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Prairie & Northern Region
Environmental Protection Operations Directorate
5019 52nd Street, 4th Floor
Yellowknife, NT X1A 2P7

July 5, 2013

Our File No.: 4706 001 037
Your File No.: S13A-002 & S13L1-005

Angela Love
Regulatory Specialist
Sahtu Land and Water Board
P.O. Box 1
Fort Good Hope, NT, X0E 0H0

Via Email at angela.love@slwb.com

Attention: Ms. Love

RE: S13A-002 & S13L1-005 – Husky Oil Operations Limited – Slater River Vertical Hydraulic Fracturing Project; Wells O-41 & G-70 – Land Use Permit (LUP) and Water Licence (WL) Application

Environment Canada (EC) has reviewed the information submitted with the above-mentioned application. The following specialist advice is provided pursuant to EC's mandated responsibilities arising from the *Canadian Environmental Protection Act, 1999* (CEPA), the pollution prevention provisions of the *Fisheries Act*, the *Migratory Birds Convention Act* (MBCA) and the *Species at Risk Act* (SARA)

Husky's proposed 2013 program includes drilling, completions and testing of two vertical wells, Little Bear O-41 and Little Bear G-70, to further validate and evaluate the Canol, Hare Indian and Bluefish Shales. These wells are follow-up wells to the previously drilled and completed Little Bear N-09 and Little Bear H-64 locations. Access and staging for the program will be conducted under existing LUP S12F-007 and WL S11L3-002 and S12L8-007.

The proposed Drilling Program will consist of the following components:

- Construction of two wellsites, Little Bear O-41 and Little Bear G-70, and associated all-weather access;
- Mobilization of one drilling rig and support equipment to the wellsites;
- Drilling of a well at O-41 to a depth of approximately 1,150 metres (m);
- Drilling of a well at G-70 to a depth of 3,000 m;
- Reservoir evaluation utilizing the drilling rig, including the collection of rock cores and down hole geophysical logs, open-hole formation testing;
- Demobilization of equipment; and,
- Waste management including the trucking of drilling waste off-site.

Completion and production testing will take place following the conclusion of the drilling program and will include the following components:

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- Mobilization of completion and testing equipment to the wellsites;
- Diagnostic Fracture Injection Tests (DFIT);

Completion, reservoir stimulation (by vertical hydraulic fracturing) and flow testing at the two wellsites;

- Flow induction and swabbing of the stimulated formations to recover completion fluids, reservoir fluids (natural gas, oil and/or condensate), and to determine flow rates;
- Incineration of produced natural gas and natural gas liquids;
- Collection of produced fluids into on-site storage tanks;
- Suspension of both wells upon completion of flow testing;
- Waste management, including the trucking or storage and barging of liquid and solid wastes off-site;
- Disposal of produced and make-up fluids at an approved disposal facility or to an oil and gas operator; and,
- Demobilization of equipment.

Husky is also proposing to:

- Consolidate LUP S11A-003 (as amended), along with the LUPs Terms and Conditions outlined into the LUP for this proposed program.
- Consolidate WL S11L1-003, along with the WLs Terms and Conditions outlined into the WL for this proposed program.

EC offers the following recommendations and comments for the proposed Project:

General

All mitigation measures identified by the Proponent, and the additional measures suggested herein, should be strictly adhered to. This will require awareness on the part of the Proponent's representatives (including contractors) conducting operations in the field. EC recommends that all field operations staff be made aware of the Proponent's commitment to these mitigation measures and provided with appropriate advice / training on how to implement these measures.

Groundwater

The proponent notes (EPP 7.4.2.1, page 89) that, "during the winter of 2013, under LUP S12X-006, Husky completed a groundwater baseline assessment that included the drilling and installation of 2 bedrock groundwater monitoring wells, 2 shallow monitoring wells, and 7 permafrost monitoring locations. Results of the winter drilling program were not available at the time this EPP was prepared. This information will be submitted to the SLWB upon receipt of final report". **It will be important for regulators to have a good understanding of baseline conditions prior to the proposed project operations. When does the Proponent anticipate providing this report to the SLWB?**

Waste Treatment/Management

The Proponent intends to store all freshwater drilling residual solids and fluids in tanks or in a lined metal or synthetic plastic-sided berm containment system. Following toxicity testing they may be transferred to bermed storage pits in the quarries. The Proponent is then proposing controlled discharge of any separated water onto adjacent lands, and completing a land application of the non-toxic residual solids into the sub-soils of the quarries. This material will then be incorporated with quarried material and used on the roads and pads (EPP 4.8.1)..

The freshwater solid residual wastes will be sampled and analyzed by an approved third party laboratory for toxicity, salinity, hydrocarbons, and metals. The blends of soil and water-based drilling waste will be analyzed before and after the disposals occur and the separated waters will be sampled for toxicity, hydrocarbons, and salinities prior to discharge. The salinity criteria will follow the *Energy Resources and Conservation Board, Directive 050, Revised edition May 2, 2012* (ERCB, 2012), and soil end points for discharge of water, and land application trace elements will meet or exceed *Soil Quality Guidelines for Protection of Environmental and Human Health* (CCME, 2012) for agricultural land-use. Reports can be made available for review by the regulatory bodies before these disposals take place. If analysis show that the waste streams will not meet soil end point criteria, the waste streams will be loaded and hauled away to an approved facility. Any contaminated waste water that does not meet the criteria for discharge will be dehydrated using Clean Steam™ units (details provided in the WMP) on site. Any total or concentrated liquid wastes will then be hauled to an approved facility (EPP 4.8.1).

In addition to meeting established criteria or guidelines for discharge of waste or waste water EC would like to reiterate the need for the Proponent to comply with Subsection 36(3) of the Fisheries Act, which specifies that, unless authorized by federal regulation, no person shall deposit or permit the deposit of deleterious substances of any type in water frequented by fish, or in any place under any conditions where the deleterious substance, or any other deleterious substance that results from the deposit of the deleterious substance, may enter any such water. The definition of a deleterious substance (Subsection 34(1) of the Fisheries Act) includes “any water that contains a substance in such quantity or concentration, or that has been so treated, processed or changed, by heat or other means, from a natural state that it would, if added to any other water, degrade or alter or form part of a process of degradation or alteration of the quality of that water so that it is rendered or is likely to be rendered deleterious to fish or fish habitat or to the use by man of fish that frequent that water.” Subsection 36(3) makes no allowance for a mixing or dilution zone at the point of deposit.

EC recommends the criteria and the reporting of results prior to discharge be captured in the water licence and/or land use permit terms and conditions.

Hazardous Waste (WMP, m. page 40): **For transfer of hazardous waste out of the Northwest Territories, EC recommends the Proponent be aware of the requirements under *CEPA Interprovincial Movement of Hazardous Waste Regulation* and make reference to it in their Waste Management Plan. More**

information on the Regulation can be found at:

<http://laws-lois.justice.gc.ca/eng/regulations/SOR-2002-301/page-1.html>

Fuel Storage

Husky plans to transport diesel fuel for the drilling program (including construction, rigs and camps) to the drilling locations from the fuel tank farm at the camp/storage site on an as-needed basis (although a base level of on-site storage will be required to ensure an uninterrupted supply).

Fuel storage at the wellsites will consist of one 15m³ (95-barrel [bbl]) double-walled tank for diesel. Fuel storage will remain on the wellsite during drilling, completion and testing operations (EPP 4.9).

EC would like to remind the Proponent the *CEPA Storage Tank System for Petroleum Products and Allied Petroleum Products Regulations* apply to both outside, aboveground and underground storage tank systems (including the piping and other tank associated equipment) under federal jurisdiction containing petroleum and allied petroleum products that have a capacity greater than 230 litres. This includes tanks located on federal or Aboriginal lands. Exceptions are pressurized tanks, mobile tanks, tanks regulated by the National Energy Board, and outdoor, aboveground storage tank systems that have a total combined capacity of 2500 litres or less and are connected to a heating appliance or emergency generator. All storage tank system owners must identify their tank systems to EC and installation of new systems must comply with the regulation's design requirements. Further information on these regulations can be found at <http://www.ec.gc.ca/st-rs>.

Drilling and Completion

Section 4.8.1 – Drilling Waste Management (pg 20): The Proponent has indicated that freshwater drilling solids and fluids will be stored in tanks or lined berms and in the Waste Management Appendix (pg 21), use of a synthetic berm is indicated. Please clarify which type of storage is proposed for use.

Section 4.6 Completion & Testing Operations (pg 17): The Proponent has indicated that it will conduct a diagnostic formation injection test (DFIT) before hydraulic fracturing operations. What does this test entail? Given that the Proponent has indicated it will follow 2 AER Directives, has it considered implementing the *Directive 083: Hydraulic Fracturing – Subsurface Integrity* from AER?

Section 3 – Table 6 (pg 19) and Additional information – MSDS sheets for drilling and completion fluids: In the additional information to the application document, there are a number of MSDS sheets attached for both drilling and completion programs. It is recommended that the proponent review the ingredients for the proposed products, for both drilling and completion, using CAPP's Fracturing Fluid Additive Risk Assessment and Management guidance to possibly identify better alternatives from a human health and environmental perspective.

Air

EC appreciates and would like to acknowledge the amount of effort that was put into sections 3(o) (Slater River Project Emissions), Appendix F (Emissions Inventory Summary) and Appendix G (Dispersion Modelling) of the application submission.

Section 3(o) (pg 42) and Appendix F – Air Emissions: **Has the Proponent considered fugitive emissions from drilling and completion activities? What are the potential emissions from this work (including VOCs)? Has the Proponent estimated greenhouse gas emissions from this proposed work?**

Appendix F (Emissions Inventory Summary) – The Proponent used a maximum flow rate of $10 \times 10^3 \text{ m}^3/\text{d}$ in their Dispersion Model Assessment but did not mention anything about the expected duration of incineration or the total volume of gas to be incinerated. **What is the anticipated duration or timeframe for incineration of produced natural gas and natural gas liquids during flow testing?**

Wildlife

EC notes the Proponent acknowledges its responsibilities under the *Migratory Birds Convention Act* and *Species at Risk Act* in their EPP. The Proponent has provided numerous mitigation measures to avoid and lessen impacts to wildlife, in addition to baseline data collection.

Although many of EC's comments and recommendations below, related to wildlife, have been submitted in regards to the Proponent's other related permits, EC also includes below additional comments and recommendations below, where applicable. EC's previous wildlife related comments, not included below, still apply.

The inadvertent harming, killing, disturbance or destruction of migratory birds, nests and eggs is known as incidental take. Currently, the regulations do not provide for authorizations or permits for the incidental take of migratory birds or their nests or eggs in the course of industrial or other activities. As such, to minimize the possibility of contravening the law, understanding your potential impact on migratory birds, nests and eggs, taking reasonable care, and avoidance are the best approaches to take when contemplating any activity or decision that has the potential to impact migratory birds, nests or eggs. To reduce the risk of incidental take of nests and eggs of migratory birds,

Environment Canada recommends that Proponents know their legal obligations; avoid engaging in potentially destructive or disruptive activities in key sensitive periods and locations in order to reduce the risk of affecting birds, their nests or eggs; and develop and implement appropriate preventative and mitigation measures to minimize the risk of incidental take and to help maintain sustainable populations of migratory birds.

For further advice on how to avoid incidental take or reduce risks to migratory birds and their nests and eggs, refer to the avoidance guidelines and frequently asked questions related to the protection of migratory bird nests and eggs as well as the fact sheet "Planning Ahead to Reduce Risks to Migratory Bird Nests" at:

<http://www.ec.gc.ca/nature/default.asp?lang=En&n=ED993EAB-B7CE-4A51-82CF-45131E042E93>

The proponent is planning to conduct project activities between August and December 2013 with the potential for activities occurring in subsequent years until July 2018. EC notes that project activities will overlap with the Middle Mackenzie River Islands key migratory bird terrestrial habitat site. This site is a traditional spring stopover point for waterfowl migrating up the Mackenzie River. Staging waterfowl are sensitive to both aircraft and ground-based disturbance. Pollution of riverine areas could also have detrimental effects on waterfowl and their habitats. EC recommends that ground-based activities and low-level aircraft overflights in this area should be avoided during early to mid-May. Further mitigation to minimize disturbance from aircraft overflights is provided below.

The Proponent has indicated (EPP page 75) that in order to mitigate some of the effects of the proposed program on snow geese, only limited use of the all-weather roads will be permitted between the dates of May 1 and June 20 of each year. The Proponent also states that although barging will be required, no residual effects to particularly sensitive island habitat or snow goose migration are expected. **EC recommends the Proponent confirm that setback distances, lateral flight distances and minimum flight altitudes will be followed in that area at all times.**

EC notes that the Proponent has included helicopter and fixed-wing aircraft as potential additional equipment in Appendix 5 Anticipated Equipment Lists. **EC provides the following additional information (as presented in previous comments):**

- Fly at times when few birds are present (e.g., early spring, late fall, winter)
- If flights cannot be scheduled when few birds are present, plan flight paths that minimize flights over habitat likely to have birds and maintain a minimum flight altitude of 650 m (2100 feet).
- Minimize flights during periods when birds are particularly sensitive to disturbance such as migration, nesting, and moulting.
- Plan flight paths to avoid known concentrations of birds (e.g., bird colonies, moulting areas) by a lateral distance of at least 1.5 km. If avoidance is not possible, maintain a minimum flight altitude of 1100 m (3500 feet) over areas where birds are known to concentrate.
- Avoid excessive hovering or circling over areas likely to have birds.
- Inform pilots of these recommendations and areas known to have birds.

The following comments are pursuant to the *Species at Risk Act* (SARA), which came into full effect on June 1, 2004. Section 79 (2) of SARA, states that during an assessment of effects of a project, the adverse effects of the project on listed wildlife species and its critical habitat must be identified, that measures are taken to avoid or lessen those effects, and that the effects need to be monitored.

Monitoring should be undertaken by the proponent to determine the effectiveness of mitigation and/or identify where further mitigation is required. As a minimum, this monitoring should include recording the locations and dates of any observations of Species at Risk, behaviour or actions taken by the animals when project activities were encountered, and any actions taken by the proponent to avoid contact or disturbance to the species, its habitat, and/or its residence. This information should be submitted to the

appropriate regulators and organizations with management responsibility for that species, as requested.

EC notes that Table 7-12 in the Environmental Protection Plan does not include Woodland Caribou (Northern Mountain population). EC recommends the table be updated with this species which has been assessed by COSWEIC and is listed as Special Concern in Schedule 1 of SARA.

Project activities will overlap with the range of Olive-sided Flycatcher, a migratory bird listed as Threatened on Schedule 1 of SARA. The Proponent has noted in their Environmental Protection Plan (pg.39) that the preferred habitat of Olive-sided Flycatcher is near open areas containing tall trees or snags for perching and young forest after a forest fire or clearcut. **EC recommends that the Proponent avoid clearing residual tall trees or snags that may serve as perching or nesting habitat for Olive-sided Flycatcher.**

Project activities will overlap with the Northwest Territories Range (NT1) of the boreal woodland caribou range identified in the “Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal Population, in Canada” posted on the Species at Risk Public Registry on 5 October 2013 found at:
http://www.sararegistry.gc.ca/document/default_e.cfm?documentID=2253

The recovery strategy identifies the amount of habitat disturbance within a boreal caribou range as a key factor determining whether a local population is likely to be self-sustaining over time. As a matter of best practice and whenever possible, the Proponent should use as much existing disturbed area as possible to minimize the amount of new disturbance added to the landscape. Proponents should work together wherever possible when projects can be combined to minimize overall new disturbance in the range.

EC recommends that the Proponent provide updated shapefiles of the final access routes, stages areas, storage areas, camps and wellsites upon project completion to aboriginal, territorial and federal agencies responsible for the management of boreal caribou and their habitat in the Northwest Territories in order to keep track of habitat disturbance within the NT1 boreal woodland caribou range.

In the June 12, 2013 additional information response to the Sahtu Land and Water Board, the Proponent discusses mitigation measures that will be implemented to minimize project associated disturbance to caribou and that they are conducting a baseline wildlife assessment that includes modelling caribou habitat suitability across their exploration leases.

In addition, the Proponent identifies the various baseline assessments that have been completed in the project area and states that, “the final report for the biophysical baseline for 2013 winter track surveys was not finalized at writing. This information will be submitted to the SLWB upon receipt of the final report”. (Baseline Assessments, EPP 7.3.5.5, page 80-81). **When does the Proponent anticipate receipt of the final biophysical baseline 2013 winter track surveys report including the results of the Habitat Suitability Modeling?**

EC recommends the Proponent share this information in the form of annual reporting which should include items such as, a summary of wildlife monitoring observations (including behaviour), summary of baseline data collected, success of mitigation measures, any changes in mitigation measures being used, results of Habitat Suitability Modeling and an assessment of predicted project effects. The annual report should be shared with EC, the Government of the Northwest Territories Department of Environment and Natural Resources, local Aboriginal organizations, and other interested parties.

Implementation of the measures implemented by the Proponent may help to reduce or eliminate some effects of the project on migratory birds and Species at Risk, but will not necessarily ensure that the proponent remains in compliance with the *Migratory Birds Convention Act*, *Migratory Birds Regulations*, and the *Species at Risk Act*. The proponent must ensure they remain in compliance during all phases and in all undertakings related to the project.

Cumulative Effects

EC recommends that the cumulative effects issues identified in the Project Description and associated mitigation measures related to wildlife and wildlife habitat also be addressed in the annual reporting recommended above.

Current and Proposed Permits

EC's comments on related Land Use Permits S11T-002 and S12X-006, Water Licence S11L3-002 and Permits S12F-007 and S12L8-007 at the Slater River site still apply.

EC is pleased to see the Proponent is proposing to consolidate Land Use Permit S11A-003 (as amended) and Water Licence S11L1-003 with the Land Use Permit and Water Licence Terms and Conditions established for this proposed program.

Additional Info

In addition to the CEPA regulations referred to above, EC would also like to remind the Proponent of responsibilities under the *Canadian Environmental Protection Act, 1999*. For a complete listing of all Regulations and Notices made under this Act please visit the CEPA Environmental Registry at www.ec.gc.ca/lcpe-cepa. EC also recommends the Proponent contact the Compliance Promotion Unit for information regarding the Regulations under the *Canadian Environmental Protection Act (1999)* at PNRCompliancePromotion@ec.gc.ca.

Please do not hesitate to contact me at (867) 669-4744 or Loretta.Ransom@ec.gc.ca with any questions concerning the above comments and recommendations.

Sincerely,

A handwritten signature in black ink that reads "Loretta Ransom". The signature is written in a cursive style with a large initial "L".

Loretta Ransom
Senior Environmental Assessment Coordinator, EPO

cc: Ken Hansen (Project Manager, Husky Oil Operations Limited)
Dave Fox (A/Head, Environmental Assessment North, EPO, EC)
Paula Smith (Environmental Assessment Coordinator, CWS, EC)
Karissa Aubie (Senior Policy Analyst, OGAED, EC)