

**Imperial Oil Resources N.W.T. Limited (Imperial)**  
**Application for Variance of Operations Authorization 1210-001**  
**Application for Line 490 Replacement Activities**  
**Subsection 5(6) of the Canada Oil and Gas Operations Act (COGOA)**

**File 3430830 and 5612618**

**Filed 1 November 2023 and 6 February 2024**

**Information Request No. 4**

**Engagement Matters**

**4.1 Update on engagement**

- Reference:**
- i) Imperial, Application for Operations Authorization Variance (**OA Variance Application**), Response to CER Information Request (**IR**) No.1.7, Attachment 4 Engagement Log, PDF pages 1-67 of 67, C28800-24
  - ii) Imperial, OA Variance Application, Response to CER IR No.1.8, Attachment 5 Summary of Concerns, PDF pages 1-3 of 3, C28800-24

**Preamble:** Reference i) is Imperial's engagement log with Indigenous Peoples, stakeholders and other governmental parties, that covers the period of 2 April 2023 to 27 February 2024.

Reference i) at row ROC# 788 indicates Imperial met with Norman Wells leadership (representatives from Norman Wells Land Corporation, Sahtu Secretariat Incorporated, Sahtu Renewable Resources Board, Town of Norman Wells, and Norman Wells Daycare Society) on 6 February 2024. Imperial stated that Norman Wells Land Corporation noted that many of their board members were unable to attend the daytime meeting, and the Indigenous members of Norman Wells Land Corporation would like to be engaged independently. Imperial stated it agreed to a separate meeting.

Reference i) at row ROC# 787\ indicates that when Imperial met separately with Norman Wells Land Corporation on 7 February 2024, Norman Wells Land Corporation suggested a meeting with board members to allow them to listen and participate. Imperial reported that it would respond to the request.

Reference i) is a summary of concerns raised and how the concerns were addressed; including row ROC# 465 which states that Imperial continues to engage with Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) to understand the Federal Government's plans and processes to support community capacity during development of closure and reclamation plans. Imperial stated that it shares this information with community leaders.

Reference ii) also indicates that Imperial:

- a) noted incident notification calls need to be made to a broader group of

leadership within the communities;

- b) was in progress to add downstream water usage to the Emergency Response Plans;
- c) was reviewing a request related to compensation for fish harvesting for those that had nets in the water at the time of the Line 490 incident release;
- d) was adding a "Frequently Asked Questions" section to the existing Norman Wells internet page to provide information on the natural seeps at Norman Wells; and
- e) will reach out to communities on additional ways to engage youth and elders and encourage participation at Community Open Houses.

**Request:** Provide an update, that covers the period of 28 February 2024 to present, on Imperial's engagement activities for the OA Variance Application and Line 490 Replacement Activities application (**Replacement Activities Application**). The response should include:

- a) a summary of Imperial's response to concerns and comments raised, including any mitigation measures identified, commitments made, or steps that have been, or will be, taken to address concerns and comments raised; or an explanation as to why no further action is required or will be taken to address them; and
- b) an update on outstanding items that were reported in reference ii) and any planned engagement with Indigenous Peoples, agencies and communities, and northern stakeholders (i.e., methods, dates, and locations). The above update should include, but may not be limited to, the following:
  - b.1) a general summary of engagement activities;
  - b.2) whether any follow-up has occurred with respect to Norman Wells Land Corporation's suggestion to meet with board members separately, or if follow-up is planned;
  - b.3) whether further engagement with CIRNAC regarding capacity; and
  - b.4) the status and/or steps taken to follow-up on the promised actions, including a description of any changes to Imperial's engagement plan design, if any, to engage youth and elders.

**Response:**

- a) An update to the Attachment 5, Summary of Concerns, provided to the CER in IR No 1.8 is provided in Attachment 1 – Updated Issue Summary Log – May 2024. This provides a summary of issues that have been raised, including by what communities, and an update to Imperial's response to concerns and comments raised, as applicable.

b)

b.1) Since February 28, 2024, Imperial has continued to engage with Indigenous Peoples, agencies and communities, and northern stakeholders including through meetings, attendance at community open houses and other conferences and events, and through the CER’s formal hearing process. An update summarizing these activities is provided in Table 1 and 2 below.

In CER IR No 1.8, Imperial provided a list of proposed 2024 Engagement Sessions and Community Open Houses. Scheduling challenges due to leadership availability in communities as well as difficulty scheduling around holiday schedules and the CER’s hearing process events has affected the dates for these events. Since filing IR 1.8, Imperial has offered to reschedule these dates for Tulita, Deline, and Fort Good Hope and awaits community feedback as to preference on timing from Colville Lake. In the interim, all communities were offered a leadership meeting (in-person or Zoom) at any time if they wished.

Table 1 highlights the Leader-to-Leader meetings that occurred or were scheduled since February 2024.

**Table 1: Leader to Leader Meetings (March 2024 – May 2024)**

<b>Date</b>	<b>Attendees</b>	<b>Summary</b>
<b>March 6, 2024</b>	TGG President, NWO Superintendent (virtual)	Scheduled, canceled by TGG
<b>March 18, 2024</b>	Yamoga President, NWO Superintendent (virtual)	Confirmation that proposed April 2 meeting (re Regulatory Clarity) would be postponed.  Fort Good Hope is engaging with SSI to ensure united group around closure and reclamation.  Yamoga indicated it would like to work business agreements to support pipeline replacement project – details passed along to Imperial business development advisor.
<b>March 22, 2024</b>	TGG President, NWO Superintendent (virtual)	TGG initiated discussion on upcoming geotechnical boreholes (~2) for Line 490 activities and business opportunities for drillers.
<b>May 15, 2024</b>	Norman Wells Mayor, SAO, NWO Superintendent (in person)	Discussion included topics related to potential housing donations, Town’s wildfire planning and preparedness, resupply, taxes.

Date	Attendees	Summary
May 22, 2024	TGG President, NWO Superintendent (virtual)	Discussion included topics related to Norman Wells wildfire planning, fuel supply concerns, business opportunities for operations, business opportunities for Line 490 Replacement Activities, winter fuel supplies, renewing discussions on the Original Families.

In addition to the above-mentioned meetings, the following engagements occurred, as listed in Table 2.

**Table 2: Engagements (March 2024 – May 2024)**

Date	Attendees	Summary
March 8, 2024	Imperial Kash'o Goti'ne Committee	Meeting to progress negotiation agreement to develop funding and structure towards formalized engagement.  Agreement left with KGC for next steps. Imperial followed up April 25, May 9, May 28 – being reviewed with community and leadership.
March 8, 2024	Imperial TGG	Cancelled by TGG.
March 11, 2024	Imperial CIRNAC	Cancelled, CIRNAC Executive Director on vacation.
March 20, 2024	Sahtu Municipal Conference  Imperial, representatives from all Sahtu Communities	Reviewed Community Benefits Poster (information on surplus equipment donations, community investment opportunities for 2024 discussed). Discussions with representatives included summer student position and improvements to communication.
April 9, 2024	SSI Open House  SSI Office Manager, SSI Staff, SSI president, SSI consultant, Imperial	Discussion regarding SSI primarily focusing on NWO closure, versus ongoing operations.
April 11, 2024	Deline Got'ine Government Chief, Sahtu Partnerships, Imperial	Meeting to discuss Line 490 business opportunities and receive feedback related to prior discussions.
April 12, 2024	TGG Board Imperial	As follow up to request (ROC 787), Imperial met with the TGG Board in

Date	Attendees	Summary
		<p>person.</p> <p>Imperial provided an update on Line 490 Replacement Activities (regulatory process and business opportunities), and reviewed community benefits poster (information on surplus equipment donations, community investment opportunities for 2024 discussed).</p> <p>TGG inquired on communication methods for ongoing work as it receives questions from community. Discussed Facebook page, email notifications, and other options.</p> <p>Resuming discussions about original families regarding historical concerns (both recognized that discussions were put on hold during COVID).</p> <p>Imperial to follow up on opportunity review for any local trainees with contractors/subcontractors.</p>
<b>April 22, 2024</b>	MVEIRB – Community Engagement & Outreach, Senior Environmental Officers	Site Tour
<b>April 29, 2024</b>	Deline Career Fair  Imperial Deline community Deline RRC Deline school principal	<p>Deline Career Fair – available to provide information on community investments, scholarship program, and NDP Program.</p> <p>Also met with Deline RRC, and discussed the Hearing process.</p> <p>Met with Deline school principal; provided information for community investments.</p>
<b>April 30, 2024</b>	TGG, Imperial	Meeting to discuss sponsorships and donations opportunities.
<b>May 13 – May 15</b>	Oral Indigenous Knowledge Sessions Fort Good Hope  Imperial	<p>During the week in Fort Good Hope, Imperial had conversations with community members during breaks and evenings.</p> <p>Received tour of Fort Good Hope</p>

Date	Attendees	Summary
		(from the Point to Rabbitskin), and were provided history of Fort Good Hope and overview of current events.
		Imperial provided information to Fort Good Hope Garden Society on how to apply again for a community donation to the moose hide workshop
		Discussed scope and methodology for Line 490 Replacement Project with community members.
		Imperial asked community members how to engage the Guardians and Renewable Resource Council as monitors for Line 490 Replacement Activities. Role of SRRB vs RRCs.
		Discussed planning of next meeting with Community with Chief and Yamoga Land Corporation President.

b.2) As noted in Table 1, a follow-up meeting with TGG board was held on April 12, 2024.

b.3) As noted in Table 2, the March meeting with CIRNAC was cancelled as not all attendees were available.

Imperial understands that the Kash’o Got’ine Committee is working with CIRNAC and other groups directly regarding funding availability. Imperial and the Kash’o Got’ine Committee have been in discussions to negotiate a funding agreement since fall 2023 (see Table 2 above),

b.4) Please see Attachment 1 – Updated Issue Summary Log – May 2024, for the status and steps taken to follow-up on identified actions, including incident notification of leadership and downstream water usage, and compensation for fish harvesting at the time of the Line 490 release.

Imperial has developed the content for Natural Seeps for the Frequently Asked Questions (FAQs) section. Next steps are to post on the [Norman Wells internet page](#), and promote the page to communities. It will be communicated in engagement sessions, and as appropriate posted on the Norman Wells Facebook page.

In terms of additional ways to engage youth and elders and encourage participation at Community Open Houses, the [Imperial Norman Wells](#) Facebook

Page launched April 1, 2024. Initial performance data shows:

- 2754 organic impressions (number of times content displayed) and 296 organic engagements (number of interactions received).
- 36% of followers are between the age of 13 – 34.

Familiarizing Communities on the launch of this page is ongoing. Posts from the page are being shared in the local Facebook groups and Imperial's socioeconomic team is directing organizations to share posts on their pages and local groups as appropriate.

During the Oral Indigenous Knowledge Sessions in Fort Good Hope, the range of demographics representing the community was noted. The Socioeconomic Advisor, Chief and Yamoga Land Corporation president had a conversation highlighting the great engagement, and their hope to be able to replicate similar engagement in a future session in Fort Good Hope.

Imperial has also encouraged feedback on how to engage youth and elders, and the use of the Facebook Page and FAQs from communities. Feedback can be provided directly in engagement sessions and interactions, or via the community inbox ([normanwellscommunity@esso.ca](mailto:normanwellscommunity@esso.ca)).

## Engineering Matters

### 4.2 Well status

#### Reference:

- i. Imperial, OA Variance Application, Section 8.2 Well Summary, PDF pages 40 to 41 of 83, C27037-2
- ii. Imperial, OA Variance Application, Appendix M, Imperial NWO Well List, C27037-15

#### Preamble:

Reference i) describes the status of wells and test holes by location in the Norman Wells facility. The wells are listed as Active, Suspended, or Abandoned, but there is no definition of these terms, nor any reference to the *Canada Oil and Gas Operations Act* or the *Canada Oil and Gas Drilling and Production Regulations*.

Reference ii) lists each well in the Norman Wells facility with its status.

The Commission requires more detailed information regarding the status of wells at the Norman Wells facility.

#### Request:

Provide the following:

- a) definitions clarifying what is meant by active status, suspended status, and abandoned status in references i) and ii); and
- b) for each of the wells with an active, suspended or abandoned status, confirmation that the well meets the definition provided in a) above.

#### Response:

- a) *Active Status*: wells currently being used for either injection or production purposes. There may be periods of time where an active well is shut in awaiting some form of surface or downhole repair but there are plans to turn the well back on in the foreseeable future.

*Suspended Status*: shut in wells with no current plans for re-activation as either a producer or injector. These are wells that have downhole suspension plugs and/or abandonment plugs in place to isolate the perforations and are therefore in a secure state. Wells in suspended status may also be progressing towards abandonment. Some wells in suspended status may be occasionally used as an observation well where the suspension plug is temporarily removed in order to obtain reservoir pressure data, and then the suspension plugs are re-installed immediately afterwards.

*Abandoned Status*: wells that have been both downhole abandoned and have also been cut and capped at surface.

- b) Confirmed. All wells that have not been cut and capped are either in active or suspended status. Ongoing oversight of the suspended wells is subject to the Norman Wells Inactive Well Management Guide which includes an annual report sent to the CER. The CER status of the suspended observation wells may show as "Other-Observation". The rest of the suspended wells will show as suspended.



#### 4.3 ***Version of Engineering Standard***

**Reference:** Imperial, OA Variance Application, Appendix D, PDF page 30 of 60, C27037-6

**Preamble:** In the reference, Imperial states “Imperial utilizes the Canadian Standards Association (CSA) Z662-19 Oil and Gas Pipeline Systems as a guidance document ....”

**Request:** CSA Z662-23 is the most recently published version of CSA Z662.

Provide confirmation that CSA Z662-23 or the latest available version will be utilized as Imperial’s guidance document, if not, please explain.

**Response:**

Imperial confirms that the latest available version, CSA Z662-23, of the Oil and Gas Pipeline Systems standard is in use for the Norman Wells Operation.

#### 4.4 ***Alter the Condition of a Well – Blanket Approval***

**Reference:** Imperial, OA Variance Application, Appendix A, PDF pages 9 and 10 of 50, C27037-3

**Preamble:** In the reference, Imperial provided a copy of a Blanket Approval to Alter the Condition of a Well that applies for well work meeting certain conditions, subject to the terms and conditions of the Operations Authorization.

**Request:** Provide:

- a) clarification on whether Imperial is requesting an extension to the Blanket Approval to Alter the Condition of a Well with this application; and
- b) a discussion of the benefits and concerns related to extending the Blanket Approval to Alter the Condition of a Well.

**Response:**

- a) Yes, Imperial is requesting an extension to the Blanket Approval to Alter the Condition of a Well that was granted by the CER on June 21, 2017.
- b) The Blanket Approval covers routine and generic well work operations in which the condition of the well is not being altered. It covers operations that involve repairing and restoring the well to some prior state of operability. The benefit of the Blanket Approval is decreased administrative burden for both Imperial and the CER as well as enabling Imperial flexibility in managing the wellwork schedule. There are no concerns associated with extending the Blanket Approval as all CER notifications and work procedures are still in place and follow Imperial standards for safety, protection of the environment and conservation.

#### 4.5 **Pipe and Cable bundle and Pullback**

**Reference:**

- i. Imperial, Replacement Activities Application, Response to CER IR No. 3.12, PDF pages 21 to 22 of 25, C29304-2
- ii. Imperial, Replacement Activities Application, Section 3.1 Operational Improvements, PDF page 19 of 103, C28320-2
- iii. Imperial, Replacement Activities Application, Section 1.7 Operational Improvements, PDF page 39 of 103, C28320-2

**Preamble:**

Reference i) states that the current plan is to pull in four lines as a loose bundle with no grout lines, and this means that the lines will be independently attached to the pullhead. The reference also states that this simplifies assembly and handling of the pipes prior to pullback.

Also in reference i), in response to CER IR No. 3.12 b) which requested an additional drawing showing the arrangement of the bundle assembly and a description of how all the various pipes and cable are kept together during the bundle assembly pull, Imperial referenced the response to CER IR No. 3.10 c), which stated that a cross-section prepared as part of the Horizontal Directional Drill (**HDD**) execution plan is anticipated to be completed in late 2024.

Reference ii) states that Line 490 and Line 491 are both Nominal Pipe Size (**NPS**) 6, steel and have a wall thickness of 7.11 mm, but in reference i), CER IR No. 3.12 e), the company states that the available space and the differing buoyancy of the lines will allow them to stay apart in the loose bundle arrangement.

Reference iii) provides the pullback details for the pipe and cable bundle assembly prior to the switch to the loose bundle. Reference i) states that the bundle assembly previously proposed handles like a NPS 20 steel line with 12.7 mm wall thickness and in terms of stiffness comparable to an NPS 12 steel line with 9.53 mm wall thickness.

**Request:**

Provide:

- a) a description of the method/technique that Imperial will put in place to keep lines 490 and 491 apart during pipe pull into the HDD borehole since these two lines are both NPS 6 made of the same material and have similar wall thickness and would have similar buoyancy forces.
- b) pullback details of each of the four pipes that includes the following:
  - b.1) a description of how the loose pipe assembly or bundle would handle compared to the NPS 20 and 12 steel pipes previously described and confirmation that the loose pipes and cable bundle are able to handle the pipe pullback forces;
  - b.2) a confirmation that the four pipes and the cable would be pulled into the HDD borehole at the same time. If Imperial plans to pull them independently, provide a description of the pull procedure.
  - b.3) a description of the pipe arrangement during pullback. If available, provide sketches/drawings that show the pipe arrangement and pullback details of each of the four pipes and cable. If not available,

provide a timeline when that information would become available;  
and

- b.4) information about cable and pipe(s) handling during pullback if a loose bundle is implemented. Pipe handling information should include how each of the pipes are gathered, handled and pulled into the HDD borehole along with confirmation that stresses and forces on the pipe do not exceed the pipe capacities.

**Response:**

- a) The design has progressed and is anticipated to have NPS 10 (steel product pipe), NPS 6 (steel product pipe), NPS 4 (steel product pipe) and NPS 4 (steel conduit for cable.) It will be a loose bundle and the pipes will be able to contact each other in the bore annulus. The lines will be tied into a common cathodic protection system, so that physical separation and electrical insulation between the lines is not necessary. Lines with matching material will be identified at pullhead and end of the pullback string so that they are not mixed up before tie in.

b)

- b.1) The statements regarding the bundle having similar handling or behaviour to an equivalent NPS 20 or 12 pipe are no longer applicable given changes to the design and use of a loose bundle rather than an assembled bundle. The following provides additional information regarding the handling and stiffness of the proposed loose bundle.

With a loose bundle, while the pipes are aboveground, they will largely be handled as individual pipes, with stresses and deflections over free spans (such as between rollers or lifting points in the breakover curve) as if evaluated independently. Two exceptions include:

- loads on rollers and lifting points will be the total sum of the individual lines;
- contact stresses on rollers and lifting points can be greater than that of individual pipes if other pipes ride over top of those below.

Pipe stress at lifting points through breakover curve have been estimated and accounting for as follows:

1. Longitudinal bending stress due to the breakover curve (minimum 300m radius);
2. Longitudinal bending stress due to free spans between lifting points (maximum 18m); and
3. Circumferential contact bending stress between the pipe and rolli-cradle (for each rolli-cradle, contact assumed to be at 2 points with a zero degree contact angle and the pipe subject to its own weight and 2/3 of the total weight of the other pipes that could be partly stacked on top of it).

On this basis, the maximum combined stress through the breakover is assumed to be 60% Specified Minimum Yield Stress for one of the NPS

4 pipes with the other lines partly stacked on top of it.

With a loose bundle, while in the bore annulus during pullback:

1. Through the straight tangents of the drill profile, the lines will be able to separate vertically due to differing buoyancy in the drilling fluid (NPS 10 is buoyant, NPS 6 is close to neutral, NPS 4 will tend to sink).
2. Through the curves of the drill profile, the lines will tend to line up horizontally at contact points on the top and bottom of the bore to minimize elastic bending stress.

The estimated pullforce of each line was evaluated separately and added together. This is standard practice for bundles, especially loose bundles where a packaged bundle of different pipe sizes may have an equivalent buoyancy or stiffness that affects the total pullforce. The total pullforce is estimated to be 140,000 lbs as the bundle approaches the entry point during pullback. The maximum tensile load for the individual NPS 10, NPS 6 & NPS 4 lines is 410,000 lbs, 208,000 lbs and 130,000 lbs respectively, based on PRCI criteria for combined tension and bending rather than tensile stress alone. While loads will not be evenly distributed among the 4 lines, it is not expected that one of the NPS 4 lines would be subject to the majority of the pullforce.

Imperial's analysis, completed by a third party, therefore shows that the loose pipes and cable bundle are able to handle the pipe pullback forces.

b.2) Confirmed. All pipes will be pulled into the HDD bore hole at the same time.

b.3) The design has progressed and currently will have NPS 10 (steel product pipe), NPS 6 (steel product pipe), NPS 4 (steel product pipe) and NPS 4 (steel conduit for cable).

To date, pullback details have been determined for lifting point and roller placement and heights. Details such as pullhead configuration and swivels are anticipated to be available during October 2024, to incorporate information from the HDD contractor's execution plan. Sketches/drawings that show the pipe arrangement and pullback details of each of the four pipes and cable can be provided once the additional details are available.

b.4) See response to question 4.5 b.1) above regarding stresses in pipes both aboveground and belowground. Imperial confirms that stresses and forces on the pipe will not exceed the pipe capacities.

The pipes will be strung/welded/tested parallel to each other through the laydown section and placed in the rollers with the NPS 10 and NPS 6 pipes at the bottom (depending on the roller design). The bundle will reconfigure itself through the breakover curve with rolli-cradles and when inside the bore.

#### 4.6 **Existing Lines Abandonment and Decommissioning**

**Reference:**

- i. Imperial, Replacement Activities, Concept Recommendation Report, PDF pages 7 to 8 of 19, C29304-3
- ii. ii) Imperial, Replacement Activities, Concept Recommendation Report, PDF pages 13 to 14 of 19, C29304-3
- iii. Imperial, Replacement Activities, Design basis Memorandum, PDF page 23 of 25, C29304-4

**Preamble:**

Reference i) states that the existing pipelines and conduit would have to either be abandoned in place or removed. It discusses the two options and lists the advantages and disadvantages of each option.

Reference ii) further discusses the abandonment in place option which includes correction to the exposed pipe locations. It also states that the removal option, although not recommended, would be the costliest option.

Reference iii) states that the existing pipelines 491, 111, and 263 have been purged, cleaned and shut in with air and that line 490 was flushed with fresh water and blinded on either side of the river. Reference iii) also states that the removal of existing lines is expected to be costly and impractical and that this option is not recommended. The reference also states that Imperial will attempt to reestablish cover over the four existing pipelines crossing the river.

The references do not clearly specify which option the company will adopt when the HDD is completed and the new pipelines and cable are replaced. They also do not indicate how Imperial will comply with the requirement to obtain leave of the Commission to abandon the pipelines (see Section 4.01 of the *Canada Oil and Gas Operations Act* and the definition of “abandoned pipeline”).

**Request:**

Provide further information on when Imperial will decide whether to abandon in place or remove the existing pipelines and how Imperial will seek leave of the Commission once Imperial has made that decision.

**Response:**

A decision regarding abandonment in place versus removal will be made as part of the closure process in consultation with Sahtu communities as well as local, Territorial, and Federal stakeholders. CER authorizations will be sought as required.

#### 4.7 *Annular Pressure and Frac Out*

**Reference:**

- i. Imperial, Replacement Activities Application, Section 3.3.2 Operational Improvements, PDF pages 23 of 103, C28320-2
- ii. Imperial, Replacement Activities Application, Section 1.7 Operational Improvements, PDF pages 23 of 103, C28320-2
- iii. Imperial, Replacement Activities, Response to CER IR No. 3.12, PDF pages 16 of 25, C29304-2
- iv. Imperial, Replacement Activities, Concept Recommendation Report, C29304-3
- v. Imperial, Replacement Activities, Design basis Memorandum, C29304-4

**Preamble:**

Reference i) states the preliminary annular pressure calculations have been completed to assess risks related to hydraulic fracturing through comparison of anticipated drilling pressures to estimated subsurface formation limiting pressure.

Reference ii) contains components of a feasibility study but not the full feasibility study. Reference iii) states that the Concept Recommendation Report provided by Stantec in reference iv) and the design basis in reference v) outlines various concepts related to the replacement activities but do not contain some key components of a feasibility study. Therefore, some essential components of a feasibility study such as risk assessment and a frac-out assessment are missing from the information submitted thus far.

A feasibility study should include a chart that shows the annular pressure calculation, the required drilling fluid pressure, the total overburden stress, the operating limits and the drill path elevation and the ground profile along the HDD chainage. This chart was not included in the submitted feasibility study and would aid in the HDD frac-out risk assessment.

**Request:**

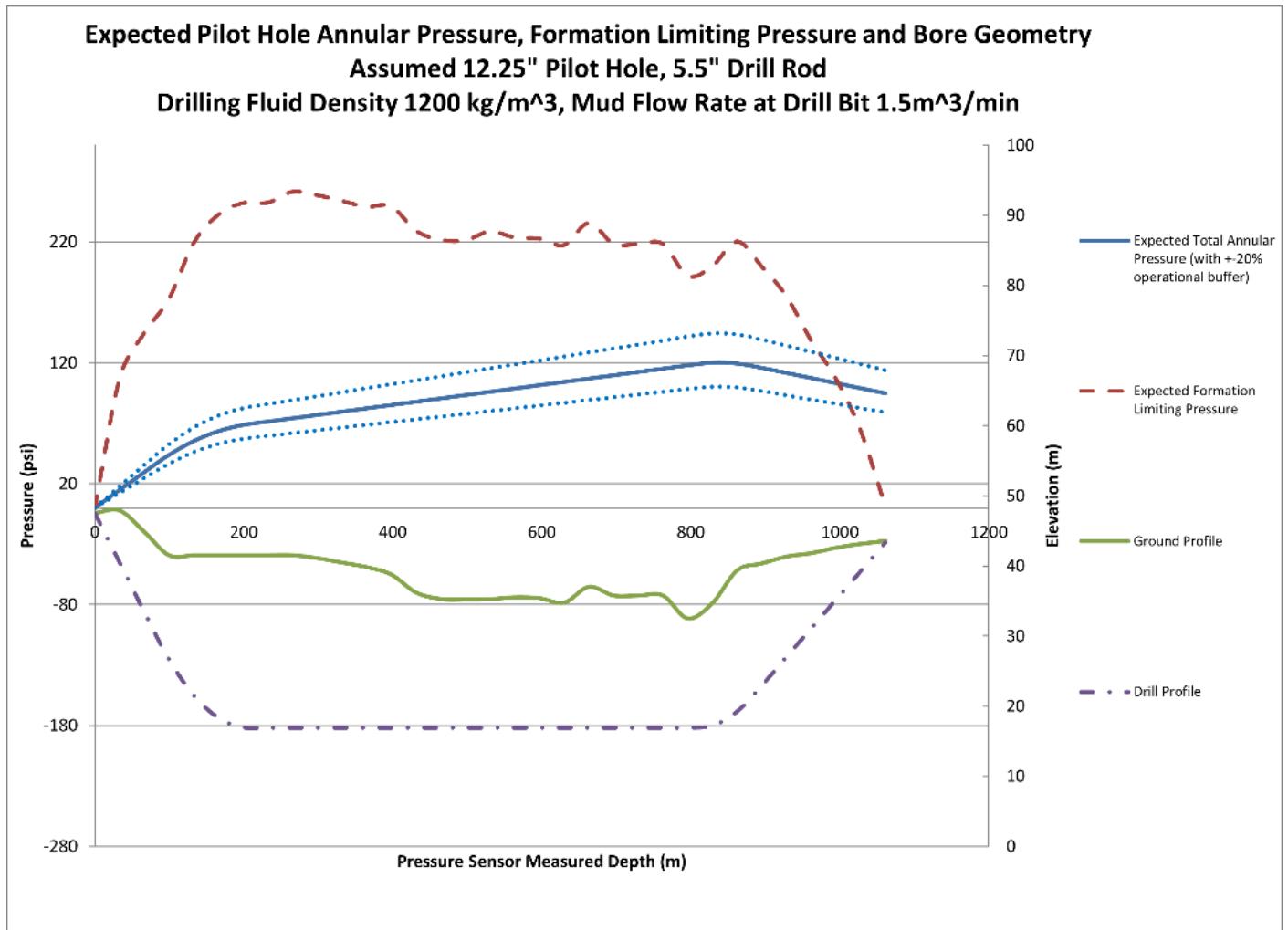
Provide:

- a) the chart that shows the calculated annular pressure, the required drilling fluid pressure, the total overburden stress, the operating limits, the drill path elevation and the ground profile along the HDD chainage; and
- b) a discussion of the risks associated with frac-out and HDD construction operation based on the data in the chart.

**Response:**

- a) A preliminary annular pressure chart is provided below. It will be updated following any geotechnical field program as well as with input from the HDD Contractor's execution plan.

Soil properties are based on typical values for medium sand and/or stiff clay.



- b) As modelled, the minimum factor of safety (formation limiting pressure divided by expected drilling annular pressure) through the river is 1.63 near the site of the pipe exposure. Typically, the formation limiting pressure decreases as the drill nears the exit point. The factor of safety drops below 1.5, approximately 125 m from the exit (on Goose Island.) The factor of safety drops below 1.0 approximately 60 m from the exit. The risks associated with inadvertent returns of drilling fluid (frac-out) under the river are considered low. The exit angle of 7° is relatively shallow, and risks associated with inadvertent returns of drilling fluid near the exit can be mitigated by reducing drilling pressure and volumes as the drill profile nears the exit point.



#### 4.8 Mackenzie River Spill Response Tactics

**Reference:**

- i. Imperial, Response to CER IR No. 1.19, PDF page 39 of 40, C28800-27
- ii. Imperial, Response to CER IR No. 1.3c, PDF pages 6-7 of 40, C28800-27
- iii. Imperial, OA Variance Application, Appendix N - Site Specific Emergency Response Plan, PDF page 305 of 428, C27037-16
- iv. Imperial, OA Variance Application, Mackenzie River Tactical Response Plan – Part 1, PDF pages 16-27 of 157, C27037-18

**Preamble:**

Reference i) states that a worst-case spill from a flowline in open water could result in the release of 350 m<sup>3</sup>, 300 m<sup>3</sup> of produced water and 50 m<sup>3</sup> of oil.

Reference ii) states that the strategies of protection, recovery, and staging have all been tested with field deployments in the Norman Wells and Radar Island Divisions.

Reference iii) lists the quantity of containment boom onsite at 2000 feet (610 m).

Reference iv) states the equipment requirements for each tactic that has been pre-developed for Norman Wells and Radar Island Divisions. Boom requirements for the strategies in the Norman Wells Division are 360 m (1181 feet) and boom requirements for the first four strategies in the Radar Island Division are 2250 m (7382 feet).

The amount of boom on site is limited to supporting the two tactics in the Norman Wells Division.

**Request:**

Explain Imperial's strategy for downstream protection of sensitive shorelines and product recovery, in a worst-case scenario, within the first 24 hours and within the first 48 hours.

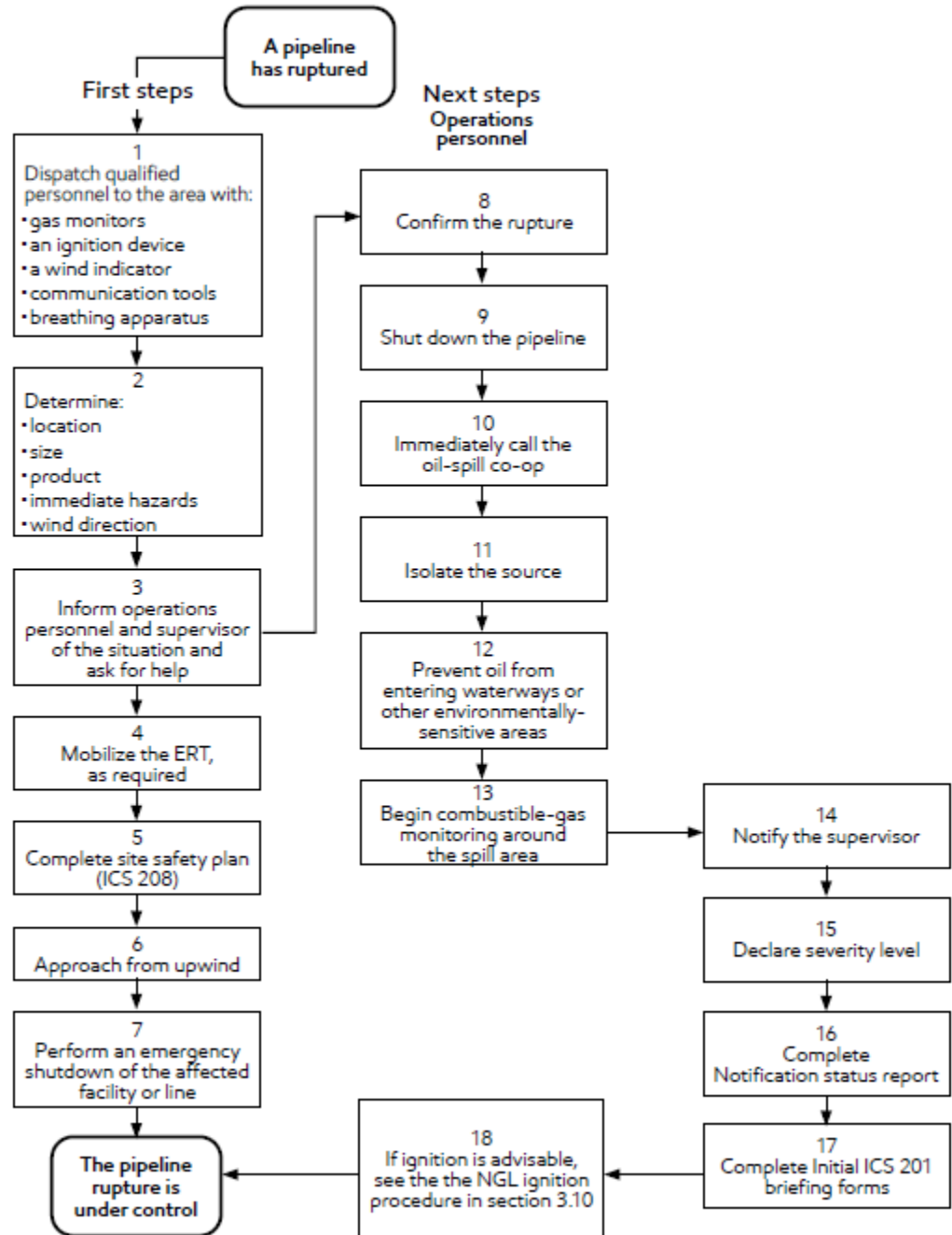
**Response:**

Please note that as indicated in Imperial's response to IR 1.2 (part of Reference i), updated versions of the Emergency Response Plan (ERP) (Reference iii), Spill Contingency and Response Plan (SCARP), and Mackenzie River Tactical Response Plan (MRTRP) (Reference iv) were planned for release in the first half of 2024. Updated versions of these plans were completed at the end of April, in coordination with industry expert spill response consultants, and subsequently filed with the CER under the existing OA. Therefore, References iii) and iv) have been superseded along with the SCARP that was submitted with the Application for Variance. These updated plans are attached to this IR submission as updated reference documents.

When read together as intended, the plans describe the variables that must be taken into consideration for releases in different seasons and points of origin whether the volume is minimal or a worst-case scenario. Within the first 24-48 hours, these plans would be used together to formulate a response. Regarding the scenario of a spill from a flowline in open water,

the NWO ERP Figure 3.10 outlines the initial steps that would be taken. This figure is reproduced below for ease of review.

Figure 3.10 Pipeline rupture flowchart



The Emergency Response plans describe the approach, planned steps, necessary considerations, and existing conditions relevant to shoreline protection (the strategies and tactics). Summarizing the approach for a spill of any size, the priorities progress from the safety of people in the immediate area, notifications within the emergency chain of command (including notification of applicable regulatory authorities and potentially

affected stakeholders and communities), activation of response teams, source control, spill containment, shoreline protection, updated assessments, spill recovery, clean-up, and remediation.

#### 4.9 *Shoreline Cleanup Techniques*

**Reference:** Imperial, OA Variance Application, Mackenzie River Tactical Response Plan, PDF pages 154-162 of 178, C27037-18

**Preamble:** This reference is a table of shoreline cleanup procedures and techniques. It states the permissibility of various techniques in terms of whether they require approval from the Regional Response Team (RRT), we understand RRTs to be response teams chaired by the United States Environmental Protection Agency for application in the USA. Further, some of the techniques listed, i.e. in-situ burning and dispersants, are only able to be used in Canada in limited circumstances. For example, Spill Treating Agents (which includes dispersants) are not permitted to be used on fresh water or where they may enter fresh water which eliminates them as an option for the Norman Wells Operations.

**Request:**

- a) Confirm that the Mackenzie River Tactical Response Plan will be updated to include references to the legally permitted response options for shoreline cleanup in Canada.
- b) Describe the process that Imperial will use to determine treatment options for oil-contaminated shorelines.

**Response:**

- a) An update to the MRTRP was completed on April 25, 2024 and does not reference the options noted in the information request. The updated version of the SCARP (May, 2024) describes burning as an option for spill clean-up but notes the need for approvals to be in-place.

It should be noted that the "Regional Response Team (RRT)" identified in the previous version of the plan was in reference to a regionally organized company / affiliates response teams and not to the US EPA team with the same abbreviation.

- b) The considerations that Imperial uses to determine treatment options for oil-contaminated shorelines is described in Section 3.2 of the updated version of the SCARP which is based on Environment and Climate Change Canada's 2021 A Field Guide to Oil Spill Response on Freshwater Shorelines.

The process considers the volume and nature of the material spilled, the characteristics of affected areas, and the weather and water conditions at the time. The primary goal of the treatment selection process is to implement a method that achieves a net environmental benefit.

#### 4.10 *Emergency Response Scenarios*

**Reference:**

- i) Imperial, OA Variance Application, PDF page 40 of 83, C27037-2
- ii) Imperial, OA Variance Application, Appendix N Site Specific Emergency Response Plan, PDF page 287 of 428, C27027-16
- iii) Imperial, Response to CER IR No. 1.19, PDF page 39 of 40, C28800-27
- iv) Imperial, Well Control Emergency Response Plan, PDF page 53 of 159, C28800-3

**Preamble:**

Reference i) states that there are currently 296 active wells at the Norman Wells Operations, 148 of which are production wells.

Reference ii) states a worst-case crude oil scenario, under the Canadian Environmental Protection Act, Environmental Emergency Regulations, is a release of the entire quantity of Tank 119 which has a capacity of 11 861 tonnes.

Reference iii) states that a worst-case spill from a flowline in open water could result in the release of 350 m<sup>3</sup> of product (50 m<sup>3</sup> of oil and 300 m<sup>3</sup> produced water).

Reference iv) states that it could take up to three days to mobilize well control equipment from Wild Well to Calgary or Edmonton.

It is observed that volumes for major oil releases from tankage and flowlines are provided, but there is no information on the volume that could be released from one of the many producing oil wells on site.

**Request:**

Provide:

- a) an estimate of volume of crude oil that could be released from a blow out at a production well over three days. To estimate how much product may be released to the environment, also include the volume of the bunker in which the well is housed; and
- b) a trajectory model and fate and effects assessment for worst case scenario release from a flowline using average river flow rates and seasonal weather conditions for May and September.

**Response:**

- a) A release from a blowout from the existing production wells is unlikely. In the event a blowout did occur from a production well, as soon as a blowout was detected, the offset injectors would be shut off and the well flow will gradually die off after 3 days even without use of kill fluid. Flow rate on the first, second and third days is estimated to be 75 m<sup>3</sup>, 50 m<sup>3</sup> and 25 m<sup>3</sup> respectively. Of this, 13 m<sup>3</sup> would be oil and 121 m<sup>3</sup> would be produced water.

The volume of bunkers is generally between 14 and 16 cubic meters.

The volume of potential flow to the environment would depend on multiple factors including location of the well, topography, time of year, type and extent of failure mechanism(s), size and bermage of lease,

reservoir pressure, well deliverability etc.

We have several safeguards in place for our bunker wells including:

- Water Injectors have pump thru plugs installed prior to breakup which would avoid blowout conditions. If a blow out occurred, it would be produced water and not crude oil. Injectors also have a downhole packer that is tested on an annual basis to confirm well integrity. Packer Isolation Test results are submitted to the CER.
  - Gas lift and ESP bunker producers have downhole packers and SubSurface Safety Valves (SSSVs) in place to prevent loss of well control in the unlikely event that the wellhead is sheared off. SSSV's and packers are tested annually.
  - In the event of loss of well control, operations would immediately shut off water injectors that are adjacent to the well control event. This would occur even prior to mobilizing well control equipment to the site. Routine wellwork experience suggests that majority of wells would die off on their own within 3 days without having to use external processes (e.g. kill fluid).
- b) The worst case scenario identified in the questions and preamble was utilized for the purposes of cost analyses and was not modeled. However, the updated SCARP and MRTRP together (which are submitted to the hearing record with this response) address the possible path of a variety of different spill scenarios and the variability of factors such as release point and wind.

The MRTRP identifies the locations along the river where a spill is likely to reach the shoreline and the tactical deployment locations identified in in the MRTRP were based on sensitivities identified during traditional knowledge studies, data collected during flyovers, and scenario modeling.

The updated SCARP and MRTRP address the possible path of a spill and the variability of factors such as release point and wind. The MRTRP identifies the locations along the river where a spill is likely to reach the shoreline. The tactical deployment locations identified in in the MRTRP were based on sensitivities identified during traditional knowledge studies, data collected during flyovers, and modelling.

## Safety Matters

### 4.11 Safety Plan – Hazards and Risk Evaluation

#### Reference:

- i. Imperial, OA Variance Application, CER IR 1.12, PDF pages 9-10 of 14, C28605-2
- ii. Imperial, Response to CER IR No. 1.12, Attachment 12 Norman Wells Operations Safety Plan, section 3.3 Hazard Identification and Reporting, PDF pages 14-15 of 29, C28800-6
- iii. Imperial, Response to CER IR No. 1.12e Risk Assessment Summary Documents, PDF page 3 of 4, C28800-11

#### Preamble:

In reference i), the Commission requested Imperial provide a revised Safety Plan that incorporates the information required by paragraph 8(c) of the Canada Oil and Gas Drilling and Production Regulations, including the most recent formal risk assessments undertaken for occupational and process hazards. Paragraph 8(c) requires the Safety Plan to describe the hazards and the risk evaluation results.

Reference ii) is the revised Safety Plan submitted in response to reference i). The Plan states that Imperial completed formal risk assessments for the Norman Wells Flowlines in 2022, Norman Wells Field in 2020, and Norman Wells Plant in 2019. In reference iii), Imperial provided an Appendix to the Safety Plan that further explains Imperial's risk assessment and management process.

References ii) and iii), however, do not describe the results of the risk evaluations.

#### Request:

File a revised Safety Plan which includes a copy or summary of the most recent risk assessment results for occupational and process safety hazards including identified hazards, risk evaluation, and mitigations.

The summary should include, at a minimum, a table of high and moderate risks identified in the most recent facility-wide process hazard analysis and a summary of the safeguards in place to reduce the risks to a tolerable level. The summary for occupational health and safety risks should contain similar information.

#### Response:

Imperial uses the IMPACT system to track risk assessment work. Attachment 2 shows an output from that system of recent risk assessments for NWO that are of risk category 1 or 2 (high or moderate). These are stewarded by Imperial management on a monthly or annual basis (depending on risk level) through IMPACT to track implementation of mitigation measures.

These tables will be added to the existing safety plan during the next annual review in early 2025.

## Financial Matters

### 4.12 *Financial Responsibility*

**Reference:** Imperial, Response to CER IR 1.19 Financial Responsibility, PDF 37 of 40, C28800-27

**Preamble:** In the reference, Imperial states a 'worst case scenario' involving a spill to river scenario of the Goose Island Terminal to Mainland cross-river flowline was reviewed again in 2024. Two release volumes 350 m<sup>3</sup> (50 m<sup>3</sup> oil and 300 m<sup>3</sup> produced water) and 90 m<sup>3</sup> (10 m<sup>3</sup> oil and 80 m<sup>3</sup> produced water) were estimated by following a common industry approach and assuming a release volume equal to the pipelines volume between isolation valve and 1 hour of flow. A third party estimate was received for these scenario that gives a range of \$3,750,000 to \$15,000,000 for containment and clean up of a spill.

**Request:**

- a) File the study/information provided by the third party mentioned in reference i).
- b) Provide and explain the forecasted levels of production in the worst case scenario spill and debris estimate of \$3,750,000 to \$15,000,000, including how this forecast takes into consideration wells that may come back into service or increased throughput.
- c) Confirm whether Imperial's \$3,750,000 to \$15,000,000 "worst case scenario" takes into account the Replacement Activities and proposed horizontal directional drilling work to be done? Provide an explanation as applicable.
- d) Explain what effect the Replacement Activities have on the Financial Responsibility proposed in the Imperial OA Variance Application, and how Imperial is proposing to satisfy the Financial Responsibility requirements in considering the Replacement Activities.

**Response:**

- a) Triox Environmental Emergencies was the third-party supporting Operations in improving spill response planning and execution. Triox was asked to provide a high-level estimate for clean-up costs related to spill scenarios based on their experience and spill volumes provided by Imperial. The estimate is shown below.



Norman Wells	Scenario 1	Scenario 2
Oil	10 m <sup>3</sup>	50 m <sup>3</sup>
PW	80 m <sup>3</sup>	300 m <sup>3</sup>
River discharge	30,000 m <sup>3</sup> /s	30,000 m <sup>3</sup> /s
Approximate extent of impacts downstream	150 km	200 km
Degree of shoreling oiling	relatively less	relatively more
<b>Oil spill cost</b>	<b>\$ 750,000.00</b>	<b>\$ 3,750,000.00</b>
<b>PW spill cost</b>	<b>\$ 3,000,000.00</b>	<b>\$ 11,250,000.00</b>
<b>Total rough spill cost estimate</b>	<b>\$ 3,750,000.00</b>	<b>\$ 15,000,000.00</b>

**Assumptions for both scenarios:**  
 May see water surface and shoreline impacts downstream to near Fort Good Hope (50/300 m<sup>3</sup> likely further downstream extent), predominantly on the descending RB, but also mid-channel islands. Descending LB will need to be surveyed to verify any impacts.

Items considered in rough cost estimate:

- 1 Incident command post
- 2 Safety
- 3 Potable water
- 4 Personnel
- 5 Environmental (sampling, wildlife, etc.)
- 6 Equipment
- 7 Waste

Cost per m<sup>3</sup> oil: \$ 75,000.00 (cost per barrel approx. \$12,000)  
 Cost per m<sup>3</sup> PW: \$ 37,500.00 (cost per barrel approx. \$6,000)

- b) The worst-case scenario was based on full production including that which is currently shut-in due to Line 490 incident. When Line 490 is returned to operation, full production volumes are anticipated to be approximately 349 m<sup>3</sup>/day of oil and 900 m<sup>3</sup>/day of produced water.
- c) The worst case scenario contemplates a more significant event than a possible release associated with the Replacement Activities. Therefore, a spill from the Replacement Activities does not increase the risk of increasing spill clean-up costs beyond that contemplated by the worst-case scenario.
- d) The Replacement Activities replace existing infrastructure and do not bring on new production. Therefore, the 'worst case scenario' which is based on full production, remains unchanged. Imperial's information provided in the response to IR 1.19 remains accurate.

Attachment 1: Updated Issue Summary Log – May 2024

Attachment 2: Summary of Recent NWO Risk Assessments (Category 1 and 2 –  
IMPACT Output)

Updated ERP Documents (filed under own cover pages with this submission):

- Norman Wells Operations Emergency Response Plan (previously called ‘Site specific ERP’ in prior versions)
- Imperial Upstream Core Emergency Response Plan
- Norman Wells Operations Spill Contingency and Response Plan (SCARP)
- Norman Wells Operations Mackenzie River Tactical Response Plan (MRTRP)