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Larry Wallace, Chair
Sahtu Land and Water Board

Delivered via email

June-16-14

RE: ConocoPhillips Canada applications S14L1-002 and S14A-003

Dear Mr. Wallace,

The ʔehdzo Got'Inę Gots'ę Nákedı (Sahtú Renewable Resources Board, the Board) has reviewed ConocoPhillips Canada's (CPC) Land Use Permit and Water Licence Applications based on its mandated responsibilities under the Sahtú Dene and Métis Comprehensive Land Claim Agreement.

Overall, the Board is concerned that these applications by CPC leave many unanswered questions about issues that could have significant environmental impacts – particularly on water and wildlife – and therefore could significantly impact Sahtú harvesters' way of life. We provide a plain language summary of our comments and recommendations below, followed by a table with more detailed comments and recommendations.

Máhsı,

Interim Chair

Plain Language Summary

Water and aquatic habitat

The proposed project could impact water bodies and habitat for fish, beaver, muskrat and other animals that live in the water. Our concerns include:

- **Draining or taking large amounts of water out of shallow lakes** – CPC is asking for a licence to take all of the water out of one shallow lake, more than half the water out of another, and large amounts out of two other shallow lakes. CPC has not yet presented research on which animals and plants depend on those lakes.

- **Taking water out of fish lakes for many years in a row (“cumulative impacts”)** – CPC already has a licence to take up to 10% of the water under ice from several fish-bearing lakes, and is requesting a licence to keep taking water from the same lakes for five more years. CPC has not yet presented research on how fast the water comes back once they take it out, and where the water comes from.
- **Risk of spills into Mackenzie River** – CPC plans to transport hazardous chemicals and waste fluids via barges on the Mackenzie River. CPC has not provided a plan for how it would clean up a spill on the Mackenzie River.

CPC’s water monitoring program needs improvement before we will be able to tell whether or not CPC’s operations are having an impact on water quality or stream flow.

We have questions about whether warm drilling fluids will melt permafrost and what effect that might have on groundwater and surface water.

We have further questions about the abandoned well located on CPC’s lease, and how close it is to any new wells CPC is planning to drill, since it would be dangerous if any new wellbore or fractures came into contact with the abandoned wellbore.

Some of the risks and impacts to water can be lowered through the following recommended measures:

- Use double walled tanks for all hazardous fluids.
- Use a tracer in the fracking fluid so we can tell whether the fracking fluid has leaked into the groundwater.
- Produce a plan that explains how CPC would deal with a spill of hazardous chemicals or waste into the Mackenzie River.

The Board also believes that all monitoring data (including well monitoring data) should be publicly available for communities and co-management boards to review.

Caribou and other sensitive species

Boreal caribou (a nationally “Threatened” species) and other sensitive wildlife could be impacted by this project through clearing of forest, disturbance from noise and smells, and higher risk of being killed by predators and humans.

The best way to protect caribou is to protect their habitat. In Alberta and British Columbia, the best practice is to use a “no net loss” strategy – any loss of caribou habitat has to be replaced with habitat that grows back somewhere else nearby. The Board expects caribou habitat in the Sahtú Region to be treated no worse than caribou habitat down south. We must actively prevent our caribou populations from collapsing the way they have in many parts of Alberta and British Columbia.

The Board also expects CPC to adopt best practices in reclamation, to make sure the forest is restored as quickly as possible. We recommend that ʔehdzo Got’ıneę (Renewable Resources Councils) be involved throughout the reclamation planning process to ensure that traditional knowledge and the interests of

the long term stewards of the land are accommodated, and the site will be restored to a state that is acceptable to community members.

It is difficult to know how much impact CPC’s program will have on boreal caribou or other species, since CPC does not know for sure yet where it wants to drill its 10 wells. It is dangerous to give permits and licences when you do not know how much impact there could be on wildlife and habitat. There should at least be limits set on how much habitat CPC is allowed to disturb or clear.

CPC is considering building an above-ground water supply line to reduce the number of truck trips along the winter road. However, CPC has not yet done any research on how much impact this water supply line could have on wildlife, and how much habitat would have to be cleared. The line could block wildlife from travelling across it and could create a lot of noise disturbance. More research is needed.

Technical Details

TOPIC	COMMENT	RECOMMENDATION
1. Impact of Water Withdrawals from New Water Sources	<p>CPC is proposing to add four new water sources (10, 11, 13, 14) –all are shallow lakes less than 1.5 metres deep, that likely freeze to the bottom in the winter. Based on the assumption that these lakes do not provide overwintering habitat for fish, CPC is requesting a licence to take 100% of the water in lake #10 (essentially drain the lake), 56% of the water in lake #14, 43% of the water in lake #13, and 16% of the water in lake #11. CPC claims that this will not have any significant impact because the lakes will probably recharge the following spring. CPC does not provide any evidence to support that claim.</p> <p>CPC has not yet assessed what other wildlife are present in those lakes, but commits to begin monitoring aquatic furbearers (such as beaver and muskrat) at some later point.</p> <p>It is unacceptable to allow such significant interference with any water body without any assessment of potential short-term and long-term impacts on wildlife.</p>	<p>Before any new water licence is issued, in each of the proposed new water sources the proponent should:</p> <ul style="list-style-type: none"> -conduct a baseline assessment of aquatic furbearer activity in the fall, winter, and spring; -conduct a baseline assessment of overall biodiversity; and -assess sources and estimated rates of recharge. <p>The proponent should assess the predicted short-term and long-term impacts on wildlife and biodiversity of withdrawing the requested amounts of water from those sources.</p>
2. Cumulative Impact of Water Withdrawals	<p>In its letter of April 25th to CPC, the Sahtu Land and Water Board noted the following: “Typically exploration programs in the Sahtu have been one or two years in length, ensuring the DFO protocol is sufficient. With Conoco’s approvals and proposed program in this application, this could result in up to seven years of continuous withdrawals from the same sources. In Appendix 2, page 121 of the pdf, ConocoPhillips admits that the nature of subsurface flow is unknown and that it is only assumed that withdrawal rates will equal the</p>	<p>Before receiving any licence for further water withdrawals from fish-bearing lakes, the proponent should produce a scientific study describing sources and rates of recharge for each of the proposed water sources.</p>

	<p>recharge from groundwater and surface runoff. Based on the volumes being requested and the importance of these lakes to the communities, more evidence is needed to support these assertions.”</p> <p>In its response, CPC states that it will continue to monitor these water sources, but does not provide any more evidence to back up its assertions on recharge rates.</p> <p>For Water Source 2, CPC is proposing to use the full water withdrawal amount allowed by the DFO Protocol (10% of under-ice volume) each year for five years; and for Water Source 3, CPC is proposing to use 93% of the available water allowed by the DFO Protocol, each year for five years.</p> <p>The cumulative impact of water withdrawals is a major concern to Sahtú harvesters and the ʔehdzo Got’Inę Gots’ę Nákedı, particularly with regard to the Fish Lakes.</p>	
<p>3. Transport of Toxic Materials by Barge - Risk of Spills into Mackenzie River</p>	<p>The Mackenzie River (Deh Cho) is a very important river to communities throughout the Northwest Territories, a source of drinking water for Sahtú communities, and important fish habitat. It is a Special Management Zone within the Sahtú Land Use Plan.</p> <p>CPC states in Table 8-1 of Appendix 2 (p. 8-3): “Flow back water will be either transported by truck off-site or stored in Norman Wells and barged to and disposed of at an appropriate waste disposal facility.”</p> <p>CPC also states on p.48 of Appendix 2: “For the 2014-2019 Program, ConocoPhillips plans to barge the majority of the required equipment to the staging area during the open-water season.” It is unclear whether the “required equipment” includes fracking chemicals.</p> <p>In Appendix 2A (p. 202), according to the notes from a February 26, 2014 meeting with the Tulita Land Corporation, CPC stated: “We are currently discussing with NTCL right now on what we would potentially be carrying on the river next summer. We would want to see their spill management procedures before we awarded a contract to them to ensure that they align with CPC’s procedures. In addition, we would have everything stored in double wall tanks (with the double hulled barge from NTCL).”</p> <p>CPC plans to transport toxic materials, including large amounts of waste fluids produced as a result of hydraulic</p>	<p>Q: How many barge trips would be required to transport all of CPC’s waste and any other hazardous materials?</p> <p>Q: Will CPC include in any contract with a barge transporter the requirement that hazardous materials be contained within double-walled tanks on deck? What would be the terms of such a contract?</p> <p>Q: Does CPC plan to transport by barge along the Mackenzie River concentrated fracking chemicals to its lease area?</p> <p>Please provide the specific EL470 Transportation Risk Assessment to the Sahtu Land and Water Board and the ʔehdzo Got’Inę Gots’ę Nákedı for review, and/or provide details of what will be contained in CPC’s spill</p>

	<p>fracturing, by barge along the Mackenzie River, creating the risk of a toxic spill into the River. However, CPC's application does not appear to mention any spill prevention or clean-up measures in place with regard to a potential spill/accident involving a barge carrying hazardous materials along the Mackenzie River.</p> <p>In its response to question #7 from ʔehdzo Got'ıne Gots'ę Nákedı on application S13A-001 last year, CPC committed to complete a "specific EL470 2013-16 Transportation Risk Assessment" and submit this to the NEB in Q2 of 2013.</p>	<p>contingency plan and emergency response plan to address the scenario of a spill/accident involving a barge carrying hazardous materials along the Mackenzie River.</p>
4. Double Walled Tanks for Produced Fluid Storage - Surface Water Quality Protection	<p>In Appendix 2A (p. 201), according to the notes from a February 26, 2014 meeting with the Tulita Land Corporation, CPC stated: "We would never store the flow back in the same piece of equipment. We store that in tanks that are double walled so that there is added protection."</p> <p>However, in section 3.8.1 of the Waste Management Plan (Appendix 5), CPC states that flowback fluids are to be stored in single-walled tanks within a lined bermed area.</p>	<p>Q: Please clarify whether flowback fluids are to be stored in single-walled tanks or double-walled tanks.</p> <p>It is preferable for CPC to be required to use double-walled tanks with overflow meters and controls to store flow back / produced fluids.</p>
5. Risk of Wellbore Integrity Failure through Permafrost Thawing and Subsidence - Surface Water and Groundwater Quality Concerns	<p>CPC states on pp. 5-22 and 5-23 of Appendix 2: "Drilling and hydraulic fracturing necessarily involve the use of warm drilling fluid. Although the potential for heat transfer exists, and could cause localized thawing and subsidence around the wellbore, the heating effect is isolated by multiple layers of steel and cement casing. Little to no subsidence is expected. The 2013 summer site inspections for wells drilled under the 2013-2016 Program showed limited pooling around the conductor at the ground surface."</p> <p>Technologies do exist to chill drilling fluid before injection; these are used in areas where permafrost thawing and subsidence could risk harm to the environment and/or operations. It is unclear to what extent potential permafrost thawing and subsidence could pose significant risk in this case, without further information being provided.</p> <p>Under the Canadian Oil and Gas Drilling and Production regulations, operators are required to ensure that the well, casing, and cement slurry are designed and installed so that the integrity of permafrost zones is protected (Sections 39 and 41).</p>	<p>Q: Please provide evidence to back up the conclusion that no subsidence is expected in relation to the proposed drilling operations. Please cite statistics or examples from oil and gas operations in permafrost zones, indicating how often and to what extent wellbore integrity has been compromised due to permafrost thawing and subsidence around the wellbore. Please indicate what factors contribute to higher risk of permafrost thawing and subsidence compromising wellbore integrity, and to what extent those factors are present within EL470.</p>
6. Surface Water Monitoring Program	<p>CPC's surface water monitoring program has not been adequately designed to collect a robust baseline from which project-specific impacts can be measured going forward. It is critical that the monitoring program design be</p>	<p>Before any further operations are permitted, the proponent should be required to design and</p>

<p>Inadequate</p>	<p>improved before another 10 wells are permitted and licensed.</p> <p>The manner in which CPC has analyzed their 2012 and 2013 data in Attachment N of Appendix 2 (in particular, combining lake, stream and Mackenzie River data, and not separating control and potentially disturbed sites), prevents any determination of whether or not CPC's activities are influencing the health of the aquatic system. CPC could likely redirect their sampling efforts to collect data that would help them better understand the influence of their activities in the watershed, without having to invest more money into their monitoring program.</p> <p>CPC indicates on page N-18 of Attachment N that toluene levels exceeding CCME guidelines were found at two sites, including CPC-SW-004. This site is very close to wellsite P-20 where horizontal fracturing was carried out this past winter. The report in Attachment N does not include any discussion of what may be the source of high toluene levels.</p> <p>Map 5-7, found on p. 5-105 of Appendix 2, indicates the locations of five hydrometric stations. CPC does not appear to have presented any data or analysis from those hydrometric stations.</p>	<p>implement an improved surface water quality monitoring program that is capable of measuring project-specific impacts. In particular, the source of toluene found at site CPC-SW-004 should to be investigated to determine whether it is naturally occurring or related to run-off from the nearby road or wellsite operations.</p>
<p>7. Use of Tracer in Frac Fluids - Groundwater Quality Protection</p>	<p>CPC committed to the use of a tracer in its 2013-16 hydraulic fracturing program. On p. 8-17 of Appendix 2, CPC states: "Other methods of monitoring the hydraulic fracturing will be considered where appropriate, including tracers and tiltmeters."</p> <p>It is important that all frac fluids contain a tracer, so that if this tracer was ever found in the groundwater, we would know that frac fluids are contaminating the groundwater.</p>	<p>CPC should be required to use a tracer in its frac fluid.</p> <p>Q: Please explain how often CPC will be testing the groundwater for tracers, and how often CPC will be reporting results of that testing to the SRRB, Sahtu Land & Water Board, and local community governing bodies.</p>
<p>8. Cement Bond Log Tests</p>	<p>CPC states on p. 7-6 of Appendix 2: "Cement bond logs will identify possible annular issues where cement bond may be an issue and will provide a baseline for future well bore monitoring. Follow up cement integrity logging could reveal potential problems which ConocoPhillips would then take corrective action to combat."</p>	<p>Q: How often will CPC conduct cement bond log tests, and how often will results be reported to the SLWB?</p>
<p>9. Microseismic Monitoring</p>	<p>CPC states on p. 7-11 of Appendix 2: "the behavior of the hydraulically induced fractures in the E-76 and P-20 wells were predictable and well-contained within the target zone. Because of this, ConocoPhillips does not plan to</p>	<p>The proponent should be required to conduct microseismic monitoring on all hydraulically fractured</p>

	conduct microseismic on future wells.”	wells.
10. Monitoring Data Should be Available to the Public	Strict monitoring and enforcement is required to protect groundwater during the drilling and horizontal fracturing process, to ensure ongoing wellbore integrity and to confirm the length of the fractures. Communities and co-management Boards should have access to all monitoring data to ensure groundwater is being protected.	CPC should be required to include in its annual reports to SLWB: the well pressure integrity tests on all vertical and horizontal wells, the cement bond logs on all vertical and horizontal wells, and the results of the microseismic monitoring undertaken during the hydraulic fracturing operations.
11. Proximity to Abandoned Well	<p>In CPC’s 2013 application for S13A-001, Appendix 9, p.26, CPC stated: “There is one abandoned well within EL 470 and that is located more than 5 km from wells E-76 or P-20.” In its response to question #7 from ʔehdzo Got’jneᑦ Gots’ᑦ Nákedı on application S13A-001, CPC stated that it would review the location and well files for any abandoned wells in the area and provide this information to the NEB.</p> <p>This abandoned well was not mentioned in the current applications. It is unclear how close this well would be to any of the ten new horizontal wells CPC plans to drill, and whether any information is available as to the integrity of the abandoned wellbore or surface casing vent flows.</p> <p>If any fractures from a horizontal wellbore came into contact with an abandoned wellbore, it could pose a risk to groundwater and surface water quality, since hazardous fluids and gases could flow through the abandoned wellbore to the groundwater zone or to the surface.</p> <p>AER Directive 083 (section 3) contains specific requirements for managing the risks of inter-wellbore communication. These include an assessment of well integrity and overall risk assessment for each offset well, and potential inclusion in the well control plan. (See http://www.aer.ca/documents/directives/Directive083.pdf)</p>	The proponent should provide information as to how close the abandoned wellbore is to any of the ten proposed horizontal wells, the integrity of the abandoned wellbore, and any evidence of surface casing vent flows.
12. Waste Fluid Volumes	Table 2-6 on p. 2-23 of Appendix 2 indicates that annual flowback fluids will amount to 10,000-15,000 m3 in total. This contradicts information provided on p. 2-15 of Appendix 1, which indicates that a maximum of 50% (15,000 m3) of fluid could flow back from <i>each well</i> . If CPC plans to complete two wells per year, then the total annual flowback fluids should amount to 30,000 m3.	The proponent should correct or clarify its estimates of annual flowback fluid amounts.
13. Temporary Storage of	In Appendix 5 (Waste Management Plan), CPC identifies the laydown yard and staging areas as “not currently planned	The proponent should clarify whether there is any

Waste	to store waste;" however there are additional comments indicating these areas might be used for temporary storage of waste before transfer. If wastes are to be stored in these areas, even temporarily, then CPC must consider the potential for spills and leaks of hazardous waste at those sites.	possibility that the laydown yard and staging areas might be used to store waste, even temporarily. If so, then these areas should first be approved as hazardous waste storage facilities.
14. Boreal Caribou - Net Neutral or Positive Impact on Caribou Habitat	<p>The application presents evidence from several surveys, confirming that EL470 serves as boreal caribou habitat. Two of CPC's potential wellsites (L-38, H-77) are in the southeast corner of the lease where there have been a particularly large number of caribou signs observed.</p> <p>CPC's discussion paper on "Canol Shale Potential Future Development and Effects Considerations", released in May 2013, considered the potential effects on boreal caribou of a 'Future Scenario' that was less intensive than the program actually proposed for 2014-19 (the scenario included drilling and completion of three to five additional vertical wells and two to four horizontal wells, in addition to the 2013-16 program). CPC concluded that this scenario would result in a linear density in the Central Canol Region of 1.17 km per km², which exceeds an acceptable threshold of 0.8 to 1.0 km per km². This means that the proposed 2014-19 program could result in significant impact to boreal caribou and "the status of wildlife may not achieve social or ecological objectives." (CPC discussion paper, 3-15)</p> <p>The national Boreal Woodland Caribou Recovery Strategy makes it clear that the most critical mitigation measure required to protect boreal caribou populations is the maintenance of adequate habitat. Moreover, the National Recovery Strategy acknowledges that a target of 65% undisturbed habitat only has a 60% chance of keeping boreal caribou self-sustaining, thus we should work to keep undisturbed boreal caribou habitat well over the 65% threshold.</p> <p>The best practice with regard to boreal caribou habitat protection is the B.C. government's Mitigation and Monitoring Guidance for South Peace Northern Caribou, which specifies that any project must have a "net neutral or positive effect" on caribou habitat. For any habitat loss</p>	<p>The proponent should be required to produce a boreal caribou mitigation plan that offsets any loss of boreal caribou habitat so that its operations have a net neutral or positive effect on the viability of boreal caribou in the region, in accordance with best practices in British Columbia and Alberta.</p> <p>The ʔehdzo Got'ıneᑦ Gots'ę Nákedı acknowledges that the Sahtu Land and Water Board may not have the power to require such a mitigation measure; this may require action from GNWT-ENR and/or the Mackenzie Valley Environmental Impact Review Board.</p>

	<p>which cannot be avoided, proponents are required to offset.¹</p> <p>The principle of caribou habitat offsetting was also employed by the joint review panel in their decision on the Northern Gateway Pipeline (conditions 57-62).</p> <p>While boreal caribou in the Sahtu Region are currently doing better than herds in Alberta and British Columbia, we must not wait until herds are on the brink of extirpation before implementing caribou habitat restoration. Best practices must be implemented now in order to maintain healthy caribou populations.</p>	
<p>15. Impacts on Boreal Caribou – Proper Assessment Required</p>	<p>CPC's application does not include a scientifically based assessment of the predicted effects of the project on boreal caribou. Its rating of the severity of potential residual effects on boreal caribou in Table 5-25 of Appendix 2 does not hold any scientific validity and it does not contain any reference to criteria contained in the legally binding National Recovery Strategy for boreal caribou.</p> <p>CPC states on p. 5-81 in Appendix 2: "Late winter aerial ungulate surveys recorded moose and caribou in proximity to existing and actively used access roads in the LSA (Figure L-4 in Attachment L). These data suggest limited avoidance behaviour towards access roads during winter. Furthermore, habitat along access roads is not limiting within the LSA and habitat surrounding the majority of proposed access roads does not appear to be high quality for boreal caribou (with the exception of roads in the Fish Lakes area). Avoidance behaviour varies as a function of the quality of surrounding habitats (Dyer 1999). Thus, any effective loss of habitat due to roads is not predicted to pose a risk for wildlife in the LSA."</p> <p>It is unacceptable to suggest that the data points in Figure L-4 in Attachment L (showing a few moose and caribou near access roads) contradict a robust body of scientific evidence showing that boreal caribou generally avoid linear disturbances such as access roads. Moreover, the research published by Simon Dyer in 1999 certainly does not support the conclusion that roads pose no risk for boreal caribou.</p> <p>A proper assessment of impacts on boreal caribou would</p>	<p>The proponent should be required to produce a proper impact assessment which evaluates the predicted effects of this project on boreal caribou habitat, based on accepted science, traditional knowledge, and the National Recovery Strategy.</p> <p>The assessment should include a calculation of total disturbed habitat and total linear disturbance within the local study area, both for this particular project and the cumulative impacts of other projects and historical impacts in the LSA.</p>

¹ See

www.env.gov.bc.ca/wld/speciesconservation/nc/documents/South%20Peace%20Northern%20Caribou%20Mitigation%20and%20Monitoring%20Plan%20Guidance.pdf

	lay out the total habitat disturbance caused by the project (including total linear disturbance and total square km of area disturbed), and use the scientific principles in the National Recovery Strategy as well as local traditional knowledge to predict the impact on boreal caribou within the Local Study Area.	
16. Disturbance Limits	<p>CPC has not completed pre-disturbance assessments for any of its proposed ten wellsites.</p> <p>CPC states on p. 2-7 of Appendix 1: "These locations were selected using currently available subsurface information only. No field scouting or field assessments have been completed for these locations and some variations in access and surface locations are likely."</p> <p>Table 2-2 (p. 2-10 of Appendix 1) provides an estimate of the maximum amount of access required to reach each of the 10 proposed wellsites. This access is divided into the use of existing linear features and new access. However, this Table does not indicate to what extent existing linear features will need to be widened to 11 metres (either for new access roads or a new corridor for an above-ground water supply line).</p> <p>Accurate predictions about linear disturbances and overall habitat disturbance are critical to understanding potential impacts on boreal caribou.</p> <p>If CPC cannot confirm the locations of its ten well-sites and the required access, then CPC should at least commit to pre-specified limits on linear disturbance and overall habitat disturbance within its lease area.</p>	The proponent should only be licensed/permitted to build wellsites at unspecified locations if there are pre-determined limits on linear disturbance and overall habitat disturbance within its lease area.
17. Construction and Use of Temporary Above-Ground Freshwater Supply Line	<p>While a temporary above-ground freshwater supply line may reduce the number of truck trips along the winter road, it is also expected to have negative environmental impacts, such as blocking movement of caribou, increased long-term habitat disturbance (through increasing the width of the access road from 8 metres to 11 metres, and creating a new corridor in some places), and the noise and energy use from pumping equipment.</p> <p>CPC has not provided any assessment of the predicted impacts of an above-ground freshwater supply line.</p>	The proponent should be required to submit a complete assessment comparing environmental impacts of different freshwater transport methods, including quantitative analysis of habitat disturbance, sensory disturbance, energy use and greenhouse gas (GHG) impacts.
18. Commitment to Reclamation Best Practices	The application does not outline a complete reclamation plan. However, section 2.5.12 on p. 2-26 of Appendix 2 states: "ConocoPhillips will monitor disturbed areas for natural regrowth and, if appropriate, will reseed using a	The proponent should be required to submit an initial Reclamation Plan for review by the SLWB, SRRB, and

