the objectives of the Policy. The Policy defines two objectives for regulating the deposit of Waste through water licence conditions:

1. To maintain water quality in the Receiving Environment "at a level that allows for current and future water uses;" and
2. To minimize the amount of Waste deposited to the Receiving Environment following the principles of pollution prevention⁹.

Board staff recommend that the Board considers these objectives when reviewing the analysis of evidence presented in Appendix #1 and providing direction on the following questions.

Oil and Grease vs. TPH

1. Do you believe IORL should switch from measuring oil and grease to Total Petroleum Hydrocarbons (TPH) in order to provide data that are more useful for detecting potential impacts?
2. If yes to #1, do you believe the proposed EQC of 3.0mg/L maximum on average and 5.0mg/L maximum per grab sample are reasonable?
3. Do you believe IORL has presented sufficient evidence to support their position that a delay in laboratory processing times may result in damage to their facilities and the land and water?
4. If yes to #3, do you believe the current EQC of 10.0mg/L of oil and grease is appropriate?

Metals and Ions

1. Do you believe IORL should sample for metals and ions?
2. Do you believe IORL has provided sufficient rationale for the exclusion of the sampling of these parameters?
3. Do you believe a Special Effects Study, as recommended by Hutchinson Environmental Sciences Limited (HESL), will help to identify whether EQC for these parameters are necessary?

⁹ Pollution Prevention, as per page 9 of the Policy, means: the use of processes, practices, materials, products, or energy that avoid or minimize the creation of pollutants and Waste and reduce the overall risk to human health and the environment.

Visible Sheen Field Testing

1. Do you believe the current practice for the field testing of Surface Water Runoff Facilities (visible sheen, chloride, and pH) are protective of the receiving environment?

Total Suspended Solids (TSS)

1. Do you believe there should be an EQC developed for total suspended solids?

Specific Conductivity

1. Do you believe there should be an EQC developed for specific conductivity?

Phenols

1. Do you believe the current EQC for phenols are protective of the environment?
2. Is there sufficient evidence to support changing the EQC for phenols?

Chloride

1. Do you believe there should be an EQC developed for chlorides?

3.2 Security

A security deposit is required as a condition of licence in order to cover the anticipated costs of closure and reclamation (the 'closure cost estimate') if the company becomes insolvent and abandons the site. Security deposits ensure that the cost to close and reclaim the site is born by the company rather than the taxpayers of Canada.

Generally, the Board will set the Licensee's security deposit during the licencing process, which for a Type A Water Licence is a formal proceeding involving a public hearing. In the case of IORL, a process for determining the appropriate amount of security has been running concurrently.

A RECLAIM estimate was submitted by IORL on September 26, 2014 and by the GNWT on October 24, 2014, and the Board also received comments on the estimate from AANDC.

Table 1. Summary of Closure Cost Estimates

Party	Security	Major Difference
IORL	\$178,321,052	Used contingency of 10% and only applied to direct costs
AANDC	\$180,883,606	Used contingency of 10% but applied to direct and indirect costs
GNWT	\$227,063,353	Wells & facility, buildings & equipment, chemical & soil management, interim care and maintenance, post-closure monitoring and maintenance, and used contingency of 25%

The Board's consultant, SLR Consulting (Canada) Ltd. prepared a memo to assist the Board in resolving the differences between the GNWT and IORL estimates, but cautioned that "the results of this assessment and the recommendations provided herein should be viewed as preliminary only and subject to change." This memo and SLR's analysis of the estimates is provided in Appendix #2.

There are hundreds of line items with associated cost estimates in the GNWT and IORL estimates and the vast majority are identical. For each difference, SLR advised the Board to adopt the higher of the two numbers, which in all cases but one case is the GNWT number. In support of this advice, SLR stated that "SLR is recommending the higher levels of security proposed by both GNWT and IOR due to the uncertainties outlined above (e.g., lack of decommissioning plan)." The specific uncertainties SLR identified are:

- No current decommissioning plan was available for review. This is a major issue in reviewing the proposed security due to the following factors:
 - The lack of overall decommissioning and reclamation objectives over the short- and long-term.
 - The lack of an overall understanding of the approach and management of reclamation activities.
 - The lack of baseline information to assess the credibility of volumes and unit costs (e.g., volume of contaminated soil).
 - The lack of details in regards to line items in the RECLAIM model to assess the adequacy of the security proposal.
- A major cost for the Abandonment and Reclamation (A&R) in the Norman Wells facility is the plugging and abandoning of 383 wells. A total of 33 already have an abandoned status leaving 350 wells to be reclaimed. The proposed unit cost for the A&R of wells is \$56,600 and \$71,200, giving a total cost on the RECLAIM model of \$35m out of a total \$136m. These costs seem low for a facility in Northern Canada, however it is not possible at this stage to provide an alternate cost proposal given the lack of information in regards to the reclamation of the NWO.
- Radioactive materials can, in certain circumstances (dependent on temperature, pressure, acidity, etc.) be transported from a producing reservoir to the surface with the hydrocarbon product. During the production process NORM (Naturally Occurring Radioactive Material) flows with the oil, gas and water mixture and accumulates in scale, sludge and scrapings. It can also form a thin film on the interior surfaces of gas processing equipment and vessels. The level of NORM can vary substantially from one facility to another. NORM is mentioned in the IMO report, but no provision appears to have been made for its analysis, removal and disposal. This issue needs to be formally included in the abandonment and

reclamation planning in terms of treatment and disposal costs. It is not possible at this stage to estimate potential reclamation costs associated with NORM due to a lack of baseline information but this should be part of an updated Decommissioning Plan for the NWO.

Although the approach suggested by SLR is simple, it does not address IORL's response to GNWT's estimate specifically. Within their response, IORL raised a number of points to support their cost estimate. For example, in IORL's response to the GNWT's closure cost-estimate IORL identifies that the GNWT added \$4.1M to dismantle and haul buildings to the landfill assuming that all buildings are two stories. IORL notes that "Only the office building occupies two stories."¹⁰ Staff do not recommend adopting SLR's recommendation because it appears that at least some of the IORL arguments may be valid. The Board would risk making a decision that did not consider all of the evidence on the record. Therefore staff recommend that the Board request that SLR conduct an analysis of IORL's responses, provide a detailed response to each of IORL's arguments, and adjust their recommendations if necessary. Staff recommend that SLR be instructed to review all evidence on the record that informs the closure cost estimate, and that its analysis should be in a format that could be cut and paste into a Reasons for Decision document, should the Board adopt SLR's recommendations. Staff estimate that SLR would require approximately two to three weeks to perform this analysis, depending on their current work load, and that staff would require approximately one week to review and confirm SLR's conclusions and refine SLR's recommended excerpts for the Reasons For Decision.

Within the time available, staff were unable to thoroughly review all of the evidence regarding the security estimate, or confirm all of SLR's findings. The Board may wish to consider allowing staff more time to work with SLR to incorporate the IORL response into their recommendations, resolve discrepancies, and if necessary, to request additional information from any of the parties.)

3.3 Water Licence Conditions

Where parties have suggested additions, deletions, or changes to conditions which seem reasonable, Board staff have incorporated these in the DRAFT water licence. For instances where parties haven't agreed and instances when staff were unsure on the inclusion or details of a condition, a discussion is included below for the Boards information before finalizing the licence.

¹⁰ IORL Response to GNWT's Closure-cost estimate. Submitted November 6, 2014.

Comments on Part A of the Licence:

Scope

The scope of the Licence was amended to use water and dispose of Waste for industrial undertakings in oil and gas production and closure and reclamation as recommended by AANDC in their intervention. IORL agreed to the change in scope. The current water licence was designed to be an operational licence to be implemented during the production life of the oilfield. As there is potential that Imperial will either be in a closure state, or preparing to enter a closure state, during the term of the renewed Water Licence, operations and closure should be reflected within the renewed scope.¹¹

Definitions

As recommended in the AANDC intervention, new definitions were added to the Licence including “Aquatic Effects Monitoring Program”; “Biocell”; “Discharge”; “Groundwater” “Groundwater Treatment Facilities”; “Management Plans”; Progressive Reclamation”; “Project”; “Receiving Environment”; “Reclamation” and “Unauthorized Discharge”. These definitions reflect the current status and regulatory requirements relating to activities undertaken at the operating site.

The legislative references in the definitions for Act, Analyst, Board, Inspector, Minister, Regulations, Waste, and Waters were updated to reflect the new *Mackenzie Valley Resource Management Act* that was enacted on April 1, 2014, as a result of the NWT Lands and Resources Devolution Agreement.

Comments on Part B and C of the Licence:

The General Conditions section stipulates matters regarding compliance and conformity with the *MVRMA* and the NWT Waters Regulations. There are also conditions in this section which pertain to the Surveillance Network Program (SNP), measuring devices, signage, and the location of copies of the WL. These are standard conditions found in recent WLs issued by the Board.

Changes made to this section include moving the information requirements for the Annual Report to Schedule 1; moving the security to a separate section – Part C and Schedule 2; adding conditions related to Management Plans; adding the submission of a revised Engagement Plan to the WL; and adding a condition to consider and incorporate any scientific information and Traditional Knowledge which reflects the current practice of IORL in their application and SLWB requirements for complete application.

Engagement assists the proponent in developing an understanding of the social, cultural, and environmental conditions in the region of operations and allows the company to adapt and improve the project in response to local concerns and interests. The Board’s Engagement and Consultation Policy defines ‘engagement’ as “the communication and

¹¹ AANDC Intervention March 7, 2014

outreach activities a proponent undertakes with affected parties prior to and during the operation of a project.”¹²

Board staff have included a condition under Part B, Item 9 of the DRAFT License which requires that:

“Within six months of the effective date of this Licence, the Licensee shall submit a revised Engagement Plan, in accordance with the Mackenzie Valley Land and Water Board’s Engagement Guidelines for Applicants and Holders of Land Use Permits and Water Licences, June 2013, to the Board for approval.”

The inclusion of such a condition will ensure the Licensee is adhering to the Board’s Policy and continues to enhance its relationship with affected parties.

The AANDC comments indicate concerns with respect to the approach taken by the Board [and other Land and Water Boards] to the review and amendment of Schedules appended to type “A” water licenses. In particular, these comments address Part B items 4, 5 and 6, and Part C item 3 of the license, respectively. The changes proposed suggest that amendments to Schedules, including those addressing the amount of the security deposit required by the license, should be subject to review and approval by the Minister of AANDC.

It has been clear in relation to the enactment of recent amendments to the *MVRMA*, and in particular to the AANDC emphasis on section 72.13 of the Act, that such comments would be made in relation to water licenses in a federal area, and that the department would attempt to reinforce the Minister’s authority with respect to license amendments. These comments are also consistent with the response from Minister Valcourt to the Nunavut Water Board (NWB) on their water license and reasons for decision in the Baffinlands Mining Corporation - Mary River Project. In that case, the Minister was particularly direct in advising the NWB that he considered provisions allowing for amendments of Schedules to be eroding his authority to approve amendments to type A water licenses. The NWB responded to the Minister’s criticism and as a result he forwarded a second letter to that board. Excerpts from that letter are set out below:

“In the future, where the Board foresees a need for flexibility on specific issues, the licence should clearly identify and establish a predictable and transparent process for the consideration and adoption of appropriate changes. The licence

¹² The Engagement Consultation Policy (The Policy) defines an engagement plan as “a forward-looking document that details times and approaches to engagement with the appropriate affected party over the life of the authorization or, for larger authorizations, over the life of the project. It should reflect the scope, scale, and context of the project” (p. 11).

should also clearly identify the provisions that could be modified within such a process.”¹³

The Board has several options in responding to these particular comments on the draft license. First, it could simply accept them, but this would undercut the practice which has evolved in the Mackenzie Valley over the last number of years whereby Land and Water Boards have reorganized, rationalized and improved the quality of their licenses by shifting material to license Schedules. In addition, Boards have developed the practice of including compliance dates and other administrative matters in these Schedules and included explicit terms and conditions authorizing the Boards to amend these Schedules in the body of the license.

That is precisely what the terms and conditions found in Part B items 4, 5 and 6, and Part C item 3 are about. It should be noted that similar provisions were approved by the Minister’s predecessor in license S03L1–001 in 2004. The second option might be to simply ignore the AANDC comments. This involves both legal and political risk since the Minister’s and department’s concerns are clear and the Board practice which has evolved, while efficient, is not based on a strong statutory foundation. Finally, the Board could take advantage of the comments made by the Minister to the Nunavut Water Board cited above and develop license terms which incorporate those ideas. It appears that in his letter the Minister is setting out the terms under which he might be comfortable with continued use of Schedules and Board authority to amend them set out in a license.

Board staff believe that it is important to show AANDC that we are aware of their concerns and that we have attempted in good faith to draft a license which is consistent with the guidance provided by their Minister. Thus, we are recommending option #3. This option will involve the addition of a couple of sections to Part B of the license but it will allow us to retain the wording set out in Part B items 4, 5 and 6, and Part C item 3. It will also allow the Board to continue to manage this water license in an efficient, effective and timely fashion.

The proposed wording for the sections to be included in Part B of the license is set out below:

Part B: General Conditions

- x. The Licensee shall comply with the Schedules, which are annexed to and form part of this License.
- xx. The Schedules may be amended at the discretion of the Board through a process which includes public notice of the Board’s intention to consider a

¹³ Letter from Minister Valcourt to T. Kabloona Chair NWB December 13, 2013 – RE: Type “A” Water Licence 2AM-MRY 1325 – Mary River Project, page 2.

change, such notice to be provided to the Licensee, the Minister, regional AANDC officials and other affected or interested stakeholders. Any proposed change to a Schedule will be clearly explained and a reasonable opportunity will be provided for comments to be provided by interested parties and considered by the Board before a decision is made.

xxx. The matters for which flexibility is required by the Board and where amendments to Schedules may be made by the Board from time to time include the following:

- The Surveillance Network Program Annex A;
- Compliance Dates Specified in the Licence;
- Schedule 1 General Conditions;
- Schedule 2 Conditions Applying to Security;
- Schedule 3 Conditions Applying to Water Use;
- Schedule 4 Conditions Applying to Operations and Maintenance;
- Schedule 5 Conditions Applying to Aquatic Effects Monitoring; and
- Schedule 6 Conditions Applying to Closure and Reclamation.

Note that the Board may wish to include additional detail about amendments to the Schedules beyond what is proposed in the draft sections set out above. Such detail can still be included in the license “for greater certainty”.

IORL proposed a change to Part B, item 8 to provide clarification on the requirement for signs, noting that signs mounted on ground posts were not always effective. The condition as written specifies that identification signs shall be posted and maintained in a manner satisfactory to an Inspector. This implies that there is flexibility in the type of sign or permanent identification to be established at any given SNP site.

Comments on Part D

IORL requested wording changes to Part D, item 1 to clarify their use of water from the Mackenzie River for other industrial or maintenance uses associated with operations utilizing either the approved water intake *or other means*. Accepting these changes to the condition creates uncertainty for the Board in their ability to ensure that any new water intake established for maintenance work will be protective of the environment. The current condition allows other intakes from the Mackenzie River to be approved by the Board. Board staff have not accepted IORL’s proposed wording and encourage the Licensee to submit a request to the Board with sufficient supporting information for their consideration.

A new condition was added to the WL regarding water to be used for dust suppressant. IORL agreed with the addition of this condition.

Comments on Part E

The title was changed from Conditions Applying the Waste Disposal to Conditions Applying to Waste and Water Management.

Conditions related to the drilling fluids, drilling waste and sumps, which are no longer used, were removed from the WL.

Conditions were added for the Licensee to operate in accordance with the Groundwater Management Plan, the Environmental Protection Plan, and the Waste Management Plan, once approved.

During the public hearing, IORL was asked to provide details and timelines for the review of their environmental management plans¹⁴. The Licensee provided a list of the plans¹⁵ and the frequency for when they are expected to be updated. After discussion with Board staff on this schedule, it was agreed that the following four management plans would be submitted to the Board for review by September 26, 2014: Environmental Protection Plan, Waste Management Plan, Groundwater Monitoring Plan, and Flowline Integrity Management Manual. The Board did not receive any comments or recommendations from parties during their closing arguments.

Board staff believe that IORL has prepared these four plans in accordance with relevant guidance and best practice and based on the lack of concerns from reviewers, recommends the Board approve the Environmental Protection Plan, the Waste Management Plan, and the Flowline Integrity Management Manual. Board staff recommend the Board does not approve the Groundwater Monitoring Plan and requires the Licensee to revise this Plan to incorporate the information outlined in Schedule 4, Item 1. The information requirements outlined in Schedule 4 are based on concerns and expert advice regarding potential groundwater impacts that Board staff believe are important to address. A condition has been included in Part E, Item 2 that requires the resubmission of this Plan.

To provide clarity, Board staff have included conditions in the DRAFT Licence which reflect wording that requires proponents to annually review their plans but only to submit a revision when they would like a change, operations on site have changed and necessitate a

¹⁴ EC Comments from Transcript Day 2 pp. 14-16

¹⁵ Waste Management Plan – update by June 2014, annual update in April of every year. Environmental Protection Plan – update June 2014, annual update in June of every year. Spill Contingency Plan (includes Fuel Management Plan) – last version March 2014, update every three years. Emergency Response Plan – NEB requirement. QA/QC Laboratory Plan – August every year. Flowline Integrity Plan – September 2014, update every three years. Groundwater Monitoring Plan – September 2014, update every three years.

revision, or the Board requires a revision¹⁶. Other plans that IORL has in place and regularly updates include: Spill Contingency and Recovery Plan, Fuel Management Plan, Emergency Response Plan, and Laboratory QA/QC Plan.

Conditions were added to ensure that any fuels, chemicals, or Wastes associated with the undertaking do not enter any Waters, except in the manners described in the SNP; and to ensure hydrostatic test fluids are not released to land or Water, but handled through the Licensees injection process.

The effluent quality criteria (EQC) and parameters measured at the surface water discharge SNP station S13L1-007 – 2 to the Mackenzie River were changed to reflect best practices in the Northwest Territories and to measure the same parameters being collected at the inlet SNP station S13L1-007 – 1.

ENR recommended that in addition to maximum average concentrations, the Water Licence also include maximum grab sample limits for the discharge criteria at SNP station S13L1-007 -2 (CPF discharge into the Mackenzie River). This is consistent with other licences in the NWT.¹⁷ We note that the previous licence included maximum average concentrations as well as maximum grab sample limits and there was no evidence submitted by any parties to change these sample limits. The EQC Table was revised to include these recommended sample limits.

The requirement for Microtox Test was eliminated from the WL. The Microtox test is not a good index of threat to the Mackenzie River and the other chemical parameters in the Licence are likely sufficient¹⁸.

A new condition requiring a Special Effects Study to validate that visible sheen is an effective indicator of the lack of hydrocarbons and to establish any threat posed by metals and ions was added into the WL.

The rationale presented for including the recommended metals and ions in the surveillance network program (SNP) is reasonable, namely “Given all of these uncertainties, the SNP network should include all parameters that may degrade water quality, including hydrocarbons, metals and ions. To date, IORL has not provided sufficient rationale for the exclusion of these parameters as noted in the parties’ interventions”¹⁹

“Water that is discharged by IORL to the Mackenzie River from the water management control structures should be of similar quality to the receiving environment if impacts from the operation are not occurring. An established SNP network will track trends of monitored

¹⁶ EC – I would also recommend that the updated date suggestions would be included in the Water Licence itself (Public Hearing Transcripts Day 2, p. 17).

¹⁷ ENR Comments on Draft Water Licence Nov 21, 2014

¹⁸ HESL Comments on Public hearing questions and responses October 24, 2014

¹⁹ Ibid

parameters over time to allow for adaptive management if project impacts are being observed in the SNP network. Without monitoring results, there is no way to determine potential impacts; natural or project related. If the proponent can demonstrate that its water management system is not impacting water quality through historical trend analysis, revisions to the frequency of SNP Monitoring can be discussed at a future date”²⁰.

“As all water control structures on the IORL site will re-enter the Mackenzie River once discharged, the parties recommend that an upstream SNP station that is not influenced by project discharges be used for comparison with the water control structures (Surface Water Runoff Facilities)”²¹.

Comments on Part F

References to the National Energy Board regarding the Flowline Integrity Management Plan were removed.

The procedure for cleaning the backwash (settling) pond was moved to the Surveillance Network Program.

The requirement to report results of the EQC monitoring of the discharge SNP station to the Inspector three days prior to discharge was removed.

Comments on Part G

Imperial proposed that repair and installation of protective features around bunkers, the removal or placement of greater than 100 metres cubed of material to repair or replace flowlines, the addition of material like riprap and sand to affected areas for erosion or river scour, and the addition of riprap around banks and shoring of bridges be included as allowed modifications in the next water licence²². The following were added to allowable modifications in the WL: bunkers, docks, bridges, flowlines, creek banks, and river banks.

Comments on Part H

Regarding Part H, Item 5 (now Item 6), AANDC requested that a detailed report on any unauthorized discharge of waste shall be submitted to the Board as soon as possible or not later than 14 days after initially reporting the event. They felt that 30 days was too long to wait for a detailed report related to an unauthorized discharge. Thirty days aligns with current practices of reporting by IORL for monthly spills – “IORL prepares monthly spill reports and sends these to the NEB with copies to SLWB and AANDC. This approach provides all spill-related information in one consistent, predictable format to all agencies on a consistent and reasonable schedule. Creating a number of similar reports for different agencies on varying schedules is inefficient for all parties, and creates the possibility for duplication and/or missed information sharing. If a particular event warrants earlier or

²⁰ Ibid

²¹ Ibid

²² Public Hearing Transcripts Day 1 p. 51

more frequent verbal or written updates to any of the government agencies, IORL has committed to provide these on an as-requested basis in addition to the regular monthly reports”²³.

Added to the condition was the requirement that the “report shall include descriptions of root causes, response actions, and any changes to procedures to prevent similar occurrences in the future”. This was added to ensure required elements in the detailed report are clear.

Comments on Part I

The previous AEMP in WL S03L1-001 was undertaken and completed from 2002-2006. The requirement to prepare and implement a new Aquatic Effects Monitoring Program within one year of issuance of the WL was added into the WL. This program must be completed according to the *AANDC Guidelines for Designing and Implementing Aquatic Effects Monitoring Programs for Development Projects in the Northwest Territories* (2009). In their intervention, AANDC recommended that an AEMP should be developed to ensure impacts to the aquatic environment are monitored and mitigated. AANDC recommended that the AEMP should be submitted to the Board for review and approval 6 months following approval of the water licence renewal. AANDC also recommended that an AEMP Working Group be established to assist in the development of the AEMP for IORL’s Norman Wells Operation. IORL agreed to the formation of a Working Group but requested one year to develop the program.

Comments on Part J

The title of the section was changed from Abandonment and Restoration to Closure and Reclamation.

The requirements for the annual Closure and Reclamation report were moved to Schedule 7.

The requirement to prepare and implement a new Closure and Reclamation Plan within one year of the issuance of the WL was added into the WL. This plan will be developed based on the concepts referenced in the *“Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories”* as recommended in the AANDC intervention. AANDC also recommended that a Closure and Reclamation Working Group be established to assist in the development of the CRP for IORL’s Norman Wells Operation. IORL agreed to these recommendations.

Moving the reporting due date for both Closure and Reclamation reports to the end of May instead of one in March and one in October.

²³ IORL Comments on Draft Water Licence November 13, 2014

AANDC has commented on Part J item 5, expressing concern that the approval of the Final Closure and Reclamation Plan is within the discretion of the Board. The comment suggests that a license condition requiring an amendment to the license to reflect the change in the purpose or scope of the work would allow “for a full review of the plans for the site by all stakeholders and the Minister”²⁴.

We suggest that this comment has been made without full appreciation for the process that would result after the Board received a Final Closure and Reclamation Plan. The review of such a plan would be a significant undertaking involving all interested parties, including AANDC and its Minister. In this case, of course, Canada is also the landowner and there is no conceivable way that such a plan would be approved without their full involvement and satisfaction. We suggest that this change to the license proposed by AANDC is not necessary for these reasons. In any event, the Board can take steps to amend the license on its own motion if such a change becomes necessary.

Comments on Annex A of the Licence – Surveillance Network Program

ENR recommended that Representative Grab Samples be taken quarterly, concurrent with acute lethality testing²⁵. It is reasonable to take Representative Grab Samples concurrently with samples for acute lethality to both confirm the accuracy of weekly composite samples and to assist in the determination of causality should there be a failure in the toxicity testing²⁶. ENR recommended that the parameter list for groundwater monitoring wells be expanded to include dissolved metals to ensure that groundwater quality is being maintained. Emphasis is placed on preventing groundwater resources from becoming contaminated, rather than relying on remediation after contamination has occurred. To gain a thorough understanding of background conditions at site it is necessary to consider data from several monitoring wells that are located up- or cross- gradient from any potentially contaminant sources.

Comments on Schedule 2 of the Water License

AANDC has recommended that an additional clause be included in Schedule 2 to “recognize the potential for future discounting of this [security] amount as securities are entered into under other regulatory instruments such as land leases”.²⁷ Once again, this comment seems to disregard appreciation of Board practice. In the past, where Land and Water Boards have received evidence of appropriate security held for purposes of closure and reclamation of

²⁴ Memo from AANDC-Resource and Land Management A/Manager to SLWB Executive Director, November 7, 2014, RE: AANDC Comments on Draft Water Licence for Imperial Oil Resources Limited’s Norman Wells Operations

²⁵ GNWT-ENR Comments on Draft Water Licence Nov. 21, 2014

²⁶ Memo from AANDC-Resource and Land Management A/Manager to SLWB Executive Director, November 7, 2014, RE: AANDC Comments on Draft Water Licence for Imperial Oil Resources Limited’s Norman Wells Operations

²⁷ Ibid

licensed undertakings, those Boards have taken that security into consideration when determining the overall security required for a water license. The determination of total security required under a license is a matter within the Board's discretion under the legislation. It is not legally necessary to include a clause like the one recommended by AANDC to ensure that the Board has the authority to grant "credit" in a security determination when other appropriate security is available to contribute to the costs of closure and reclamation.

Additional AANDC Comments

AANDC included an additional comment on the License²⁸. The department requests a condition in the license requiring the licensee to make application to the Land and Water Board some 15 to 16 months before the expiry of the license for either a renewal or a cancellation of the license.

It is not clear how such a condition would provide any additional advantage to the closure and reclamation process already required by the license. The license includes a requirement for the filing of a Final Closure and Reclamation Plan a minimum of 24 months before the expiry of the license. It seems hard to imagine in light of the extensive effort likely required to review and approve that plan that the end of the term of the license could simply sneak up on the Board or AANDC. Thus, it is not clear what a requirement such as the one proposed would do other than take up additional time and expense in the regulatory process. It seems likely in any event that once operations at the site are completed that a period of active closure and reclamation which must be licensed will follow and that this is also likely to include several years of monitoring before the license is terminated.

Thus, in our view a condition of the type requested by AANDC is of questionable merit.

4. CONCLUSION

The conditions set forth in the DRAFT water licence (S13L1-0007) have been proposed to address the Board's statutory responsibility and the concerns that arose during the regulatory process. Staff believe that the licensed undertaking can be carried out by the Licensee while providing for the conservation, development, and utilization of Waters in a manner that will provide optimum benefit for all Canadians and in particular residents of the Sahtu. Board staff believe these provisions are necessary to ensure and monitor compliance with the MVRMA and the *Waters Act* and the Regulations thereunder and to provide appropriate safeguards in respect of the Applicant's use of the land and water and deposit of waste.

²⁸ Ibid.

5. RECOMMENDATIONS

Board staff recommend the Board:

1. provide direction on each of the issues identified in 3.1, 3.2, and 3.3 as discussed above;
2. approve the DRAFT Water Licence (S13L1-0007) and direct staff to complete the final legal and technical review; and
3. provide any information to be included in the Reasons for Decision and direct staff to prepare DRAFT Reasons for Decision based on the information discussed above for the Board's consideration.

Respectfully submitted,



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Appendix #1 – Evidence Related to Effluent Quality Criteria

1. Regarding the Change of test from oil & grease to TPH

AANDC is to provide the scientific rational for the values recommended for the Effluent Quality Criteria (EQC) for Total Petroleum Hydrocarbons (TPH) from the AANDC intervention.

IORL	AANDC	GNWT	HESL
Change from Oil and Grease to TPH			
<p>In section 3 of the application, Imperial suggested that the Board change the test method from oil and grease to TPH as it would be a more useful test to detect potential impacts of Imperial’s operations on water. The O&G method does not distinguish between petroleum related hydrocarbons and those that are naturally occurring whereas the TPH method would. To be clear, neither method will differentiate the hydrocarbons originating from production fluids from those originating from natural seeps. (IORL Response to Interventions March 26, 2014)</p> <p>We are formally requesting to go to oil and grease, recognizing that we can get that test done much more quickly than TPH (Day 1 p. 89)</p>	<p>AANDC supported the request by IORL in their application to move to TPH’s from Oil and Grease</p> <p>Imperial Oil proposed “replacing oil and grease to TPH, as it has a lower detection limit than oil and grease, and will provide data that are more useful for detecting potential impacts”.</p> <p>Why change beyond expediency when clearly their application indicated that it was “a better indicator for detecting potential impacts” (Day 1 p. 89-90)</p>	<p>ENR also concurs with and supports the recommendations provided in the intervention submitted by AANDC for updating the EQC for total petroleum hydrocarbons and the SNP for the new WL (GNWT Intervention March 7, 2014).</p>	

EQC for TPH			
<p>IORL stated that these concentrations would not pose a regulatory compliance issue for the operation (February 28, 2014 teleconference).</p> <p>Imperial recognizes the authority of the Board to regulate effluent discharged into the Mackenzie River. It requests that the Board apply a licence condition which reflects the reality that the water which is withdrawn from, and then returned to the Mackenzie River does not come in contact with oil or grease from the operation. Historically, those observed detections have been confirmed to have originated in the background (intake water), and not from Imperial's operations (IORL Response to Interventions March 26, 2014)</p>	<p>AANDC recommended an EQC for TPH at 3.0 mg/L maximum average and 5.0 mg/L maximum grab concentrations (February 28, 2014 teleconference).</p>	<p>It's suggested that these EQCs could be achievable. So in the spirit of the pollution prevention of the Effluent Quality Management Policy, by setting a reasonably achievable, EQC, it's not unrealistic that Imperial could achieve those numbers. And setting a higher number, it's not as protective of the environment. So we would know earlier if there's an issue, and we could look at the possible amendments at a later date if it was required. Day 2 p. 11.</p>	<p>The rationale presented for EQC for TPH of 3.0 mg/L maximum average and 5.0 mg/L maximum grab is reasonable, vs. the current method of monitoring total oil and grease. Further, TPH monitoring may be to the benefit of IOR and regulators as it may help to distinguish between facility-related and background concentrations of petroleum hydrocarbons if there is a concern in the future, as described in HESL memo of January 14, 2014 (Leeder to Hutchinson) and in Undertaking 3.</p>
Analytical Return Times and Safety Considerations			
<p>While this would be a very useful test, it also takes more time for our lab to complete it, and we are concerned that the extra time might mean our</p>		<p>There are other commercial chemistry labs out there who can do the tests in a shorter time period...so the concern on the turnaround time may</p>	<p>IORL indicated that the analytical return times for TPH monitoring were longer than for total oil and grease, and the delay might cause overflows or</p>

<p>facilities and the land and water could be damaged while we wait for the results, or somebody could get hurt if we let things overflow. (Day 1 p. 49-50).</p> <p>The logistics of collecting and getting samples to the laboratory on time can be challenging, especially in the spring when everything is breaking up and melting all at once. At this time of the year, it is very important that samples are analyzed quickly. If analysis is delayed, berms and ditches can overflow and our facilities, the land and water can be damaged and safety risks created. (IORL Response to Interventions March 26, 2014)</p> <p>For this reason, we now think it would be better to continue to do the oil and grease test.</p> <p>We have confirmed with our analytical laboratory, Maxxam Analytics, that oil and grease testing method (method 5520B) offers the fastest turnaround time with samples being analyzed in Edmonton. We are</p>		<p>not be an appropriate fall-back response Day 1 p. 114.</p>	<p>infrastructure collapse, and recommended that total oil and grease remain (Day 2 transcripts, page 50). IORL should provide further rationale including the delay time for TPH vs. total oil and grease, relative to the period under which physical water management issues could occur, and if other laboratories can return TPH results on the same time frame as the current total oil and grease.</p> <p>If the concern about delays is substantiated, total oil and grease analysis combined with petroleum sheen and chloride field screening should remain. Otherwise, TPH monitoring should be conducted.</p>
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<p>advised that at least one additional day is required to analyze samples using TPH (by gas chromatograph flame ionization detection) test, TPH (infrared spectroscopy) test. (IORL Response to Interventions March 26, 2014)</p>			
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Oil and Grease Test

<p>Per Schedule II of the Petroleum Refinery Liquid Effluent Regulations (2014) administered by the Department of Fisheries and Oceans, and similar to the limits and test methods used in other jurisdictions, we suggest that 10 mg/L oil & grease continues to be appropriate screening parameter to check for potential contact between the cooling water and production fluids. Imperial does not agree with the proposed testing method and criteria change: the limits proposed are not based on any scientific rationale or traditional knowledge, and the change of method will result in unnecessary delays due to the additional required</p>			
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turnaround time by analytical laboratory to complete the TPH test. (IORL comments on draft water licence version 2 – Nov. 13, 2014)			
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2. Metals and Ions

AANDC and the GNWT are to provide specific metals for inclusion in the SNP with rationale and provide the Board a means to distinguish between natural sources and Imperial Oil related activities in their surface water run-off.

IORL	AANDC	GNWT	HESL
<p>Imperial does not believe that testing for metals and ions at surface water run-off facilities is warranted as a matter of routine. For those facilities labelled as Category B, laboratory testing of O&G, phenols, pH, chloride, TSS, TDS, and specific conductivity provide a relatively quick means to test for a broad range of introduced constituents in the surface water. Chloride, for example, is a very mobile ion whose presence indicates possible contact with production fluids. Similarly, O&G is a broad spectrum indicator parameter whose presence indicates possible</p>	<p>IORL has not identified whether metals and ions (both cations and anions) are present in on-land water control structures. Additionally there has been no comparison for water discharged from water control structures and the Mackenzie River (the receiving waterbody).</p> <p>Given all these uncertainties, the SNP network should include all parameters that may degrade water quality, including hydrocarbons, metals and ions. To date, IORL has not provided sufficient rationale for the exclusion of these parameters as noted in the parties interventions (undertaking # 4 AANDC and GNWT – June 25, 2014)</p> <p>AANDC and GNWT are not recommending EQC immediately – they recommend to monitor the discharges and water control structures to develop a trend analysis and if necessary, develop specific water quality objectives, only if observed levels have the potential to result in negative impacts to the aquatic environment. (undertaking # 4 AANDC and GNWT – June 25, 2014)</p>		<p>While there is good reason to include ions and metals in the SNP monitoring there is not sufficient evidence to a) set EQCs or b) warrant EQCs for metals and ions (HESL comments on public hearing questions and responses Oct 24, 2014).</p>

<p>contact with production fluids. (IORL Response to Interventions March 26, 2014).</p>		
<p>Mr. John Bertrand (IORL) in response to GNWT questioning on pg. 120 of Day 1 transcripts with respect to groundwater stated: And there are you know, there are impacts associated with metals and chloride, and hydrocarbons that we manage accordingly.</p> <p>IORL suggested that the Special Effects Study be removed as a condition of the Licence at this time, and instead be referred to the AEMP working group for consideration during development of the AEMP (IORL Comments of Draft Water Licence Nov. 13, 2014).</p>	<p>The parties are requesting that the proponent monitor the following: Metals: Aluminum, Antimony, Arsenic, Barium, Beryllium, Bismuth, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Lithium, Magnesium, Manganese, Molybdenum, Nickel, Phosphorus, Potassium, Selenium, Silicon, Silver, Sodium, Strontium, Thallium, Tin, Titanium, Vanadium, Zinc. Ions: Hardness, Bromide, Chloride, Fluoride, Nitrate, Nitrate plus Nitrite, Nitrite, Sulfate. (AANDC, GNWT Public Hearing Undertakings June 25, 2014)</p>	<p>We recommend that the Water Licence require a Special Effects Study in which metals and ions are monitored in the Mackenzie River, upstream of the facility, and at selected SNP sites, for a period of 2 years (min. 12 samples) to establish any threat posed by ions and metals in the runoff and that IORL submit a report to the Board with any recommendations on the need for EQC (HESL comments on public hearing questions and responses Oct 24, 2014).</p>
<p>The addition of metals would certainly provide more information, but I think if we are finding metals, we would have seen the chloride and the oil and grease in the first place. Those are the first indicators.</p>		<p>What is the relationship between the ions, the metals, and the oil and grease test. This should be well documented otherwise, metals and ions should be tested for the SNP program. This is the best</p>

So its not meant to be a thorough test. It is meant to be a quick broad-spectrum first-look test (Day 1, p. 116).		practice in the NWT. (Day 1 p. 116-117).	
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3. Visible Sheen as a field test for surface water releases at bunkers

IORL is to provide any available information related to testing methods and analytical results for surface water releases at all bunkers.

IORL	AANDC	GNWT	HESL
<p>In cases where no hydrocarbons are anticipated in surface water discharge, sheen remains an effective and practical field screening tool, especially when used in conjunction with field chloride analysis. With over 100 bunkers at the Norman Wells Operation, laboratory testing would create real potential for overwhelming the capacity of containment areas resulting in uncontrolled releases. This causes safety concerns and may also cause erosion and the addition of TSS to the water. Needlessly shutting-in facilities to deal with additional freshwater volume creates real and avoidable safety risks and business impacts. These impacts are not</p>		<p>The use of a visible subjective test to be able to determine whether there is dissolved contaminants in the water is not modern practice. The practice would be testing specifically using modern scientific methods. The land-based bunkers were of concern in that discussion (Day 2 p. 19).</p> <p>GNWT considers an end-of-pipe discharge any discharge of water to the environment from the last point of control, and that discharge should be monitored as a point source discharge, which it is. But considering it is a last point discharge, we feel that field tests are not appropriate, and that's why we are</p>	<p>The rationale provided for the surface water monitoring and management programs at the bunkers is reasonable, and we find no reason to revise the monitoring program at this time. Field tests for sheen are adequate, the protocol requires no release if sheen is detected and the turnaround time required for lab testing (given 100 bunkers) may impair storage of runoff water in bunkers during high runoff periods (HESL comments on public hearing questions and responses Oct 24, 2014).</p>

<p>justified when the existing field sampling program has been proven to be effective and efficient. (Day 2 transcripts p. 25-26).</p>		<p>asking for higher levels in the SNP (Day 1 p. 107-108).</p> <p>ENR is of the position that all potential surface discharge locations should be considered SNP stations, and require testing for the parameters under Category "B" (GNWT – Intervention March 7, 2014)</p>	
		<p>Visual observation involves a great deal of subjectivity, as well, there may be instances where the contamination of water cannot be assessed visually. Further, there is no way to confirm compliance with visual observations (frequency or location). Actual sample results are the only and the preferred method to determine the existence and concentration of contamination (GNWT-ENR comments on draft Water Licence Nov. 21, 2014)</p>	

4. Total Suspended Solids and Conductivity

IORL appear to have provided adequate responses as to how they interpret and use TDS, TSS, Conductivity and chloride and do not appear to object to the continued testing for these parameters. The Board appear to be concerned about licencing parameters for which there is no limit.

We recommend that there is no problem with a Licence that requires monitoring of parameters for which there is no limit. Having these data and tracking them will allow the Board to determine if or when a limit might be needed. If they are not included in the SNP, and not therefore monitored then the Board would not have the necessary information. (HESL Oct 24, 2014 – comments on public hearing questions and responses).

a) Total Suspended Solids

IORL is to provide information regarding Total Suspended Solids (TSS) at the inlet as a background limit to use the CCME guidelines as an EQC on the outlet and surface water run-off facilities.

IORL	AANDC	GNWT	HESL
<p>Imperial does not believe it necessary to measure or set a TSS limit for either the Norman Wells Central Processing Facility (CPF) outlet or the surface water run off facilities.</p> <p>Imperial does not use any sediment in our process. Sediment is not carried from the reservoir to the surface in production fluids. As such, sediment is not a parameter of concern or suitable indicator parameter to identify potential contact with production fluids or impacts from routine oil and gas activity. (IORL Public Hearing Undertakings June 25, 2014; Comments on Draft WL Nov 13, 2014).</p>	<p>AANDC recommends TSS limits at 15 mg/L Maximum Average and 25 mg/L Maximum Grab (AANDC Intervention March 7, 2014)</p>	<p>ENR recommends that the effluent quality criteria for TSS be revised to better reflect the CCME Guidelines for the Protection of Aquatic Life:</p> <p>Clear flow: Maximum increase of 25 mg/L from background levels for any short-term exposure (e.g. 24-h period). Maximum average increase of 5 mg/L from background levels for longer term exposures (e.g. inputs lasting between 24 h and 30 d).</p> <p>High Flow: Maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L. Should not</p>	<p>We recommend that a TSS limit be established.</p> <p>Monitoring could be simplified by establishing a relationship between turbidity and TSS, and using turbidity as a proxy field screening tool for TSS once SLWB has approved the relationship. The relationship can be pro-rated to reflect acceptable TSS targets as measured by turbidity, or a turbidity-based guideline could be implemented providing it is sufficiently conservative to protect the environment from suspended solids</p>

<p>Based on the surveillance data collected under the existing water licence, Imperial does not believe it is necessary to set a TSS limit for the Norman Wells Outlet in the renewed water licence. TSS readings for river water taken at the inlet are often naturally higher than the 15 mg/L /25 mg/L limits included in AANDC's recommendation. Should the Board decide otherwise, Imperial respectfully requests it consider the CCME guidelines in the setting of such a limit (IORL Response to Interventions March 26, 2014)</p>		<p>increase more than 10% of background levels when background is ≥ 250 mg/L.</p>	<p>(HESL comments on public hearing questions and responses Oct 24, 2014).</p>
<p>For the years 2004-2013 inclusive, the monthly average TSS for the CPF inlet ranged between 4 mg per L in April and 139 mg per L in June. For the same time period, the monthly average TSS for the CPF outlet ranged between 3 mg per L in April and 40 mg per L in June. Naturally occurring sediment in the river water is settling by gravity in the settling pond. As a result, the monthly average TSS measurement for cooling water returned to the river was lower than the monthly average TSS measurement for</p>			<p>We recommend that monitoring for suspended solids should be continued for the CPF outlet and other surface water releases. Suspended solids settled out of process water in the settling pond may become re-suspended and result in unacceptable water quality if correct maintenance of the pond is not conducted or water flows through the pond at a higher rate than the ponds design capacity. While monthly average of TSS are lower at the CPF outlet than at the inlet, there are individual occasions</p>

<p>water taken in from the river. (IORL Public Hearing Undertaking #5, June 25, 2014; Comments on Draft WL, Nov 13, 2014).</p>			<p>when the outlet TSS is higher than the inlet TSS, indicating a source of TSS in the process stream from time to time that should be monitored to protect receiver water quality. We support the proposal to use the CCME limit of TSS to increase by less than 10% over the background levels when greater than 250 mg per L (HESL comments on public hearing questions and responses Oct 24, 2014).</p>
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b) Specific Conductivity

The limits proposed by HESL are for contaminated sites and the once-through cooling system is not a contaminated site.

IORL	AANDC	GNWT	HESL
<p>Specific conductivity is a measurement of a fluid’s ability to conduct electricity. SC provides a measure of the contribution of different salts that may be present in a sample including potassium, sodium, chloride, sulphate and others. Of these, chloride is the best indicator of potential contact with production fluids as it is brought up in high concentrations from the reservoir and is a</p>	<p>Proposed no criteria be measured for conductivity in their intervention (AANDC Intervention March 7, 2014)</p>		<p>We recommend that conductivity is preferable to TDS as it can be measured on site and continuous records kept. Although an EQC which compare inlet and outlet values could be considered there is no evidence to set the EQC on this basis. The BC values should be considered (HESL comments on public hearing questions and responses Oct 24, 2014).</p>

<p>very mobile soluble ion that remains in solution, whereas the others tend to precipitate out as calcium sulphate and calcium carbonate.</p> <p>Neither specific conductivity nor chloride testing have been required for the water inlet and only specific conductivity has been required for the outlet under the existing licence (but without EQC). We suggest that this matter be referred to the AEMP working group for their review, discussion and recommendation regarding the need for inclusion in the renewed licence (IORL comments on draft water licence Nov 13, 2014)</p>			
<p>We have been unable to confirm the reference given to B.C. Regulation 375/96 Environmental Management Act Contaminated Sites Regulation Schedule 6, column 2. This regulation, which includes criteria for freshwater aquatic life used for contaminated sites in BC, does not appear to specify numeric limit for specific conductivity as</p>			<p>One of the flowing two methods may be useful to establish an EQC for conductivity:</p> <ol style="list-style-type: none"> 1. 2,000 microS/cm is the surface water discharge conductivity guideline used by the BC Oil and Gas Commission for oil and gas field-related

<p>indicated. Further, we note that the once-through cooling system is not a contaminated site (IORL comments on draft water licence Nov 13, 2014)</p>			<p>process water discharges to land surfaces assuming a nearby surface water receptor, and may be a reasonable guideline providing background conditions would not result in IORL discharges exceeding it.</p> <p>2. 1,400 – 4,200 microS/cm is the range of conductivity recommended for the protection of freshwater aquatic life by BC, with the exact value depending on the sensitivity of the species in the receiving water environment. A study will be required to establish an EQC using this method.</p> <p>(HESL comments on public hearing questions and responses Oct 24, 2014).</p>
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5. Phenols Limit

In the existing licence, 0.07 mg/L criteria applies to the 4 week rolling average and 0.14 mg/L to grab samples. Imperial does not agree that 0.07 mg/L should now be applied to single weekly composite samples. The matter of appropriate phenol limits for Norman Wells was referred to the Technical Advisory Committee during the last licence period. The recommended limits were reviewed and approved by the Board, and the licence terms and conditions amended accordingly on June 12, 2006. Imperial is not aware of any new information or environmental change that would suggest these limits require review at this time (IORL Comments on Draft WL Nov. 13, 2014).

AANDC intervention recommended Phenol limits as 0.07 mg/L Maximum Average and 0.14 mg/L Maximum Grab. Imperial takes no exception to the recommendations and criteria AANDC has proposed for phenols (IORL Response to Interventions March 26, 2014).

We need to look into the technical considerations in Staff Report No. 8 for S03L1-001 that amended the Licence Terms and Conditions for phenols on June 12, 2006. Is there any new information or environmental change that would suggest these limits require review at this time? None of the interveners suggested changing the phenol limit and we did not ask HESL to provide an opinion on this.

The change to the phenol concentration was approved the Board on June 12, 2006; however, the amended Licence was never submitted to the Federal Minister for approval.

Staff Report No. 8 for June 12, 2006 Board meeting regarding S03L1-001 Amendment to the Terms and Conditions and the Surveillance Network Program regarding phenol concentrations in effluent and testing criteria.

A Technical Advisory Committee was formed to gather and consider expert advice on various technical issues and criteria relating to the Water Licence renewal. Phenols was one of the topics of discussion.

In review of the reports, advice and recommendations submitted to the Board it has been determined that increasing the Maximum Average Concentration for phenols to 0.07 mg/L and increasing the Maximum Concentration of any Grab Sample for phenols to one order of magnitude higher or 0.14 mg/L will have insignificant effects to the aquatic environment.

6. Chloride

AANDC recommended the SNP be updated to include chloride measured at the CPF Outlet with EQC of 250 mg/L Maximum average and 500 mg/L Maximum Grab (AANDC Intervention March 7, 2014).

IORL takes no exception to the recommendations and criteria AANDC has proposed for chloride (IORL Response to Interventions March 26, 2014).

Appendix #2 – SLR Memo & Analysis of Closure Cost Estimates

AMEC/IOR Estimate				GNWT Estimate		
CAPITAL COSTS	Number	Unit Cost	Total ¹	Number	Unit Cost	Total
Wells & Facilities						
<u>Wells</u>						
Sweet Wells 1	351	56600	19,866,600			
Sweet Wells 2	2	71200	142,400			
Vent Flow	177	87200	15,434,400			
Well Site Equipment	9562	14	133,868			
Hauling and Disposal of Well Site Equipment	No cost estimate provided					5,250,000
<i>Subtotal</i>			35,577,268			
<u>Production Facilities</u>						
Above Ground Flow Lines	149	14	2,086	27730	1	27,730
Cut & Cap Flow Lines	1046	6826	7,139,996			
<i>Subtotal</i>			7,142,082			
Total Wells & Facilities			\$42,677,251			47,817,087

Buildings & Equipment						
<u><i>Building Decontamination & Hazardous Waste Removal</i></u>						
Decontaminate flowlines, Water Flush	16230	1000	16,230,000			
Decontaminate flowlines, Air Flush	27070	225	6,090,750			
Electrical			1,000,000			
Decontaminate storage tanks	29	15000	435,000			
<i>Subtotal</i>			<i>23,755,750</i>			<i>23,755,750</i>
<u><i>Remove Buildings</i></u>						
Central Processing Facility	9346	65	607,490	18692	65	1,214,980
Process Facilities	3782	65	245,830	7564	65	491,660
Offices, Repair, Lab, Warehouse	2158	65	140,270	4316	65	280,540
Storage Facilites	4472	65	290,680	8943	65	581,295
Warehouse, Shops and Other	4232	65	275,080	8464	65	550,160
Storage tanks	2440	500	1,220,000	2240	500	1,120,000
Freshwater intake	57	65	3,705	114	65	7,410
other	5100	14	71,400	5100	14	71,400
<i>Subtotal</i>			<i>2,854,455</i>			<i>4,317,445</i>
<u><i>Basement Slabs</i></u>						
Central Processing Facility	9346	40	373,840			
Process Facilities	3782	40	151,280			
Offices, Repair, Lab, Warehouse	2158	40	86,320			
Storage Facilites	4472	40	178,880			
Warehouse, Shops and Other	4232	40	169,280			
Other	3447	2000	6,894,000			
<i>Subtotal</i>			<i>7,853,600</i>			<i>7,853,600</i>
<u><i>Landfill for Demolition Waste</i></u>						

Load and haul building debris haul to onsite landfill	4622	14	64,708	4622	23	106,306
Load and haul tank debris to onsite landfill	976	14	13,664	976	23	22,448
Load and haul Goose Island debris onsite landfill	985	14	13,790	985	23	22,655
Load and haul Bear Island debris to onsite landfill	594	14	8,316	594	23	13,662
Load and haul CPF debris to onsite landfill	10750	14	150,500	10750	23	247,250
<i>Subtotal</i>			<i>250,978</i>			<i>412,321</i>
<u>Grade and Contour</u>						
Vegetate - all surface areas excluding roadways	120	42125	5,055,000			
Other - Grading and contouring of all areas included above	No cost estimate provided			120	20,000	2,400,000
<i>Subtotal</i>			<i>5,055,000</i>			<i>7,455,000</i>
<u>Reclaim Roads</u>						
Vegetate	33	42125	1,390,125			
<i>Subtotal</i>			<i>1,390,125</i>			<i>1,390,125</i>
Total Buildings & Equipment			41,126,888			45,245,889
Chemicals						
<u>Hazardous Materials Audit</u>						
Phase I Audit	7.5	100000	750,000			
<i>Subtotal</i>			<i>750,000</i>			<i>750,000</i>
<u>Consolidate Hazardous Materials for Removal</u>						
Assay & environmental lab reagents	7.5	12000	90,000			
Machine shop, paints, solvents etc	7.5	12000	90,000			
<i>Subtotal</i>			<i>180,000</i>			<i>180,000</i>
<u>Contaminated Soil Removal</u>						
Env. investigation Phase I/II	216	25000	5,400,000			

Load, haul, dump or doze						
	445774	14	6,240,836	445774	23	10,252,802
Reclaim sump areas	24	42125	1,011,000			
Construct slurry wall for sumps	16900	75	1,267,500			
<i>Subtotal</i>			13,919,336			17,931,302
<u>Other</u>						
Occupational Health and Safety Development	1	100000	100,000	2	100,000	200,000
Non-Hazardous materials removal	8	3500	28,000			
Load, haul, dump or doze	109548	14	1,533,672			
<i>Subtotal</i>			1,661,672			1,761,672
Total Chemicals			16,605,839			20,717,805
Construction and Operation of On-Site Landfill						
Landfill construction and implementation						18,650,000
Total Construction and Operation of On-Site Landfill			18,650,000			18,650,000
Water Treatment						
<u>Groundwater Collection</u>						
Other - Remediate groundwater all in cost (Mainland East FTA and Wellhead Areas)	1	305318	3,053,184	1	800,618	800,618
Other - Remediate groundwater all in cost (Mainland East Tankfarm Area)	1	514652	5,146,527	1	2,893,511	2,893,511

Other - Remediate groundwater all in cost (Mainland Central)	1	417146	4,171,469	1	1,708,310	1,708,310
Total Water Treatment			12,371,181			6,309,975
Interim Care and Maintenance						
misc. supplies	1	500000	500,000			
pick-up truck	4	10000	40,000	4	24,000	96,000
small dozer	480	260	124,800			
small excavator	480	190	91,200			
snow machine	2	10000	20,000			
ICM monitoring	1			1	589,232	589,232
Environmental coordinator	2080	74	153,920			
Electrician	2080	74	153,920			
Journeyman - various	8320	72	599,040			
Security / first aid	6240	67	418,080			
Administrative staff	2080	58	120,640			
Construction	2.5	11500	28,750			
other	1	500000	500,000			

<i>Subtotal</i>		2,750,350			6,182,271
Number of Years ICM	2	5,500,700			
Total Interim Care & Maintenance		5,497,039			6,787,503
Subtotal Capital Costs		136,928,198			145,528,259
INDIRECT COSTS					
Mobilization/Demobilization					
Total Mobilization/Demobilization		2,352,880			3,008,630
Post Closure Monitoring and Maintenance					
Landfill Maintenance and Monitoring (25 years)	50000	842,255			
Groundwater Monitoring		7,368,305	1	9,045,889	9,045,889
Reclamation Monitoring Costs			1	9,006,082	9,006,082
Total Post Closure Monitoring and Maintenance		8,210,561			23,931,505
Engineering		6,846,410		7276412.9	
Project Management				5	7,276,413

	6,846,410	7,276,413
Health & Safety Plans/Monitoring & QA/QC	1,369,282	1,455,283
Bonding/Insurance	1,369,282	1,455,283
Contingency	13,692,820	36,382,065
Market Price Factor Adjustment	-	-
Inflation adjustment	705,210	749,502
Subtotal Indirect Costs	41,392,854	81,535,094
TOTAL COSTS	178,321,052	227,063,351

IOR Security Assessment	178,321,05 1
GNWT Security Assessment	227,063,35 1
RECOMMENDED SECURITY ESTIMATE	238,060,18 8

Notes

The recommended security estimate was calculated by adding the values shown in the cells highlighted in yellow.

¹ Certain line totals may not be identical to the totals shown in the AMEC/IOR sheets in this workbook, due to omission of decimals in the number of units. To rectify this error, we copied the subtotals from the Summary sheet so that the Total Costs for the IOL Security Assessment is accurate.



November 25, 2014

Bonnie Bergsma
Regulatory Specialist
SAHTU Land and Water Board
P.P. Box 1 Fort Good Hope NT X0E 0H0

Dear Ms Bergsma,

RE: REVIEW OF SECURITY PROPOSAL FROM IMPERIAL OIL RESOURCES FOR THE NORMAN WELLS FACILITY

Background

Imperial Oil Resources (IOR) is required to post a security bond for the re-licensing of its Norman Wells Operation (NWO) to cover costs for abandonment and reclamation costs of this facility.

Imperial selected AMEC to undertake the assessment using the RECLAIM Model. RECLAIM was originally developed in 1994 and has been used for estimating mine closure and restoration projects. It has been updated and refined subsequently and is accepted as a useful tool by AANDC for the mining sector. It was modified in 2013 for use in estimating security for oil and gas operations. The oil and gas version of the model is RECLAIM Model Ver.7.0 developed by Brodie Consulting Limited.

The RECLAIM model is an excel based spreadsheet with a quantity and a unit price for each task that is relevant for the NWO. The total liability is simply the sums of all task quantities and unit prices for each task. Unit prices are independent third-party costs (Brodie 2012) and adjusted to 2nd Quarter 2014 using StatCan price indices. Where RECLAIM unit prices were not available, site specific unit prices or allowances were developed by Imperial (via data provided by WorleyParsons).

Observations

The following summarizes some of the observations that were developed by SLR during the review of the proposed security for the reclamation of the Norman Wells facility. It should be noted that this assessment was performed using high level, overview information provided to SLR by the SAHTU Land and Water Board. As such, the results of this assessment and the recommendations provided herein should be viewed as preliminary only and subject to change.

- The contingency must have been very high the first time that RECLAIM was used for assessing security for the abandonment and reclamation of cost estimate for a mining project in Northwest Territories (NWT). It is likely that as more projects utilized the RECLAIM model, the overall contingency would be reduced as experience was gained and the model was refined in areas such as unit costs and line items.
- RECLAIM has had only very limited experience with oil & gas operations. The only example provided was for Cameron Hills in 2010.
- No current decommissioning plan was available for review. This is a major issue in reviewing the proposed security due to the following factors:

- The lack of overall decommissioning and reclamation objectives over the short term and long term.
- The lack of an overall understanding of the approach and management of reclamation activities.
- The lack of baseline information to assess the credibility of volumes and unit costs (e.g. volume of contaminated soil).
- The lack of details in regards to line items in the RECLAIM model to assess the adequacy of the security proposal.
- A major cost for the Abandonment and Reclamation (A&R) in the Norman Wells facility is the plugging and abandoning of 383 wells. A total of 33 already have an abandoned status leaving 350 wells to be reclaimed. The proposed unit cost for the A&R of wells is \$56,600 and \$71,200, giving a total cost on the RECLAIM model of \$35m out of a total \$136m. These costs seems low for a facility in Northern Canada, however it is not possible at this stage to provide an alternate cost proposal given the lack of information in regards to the reclamation of the NWO.
- Contingency costs of 10% are included by IOR in their security proposal. The table below is extracted from a presentation by John Brodie (Brodie Consulting Limited) titled 'Issues and Methods in Mine Reclamation Costing'¹. This clearly shows that estimates at the "conceptual" level should have a contingency at the 25 % level. We believe that the current security estimate provided by Imperial Oil is at the pre-feasibility or conceptual level and for that reason a contingency of 25 % should be used for this assessment.

Estimate Type	Description	Accuracy or appropriate contingency
Detailed or Project Control	Based upon detailed engineering take-offs and written quotes	+/- 5 %
Definitive or construction drawing phase	Engineering mostly complete, some written quotes	+/-10 %
Preliminary or budget level	Little detailed engineering and costs based upon verbal quotes	+/- 15 %
Feasibility or advanced conceptual	Engineering may be 10 % complete and costs based upon typical unit costs	+/- 20 %
Pre-feasibility, conceptual or trade-off study	Very basic engineering only and costs based upon typical unit costs	+/- 25 %

- Radioactive materials can, in certain circumstances (dependent on temperature, pressure, acidity etc) be transported from a producing reservoir to the surface with the hydrocarbon product. During the production process NORM (Naturally Occurring Radioactive Material) flows with the oil, gas and water mixture and accumulates in scale, sludge and scrapings. It can also form a thin film on the interior surfaces of gas processing equipment and vessels. The level of NORM can vary substantially from one facility to another. NORM is mentioned in the IMO report, but no provision appears to have been made for its analysis, removal and disposal. This issue needs to be formally included in the abandonment and reclamation planning in terms of treatment and disposal costs. It is not possible at this stage to estimate potential reclamation costs associated with NORM due to a lack of baseline information but this should be part of an updated Decommissioning Plan for the NWO.

¹ See <http://www.monitoringagency.net/LinkClick.aspx?fileticket=V5Q6MNOFUXc%3D&tabid=81>

- It is recognised that the risk associated with a possible bankruptcy, or the failure to meet its abandonment and reclamation obligations, of Imperial Oil is low. However it is an accepted business model of major oil companies to sell older production assets with declining production levels to smaller companies that can operate the assets with a lower overheads and production costs and where the impact of the operation may be more material. In such a case the abandonment and reclamation bond becomes more material.

Closure

SLR completed a comparison of proposed security levels from IOR, GNWT and AANDC and is recommending the following:

IOR Security Assessment	\$ 178,321,051
GNWT Security Assessment	\$ 227,063,351
AANDC Security Assessment	\$ 180,883,606
SLR Recommended Security Assessment	\$ 238,060,188

SLR is recommending the higher levels of security proposed by both GNWT and IOR due to the uncertainties outlined above (e.g lack of decommissioning plan).

Please do not hesitate to contact SLR if you require additional information or clarification on any of the points above.

Yours sincerely,
SLR Consulting (Canada) Ltd.



Stephen Morison, M.Sc., P.Geol.
Director, Mining Business Sector