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Staff Report

Applicant: Imperial Oil Limited	
Location: Jean Marie River, NT	**File Number(s):** MV2021X0019 and MV2021L1-0009
Date Prepared: October 14, 2021	**Date of Board Meeting:** October 28, 2021
Subject: New Type A Land Use Permit and New Type B Water Licence	

1. Purpose

The purpose of this Report is to present to the Mackenzie Valley Land and Water Board (MVLWB/the Board):

a) A new Land Use Permit (Permit) Application and Water Licence (Licence) Application submitted by Imperial Oil Limited (Imperial);
b) Consider the preliminary screening;
c) Consider the Waste Management Plan;
d) Consider the Spill Contingency Plan;
e) Consider the Engagement Plan; and
f) Consider the Closure and Reclamation Plan.

2. Background

- September 10, 2021 – Applications received;
- September 20, 2021 – Applications deemed complete and review commenced;
- October 8, 2021 – Comments and recommendations due and received;
- October 13, 2021 – Responses due and received;
- **October 28, 2021 – Applications presented to the Board for decision; and**
- October 31, 2021 – end of the 42-day timeline.

3. Discussion

History

On March 2, 2021, Imperial received a request from the Office of the Regulatory of Oil and Gas Operations (OROGO) to complete an application for an Operation Authorization. Exxon Mobil

Corporation is the majority shareholder of Imperial Oil Limited. Imperial Oil Resources Limited is a wholly owned subsidiary of Imperial Oil Limited and will be managing the well re-abandonment on behalf of ExxonMobil.

On September 10, 2021, Imperial submitted Applications for both a Licence and Permit to complete the work.

Project Summary

During December 2021, an ice road of sufficient thickness to support the required loads will be constructed. The access road to the site will be opened along the original road right-of-way and the original wellsite location opened to a sufficient size to support the drilling rig and associated materials and equipment. To minimize the size of the wellsite location, contingency equipment and materials will be stored offsite on an existing site in or near the community of Jean Marie River. A camp facility will be mobilized to house the workers associated with the operation.

In early January 2022, a suitably sized and equipped drilling rig and supporting equipment and material will be mobilized to the location. A casing bowl and extension will be installed onto the existing casing stub, well control equipment will be installed and tested. The cement plug that is set at surface will be drilled out and the integrity of the existing casing determined by way of casing logging and pressure testing. The remaining two cement plugs in the well will be drilled out. The condition of the wellbore will be assessed by open-hole logging. The well will then be cased with 139.7 mm outside diameter casing. The casing will be cemented full length with oil-well cement suitable for the well condition and temperature.

The wellhead will be secured, then the rig, associated equipment and material will be demobilized. Appropriate heavy equipment will be mobilized to reclaim a portion of the site while leaving enough working space around the wellhead to allow a standalone cased hole logging unit to conduct a cement evaluation log (CEL). The CEL will be run approximately a week after the cementing of the 139.7 mm casing, the cased hole logging unit will be mobilized, and a cement evaluation run on the cased well to collect base line data of the cement quality. The well will be again secured after CEL.

A dozer and excavator will then be used to reclaim the remainder of the site and access while leaving access to the site for possible future monitoring. Barricades will be placed around the well, which will be left in this state for a period of time to allow monitoring to determine the success of the re-abandonment. The well will be accessed by helicopter or light duty equipment at a later date and the well will be “cut and capped”. The cellar will then be backfilled and the remaining area around the well will be reclaimed by hand or with heli-portable equipment. All waste generated from the work site will be hauled to an approved landfill or disposal facility.

As discussed above, the fieldwork is planned to start December 2021 and be completed in January 2022 followed by a period of monitoring, if necessary.

Description of Applications

The overall program objective is to re-abandon the JMR-B-48 well. This will be done by the following:

- Building of winter access to the well site (approximately 3.3 km)
- Cross the Jean Marie River by constructing an ice bridge capable of supporting all loads
- Prepare the site for equipment required to perform the re-abandonment
- Establish a camp
- Support the logistics of the drilling rig
- Perform the initial - preliminary reclamation of the site.

Equipment List

Number	**Description**
6	Bunkhouses/Portable structures
1	Well site garbage bin
1	Kitchen/portable structure
1	400bbl tank
1	BOP Stack
1	Casing/hauled on a hi-boy
1	Cement bins (2 bins per load)
2-3	Cementing equipment/bunker and pumper units
1	Dozer
10-15	Drilling rig
1	Fishing equipment
1	Flock tank
1	Camp garbage bin
1	Grader
1	Hi-boy of barite
2	Semi vac
2	Tri-drive vac truck
2	Tri-drive water truck
1	Mud van
1	Potable water/tank truck
1	Power tongs
1	Pressure tester
1	Sewage truck
1	Wellsite trailer
2	Wireline logging unit

Fuel List

Type of Fuel	Number of Containers	Capacity of containers
Diesel	1	10,000L
Diesel	1	5,000L
Diesel	1	1,000L
Diesel	1	3,000L
Gasoline	1	3,000L
Propane	6	400L

Water source and Amount

Purpose of Water Use	Name and Type of Water Source	Location	Proposed Water Use Volume/Rate, including units
Industrial – Construction, Drilling and Cement Prep	Jean Maire River	Jean Maire River	Estimated usage is 2600m^3 with a maximum diversion ration of 299m^3/day
	Borrow Pit (backup source)	Along Jean Maire River Road	
	Borrow Pit (backup source)	Along Jean Maire River Road	
	Borrow Pit (backup source)	Along Jean Maire River Road	
	Borrow Pit (backup source)	Along Jean Maire River Road	
	Mackenzie River (backup source)	Mackenzie River near Jean Maire River	
Potable – Wellsite trailer, camp rig boiler operation and cement prep	Mackenzie River (via community withdrawal)	Village of Fort Simpson	Estimate usage is 555m^3 This will be trucked in so rate will vary with truck drivers
	Great Slave Lake (via community withdrawal) (backup source)	Town of Hay River	

Management Plans

A Waste Management Plan, Spill Contingency Plan and Closure and Reclamation Plan were included with the Application. Board staff suggest that these Plans meet applicable guidelines and sufficiently reflect the scope of the proposed activities.

However, based on reviewer comments, Board staff suggest that the Board require Imperial to resubmit the Waste Management Plan to include commitments made during the review as well as information relating to the use and operation of the sewage treatment plan. At the time of Application submission, Imperial did not have the specific information to include however, it does play a role in the formation of the Waste Management Plan.

Engagement

An Engagement Record and Engagement Plan were included in the Application. Imperial noted they engaged with the following Parties:

- Dehcho First Nations
- Tthets'e'hke'deli First Nation (Jean Marie River)
- Deh Gah Got'ie First Nation (Fort Providence)
- Ka'a'gee Tu First Nation (Kakisa Lake)
- Liidlii Kue First Nation (Fort Simpson)
- Pehdzeh Ki First Nation (Wrigley)
- Sambaa K'e First Nation (Trout Lake)
- West Point First Nation (West Point)
- Fort Providence Metis Council (Fort Providence)
- Fort Simpson Metis (Fort Simpson)

Through a review of the Engagement Record, emails, phone calls and virtual meetings were held in relation to the project on the following dates:

- July 8, 2021
- July 16, 2021
- July 20, 2021
- August 27, 2021
- August 31, 2021
- September 2, 2021
- September 8, 2021
- September 9, 2021

Eligibility

Imperial has submitted the Operations Authorization and Well Approval application to OROGO (OA-2021-004-IMP and ACW-2021-IMP-B-48-WID0448S), which will provide the access to the wellsite.

Type of Area

This Project is in a non-federal area.

Fees

The required Application Fee of $150.00 was included with the Application (attached).

Term

Imperial has applied for a term of 5 years for the Permit. Board staff note that permits can be granted for a period of five years, plus a two-year extension (for a total of seven years).

Imperial has applied for a term of 7 years for the Licence. The request for 7 years is to match the term for the Permit, although it is understood that a 2-year extension request for the Permit may not be required. Section 26(2) of the *Waters Act*/subsection 72(2) of the MVRMA allows for license to be issued for a term not exceeding 25 years.

4. Comments

Not applicable.

Triggers

The activities as described trigger a Type A permit as per with paragraph 4(a) of the Mackenzie Valley Land Use Regulations:

(4) No person shall, without a Type A permit, carry on any activity that involves

(a) on land outside the boundaries of a local government,

(ii) the use of a vehicle or machine of a weight equal to or exceeding 10 t, other than on a road or on a community landfill, quarry site or airport,

(iii) the use of a single container for the storage of petroleum fuel that has a capacity equal to or exceeding 4 000L,

(iv) the use of a self-propelled motorized machine for moving earth or clearing land.

(v) the leveling, grading, clearing, cutting or snowploughing of a line, trail or right-of- way, other than a road or existing trail to a building, that exceeds 1.5 m in width or 4 ha in area, for the purpose other than the grooming of recreational trails; or

(b) On land within or outside the boundaries of a local government,

(i) The use of motorized earth-drilling machinery the operating weight of which, excluding the weight of drill rods, stems, bits, pumps and other ancillary equipment, equals or exceeds 2.5 t, for a purpose other than the drilling of holes for building piles or utility poles or the setting of explosives within the boundaries of the local government,

(ii) The use of a campsite outside a territorial park for a duration of or exceeding 400 person-days,

The activities as described trigger a Type B water licence as per Schedule D of the Waters Regulations:

- To obtain water
- To cross a water course

5. Public Review

By October 8, 2021, comments and recommendations on the Applications were received from 5 Parties:

- GNWT – Lands North Slave Region
- NWT – Office of the Regulator of Oil and Gas Operations
- GNWT – Lands Dehcho Region
- GNWT – Environment and Natural Resources
- Department of Fisheries and Oceans Canada

Imperial responded by October 13, 2021.

The Review Summary and Attachments (attached) presents the concerns identified through this review.

No significant concerns were raised during this review, and Board staff suggest Imperial responded appropriately and completely to all comments.

Preliminary Screening

The draft Preliminary Screening (attached) contains information from the Applications and public review regarding environmental and socio-economic concerns, along with mitigations, and is for the Board's consideration.

Draft Permit and Licence

The draft Permit and Licence (attached) contain recommended defined terms and conditions based the Board's Standard Permit and Licence Conditions and reflects concerns and recommendations raised during the public review.

6. Security

Legislative Requirements

The Board may require security as per section 32 of the Mackenzie Valley Land Use Regulations, which state:

32(1) The Board may require security to be posted in an amount not exceeding the aggregate of the costs of

(a) Abandonment of the land-use operation;

(b) Restoration of the site of the land-use operation; and

(c) Any measures that may be necessary after the abandonment of the land-use operation.

32(2) In setting the amount of security pursuant to subsection (1), the Board may consider

(a) The ability of the applicant or prospective assignee to pay the costs referred to in that subsection;

(b) The past performance of the applicant or prospective assignee in respect of any other permit;

(c) The prior posting of security by the applicant pursuant to other federal legislation in relation to the land-use operation; and

(d) The probability of environmental damage or significance of any environmental damage.

Closure and Reclamation Cost Estimate – RECLAIM

In analyzing the closure and reclamation cost evidence, Board staff have utilized the evidence included in the Applicant's submission and received as part of the public review, including closure and reclamation cost estimate submitted by the Government of the Northwest Territories. The closure and reclamation cost estimates were developed using the RECLAIM model, which is the Board's preferred method for estimating closure and reclamation costs for projects that trigger a water licence.

The RECLAIM model was developed by the GNWT and CIRNAC based on reasonable and well-founded assumptions that reflect the principles of the INAC's *Mine Site Reclamation Policy for the Northwest*

Territories. Board staff consider the GNWT to be well-versed in using the RECLAIM model as a result of their direct involvement in its development. RECLAIM allows the user to attribute closure and reclamation costs as either land or water-based liability. This facilitates the administration of security adjustments over the life of a project. In acknowledgment of needing this input from the land manager, along with the GNWT's experience in using RELCAIM, and the complexity of underlying assumptions required to develop closure cost estimates, practice has been for Board staff to not generate an estimate; rather, Board staff conduct an analysis of the evidence submitted and present options to the Board for consideration. The analysis conducted for this submission was consistent with this practice. Table 1 compares the estimates submitted by GNWT and Imperial.

Table 1: Closure and Reclamation Cost Estimates Submitted to the Board

Capital Cost Item	Imperial Oil Limited			GNWT- ENR		
	Cost	Land Liability	Water Liability	Cost	Land Liability	Water Liability
Wells and Facilities	$1,308,278	$0	$1,308,278	$1,308,278	$0	$1,308,278
Buildings and Equipment (Construction Execution)	$605,725	$605,725	$	$605,725	$605,725	$
Chemicals and Contaminated Soil Management	$60,000	$60,000	$	$60,000	$60,000	$
Surface and Groundwater Management	$	$	$	$	$	$
Interim Care and Maintenance	$	$	$	$	$	$
Inflation – 0%	$	$	$	$	$	$
Subtotal: Capital Costs	$1,974,003	$665,725	$1,308,278	$1,974,003	$665,725	$1,308,278
Indirect Cost Item	**Cost**	**Land Liability**	**Water Liability**	**Cost**	**Land Liability**	**Water Liability**
Mobilization/Demobilization	$766,920	$258,641	$508,279	$766,920	$258,641	$508,279
Post-Closure Monitoring and Maintenance	$0	$0	$0	$102,328	$34,510	$67,818
Engineering	$98,700	$33,286	$65,414	$98,700	$33,286	$65,414
Project Management	$98,700	$33,286	$65,414	$98,700	$33,286	$65,414
Health and Safety Plans/Monitoring & QA/QC	$19,740	$6,657	$13,083	$19,740	$6,657	$13,083
Bonding/Insurance	$19,740	$ 6,657	$13,083	$19,740	$ 6,657	$13,083
Contingency (20%*)	$493,501	$166,431	$327,069	$493,501	$166,431	$327,069
Contingency – Mobilization and Accommodations	$191,730	$64,660	$127,070	$217,312	$73,288	$144,024
Market Price Factor Adjustment	$0	$0	$0			
Inflation**	$0	$0	$0	$	$	$
Subtotal: Indirect Costs	$1,689,031	$569,618	$1,117,412	$1,816,941	$612,757	$1,204,184
TOTAL COSTS	**$3,663,034**	**$1,235,343**	**$2,427,690**	**$3,790,944**	**$1,278,482**	**$2,512,462**

* Applied To Capital Cost, Mobilization/Demobilization, and Post-Closure Monitoring and Maintenance

** Applied To Mobilization/Demobilization and Post-Closure Monitoring and Maintenance

The main differences between both estimates provided relates to the Post-Closure Monitoring and Maintenance and the Contingency – Mobilization and Accommodation. As noted in Table 1, Imperial did not include a value for the Post-Closure Monitoring and Maintenance and GNWT did which in turn impacted the amount calculated for the Contingency – Mobilization and Accommodations as it is calculated on a percentage.

The cost estimate difference between the two estimates is $127,910.00.

7. Conclusion

Based on the information provided in the application and the public review, the proposed development is not likely to have a significant adverse impact on the environment or be a cause of public concern.

The draft Permit and Licence are based upon the Board's Standard Condition List, public review, and Board staff recommendations. Board staff conclude that the scope, defined terms, and conditions contained within the drafts should mitigate the potential environmental impacts this development may have on the land and water.

Board staff conclude that the Spill Contingency and Engagement Plans, as submitted, are in conformity with guidelines and the requirements of the Permit and Licence can be approved.

Board staff conclude that the Closure and Reclamation Plan, as submitted, are in conformity with the requirements of the Permit and Licence and can be approved.

The Waste Management Plan should be revised and re-submitted to reflect updates as agreed to during the review. The Board will need to determine whether the information requested shall be submitted and reviewed prior to approval, or whether the Permit/Licence provides enough flexibility for staff conformity of revisions.

Board staff conclude there are no outstanding issues or concerns with these Applications.

8. Recommendation

Board staff recommend the Board:

a) **Make a motion to approve the preliminary screening** of the Applications for Land Use Permit MV2021X0019 and Water Licence MV2021L1-0009 from Imperial Oil Limited.

b) **Make a motion to approve the Type A Land Use Permit MV2021X0019** for a term of 5 years **and associated Reasons for Decision**.

c) **Make a motion to approve the Type B Water Licence MV2021L1-0009** for a term of 7 years **and associated Reasons for Decisions.**

d) **Make a motion to approve the Waste Management Plan as required by Land Use Permit MV2021X0019 and Water Licence MV2021L1-0009 as an interim submission**. Imperial Oil Limited is required to submit a revised submission in accordance with comments and commitments made during this review by **December 15**, **2021** for confirmation of conformity from Board staff.

e) As **Make a motion to approve the Spill Contingency Plan** as required by Land Use Permit MV2021X0019 and Water Licence MV2021L1-0009.

f) **Make a motion to approve the Engagement Plan** as required by Land Use Permit MV2021X0019 and Water Licence MV2021L1-0009.

g) **Make a motion to approve the Closure and Reclamation Plan** as required by Land Use Permit MV2021X0019 and Water Licence MV2021L1-0009.

Draft decision letters are attached.

9. Attachments

- MV2021X0019
  - Land Use Permit Application
- MV2021L1-0009
  - Water Licence Application
- Supporting Documents
  - Safety Data Sheets
  - Waste Management Plan
  - Drilling Execution Plan
  - Construction Execution Plan
  - Maps
  - Certificate of Registration
  - Eligibility Email
  - Financial Security
  - Closure and Reclamation Plan
  - Spill Contingency Plan
  - Engagement Plan
  - Pre-submission Engagement Record
  - Written Confirmation of Waste Acceptance
  - Fee Receipt
- Review Summary and Attachments
- Draft Preliminary Screening Determination and Reasons for Decision
  - Draft Notification Letter to Review Board re 10-day pause period
- Draft Land Use Permit Cover Page
- Draft Land Use Permit Conditions
- Draft Water Licence Cover Page
- Draft Water Licence Conditions
- Draft Reasons for Decision
- Draft Decision Letter from the Board – Land Use Permit
- Draft Decision Letter from the Board – Water Licence

Respectfully submitted,

Tyree Mullaney
Regulatory Specialist

Reviewer Comments and Proponent Responses

Project: Jean Marie River - Well Abandonment
Board: Mackenzie Valley Land and Water Board
Organization: Imperial Oil Resources

No	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response	Board Decision
GNWT-Lands - North Slave Region - Mrs. Cheryl Larocque					
1		MV2021X0019 - LUPA Comments Letter	See attached letter	Imperial has reviewed the submitted letter and notes the comments from the Territorial Land Administration regarding tenure. The Imperial Land department will reach out to discuss tenure needs for this project.	
No	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response	
NWT- OROGO - Pauline De Jong					
1		Please see attached letter	No recommendations	Imperial has reviewed the submitted letter and thanks OROGO for the response. As noted, Imperial has submitted the required applications to OROGO to support execution of this work.	Noted
No	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response	
GNWT-Lands - Dehcho Region - Mr. Andrew Lirette					
1	JMR Well Abandonment	Inspectors from the Department of Lands (Dehcho Region) have no comments or concerns.	N/A	Imperial has reviewed the comments from the Dehcho Region Department of Lands.	Noted
No	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response	
GNWT-ENR (Environment and Natural Resources) - Mr. Patrick Clancy					
1	Imperial B-48 Remediation Review	ENR Letter to the Proponent	ENR Letter to the Proponent	Imperial has reviewed the submitted letter and thanks ENR for the response. Re: Birds Nests - Imperial will follow the recommendations provided and notes that were no bear dens, raptor nests or other wildlife activity seen	Noted

No	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response	Board Decision
				during the fall scouting trip. Re: Wildlife Abodes - Imperial will contact ENR and work with the local community (JMRFN) prior to start-up of project to determine if there are any wildlife habitats within the project area. On October 1, 2021 Imperial conducted a scouting trip that evaluated the wellsite, proposed access, and river crossing - no bear activity or bear dens were observed. There were no presence of beavers or muskrats observed at the river crossing area. Some moose tracks appearing to come out of the river were observed at the river bank. Re: Disturbance and Harassment of Wildlife - Imperial will follow the recommendations provided. Re: Wildlife Attractants and Waste Management - Imperial will update the Waste Management Plan to include food and waste storage procedures to mininize the attraction of wildlife. Re: Reporting Wildlife Sightings - Imperial will report wildlife sightings during project execution. Re: Reporting Wildlife Defense of Life and Property Kills and Wildlife Emergencies/Incidents - Imperial will have procedures in place to limit attracting wildlife to the project site and lead field personnel will have bear safety training. However, Imperial notes that the project timeframe is during bear hibernation season and while the crew will be prepared, Imperial is not expecting any bear encounters. Imperial	

No	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response	Board Decision
				will report bear sightings and if any wildlife are killed, Imperial will report to an ENR officer as soon as practicable.	
2	JMR B-48 Review	RECLAIM Ver. 7 Model Estimate – October 8, 2021	RECLAIM estimate is submitted in support of ENR's comments	Imperial has reviewed ENR's RECLAIM estimate and comments.	Noted
3	JMR B-48 Review	Arktis Memo - Oct 8, 2021	Memo is submitted in support of ENR Comments	Imperial has reviewed the memo and thanks Arktis for the response.	Noted
4	JMR B-48 Well Abandonment	ENR Cover Letter	ENR Cover Letter	Imperial has reviewed the submitted letter and thanks ENR for the response. Imperial notes this is a letter for the Board.	Noted
5	Topic: ARKTIS Solutions Memorandum and Security RECLAIM Estimate	As part of the review of Imperial Oil Resources (Imperial) Applications for a type A Land Use Permit (MV2021X0019) and type B Water Licence (MV2021L1-0009), ENR retained ARKTIS Solutions Inc. (ARKTIS) to conduct a technical review of the proposed documents and complete a RECLAIM Ver. 7 model estimate based on these documents. ENR has extracted and summarized the comments and recommendations from the memorandum from ARKTIS and has provided them below. ENR has also attached the memo and RECLAIM estimate, which provides additional background for the Board and Imperial's information. The security estimate has been developed by ARKTIS utilizing the RECLAIM Ver. 7 model – Oil and Gas (O&G) version and in general accordance with Indian and Northern Affairs Canada (2002) "Mine Site Reclamation Policy for the Northwest Territories." Despite the policy being developed for mining reclamation, select principles of this policy regarding	1) ENR recommends that the total reclamation security is $3,790,943 with a recommended land and water liability portion of $1,278,482 and $2,512,462, respectively. Please see the RECLAIM estimate and associated ARKTIS memorandum included with this submittal for further details and cost assumptions associated with ENR's estimate.	Imperial has reviewed the comment and thanks ENR for the response.	Noted

No	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response	Board Decision
		reclamation security are directly applicable to oil and gas reclamation. The estimate is based on the premise that adequate security is to be provided to cover the cost of reclamation, including shutdown, closure, and post-closure for all project components, and that a third party, an independent contractor would complete the reclamation activities. ENR directs the Board and Imperial to the attached ARKTIS memorandum for further details on the costing assumptions and the attached RECLAIM estimate for the complete costing information. Typically, the RECLAIM security calculates the portion of security that applies to land and water liabilities based on capital costs. ENR further notes that the GNWT Department of Lands has also reviewed the estimate and memo from ARKTIS and supports the recommendation herein for land and water security for both authorizations.			
6	Topic: Bird Nests	• On page 10 of the Imperial's Water License Application the Proponent outlines the use of a winter road, an access road, and vegetation clearing. • The project poses a risk of damaging, or destroying, inactive raptor nests.	1) ENR recommends that the Board include Land Use Permit condition(s) requiring the following: • If nesting areas are encountered during the course of operations, the Permittee shall minimize all activity so as to not disturb them; • The Permittee shall not clear any vegetation or disturb any structures supporting an occupied	Imperial has reviewed the conditions and notes this is a comment for the Board.	Board has included a condition in the Permit which addresses the protection of habitat.

No	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response	Board Decision
			bird nest or an unoccupied raptor nest, unless authorized by a permit issued by the relevant management authority. • The Permittee shall search areas for evidence of occupied bird nests and/or unoccupied raptor nests prior to undertaking any activities involving vegetation clearing or, ground disturbance. • The Permittee shall not conduct any activity within the setback distances specified for occupied raptors nests within Table 2-5 of the Northern Land Use Guidelines – Northwest Territories Seismic Operations.		
7	Topic: Wildlife Attractants and Waste Management	The Proponent's application and/or Waste Management Plan doesn't include sufficient detail on how wastes will be stored so as not to create an attractant to wildlife. After review of the Imperial's Water License Application and Waste Management Plan, ENR notes that the Proponent doesn't include wildlife proof waste storage containment.	1) The proponent's Waste Management Plan should be updated to include additional detail regarding how wastes will be managed and stored, so as to minimize attraction of wildlife, including the types of waste storage containers that will be used.	Imperial has updated the Waste Management Plan to include additional detail on how wastes will be managed and stored in order to minimize the attraction of wildlife. The types of waste storage containers that will be used are noted in the updated plan.	Board requires that the Plan be updated to include information requested from GNWT – ENR as well as information relating to the use and operation of the sewage treatment plant.

No	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response	Board Decision
8	Topic: Species at Risk	• Section 76 and 77 of the Species at Risk (NWT) Act requires the Minister of Environment and Natural Resources to make a submission to the body responsible for assessing the potential impacts of a proposed development, or for considering a Land Use Permit or Water Licence application, respecting the potential impacts of the proposed development, or the Permit or Licence application on a NWT-listed or pre-listed species or its habitat. NWT-listed species are those that are on the NWT List of Species at Risk. Pre-listed species are those that have been assessed by the NWT Species at Risk Committee (SARC) but have not yet been added to the NWT List of Species at Risk. • The project area overlaps with the ranges of the following NWT-listed and/or pre-listed species; information on these species is available at the following link: • https://www.nwtspeciesatrisk.ca/SpeciesAtRisk o Boreal Caribou – Threatened in the NWT o Little Brown Myotis (bat) – Special Concern in the NWT o Northern Myotis (bat) – Special Concern in the NWT Potential impacts to the species at risk listed above from the project include sensory disturbance and disturbance or destruction of habitat. Although the project overlaps with the range of boreal caribou, and there is potential for sensory disturbance to boreal caribou from	None.	Imperial has reviewed the comment and thanks ENR for the response.	Board has included a condition in the Permit which addresses the protection of habitat.

No	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response	Board Decision
		the proposed operations, the amount of new habitat disturbance from the project has been minimized by using existing disturbance features. While there is the potential for bat hibernacula and/or summer maternity roosts to occur within the project area, these features have not been well surveyed in the NWT, and their occurrence in the project area is currently unknown. The use of existing disturbance features should help to minimize the risk of damaging or destroying summer maternity roosts for bats, should they occur in the project area. ENR is satisfied that with application of the specific recommendations contained within ENR's letter to the Board and letter to the Proponent, and with the application of the wildlife mitigation and monitoring measures outlined in the Imperial's Land Use Permit and Water Licence application, potential impacts to the species at risk listed above can be avoided or minimized.			
No	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response	
Fisheries and Oceans Canada (DFO) - Nicholas Wasilik					
1	Jean Marie River - Well Abandonment	The proponent has engaged with Fisheries and Oceans Canada in preliminary conversations concerning the proposed work on the Jean Marie River. DFO has informed the proponent that, if water is to be withdrawn from either the Jean Marie River or Mackenzie River, a Request for Review will be required to be submitted to DFO due to the documented presence of bull trout in both these	It is recommended that the proponent continue to engage with DFO to ensure that the project does not contravene the Fisheries Act.	Imperial has reviewed the comment and will continue to engage with DFO. Imperial will be submitting the Request for Review to DFO shortly.	Noted

No	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response	Board Decision
		watercourses.			

MEMORANDUM

File:	**2021-GNWT Imperial Oil Limited B48 Well**
To:	**Government of the Northwest Territories**
Attention:	**Bill Pain, Environmental Scientist – Water Regulatory and Assessment, Department of Environment and Natural Resources**
Subject:	**RECLAIM security review – Imperial Oil Limited B48 Well - Land Use Permit and Water Licence (MV2021X0019, MV2021L1-0009)**
Author:	**Jamie Van Gulck, Ph.D., P.Eng., Principal** **Drew Stavinga, M.Sc., P.Geo., Environmental Geoscientist**
Page Total:	**4 plus appendices**
Revision:	**0**
Date:	**October 8, 2021**

PREAMBLE

The Government of the Northwest Territories (GNWT) has contracted ARKTIS Solutions Inc. (ARKTIS) to complete a review of Imperial Oil Limited's (IOL) reclamation security associated with the closure and abandonment of the Jean Marie B-48 well. These materials were distributed by the Mackenzie Valley Land and Water Board (MVLWB) on September 20, 2021. This Memorandum provides ARKTIS' recommendation regarding the reclamation security for consideration by the GNWT in their review of IOL's Land Use Permit (MV2021X0019) and Water Licence (MV2021L1-0009) application materials. Review comments are due to the MVLWB by October 8, 2021.

ANALYSIS AND RESULTS

ARKTIS provides the following comments regarding IOL's reclamation security and methodology.

- Reclamation Policy – IOL's approach to reclamation costing is considered in general agreement with Indian and Northern Affairs Canada (2002) "Mine Site Reclamation Policy for the Northwest Territories". It is noted that despite this policy being developed for mining reclamation, select principals of this policy with regards to reclamation security are directly applicable to O&G reclamation.
- RECLAIM tool - IOL's reclamation security utilized the RECLAIM v7 model – Oil and Gas (O&G) version, which is considered the preferred tool to estimate securities for projects of this type.
- Unit costs - For most of the line items within the security estimate, site specific costs were applied rather than the default RECLAIM unit costs. On review of the site-specific costs, ARKTIS notes that a) where comparable RECLAIM unit costs exist, the site-specific cost are larger in value and therefore considered reasonable and b) where comparable RECLAIM unit costs do not exist, the site specific costs do not appear unreasonable from an order of magnitude basis. For the latter, it is noted that evidence in the form of verbal or written quotations were not provided in IOL's reclamation security to support their selection of site-specific costs. The site-specific unit costs were assumed to be representative of current dollars and the use of default unit costs is limited, an inflation adjustment of the default RECLAIM 2011 unit costs was not considered necessary. Any such inflation adjustment would be nominal in value.
- Quantities – The quantities for each RECLAIM line item are reasonably selected based on the information presented in IOL's application materials or otherwise applied.
- Capital costs – Capital costs are calculated as the product of the quantities and the associated unit costs. IOL's capital costs are considered reasonable since the quantities and unit costs were also considered reasonable.
- Indirect percentages – IOL's selected indirect percentages for engineering, project management, health and safety & QA/QC, and bonding/insurance are within the typical values documented within the RECLAIM O&G manual and applied to other security estimates for industrial undertakings in the Northwest Territories. Thus, IOL's indirect percentages are considered reasonable.

- Contingency – IOL's contingency percentage is considered representative of the level of closure planning and therefore reasonably applied to the capital costs and the mobilization and demobilization costs. IOL did not apply contingency to the post-closure monitoring and maintenance. It is recommended that contingency apply to this line item for uncertainty would exist in the estimate for these costs. This approach is consistent with other security estimates for industrial undertakings in the Northwest Territories.
- Mobilization and Demobilization - There is uncertainty in IOL's estimate for mobilization of heavy and rental equipment to and from site. IOL provided a lump sum cost that does not allow for an understanding of the number and type of equipment considered in the estimated cost. The source location for the equipment is also unclear. Without this information, it is difficult to assess the validity of IOL's equipment mobilization and demobilization cost or develop a more robust estimate. To provide a more detailed estimate for equipment mobilization/demobilization, the following information would be required:
    - Origin of heavy and rental equipment (e.g., Yellowknife, Fort Nelson, etc.) to be brought to site.
    - Detailed list of equipment required for construction, abandonment and reclamation activities.
    - Duration at site required for each equipment piece.
    - Rental costs for individual equipment.

  Notwithstanding the above, based on the equipment list provided in the application materials, ARKTIS does not consider IOL's mobilization and demobilization fees for equipment to be unreasonable and likely to be within the accuracy of this estimate. The challenge is based on the information, IOL's estimate can't be further evaluated to confirm its acceptability. Until further information is available, ARKTIS cost accepted IOL's costing for this item.
- Post-Closure Monitoring and Maintenance (Vegetation) – IOL's estimate for post-closure vegetation assessment was considered limited in detail to understand the basis of their costing. IOL provided a lump sum cost that did not include or provide an understanding of specific cost activities (e.g., labour, transport, etc.) expected to be required for a vegetation assessment to assess their validity. IOL may have potentially only included costing for an aerial assessment. ARKTIS has provided their own estimate for a post-closure vegetation/detailed site assessment that breaks down costing for crew labour, helicopter and ground transport, and accommodations. ARTKIS has assumed costing for ground assessment in addition to aerial assessment as is noted may occur in the Closure and Reclamation Plan.
- Post-Closure Monitoring and Maintenance (Summary Costs) – IOL's estimate includes an error in the Summary Costs for post-closure monitoring and maintenance, where the cost is mistakenly reported to be $0.

ARKTIS utilized IOL's RECLAIM estimate and completed adjustment as noted in the above text. The updated RECLAIM v7 output sheets are provided in Appendix A. The RECLAIM output sheets identify where a change was completed in IOL's estimate to develop ARKTIS' estimate. Table 1 summarizes the capital and indirect cost and total security estimate as calculated by the RECLAIM v 7 model for both IOL's estimate and ARKITS' estimate.

Table 1. Summary of the reclamation security.

CAPITAL COSTS	IOL's Sep 10, 2021 RECLAIM Estimate			ARKTIS' Oct 7, 2021 RECLAIM Estimate		
	TOTAL COSTS	**LAND LIABILITY**	**WATER LIABILITY**	**TOTAL COSTS**	**LAND LIABILITY**	**WATER LIABILITY**
WELLS AND FACILITIES	$1,308,278	$0	$1,308,278	$1,308,278	$0	$1,308,278
BUILDINGS AND EQUIPMENT	$605,725	$605,725	$0	$605,725	$605,725	$0
CHEMICALS AND CONTAMINATED SOIL MANAGEMENT	$60,000	$60,000	$0	$60,000	$60,000	$0
SURFACE AND GROUNDWATER MANAGEMENT	$0	-	$0	$0	-	$0
INTERIM CARE AND MAINTENANCE	$0	-	$0	$0	-	$0
INFLATION – 0%	$0	$0	$0	$0	$0	$0
SUBTOTAL: Capital Costs	**$1,974,003**	**$665,725**	**$1,308,278**	**$1,974,003**	**$665,725**	**$1,308,278**
PERCENT OF SUBTOTAL		**34%**	**66%**		**34%**	**66%**
INDIRECT COSTS	**TOTAL COSTS**	**LAND LIABILITY**	**WATER LIABILITY**	**TOTAL COSTS**	**LAND LIABILITY**	**WATER LIABILITY**
MOBILIZATION/DEMOBILIZATION/WORKER ACCOMMODATIONS	$766,920	$258,641	$508,279	$766,920	$258,641	$508,279
POST-CLOSURE MONITORING AND MAINTENANCE	$0	$0	$0	$102,328	$34,510	$67,818
ENGINEERING (5%)	$98,700	$33,286	$65,414	$98,700	$33,286	$65,414
PROJECT MANAGEMENT (5%)	$98,700	$33,286	$65,414	$98,700	$33,286	$65,414
HEALTH AND SAFETY PLANS/MONITORING & QA/QC (1%)	$19,740	$6,657	$13,083	$19,740	$6,657	$13,083
BONDING/INSURANCE (1%)	$19,740	$6,657	$13,083	$19,740	$6,657	$13,083
CONTINGENCY (25%) - CAPITAL COST	$493,501	$166,431	$327,069	$493,501	$166,431	$327,069
CONTINGENCY (25%) – MOBILIZATION, ACCOMMODATIONS AND POST-CLOSURE	$191,730	$64,660	$127,070	$217,312	$73,288	$144,024
MARKET PRICE FACTOR ADJUSTMENT (0%)	$0	$0	$0	$0	$0	$0
SUBTOTAL: Indirect Costs	**$1,689,031**	**$569,619**	**$1,119,412**	**$1,816,941**	**$612,757**	**$1,204,184**
TOTAL COSTS	**$3,663,033**	**$1,235,344**	**$2,427,689**	**$3,790,943**	**$1,278,482**	**$2,512,462**

RECOMMENDATIONS

The recommended amount of reclamation security is listed in Table 2. The water and land related liability is presented and recommended to be placed within the Water Licence (MV2021L1-0009) and Land Use Permit (MV2021X0019), respectively.

Table 2. Summary of recommended total, land and water related liability.

Authorization	Amount
Land Use Permit (MV2021X0019)	$1,278,482
Water Licence (MV2021L1-0009)	$2,512,462
Totals	**$3,790,943**

DISCLAIMER AND CLOSURE

ARKTIS Solutions Inc. assumes no responsibility for inappropriate use of the contents of this memorandum and disclaims all liability arising from negligence or otherwise in respect of such information and recommendations presented in this memorandum. General terms and conditions available in Appendix B.

ARKTIS SOLUTIONS INC.

Jamie Van Gulck, Ph.D., P.Eng. Chief Technical Officer	Drew Stavinga, M.Sc., P.Geo. Professional Geoscientist

APPENDIX A – RECLAIM OUTPUTS

SUMMARY OF COSTS

CAPITAL COSTS	COMPONENT NAME	COST	LAND LIABILITY	WATER LIABILITY	ARKTIS Notes
WELLS AND FACILITIES		$1,308,278	$0	$1,308,278	
BUILDINGS AND EQUIPMENT (Construction Execution)		$605,725	$605,725	$0	
CHEMICALS AND CONTAMINATED SOILD MANAGEMENT		$60,000	$60,000	$0	
SURFACE AND GROUNDWATER MANAGEMENT		$0	-	$0	
INTERIM CARE AND MAINTENANCE		$0	-	$0	
INFLATION - 0%	**0.00%**	$0	$0	$0	
	SUBTOTAL: Capital Costs	**$1,974,003**	**$665,725**	**$1,308,278**	
	PERCENT OF SUBTOTAL		**34%**	**66%**	

INDIRECT COSTS		COST	LAND LIABILITY	WATER LIABILITY	
MOBILIZATION/DEMOBILIZATION/WORKER ACCOMODATIONS		$766,920	$258,641	$508,279	
POST-CLOSURE MONITORING AND MAINTENANCE		$102,328	$34,510	$67,818	IOL's estimate mistakenly listed post-closure monitoring as $0.
ENGINEERING	5%	$98,700	$33,286	$65,414	
PROJECT MANAGEMENT	5%	$98,700	$33,286	$65,414	
HEALTH AND SAFETY PLANS/MONITORING & QA/QC	1%	$19,740	$6,657	$13,083	
BONDING/INSURANCE	1%	$19,740	$6,657	$13,083	
CONTINGENCY	25%	$493,501	$166,431	$327,069	
CONTINGENCY - MOBILIZATION, ACCOMODATIONS AND POST-C	25%	$217,312	$73,288	$144,024	
MARKET PRICE FACTOR ADJUSTMENT	0%	$0	$0	$0	
	SUBTOTAL: Indirect Costs	**$1,816,941**	**$612,757**	**$1,204,184**	

TOTAL COSTS	**$3,790,943**	**$1,278,482**	**$2,512,462**

1 **Wells and Facilities**

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
OBJECTIVE: ABANDONMENT OF WELLS				#N/A					
All wells- Drilled / Cased		m	1	WLS	$12,500.00	$12,500		$0	$12,500
Sweet Well - Completed / Active / Inactive		m	785	SWWL1S	$1,650.67	$1,295,778		$0	$1,295,778
Sour Well (H2S>1%) - Completed / Active / Inactive		m		#N/A	$0.00	$0		$0	$0
Vent Flow / Gas Migration				#N/A	$0.00	$0		$0	$0
Additional Completion Zones				#N/A	$0.00	$0		$0	$0
OBJECTIVE: ABANDONMENT OF PRODUCTION FACILITIES				#N/A					
Oil / bitumen process or injection / disposal facility		m3/day		#N/A	$0.00	$0		$0	$0
Gas processing facility		m3/day		#N/A	$0.00	$0		$0	$0
Gas dehydration facility		m3/day		#N/A	$0.00	$0		$0	$0
Compressor station		KW		#N/A	$0.00	$0		$0	$0
Battery sites		m3/day		#N/A	$0.00	$0		$0	$0
Battery sites w/ separation, compression, injection and/or disposal equipment		m3/day		#N/A	$0.00	$0		$0	$0
Satellite batteries		m3/day		#N/A	$0.00	$0		$0	$0
Other stations		ha		#N/A	$0.00	$0		$0	$0
					Total	$1,308,278		$0	$1,308,278
					% of Total			0	100

1 **Building / Equip Name:** **Bldg / Equip #:** *1*

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost	ARKTIS Notes
OBJECTIVE: Construction Execution for Wellsite Access, Cut and Cap				#N/A						
Project Coordination for Construction, building access		each	1		$137,725.00	$137,725	100%	$137,725	$0	
Fuel, Heavy Equipment, Personnel and Rental Equipmentfor Construction Execution		each	1		$268,000.00	$268,000	100%	$268,000	$0	Assumed to include fuel transport to site.
Estimated costs to cut and cap well, fill cellar, and complete rollback.		each	1		$200,000.00	$200,000	100%	$200,000	$0	
OBJECTIVE: BUILDING DECONTAMINATION & HAZ. MATERIAL REMOVAL				#N/A						
Decontaminate, oil, fuel and glycol systems		mandays		#N/A	$0.00	$0		$0	$0	
Decontaminate, general		mandays		#N/A	$0.00	$0		$0	$0	
Mechanical		mandays		#N/A	$0.00	$0		$0	$0	
Electrical		mandays		#N/A	$0.00	$0		$0	$0	
Decontaminate maintenance shop		each		#N/A	$0.00	$0		$0	$0	
Decontaminate power plant		each		#N/A	$0.00	$0		$0	$0	
Decontaminate bulk fuel storage		each		#N/A	$0.00	$0		$0	$0	
Deontaminate offices/warehouse/accom		each		#N/A	$0.00	$0		$0	$0	
Removal of asbestos siding on buildings		each		#N/A	$0.00	$0		$0	$0	
Removal of friable asbestos on equipment		each		#N/A	$0.00	$0		$0	$0	
Other				#N/A	$0.00	$0		$0	$0	
OBJECTIVE: REMOVE BUILDINGS - ALL BUILDING AREAS SCALED TO ACCOUNT FOR HEIGHT				#N/A						
Accomodation Complex		m2		#N/A	$0.00	$0		$0	$0	
Process Facilities		m2		#N/A	$0.00	$0		$0	$0	
Offices, Repair, Lab, Warehouse		m2		#N/A	$0.00	$0		$0	$0	
Storage Facilites		m2		#N/A	$0.00	$0		$0	$0	
Water and Wastewater Treatment Facilities		m2		#N/A	$0.00	$0		$0	$0	
U/G Heating Plant		m2		#N/A	$0.00	$0		$0	$0	
Emulsion Plant		m2		#N/A	$0.00	$0		$0	$0	
AN Storage Facility		m2		#N/A	$0.00	$0		$0	$0	
Warehouse, Shops and Other		m2		#N/A	$0.00	$0		$0	$0	
Storage Facility at Laydown/Airstrip		m2		#N/A	$0.00	$0		$0	$0	
Fuel tanks		m2		#N/A	$0.00	$0		$0	$0	
Fuel Tanks		m2		#N/A	$0.00	$0		$0	$0	
Freshwater intake		m2		#N/A	$0.00	$0		$0	$0	
Reclaim pumps		m2		#N/A	$0.00	$0		$0	$0	
Outfall & Diffuser		m2		#N/A	$0.00	$0		$0	$0	
Airstrip lighting, navigation, electrician		mandays		#N/A	$0.00	$0		$0	$0	
Airstrip lighting, navigation, mechanical		mandays		#N/A	$0.00	$0		$0	$0	
Consolidate & dump boneyard debris		m3		#N/A	$0.00	$0		$0	$0	
other				#N/A	$0.00	$0		$0	$0	
OBJECTIVE: BREAK BASEMENT SLABS				#N/A						
Accomodation Complex		m2		#N/A	$0.00	$0		$0	$0	
Process Facilities		m2		#N/A	$0.00	$0		$0	$0	
Offices, Repair, Lab, Warehouse		m2		#N/A	$0.00	$0		$0	$0	
Storage Facilites		m2		#N/A	$0.00	$0		$0	$0	
Water and Wastewater Treatment Facilities		m2		#N/A	$0.00	$0		$0	$0	
U/G Heating Plant		m2		#N/A	$0.00	$0		$0	$0	
Emulsion Plant		m2		#N/A	$0.00	$0		$0	$0	
Warehouse, Shops and Other		m2		#N/A	$0.00	$0		$0	$0	
Other				#N/A	$0.00	$0		$0	$0	
OBJECTIVE: LANDFILL FOR DEMOLITION WASTE				#N/A						
Place soil cover		m3		#N/A	$0.00	$0		$0	$0	
Vegetate		ha		#N/A	$0.00	$0		$0	$0	
Landfill disposal fee		tonne		#N/A	$0.00	$0		$0	$0	
OBJECTIVE: GRADE AND CONTOUR				#N/A						
Accomodation Complex		ha		#N/A	$0.00	$0		$0	$0	
Process Facilities		ha		#N/A	$0.00	$0		$0	$0	
Offices, Repair, Lab, Warehouse		ha		#N/A	$0.00	$0		$0	$0	
Storage Facilites		ha		#N/A	$0.00	$0		$0	$0	
Water and Wastewater Treatment Facilities		ha		#N/A	$0.00	$0		$0	$0	
U/G Heating Plant		ha		#N/A	$0.00	$0		$0	$0	
Emulsion Plant		ha		#N/A	$0.00	$0		$0	$0	
Warehouse, Shops and Other		ha		#N/A	$0.00	$0		$0	$0	
Place rock cover		m3		#N/A	$0.00	$0		$0	$0	
Vegetate		ha		#N/A	$0.00	$0		$0	$0	
Other				#N/A	$0.00	$0		$0	$0	
OBJECTIVE: LINED SUMPS				#N/A						
Puncture liner and place soil cover		m3		#N/A	$0.00	$0		$0	$0	
OBJECTIVE: RECLAIM ROADS				#N/A						
Remove culverts		each		#N/A	$0.00	$0		$0	$0	
Remove bridges		each		#N/A	$0.00	$0		$0	$0	
Scarify and install water breaks		ha		#N/A	$0.00	$0		$0	$0	
Scarify airstriip		ha		#N/A	$0.00	$0		$0	$0	
Scarify laydown areas		ha		#N/A	$0.00	$0		$0	$0	
Vegetate		ha		#N/A	$0.00	$0		$0	$0	
Other				#N/A	$0.00	$0		$0	$0	
SPECIALIZED ITEMS				#N/A						
Dispose of misc. debris and laydown area refuse				#N/A	$0.00	$0		$0	$0	
					Total	$605,725		$605,725	$0	
					% of Total			100	0	

1 **Chemicals/Soil Area Name:**

Note: The procedures, equipment and packaging for clean up and removal of chemicals or contaminated soils are highly dependent on the nature of the chemicals and their existing state of containment. Government guidelines should be consulted on an individual chemical basis. Any estimate made here should be considered very rough unless specific evaluations have been conducted.

ACTIVITY/MATERIAL		Units	Quantity	Cost Code	Unit Cost	Cost		Land Cost	Water Cost
HAZARDOUS MATERIALS AUDIT				#N/A					
Phase 1 audit		each		#N/A	$0.00	$0		$0	$0
Phase 2 audit		each		#N/A	$0.00	$0		$0	$0
CONSOLIDATE HAZARDOUS MATERIALS FOR REMOVAL				#N/A					
Waste oils		litre		#N/A	$0.00	$0		$0	$0
Fuel - Type 1, eg diesel dregs		litre		#N/A	$0.00	$0		$0	$0
Fuel - Type 1, eg gasoline dregs		litre		#N/A	$0.00	$0		$0	$0
Waste batteries		kg		#N/A	$0.00	$0		$0	$0
Assay & environmental lab reagents		kg		#N/A	$0.00	$0		$0	$0
Machine shop, paints, solvents etc		litre		#N/A	$0.00	$0		$0	$0
Contaminated soils - hydrocarbon		m3		#N/A	$0.00	$0		$0	$0
Metal contam. soil at conc. load-out		m3		#N/A	$0.00	$0		$0	$0
Glycol		litre		#N/A	$0.00	$0		$0	$0
Nuclear sources		each		#N/A	$0.00	$0		$0	$0
HAZARDOUS MATERIALS				#N/A					
Transportation to disposal facility		allow		#N/A	$0.00	$0		$0	$0
Disposal fees		allow		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
CONTAMINATED SOILS				#N/A					
Contam. soil investigation - technical		each		#N/A	$0.00	$0		$0	$0
Environmental Monitoring - Flux		each	1		$60,000.00	$60,000	100%	$60,000	$0
Rec. Aerial Monitoring by Helicopter		each				$0	100%	$0	$0
Contam. soil investigation - drilling & sampling		each		CSEIS	$25,000.00	$0	100%	$0	$0
CONTAMINATED SOIL REMOVAL				#N/A					
Contaminated soils - hydrocarbon	TBD	m2		#N/A	$0.00	$0		$0	$0
Metal contam. soil at conc. load-out	TBD	m3		#N/A	$0.00	$0		$0	$0
Load, haul, dump or doze	TBD	m3		#N/A	$0.00	$0		$0	$0
Reagents/stabilizing agent	TBD	m2		#N/A	$0.00	$0		$0	$0
Contour reclaimed area	TBD	m3		#N/A	$0.00	$0		$0	$0
Type 2, heavy fuel and oil	TBD	m3		#N/A	$0.00	$0		$0	$0
CONTAMINATED SOIL VERY LOW PERMEABILITY COVER				#N/A					
Supply geomembrame, HDPE, ES3, GCL		m2		#N/A	$0.00	$0		$0	$0
Upper and lower bedding layers		m3		#N/A	$0.00	$0		$0	$0
Install geomembrane, HDPE, ES3, GCL		m2		#N/A	$0.00	$0		$0	$0
Erosion protection layer		m3		#N/A	$0.00	$0		$0	$0
Vegetate		m2		#N/A	$0.00	$0		$0	$0
Install infiltration/seepage instrumentation		allow		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
OTHER				#N/A					
				#N/A	$0.00	$0		$0	$0
					Total	$60,000		$60,000	$0
					% of Total			100	0

1 Capital Expenditures and Short Term Water Treatment

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost
OBJECTIVE: STABILIZE SEDIMENT PONDS/WATER MANAGEMENT PONDS				#N/A		
Place soil cover		m3		#N/A	$0.00	$0
Doze & spread excavated material		m3		#N/A	$0.00	$0
Vegetate spread material		ha		#N/A	$0.00	$0
Rip rap in channel base		each		#N/A	$0.00	$0
OBJECTIVE: REDIRECT RUNOFF/CONSTRUCT DIVERSION DITCHES				#N/A		
Excavate ditches -soil		m3		#N/A	$0.00	$0
Excavate ditches -rock		m3		#N/A	$0.00	$0
Stabilize side slopes		m3		#N/A	$0.00	$0
Rip rap in channel base		m3		#N/A	$0.00	$0
OBJECTIVE: BREACH DITCHES				#N/A		
Excavate breaches		m3		#N/A	$0.00	$0
Backfill/recontour		m3		#N/A	$0.00	$0
Install flow dissipation		m3		#N/A	$0.00	$0
Vegetate remainder of ditch		m2		#N/A	$0.00	$0
OBJECTIVE: FRESH WATER SUPPLY				#N/A		
Breach embankment		m		#N/A	$0.00	$0
Remove pump		LS		#N/A	$0.00	$0
Remove pipeline		m		#N/A	$0.00	$0
OBJECTIVE: WATER CONTROL IN RECLAMATION QUARRY				#N/A		
Install pumping system		LS		#N/A	$0.00	$0
Remove pumping system		LS		#N/A	$0.00	$0
OBJECTIVE: REMOVE WATER PIPELINES				#N/A		
Remove pipes		m		#N/A	$0.00	$0
Concrete plug deep pipes		m3		#N/A	$0.00	$0
Other				#N/A	$0.00	$0
OBJECTIVE: GROUNDWATER COLLECTION SYSTEM				#N/A		
Excavate/install sumps		m3		#N/A	$0.00	$0
Install pumping wells		m3		#N/A	$0.00	$0
Install pumps/pipelines/power supply		LS		#N/A	$0.00	$0
OBJECTIVE: CONSTRUCT CONTAMINATED WATER STORAGE POND				#N/A		
Excavate pond		m3		#N/A	$0.00	$0
Doze & spread excavated material		m3		#N/A	$0.00	$0
Vegetate spread material		ha		#N/A	$0.00	$0
Bedding layer		m3		#N/A	$0.00	$0
Supply geomembrane		m2		#N/A	$0.00	$0
Install geomembrane		m2		#N/A	$0.00	$0
Erosion protection layer		m3		#N/A	$0.00	$0
OBJECTIVE: CONSTRUCT PASSIVE TREATMENT SYSTEM (e.g. Constructed Wetland)				#N/A		
Construct access roads		km		#N/A	$0.00	$0
install HDPE piping system from collection pond		m		#N/A	$0.00	$0
Inter-cell flow structures		allow		#N/A	$0.00	$0
Install liners		m2		#N/A	$0.00	$0
Install growth media		m3		#N/A	$0.00	$0
Wetland vegetation		ha		#N/A	$0.00	$0
OBJECTIVE: CONSTRUCT WATER TREATMENT PLANT				#N/A		
Build treatment plant		LS		#N/A	$0.00	$0
Build sludge containment facility		LS		#N/A	$0.00	$0
					Total	$0

For cost of long-term/post-closure water treatment see "WATER TREATMENT" Worksheet"

1 Post-Closure Water Treatment

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost
OBJECTIVE: ADDITION OF REAGENTS TO WTP				#N/A		
H2O2		kg		#N/A	$0.00	$0
lime		kg		#N/A	$0.00	$0
ferric sulphate		kg		#N/A	$0.00	$0
ferrous sulphate		kg		#N/A	$0.00	$0
flocculents		kg		#N/A	$0.00	$0
Other				#N/A	$0.00	$0
OBJECTIVE: LABOUR AND SUPPLIES				#N/A		
Annual fuel		litres		#N/A	$0.00	$0
Annual power		kW-h		#N/A	$0.00	$0
Electrician/mechanic to maintain treatment plant		allow		#N/A	$0.00	$0
Equipment maintenance and parts		allow		#N/A	$0.00	$0
Misc. supplies, hoses, tools		allow		#N/A	$0.00	$0
Communications		allow		#N/A	$0.00	$0
Other				#N/A	$0.00	$0
OBJECTIVE: WTP WATER SAMPLING AND ANALYSES				#N/A		
Sampling equipment		allow		#N/A	$0.00	$0
Analyses		allow		#N/A	$0.00	$0
Shipping to laboratory		allow		#N/A	$0.00	$0
Reporting		allow		#N/A	$0.00	$0
Other				#N/A	$0.00	$0
OBJECTIVE:SITE ACCESS				#N/A		
Road maintenance (incl. snow removal)		allow		#N/A	$0.00	$0
Winter road tariff		allow		#N/A	$0.00	$0
Truck rental		allow		#N/A	$0.00	$0
Air support		allow		#N/A	$0.00	$0

		Annual water treatment costs	$0
Number of years of water treatment	years		
		Total water treatment costs	$0

1 Interim Care and Maintenance

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost
INTERIM CARE & MAINTENANCE				#N/A		
on-site caretaker		manmonths		#N/A	$0.00	$0
extra personnel		manmonths		#N/A	$0.00	$0
-electrician		manmonths		#N/A	$0.00	$0
-mechanic		manmonths		#N/A	$0.00	$0
annual fuel		litre		#N/A	$0.00	$0
misc. supplies		allow		#N/A	$0.00	$0
pick-up truck		each		#N/A	$0.00	$0
small dozer		allow		#N/A	$0.00	$0
small excavator		allow		#N/A	$0.00	$0
snow machine		allow		#N/A	$0.00	$0
communications		allow		#N/A	$0.00	$0
SNP/AEMP water sampling & reporting		each		#N/A	$0.00	$0
geotechnical assessment		each		#N/A	$0.00	$0
interim water treatment				#N/A	$0.00	$0
other		each		#N/A	$0.00	$0
			Annual	Interim C&M Cost		$0
Number of years of ICM		years		Total Cost		$0

1 Mobilization/Demobilization

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	ARKTIS Notes
MOBILIZE HEAVY EQUIPMENT				#N/A			
Heavy Equipment		each	1		11520	$11,520	Providing a lump sum cost for equipment mobilization does not allow for an understanding of the number and type of equipment required. It is also unclear what the source location for equipment will be, and rental fees used. Without this information, it is difficult to assess the validity of IOL's equipment mod/demob cost.
Rental Equipment		each	1		4320	$4,320	
Dozers		each		#N/A	0	$0	
Demolition shears		each		#N/A	0	$0	
Crane		each		#N/A	0	$0	
Loader		each		#N/A	0	$0	
Mobilize Environmental Drilling Rig		each		TBD	0	$0	
Drilling Rig		each	1		418300	$418,300	
MOBILIZE MISC. EQUIPMENT				#N/A			
Pump shipping		each		#N/A	0	$0	
Pipe shipping		m		#N/A	0	$0	
Minor tools and equipment		allow		#N/A	0	$0	
Truck tires		allow		#N/A	0	$0	
Other				#N/A	0	$0	
MOBILIZE CAMP				#N/A			
Reclamation activities		allow	1		34560	$34,560	
Long term reclamation activities (eg pump flooding)		allow		#N/A	0	$0	
MOBILIZE WORKERS				#N/A			
Reclamation activities - transport		each	1	MWS	6800	$6,800	
Reclamation activities - travel time		manhours		#N/A	0	$0	
Long term reclamation activities (eg pump flooding) - transport		each		#N/A	0	$0	
Long term reclamation activities (eg pump flooding) - travel time		each		#N/A	0	$0	
Monitoring Airfare		each		#N/A	0	$0	
WORKER ACCOMODATIONS				#N/A			
Construction activities - camp		Nightly Camp rate	210	#N/A	864.2857	$181,500	
Construction activities - hotels for travel days		Nightly	12	#N/A	160	$1,920	
MOBILIZE FUEL				#N/A			
Fuel freight - reclamation activities		litre		#N/A	0	$0	
Fuel freight - long reclamation activities		litre		#N/A	0	$0	
Fuel freight accomodations		litre		#N/A	0	$0	
WINTER ROAD				#N/A			
Construction and operation		km	3.3	WRCS	17454.545	$57,600	
Limited winter use		km		WRUS	0.29	$0	
Winter road tarriff		km		#N/A	0	$0	
DEMOBILIZE OTHER INFRASTRUCTURE AND SITE EQUIPMENT				#N/A			
Heavy Equipment		each	1	#N/A	11520	$11,520	
Rental Equipment		each	1	#N/A	4320	$4,320	
Dozers		km		#N/A	0	$0	
Demolition shears		km		#N/A	0	$0	
Crane		km		#N/A	0	$0	
Loader		km		#N/A	0	$0	
Compactor		each		#N/A	0	$0	
Light duty vehicles		km		#N/A	0	$0	
Other		km		#N/A	0	$0	
DEMOBILIZE CAMP				#N/A			
		allow	1		34560	$34,560	
DEMOBILIZE WORKERS				#N/A			
crew travel time		mandays		#N/A	0	$0	
crew transportation		each		#N/A	0	$0	
WINTER ROAD				#N/A			
Construction and operation		km		#N/A	0	$0	
Limited winter use		km		#N/A	0	$0	
Winter road tarriff		km		#N/A	0	$0	
					Mobilization/Demobilization Cost	**$766,920**	

1 **Post-Closure Monitoring & Maintenance**

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	ARKTIS Notes
OBJECTIVE: MONITORING & INSPECTIONS				#N/A			
Vegetation assessment		visits	2	#N/A	$18,000.00	$36,000	Assume crew of 3 (2 enviro tech, 1 supervisor) Assume 4 days x 3 people = 120 hr Assume 40 hrs in office. Total crew time 180 hr. Assume average labour cost $100/hr Totals labour cost = $18,000/yr
Other - crew accomodations	Assume 3 person crew (2 enviro, 1 supervisor) 4 days total field work per year.	manday	24	ACCMH	$175	$4,200	Assume accomdation time required based on duration of field program for crew (see monitoring above).
Other - heli support	Allowance for transport to and around site for 2 days to support aerial and ground assessment. Assume crew mob/demob to site with helicopter	visits	2	#N/A	$15,564	$31,128	Included costs based on helicopter quotation from Sahtu Helicopters Jan 22, 2021. Flight time = $1850/hr * 2 day * 3 hr min flight/day = $11,100 Fuel usage = $744/hr * 3 hrs * 2 days = $4,464 Total = $15,564/yr
Other - ATV rental	Rental allowance for ATV. Assume 2 units for 2 days to support ground assessment. Rental allowance inclusive of transport to cut line.	allow	4	#N/A	$1,500.00	$6,000	Assumes ground assessment by ATV for 50% of the site visit.
Annual geotechnical inspection		each		#N/A	$0.00	$0	
Survey inspection		each		#N/A	$0.00	$0	
Site water monitoring (AEMP and SNP)		each		#N/A	$0.00	$0	
- During pit flooding		each		#N/A	$0.00	$0	
- Post pit flooding		each		#N/A	$0.00	$0	
Air Quality Monitoring Program (AQMP)		each		#N/A	$0.00	$0	
Wildlife Effects Monitoring Program (WEMP)		each		#N/A	$0.00	$0	
Vegetation Monitoring (Aerial Monitoring by Helicopter)		each		#N/A	$15,000.00	$0	Removed from cost. Revised estimate for vegetation assessment provided above.
Contam. soil investigation - drilling & sampling		each	1	#N/A	$25,000.00	$25,000	Assume completed at time of well abandonment
OBJECTIVE: SITE MAINTENANCE				#N/A			
Repair erosion - infill gullies		allow		#N/A	$0.00	$0	
Repair erosion - upgrade diversion ditches		allow		#N/A	$0.00	$0	
Remove problem vegetation		allow		#N/A	$0.00	$0	
Repair animal damage		allow		#N/A	$0.00	$0	
Repair/upgrade access controls		allow		#N/A	$0.00	$0	
Other				#N/A	$0.00	$0	
SPILLWAY MAINTENANCE				#N/A			
Repair erosion		m3		#N/A	$0.00	$0	
Clear spillway		each		#N/A	$0.00	$0	
Other				#N/A	$0.00	$0	
POST-CLOSURE WATER TREATMENT							
Annual water treatment cost, from "Water Treatment"				#N/A	$0.00	$0	
Subtotal, Annual post-closure costs						$102,328	
Discount rate for calculation of net present value of post-closure cost, %				0.00%			
Number of years of post-closure activity				1	years		
Present Value of payment stream						$102,328	

Unit Cost Table (for refining unit costs see "Estimator" worksheet)

Filter by unit

ITEM	Detail	COST CODE	UNITS	LOW $	HIGH $	SPECIFIED $	COMMENTS
Accomodation							
		ACCM	manday	100.00	175.00		
Buildings - Decontaminate							
	Asbestos	BDA	m2	25.60	51.20		Low: removal of asbestos siding & flooring; High: removal of insulated pipes, friable asbestos
Buildings - Remove							
	areas are per floor of 3 m average height						
	Wood	BRW	m2	27.50	41.00		
	Concrete	BRC	m2	40.00	65.00		
	Steel - teardown	BRS1	m2	45.00	65.00		
	Steel - for salvage	BRS2	m2	67.00	100.00		
Concrete work							
	Small pour	CSF	m3	426.50	639.75		Low: YK; High=1.5xLow
	Large pour	CLF	m3	353.50	530.25	2,130.00	Specified: concrete crown pillar
Contaminated Soils							
	Remediate on site	CSR	m3	47.00	146.00		
	Env. investigation Phase I/II	CSEI	each	25000.00		25,000.00	Low: small, "clean" site
Dozing							
	doze rock piles	DR	m3	1.05	2.40		Low cost: doze crest off dump
	doze overburden/soil piles	DS	m3	0.95	3.80		High cost: push up to 300 m
Excavate Rock; Low Spec's and QA/QC							
	drill/blast/load/short haul	RB1	m3	11.40	17.05		Low:quarry operations for bulk fill
	drill/blast/load/long haul	RB2	m3	12.05	17.80		
	RB1 + spread and compact	RB3	m3	12.05	17.80		
	RB2 + spread and compact	RB4	m3	12.70	30.75		
	Specified activity	RBS	m3				
Excavate Rock; High Spec's and QA/QC							(e.g. ditch/spillway excavation)
	drill/blast/load/short haul	RC1	m3				Low:foundation excavation;High:spillway excavation
	drill/blast/load/long haul	RC2	m3	12.70	18.40		
	RC1 + spread and compact	RC3	m3	12.70	18.40		e,g, cover construction
	RC2 + spread and compact	RC4	m3	13.50	19.20		e,g, cover construction
	Specified activity	RCS	m3			175.00	Specified-drift excavation
Excavate Rip Rap							
	drill/blast/load/short haul/place	RR1	m3	13.50	17.75		High: quarry & place rip rap in channel
	drill/blast/load/long haul/place	RR2	m3	13.50	20.65		
	source is waste dump/short haul	RR3	m3	5.20	7.00		
	source is waste dump/long haul	RR4	m3	5.70	7.60		
	specified rip rap source	RR5	m3				
Excavate Soil; Low Spec's and QA/QC							
	clear & grub	SBC	m2	3.40	5.00		
	excavate/load/short haul	SB1	m3	4.30	5.90		
	excavate/load/long haul	SB2	m3	4.30	7.30		
	SB1 + spread and compact	SB3	m3	4.50	6.50		Low: non-engineered; High:engineered
	SB2 + spread and compact	SB4	m3	5.50	11.00		Low: non-engineered; High:engineered
	Specified activity	SBS	m3	3.20	6.00		Low: rehandle waste rock dump by dozing; High:rehandle waste rock by hauling
	Tailings	SBT	m3	1.35	3.70	15.50	Low:doze frost heaves; High:contour surface - wet or frozen; Specified:haul/place wet infill
Excavate Soil, High Spec's and QA/QC							
	excavate/load/short haul	SC1	m3	6.80	9.30		
	excavate/load/long haul	SC2	m3	7.10	11.75		
	SC1 + spread and compact	SC3	m3	8.50	14.20		Low: non-engineered; High:engineered
	SC2 + spread and compact	SC4	m3	8.90	23.20		Low: non-engineered; High:engineered (e.g. complex covers, low volume dam construction)
	Specified activity	SCS	m3			18.80	Backfill adit with waste rock
Fence							
		FNC	m	13.55	203.00		
Fuel and Electricity							
	Fuel operating cost automative	FOA	litre	1.05			
	automative	FONA	litre	0.99	1.31		
	Fuel mobilization	FM	litre	0.22	0.42		High: winter road usage
	Electricity	FE	kW-h	0.17	0.19	0.49	Low and High:Yellowknife; Specified:diesel generator
Geo-Synthetics							
	geotextile	GST	m2	3.44			Supply and install
	geogrid	GSG	m2	5.75			
	liner, HDPE	GSHDPE	m2	7.95			Supply and install; large quantity
	liner, ES3	GSES3	m2	20.20			FOB Yellowknife
	geosynthetic installation	GSI	m2	3.16	14.00		Low:geotextile; High:ES3 or HDPE
	bentonite soil ammendment	GSBA	tonne	308.30	348.50		FOB Edmonton, add shipping & mixing
Grouting (/m3 of rock grouted)							
		grout	m3	236.55	286.75		High: cement, FOB Yellowknife
Labour & Equipment Rates							
	Manager	Sman	$/hr	125.00			
	Superintendant		$/hr	103.54			
	Registered engineer	Eng	$/hr	220.00			
	Environmental coordinator	Envco	$/hr	74.16			
	Electrician	Elec	$/hr	74.00			
	Journeyman - various	Jour	$/hr	71.79			
	Labour - skilled	Lab-s	$/hr	49.60			
	Labour - unskilled	Lab-us	$/hr	43.98	50.00		
	Equipment operator	oper	$/hr	65.00	80.00		
	Heavy duty mechanic	mech	$/hr	72.85			

Unit Cost Table (for refining unit costs see "Estimator" worksheet)

	Filter by unit					
Water treatment plant operator	oper-wt	$/hr	59.86			
Security / first aid	safety	$/hr	66.97			
Administative staff	admin	$/hr	57.89			
Equipment rates include operator and fuel unless specified						
Loader - 4 cu.yd (3.06m3)	load-s	$/hr	175.00			
Loader - 7 cu.yd (5.35m3)	load-l	$/hr	315.00			
Excavator - 26.76-30.84 tonnes	exc-s	$/hr	190.00			
Excavator - 68.95+tonnes	exc-l	$/hr	420.00			
Grader	grad	$/hr	190.00			
Dump truck off hwy 30-50 tonnes	truck-s	$/hr	225.00			
Dump truck off hwy 55-75 tonnes	truck-l	$/hr	300.00			
dozer, small	dozers	$/hr	205.00	260.00		
dozer, large	dozerl	$/hr	490.00	565.00		
smooth drum compactor	comp	$/hr	155.00			
scooptram, 6 yd3 bucket	scoop	$/hr	170.00			
flat bed truck with hiab	hiab	$/hr	155.00			
fuel truck	ftruck	$/hr	150.00			
water truck	wtruck	$/hr	150.00			
Mobilize Heavy Equipment						
Road access	MHER	kmtonne	3.40	10.25		
Air access	MHEA	kmtonne	12			cargo rate>500lb
Mobilize Camp						
Road access	MCR	each	50000			refurbish existing camp
Mobilize Workers						
flight	MW	each	4500.00	9100.00	6800.00	Low:e.g. 8 passenger; High: Dash 7
Oil Removal						
oil removal	OR	litre	0.43	1.20		Low:waste oil heater; High: ship offsite
PCB Removal						
Remove from site	PCBR	litre	40.20	46.90		Low: shipping, handling & disposal from Yellowknife
Pipes, small (<6in dia.)						
remove/dispose on site	PSR	m	1.00	24.00		Low: remove/dispose on site; High: remove/re-use
supply	PSS	m	6.10	11.10		Low:supply; High:supply and ship
install	PSI	m	25.00			
Pipes, large (>6in dia.)						
remove/dispose on site	PLR	m	22.00	72.00		Low: remove/dispose on site; High: remove/re-use
supply	PLS	m	129.00	143.00		Low:supply; High:supply and ship
install	PLI	m	50.00			
Power Lines						
remove/dispose on site	POWR	each	25.50			
Process Chemicals						
Remove from site	PCR	kg	0.45	2.50		
Pumps						
Pump capital cost	PCR	each	#######			
Pump shipping	PS	each	2500.00			
Pump maintenance	PM	each	20000.00			
Pump sand BackFill						
	BF	m3	85.00	300.00		
Scarify - road/mine site						
	SCFY	ha	4300	6030	2150	
Shaft, Raise & Portal Closures						
Shaft & Raises	SR	m2	645	2132		Low:pre-cast concrete slabs, little site prep. Area=shaft+>1m all around
Portals	POR	m3	18.8	250	1200.00	Low:unit cost code SCS;High:excavate & backfill collapsed portal;Spec: installed pressure plug
Site Inspection Report						
	RPT	each	10000.00	20000.00		
SpillWay - Clear						
	CSW	each	3000.00	7000.00		
Survey/Instrumentation						
	SI	each	1800	3600		2 person crew
Treatment Plant - Construct						
Small (< 1000 m3/d)	BTPS	lump sum	1218600	2437300		
Large (> 1000 m3/d)	BTPL	lump sum	2437300	42650200		
Treatment Plant - Operate						
	OTP	m3	0.35	2		
Vegetation						
Hydroseed, Flat	VHF	ha	4000.00			
Hydroseed, Sloped	VHS	ha	6000.00			
veg. Blanket/erosion mat	VB	ha				
Tree planting	VT	ha				
Wetland species	VW	ha	50000.00		47.72	Specified= /m3, Wetland Growth Media Substrate mixed and installed (sand-local, biochar and fertilizer, woodchips-local)
Water Sampling/Analysis/Reporting						
	WS	each	7000.00	10000.00		
Water Treatment Chemicals						
ferric sulphate	ferric	kg	1.19			
ferrous sulphate	ferrous	kg	1.32			
lime	lime	kg	0.51			
hydrogen peroxide, 35%	hperox	kg	1.50			
Sodium Metabisulfate	Nametab	kg	1.18			
Caustic soda, 50%	caustic	kg	0.74			
Sulfuric acid, 93%	sulfuric	kg	0.31			
flocculant	flocc	kg	6.00			

Unit Cost Table (for refining unit costs see "Estimator" worksheet)

	Filter by unit					
copper sulphate	copper	kg				
shipping	shipping	kg	0.20			
Winter Road						
Construction	WRC	km	2000.00	11500.00	17454.55	
Usage	WRU	kmtonne	0.29		0.29	
Well Abandonment						
All wells - Drilled / Cased	WL	m			12500	-
Sweet Well - Completed / Active / Inactive	SWWL1	m			1651	0 - 1000 m
	SWWL2	m			71200	1000 - 2000 m
	SWWL3	m			88000	2000 - 3000 m
	SWWL4	m			104900	>3000 m
Sour Well (H2S > 1%) - Completed / Active / Inactive	SRWL1	m			74700	0 - 1000 m
	SRWL2	m			94400	1000 - 2000 m
	SRWL3	m			116500	2000 - 3000 m
	SRWL4	m			138600	>3000 m
Source Water Well	WWL1	m			5000	0 - 150 m
	WWL2	m			10000	151 - 300 m
	WWL3	m			30000	>300 m
Vent Flow / Gas Migration	VFGM	each			87200	-
Additional Completion Zones	ACZ	each			Add 30% per zon	-
Facility Abandonment						
Oil / bitumen processing or injection / disposal facility	OBP1	m3/day			50000	0 - 50 m3/d
	OBP2	m3/day			100000	>50 m3 < 500 m3/d
	OBP3	m3/day			200000	>50 m3 < 3000 m3/d
	OBP4	m3/day			400000	>3000 m3/d
Gas processing facility	GPF1	m3/day			192900	0 - 999 e3m3/d
	GPF2	m3/day			372200	1000 - 2999 e3m3/d
	GPF3	m3/day			500700	3000 - 4999 e3m3/d
	GPF4	m3/day			638700	>5000 e3m3/d
Gas dehydration facility	GDF1	m3/day			53000	0 - 299 e3m3/d
	GDF2	m3/day			132500	300 - 1499 e3m3/d
	GDF3	m3/day			238700	>1500 e3m3/d
Compressor stations	CST1	KW			46600	0 - 599 KW
	CST2	KW			113600	600 - 2999 KW
	CST3	KW			210500	>3000 KW
Battery sites	BAT1	m3/day			46600	0 - 49 m3/d
	BAT2	m3/day			136400	50 - 499 m3/d
	BAT3	m3/day			244300	500 - 1500 m3/d
	BAT4	m3/day			353100	>1500 m3/d
Battery sites w/ separation, compression, injection and/or disposal equipment	BATS1	m3/day			71900	0 - 49 m3/d
	BATS2	m3/day			158800	50 - 499 m3/d
	BATS3	m3/day			296900	500 - 1500 m3/d
	BATS4	m3/day			406200	>1500 m3/d
Satellite batteries	SBAT1	m3/day			49600	0 - 99 m3/d
	SBAT2	m3/day			74400	>100 m3/d
Other stations	OST	each			39900	
H2S premium (>1%)	H2S	each			Add 10%	
Legacy premium (Pre 1990)	LEG	each			Add 20%	

APPENDIX B – GENERAL TERMS AND CONDITIONS

USE OF REPORT

This report has been prepared for the specific site, design objective, development and purpose described to ARKTIS Solutions Inc. (ARKTIS) by the Client. The factual data, interpretations and recommendations pertain to a specific site, a specific development, and a specific scope of work. It is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation of site conditions, purpose, and development plans, or if the project is not initialed within three months of the date of the report may alter the validity of the report. ARKTIS cannot be responsible for use of this report, or portions thereof, unless ARKTIS is requested to review, and if necessary, revise the report.

This report and the assessments and recommendations contained in it are intended for the sole benefit of ARKTIS' Client. No other party may use or rely on this report or any portion thereof without ARKTIS' expressed written consent. If the report was prepared to be included for a specific permit application process, then upon reasonable request of the client, ARKTIS may authorize in writing the use of this report by the regulatory agency as an Approved User for the specific and identified purpose of the applicable permit review process. Any other use of this report by others is prohibited and is without responsibility to ARKTIS.

The report, all plans, data, drawings and other documents as well as all electronic media prepared by ARKTIS are considered its professional work product and shall remain the copyright property of ARKTIS, who authorizes only the Client and Approved Users to make copies of the report, but only in such quantities as are reasonable and necessary for the use of the report by those parties. The Client and Approved Users may not give, lend, sell, or otherwise make available the report or any portion thereof to any party without the express written consent of ARKTIS. The Client acknowledges that electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore the Client cannot rely upon the electronic media versions of ARKTIS' report or other work products. ARKTIS does not accept any responsibility for the accuracy of any of the data, the analysis or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than ARKTIS' Client or Authorized User unless otherwise authorized in writing by ARKTIS.

LIMITATIONS OF REPORT

The report is of a summary nature and is not intended to stand alone without the reference to the instructions given to ARKTIS by the Client, communications between ARKTIS and the Client, and to any other reports prepared by ARKTIS for the Client relative to the specific site described in the report. In order to properly understand suggestions, recommendations and opinions expressed in this report, reference must be made to the whole of the report. ARKTIS cannot be responsible for use of portions of the report without reference to the entire report.

Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project. The extent and detail of investigations, including the number of test holes, necessary to determine all of the relevant conditions which may affect construction costs would normally be greater than has been carried out for design purposes. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, and safety and equipment capabilities.

Classification and identification of soils, rocks, and geologic units have been based on commonly accepted methods employed in the practice of geotechnical engineering and related disciplines. Classification and identification of the type and condition of these materials or units involves judgment, and boundaries between different soil and rock or geologic types or units may be transitional rather than abrupt. Accordingly, ARKTIS does not warrant or guarantee the exactness of the descriptions.

LIMITATIONS OF LIABILITY

The client, and any other parties using this report with the express written consent of the clients and ARKTIS, acknowledge that conditions affecting the financial liability of the site can vary with time and that the conclusions and recommendations set out in this report are time sensitive.

During the performance of the work and the preparation of this report, ARKTIS may have relied on the information provided by persons other than the client. While ARKTIS endeavors to verify the accuracy of such information when instructed to do so by the client, ARKTIS accepts no responsibility for the accuracy or the reliability of such information which may affect the report.

The client, and any other party using this report with the express written consent of the client and ARKTIS, also acknowledge that the conclusions and recommendations set out in this report are based on limited observations and testing on the subject site and that conditions may vary across the site which, in turn, could affect the conclusions and recommendations made.

The client acknowledges that ARKTIS is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of the property, the decisions on which are the sole responsibility of the client.

STANDARD OF CARE

Services performed by ARKTIS for this report have been conducted in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and financial and physical constraints applicable to the services. Engineering judgment has been applied in developing the conclusions and/or recommendations provided in this report. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of this report.

ALTERNATE REPORT FORMAT

Where ARKTIS submits both electronic file and hard copy versions of reports, drawings and other project related documents and deliverables (collectively termed instruments of professional service), the Client agrees that only the signed and sealed hard copy versions shall be considered final and legally binding.

The hard copy versions submitted by ARKTIS shall be the original documents for record and working purposes, and, in the event of a dispute or discrepancies, the hard copy versions shall govern over the electronic versions. Furthermore, the Client agrees and waives all future right of dispute that the original hard copy signed version archived by ARKTIS shall be deemed to be the overall original for the Project.

The Client agrees that both electronic file and hard copy versions of instruments of professional services shall not, under any circumstances, no matter who owns or uses them, be altered by any party except ARKTIS. The Client warrants that instruments of professional services will be used only and exactly as submitted by ARKTIS.

October 8, 2021

Esther Choi
Project Manager
Imperial Oil Limited
P.O. Box 2480, Station M
505 Quarry Park Blvd SE
Calgary, Alberta
T2C 5N1

Dear Ms Choi,

Re: Imperial Oil Limited
Type B Water Licence Application – MV2021L1-0009
Land Use Permit Application – MV2021X0019
B-48 Well Abandonment – Jean Marie River
ENR Letter to the Proponent

The Wildlife and Fish Division, Department of Environment and Natural Resources (ENR), Government of the Northwest Territories has reviewed the applications at reference based on its mandated responsibilities under the *Wildlife Act* and the *Species at Risk (NWT) Act*. ENR provides the following comments and recommendations for Imperial Oil Limited's consideration and appropriate action.

Topic: **Bird Nests**

Comment(s):

- Protection of nests is essential to ensuring reproductive success and survival of both adult birds and their young.

- Activities involving vegetation clearing, ground disturbance or demolition of buildings and other structures outside of the nesting season may also disturb the birds themselves or a nest that is not occupied. Paragraph 51(1)(c) of the *Wildlife Act* prohibits the disturbance or destruction of the nest of a prescribed bird, even when it is unoccupied. Prescribed birds for the purpose of paragraph 51(1)(c) and 52 of the *Wildlife Act* are birds of prey (raptors) as set out in Schedule B of the *Wildlife General Regulations*. However, while a raptor nest may not be intentionally destroyed, even if unoccupied, typically on a case-by-case basis the destruction or removal of nests may be authorized where required by General Wildlife Permit.

- While compliance to the *Wildlife Act* and its regulations are required, the Canadian Wildlife Service of Environment and Climate Change Canada is the primary responsible management authority for migratory birds protected under the *Migratory Birds Convention Act, 1994* at the following link: (https://www.canada.ca/en/environment-climate-change/services/migratory-birds-legal-protection/convention-act.html).
- GNWT is responsible for the management of non-migratory birds including upland game birds like ptarmigan and grouse, and raptors as indicated in the schedules of the *Wildlife General Regulations*.

Recommendations:

1) Information on critical breeding periods for raptors in the NWT is available at: https://www.enr.gov.nt.ca/sites/enr/files/raptor_species_br eeding_periods.pdf

2) Follow the Government of Canada's *Guidelines to reduce risk to migratory birds* available at the following link: https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/reduce-risk-migratory-birds.html.

3) Consult the Government of Canada's *General nesting periods of migratory birds* for current information on general nesting periods of federally protected migratory birds that occur within the NWT at the following link: https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods.html

4) The Proponent has indicated on page 11 of their Water Licence application that they will conduct scouting in fall to identify any potential bear dens, sensitive features or other wildlife activity. This survey should also include looking for unoccupied raptor nests.

5) If disturbance or destruction of an occupied nest or eggs of a non-migratory bird species (including raptors), or an unoccupied raptor nest, cannot be avoided and all other all mitigation options have been ruled out, Proponents should contact the regional ENR office to determine whether a permit to disturb or destroy the nest/eggs can be obtained.

Topic: Wildlife Abodes

Comment(s):

- Subject to sub-section 51(2) of the *Wildlife Act*, it is illegal to break into, destroy or damage a den, beaver dam or lodge, muskrat push-up or hibernaculum unless you have an Aboriginal or treaty right, license or a permit to do so.

- Protection of dens, beaver lodges, muskrat push-ups, and hibernacula is essential to ensuring reproductive success and survival of both adults and young.

Recommendation(s):

1) The Proponent should contact ENR prior to start-up of project activities to determine if there are any known dens, push-ups, lodges, beaver dams or hibernacula, or bat maternity roosts within the project area.

2) Prior to start-up of project activities, the Proponent should conduct surveys of lakes or other water bodies proposed to be used for water withdrawal or winter access roads to determine the presence of muskrat push-ups, beaver lodges or beaver dams. If one or more of these features is found contact ENR to discuss mitigation options.

3) The Proponent should conduct pre-activity surveys within 800m of the project footprint to identify active bear dens between September 30 and March 30. Surveys should be conducted in the fall shortly after the first snow fall to detect freshly dug dens.

4) If an active bear den is detected, or suspected, implement and maintain an 800 m buffer zone until the bear emerges in spring.

5) If the bear den and exclusion zone would result in the halt of part or the entire program, the Proponent should contact ENR to discuss alternative mitigation options. The location of active bear dens should be kept confidential between the developer and ENR until after emergence in the spring.

6) Further guidance on different setback distances and timing windows for wildlife abodes are provided in Table 2-5 of the Northern Land Use Guidelines: *Northwest Territories Seismic Operations* at the following link: https://www.lands.gov.nt.ca/sites/lands/files/resources/nlug_seismic_2015_english_-_16_sept_2015.pdf

Topic: Disturbance and Harassment of Wildlife

Comment(s):

- Unless authorized by a licence or permit, paragraphs 52(a) and (b) of the *Wildlife Act* prohibit engaging in an activity that is likely to result in significant disturbance to big game or birds of prey, or to unnecessarily chase, fatigue, disturb, torment or otherwise harass any species of game or birds of prey.

- Game species include big game, fur-bearers, and small game as listed in Schedule A of the *Wildlife General Regulations*, and birds of prey are listed in Schedule B.

- As per section 55 of the *Wildlife Act* a person may chase wildlife away from a camp or work site if doing so is necessary to prevent injury or death to a person or damage to property. However sub-section 56(2) also states wildlife may be killed if it is necessary to prevent injury or death to a person, as long as resorting to killing wildlife was not a result of his or her mismanagement.

- Disturbance to wildlife from sources such as noise, light, vibrations, and human presence can result in energetic stress, avoidance of key habitat, loss of reproductive fitness, injury or mortality of wildlife. Activities that may cause sensory disturbance to wildlife include vehicle traffic, stationary machinery, noise from blasting, excavation, crushing, seismic testing, vegetation clearing, and lighting or flaring.

Recommendation(s):

1) Game species and birds of prey shall be given the right of way at all times.

2) If big game species are observed within 500 m prior to starting up activities that could lead to sensory disturbance or startling the animal(s), delay starting up until they have moved at least 500 m away from the site of project activities. If they do not leave the area within 15 minutes, they may be gently encouraged to move away from the site. This should involve the slow approach by vehicle towards the animal or making your presence known by calling out and waving your arms to encourage them to move. This should be done from behind a vehicle or piece of equipment to prevent personnel from going too close to the animal. It is possible that females may be unwilling to leave the area if they have a calf hiding nearby. If big game species approach the project within 500 m once activities have already started, monitor and document their behaviour, and suspend activities if there is an imminent threat of injury or mortality to the animal(s).

3) An Incident Report should be completed for all wildlife deterrent actions taken and submitted to ENR. Blank incident report forms can be downloaded from the following link:
https://www.enr.gov.nt.ca/sites/enr/files/resources/sample_procedural_manual_and_reporting_templates_june_2019.pdf

Topic: Wildlife Attractants and Waste Management

Comment(s):

- Subject to sub-section 66(1) of the *Wildlife Act* no person shall store food, waste, or other substances in a manner that may attract big game and put people, domestic animals or wildlife in danger.

- Subject to sub-section 65(1) of the *Wildlife Act*, it is illegal to intentionally feed big game or fur-bearers. Schedule A – Part 1 of the *Wildlife General Regulations* sets out the wildlife that are prescribed as big game, and Part 2 sets the wildlife that are prescribed as fur-bearers.

Recommendation(s):

1) The Proponent should utilize food and garbage handling and storage procedures that will minimize the attraction of wildlife.

2) The Proponent should store all food, waste, washed recyclables and debris that may attract wildlife within sealed animal proof containers until final disposal.

3) The Proponent should ensure that sealed animal proof containers are cleaned once emptied to minimize the attraction of wildlife.

Topic: Reporting Wildlife Sightings

Comment(s):

- ENR recognizes the commitment to report sightings as outlined on page 12 of the Water License Application. Proponents are encouraged to record wildlife sightings and to submit these records to ENR's Wildlife Management Information System (WMIS). Wildlife sightings data provides useful information for assessing changes in species distribution and the timing and location of different life history events such as migration, denning, nesting, calving, etc.

Recommendation(s):

1) Submit information about wildlife sightings (species, date, time, location, number of individuals, sex, behavior, etc.) to ENR's Wildlife Management Information System (WMIS) at WMISTeam@gov.nt.ca. For further information on the WMIS consult the following link:
https://www.enr.gov.nt.ca/en/services/recherche-et-donnees/wildlife-management-information-system

2) Blank wildlife sighting report forms can be downloaded from the following link:
https://www.enr.gov.nt.ca/sites/enr/files/resources/sample_procedural_manual_and_reporting_templates_june_2019.pdf

Topic: Reporting Wildlife Defense of Life and Property Kills and Wildlife Emergencies/Incidents

Comment(s):

- Subject to paragraph 57(a) of the *Wildlife Act*, any big game that is killed to prevent injury or death to a person or damage to property must be reported to

ENR as soon as is practicable. Section 7 of the *Wildlife General Regulations* indicates the information that must be included in the report.

- Subject to section 58 of the *Wildlife Act* and sub-section 8(1) of the *Wildlife General Regulations*, any person who accidentally kills or seriously wounds big game with a motorized vehicle on a highway must report the event to an officer within 24 hours after the incident. Sub-section 8(2) of the *Wildlife General Regulations* indicates the information that must be included in the report.

Recommendation(s):

1) Ensure all field personnel have completed a bear safety training course to decrease the risk of attracting bears to work sites and threats to human safety, learn how to respond to bear encounters, and decrease the risk of wildlife mortality resulting from kills in defense of life and property.

2) Consult the "Safety in Grizzly Bear and Black Bear Country" brochure, available at the following link:
https://www.enr.gov.nt.ca/sites/enr/files/resources/safety_in_grizzly_and_black_bear_country_english.pdf

3) Report all sightings of bears in and around the project location to your local ENR office. Any defence of life and property kills must be reported to the appropriate ENR office immediately. Please contact the following Regional Office as required:
    - Fort Simpson Wildlife Emergency Line at (867) 695-7433
    - Bear Sightings Line (866) 762-2437

4) Report to an ENR officer as soon as is practicable any wildlife that is killed to prevent injury or death to a person or damage to property.

5) Report to an ENR officer any big game that is killed or seriously wounded by a motorized vehicle on a highway within 24 hours after the incident by calling 1-866-762-2437.

6) Reports must include at minimum the name of the person who killed or seriously wounded the big game, an explanation of the incident, the time, date and location of the incident, the species or quantity involved, and any other information requested by the wildlife officer.

7) Blank incident report forms can be downloaded from the following link:
https://www.enr.gov.nt.ca/sites/enr/files/resources/sample_procedural_manual_and_reporting_templates_june_2019.pdf

Comments and recommendations were provided by ENR technical experts in the Wildlife and Fish Division and were coordinated and collated by the Environmental Assessment and Monitoring Section (EAM), Environmental Stewardship and Climate Change Division.

Technical questions on this submission can be addressed by:

> James Hodson: Manager, Habitat and Environmental Assessment, Wildlife and Fish Division by email at Jame Hodson@gov.nt.ca or (867) 767-9234 Ext: 53227.

For general questions about this submission, please contact Patrick Clancy, Environmental Regulatory Analyst by email at Patrick_Clancy@gov.nt.ca or 867-767-9234 Ext. 53096.

Sincerely,

Patrick Clancy
Environmental Regulatory Analyst
Environmental Assessment and Monitoring Section
Environmental Stewardship and Climate Change Division
Department of Environment and Natural Resources
Government of the Northwest Territories

Government of Northwest Territories
Gouvernement des Territoires du Nord-Ouest

October 5, 2021

Ms. Tyree Mullaney
Mackenzie Valley Land and Water Board (MVLWB)
7th Floor, 4922-48th Street
YELLOWKNIFE, NT X1A 2P6

Dear Ms. Mullaney:

Land Use Permit Application: MV2021X0019 – Imperial Oil Resources
Type of Operation: Miscellaneous
Location: Jean Marie River, B-48 wellsite

The Department of Lands, North Slave Regional Office reviewed Land Use Permit Application MV2021X0019 and support the issuance of the permit.

Our Inspectors, Danielle Rogers and Andrew Lirette, will provide their comments and recommendations for your consideration, via the LWB Online Review System.

Comments received from Territorial Lands Administration note that tenure has not been secured for all project components. They invite the applicant to contact Land Administration to discuss tenure needs for the project.

Comments received from Mining Recorder's Office indicate there is no active mineral tenure in the area of the proposed LUP application.

Thank you for the opportunity to comment on this application. Should you have any questions or concerns regarding our comments, please contact our Inspector, Danielle Rogers or Andrew Lirette at (867) 695-2626.

Sincerely,

Scott Stewart
Regional Superintendent
North Slave Region

P.O. Box 1320, Yellowknife NT X1A 2L9 www.gov.nt.ca C. P. 1320, Yellowknife NT X1A 2L9
Ph. (867) 767-918 ext. 24194 Fax (867) 873-9754

c. Dehcho Region (Fort Simpson), Department of Lands, GNWT
Land Administration (Yellowknife), Department of Lands, GNWT
Mining Recorder's Office (Yellowknife), Department of Industry, Tourism & Investment, GNWT

NWT OFFICE OF THE REGULATOR OF OIL AND GAS OPERATIONS
Office of the Regulator of Oil and Gas Operations
P.O. Box 1320, Yellowknife, NT X1A 2L9
Tel: 867-767-9097 • Fax: 867-920-0798 • Web: www.orogo.gov.nt.ca
Courier Address: 4th floor, 5201 – 50th Avenue, Yellowknife, NT X1A 3S9

Tyree Mullaney
Regulatory Officer
Mackenzie Valley Land and Water Board
PO BOX 2130
YELLOWKNIFE NT X1A 2P6

October 6, 2021

Dear Tyree Mullaney:

Imperial Oil Resources Land Use Permit Application (MV2021X0019) and Water License Application (MV2021L1-0009)

This letter is in response to the request from the Mackenzie Valley Land and Water Board (MVLWB) for reviewer comments on the above captioned applications.

The proposed scope of Land Use Permit MV2021X0015 and Water License MV2021L1-0009 includes abandonment and reclamation activities at the Jean Marie B-48 well, located near the community of Jean Marie River in the Dehcho Region of the Northwest Territories.

Oil and gas works and activities are regulated by the GNWT Regulator of oil and gas operations through the Office of the Regulator of Oil and Gas Operations (OROGO) and require an Operations Authorization issued under the *Oil and Gas Operations Act* (OGOA).

In addition, each well abandonment requires a well approval, issued under the *Oil and Gas Drilling and Production Regulations* (OGDPR). Operator requirements for safety, environmental protection and conservation of the resource specified in OGOA and the OGDPR, will, as appropriate, apply to the proposed well-related activities.

OROGO has received applications for an Operations Authorization (OA-2021-004-IMP) and a well approval (ACW-2021-IMP-B-48-WID0448) for the abandonment of the Jean Marie B-48 well. Information on these applications can be found on OROGO's public registry at orogo@gov.nt.ca.

…/2

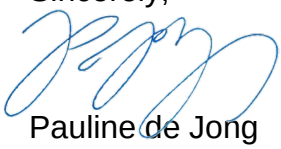
Bureau de l'organisme de réglementation des opérations pétrolières et gazières
B.P. 1320, Yellowknife, TNO X1A 2L9
Tél : 867-767-9097 • Téléc : 867-920-0798 • Site web : www.orogo.gov.nt.ca
Adresse de messagerie : 4e étage, 5201 – 50e Avenue, Yellowknife TNO X1A 3S9
BOROPG
BUREAU DE L'ORGANISME DE RÉGLEMENTATION DES OPERATIONS PÉTROLIÈRES ET GAZIÈRES DES TN-O

At this time, we have no other specific comments on Imperial Oil Resources' application for Land Use Permit (MV2021X0015) and Water License (MV2021L1-0009) or on the proposed Land Use Permit and Water License conditions.

The OROGO decision-maker is a preliminary screener of this activity under the *Mackenzie Valley Resource Management Act* (MVRMA) and may decide to adopt the MVLWB's preliminary screening as permitted under section 124 of the MVRMA.

If you have any questions, please contact Peter Lennie-Misgeld, Senior Advisor, Legislation and Policy at (867) 767-9097 or by email at Peter_lennie-misgeld@gov.nt.ca.

Sincerely,



Pauline de Jong
Executive Director

c. Jaclyn Mersereau, Imperial Oil Resources