

### Reviewer Comments and Proponent Responses

Project: Special Effects Study  
 Board: Sahtu Land and Water Board  
 Proponent: Imperial Oil Resources N.W.T. Limited

File Number: S13L1-007  
 Review Comments Due: November 1, 2023  
 Proponent Responses Due: November 22, 2023

Organization	ID	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response
GNWT - Environment and Climate Change - Environmental Regulatory Analyst	1	GNWT-ECC Cover Letter	Please see attached cover letter.	N/A	
GNWT - Environment and Climate Change - Environmental Regulatory Analyst	2	Representativeness of Sampling	<p>GNWT-ECC notes that IORL did not validate the sheen test using Category B surface water runoff facilities (SWROFs) as directed by the SLWB (2023 Directive iii), nor did IORL discuss how the four Category A surface water runoff locations (SWRO) sampled address the paraphrased SWLB (2023 Directive iii) to “test all types of category A SWROFs”.</p> <p>However, it is unclear to GNWT-ECC if it is necessary to demonstrate that the absence of a sheen indicates the absence of hydrocarbons in SWROFs where discrete water licence conditions apply (SLWB 2015, Part E 1(b) (i.e., Category B SWROFs). IORL should discuss why the four selected Category A SWRO locations that represent two ditches and two culverts only, sufficiently represent the population of Category A SWROs to reach a definitive conclusion regarding the safety implied by a sheen test. This discussion should include possible matrix effects at locations and not focus solely on the observed four “successful” validations.</p>	<p>GNWT-ECC recommends that IORL discuss why the four selected Category A SWRO locations (ditches and culverts) only, are sufficiently representative of the population of Category A SWROs to reach a definitive conclusion regarding the safety implied by a sheen test. This discussion should include possible matrix effects at locations and not focus solely on the observed four “successful” validations.</p>	<p>All Category A SWRO locations requiring discharge during the month of May 2023 were included in this repeat trial. The prior study included various bunker well locations on Goose Island and the Mainland, which were the only locations containing a visible sheen. Imperial determined the four additional Category A locations on the mainland supplemented the study further to reach a definitive conclusion based on the results. Category B locations were not included in the trial as Imperial already follows Water License lab analysis requirements prior to discharging (Annex A Part E 1b) for these locations and is not proposing any changes in how SWRO is managed in these locations. Overall the entire study included 11 Category A locations across the operation, 7 in the original, and 4 in the additional trial with similar results.</p>

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GNWT - Environment and Climate Change - Environmental Regulatory Analyst	3	<b>Correlation between the Presence of Sheen and Total Petroleum Hydrocarbon Concentrations</b>	<p>SWLB 2023 Directive ii requires that IORL “implement the recommendations of reviewers to demonstrate ...”. One of the review comments is in regards to ambiguity in defining a sheen. IORL did not respond to this review comment. Examination of sheen evaluations presented in IORL (2022) for the “thinnest observed sheen appeared to be found at Location 3-VS-Q-17X-Bunker-1” show that the measured total petroleum hydrocarbon concentrations are 29 mg/L, which are significantly higher than the water licence EQC of 5 mg/L. This leaves the question, “At what total petroleum hydrocarbon concentration does a sheen disappear?” GNWT-ECC believes this is the most important question to answer when validating the absence of sheen as an indicator of compliance with a water licence condition and what was expected. The results presented in IORL (2023) do not contradict the argument that an absence of a sheen indicates compliance with the water licence condition, however, the results do not fully support this idea either.</p> <p>Reference: IORL (Imperial Oil Resources (NWT) Limited). 2023. Special Effects Study – Cat A Surface Water Run off (SWRO) Visible Sheen Test Trial Results, August 31 2023.</p>	<p>Given the ambiguity in deciding whether a sheen is present or not, GNWT-ECC recommends that IORL conduct a “blind” experiment consisting of spiking water from Category A locations with “representative” total petroleum hydrocarbons using a concentration series of 0.5, 1, 2, 4 and 8 mg/L and assessing whether a sheen is visually detected. This should include at least five randomly selected Category A SWRO locations. IORL should discuss what comprises a representative total petroleum hydrocarbon mixture for Category A locations.</p>	<p>Field operators are trained to detect visible sheens similar to Imperial's other operating assets in other provinces where surface water run-off legislation is followed using visible sheen tests. Thickness observations of sheens were included in the original study to provide additional details in the discussion section however they do not dictate or factor into the determination of a visible sheen test to remove any ambiguity. If any visible sheen is detected, no matter the thickness or extent, the location is immediately flagged and not discharged to the environment. Instead, the surface water is properly recovered via vac truck for on-site disposal downhole using the approved F-31X treatment and injection facility on-site. Imperial will continue following the Type A Water License S13L1-007 requirements for Category A SWRO management on-site outlined in Annex A, Part E(1a) and results will continue to be shared with the SLWB via the Monthly Water Use Reports.</p>
Fisheries and Oceans Canada (DFO) - Nicholas Wasilik	1	Special Effects Study: Sheen Validation Test	<p>Fisheries and Oceans Canada has reviewed the submission but has not comments at this time.</p>	<p>Fisheries and Oceans Canada has not recommendations at this time.</p>	