GENERAL INSTRUCTIONS FOR EXCEL TEMPLATE: 1. Do not leave blank rows above or between comments. 2. Do not modify or delete the instructions or the column headings (*i.e.* the grey areas). 3. Each comment must have an associated topic and recommendation. 4. All formatting (*i.e.* bullets) will be lost when this file is uploaded to the Online Comment Table. 5. If necessary, adjust the cell width and height in order to view all text. 6. Cutting and pasting comments from WORD documents cannot include hard returns (spaces between paragraphs). 7. If you would like to create paragraphs within a single cell, please use a proper carriage return (ALT & ENTER).		**App #: S13L1-005** **Review of: Husky Oil Operations Ltd - EL 462 & EL 463 Slate River Drilling program** **Reviewing Agency: Aboriginal Affairs and Northern Development Canada (AANDC)** **Date: July 5th, 2013**	
TOPIC *Be as specific as you think is appropriate; for example a section or page of the document, a recommendation #, general comment, etc.*	**COMMENT** *Comments should contain all the information needed for the proponent and the Board to understand the rationale for the accompanying recommendation.*	**RECOMMENDATION** *Recommendations can be for the proponent or for the Board. Recommendations should be as specific as possible, relating the issues raised in the "comment" column to an action that you believe is necessary.*	**Husky Response**
Drilling wastes deposit into Quarry and separation water to be discharged onto adjacent lands - NWTWA and Regulations	AANDC has completed the review Husky last water licence application S13L1-005, for hydraulic fracturing exploratory operations of two vertical wells: Little Bear O-41 and G-70. The Waste Management Plan (WMP) specifies that there are currently no NEB or NT based guidelines for drilling waste management. However, the Northwest Territories Water Regulations do cover the proposed disposal of drilling waste and associated requirements. AANDC notes that the NWT Waters Act under oil and gas exploration, deposit of drilling waste in manners other than into a sump would require a Type A water licence.	The proposed disposal of drilling waste must be done in accordance with the NWTWA and Regulations.	Agreed

Project Authorization Amendments	Husky Oil has a number of different land use permits and water licences that cover its activities associated with EL462 & EL463. AANDC would like to stress to the Board and to the proponent the importance of conducting a signal and clear application and review process for exploration undertakings in the region. This could involve only one water licence and one-two land use permits to cover the anticipated exploration activities for the next few years. With single authorizations that cover the anticipated activities only slight modifications or amendments to the original authorizations would be required. This would simplify tracking of project components, securities and approvals. Further, the same would apply to each company that is active in the region. AANDC is already struggling to handle the complexity associated with issuing several licences and permits for exploration work in the region. AANDC is available to work with both the proponent and the Board to facilitate the consolidation application to transition into single land and water related authorizations.	AANDC believes it is imperative that future planning be incorporated into the regulatory permit application and review process and that the existing permits and licences be amalgamated into single authorizations, if possible.	Husky is in the process of consolidating a number of permits and licences to reduce the complexity of the existing and future permits. Permits and licences associated with common uses, such as camps and road construction and operation will be merged. New well applications will be applied for separately but will be supported by the camp and road facilities under the consolidated permit and licence.
Surface and Groundwater Monitoring Recommendation towards monitoring goals	In its approval letter to Husky on May 16 2013, the Board stated that it is currently working on creating a Surface and Groundwater Monitoring framework that will promote consistency in the development of credible, comparable data and information pertaining to water quality. This framework will set out minimum standards for monitoring programs. At the moment, AANDC understands that Surface and Groundwater Monitoring Plans (SGWMP) are recognized as living documents enabling them to evolve overtime in conjunction with the growing scale of exploration and available data.	AANDC commends the Board for taking the steps to develop a framework to establish the minimal requirements for surface and groundwater monitoring programs. AANDC provides the following recommendations in order to help Husky reached its monitoring goals of representing baseline water quality and associated project monitoring to detect potential impacts to both surface and groundwater.	Husky has submitted a groundwater and surface water monitoring plan which has been approved by the Board. The plan will be reviewed annually and will be modified as required.

Surface Water Monitoring Husky SGWMP - Surface Water Monitoring for Monitoring of Operations at O-41 and G-70, Not yet established	Section 7.4.1.1.2 of the EPP specifies that surface water samples were collected in 39 locations in July and September 2012 as part of the baseline surface water quality assessment. All 39 sampling locations are represented on Figure 2 of Husky Surface and Groundwater Monitoring Plan (SGWMP) submitted as part of S12X-006 Land Use Permit. AANDC acknowledges that Husky collected samples across both EL 462 & EL 463 areas, allowing for the assessment of potential impact of future development or expansion in the two claim blocks. Such baseline is important and will be required if the exploration program was to advances to production and additional oil and gas wells are drilled. However, surface water sampling locations have not yet been established to monitor potential effects from the current application (for wellsites O-41 and G-70). When choosing water sampling locations, Husky should locate the stations as close as possible to wellsite and other waste management activities such as tanks storage locations, trucks, etc. or beside transportation corridors. To differentiate between natural and anthropogenic influences, monitoring stations should be located upstream (no effects - control site) and downstream (potential effects) from operations.	AANDC recommends that surface water quality sampling location be determined by Husky and submitted to the Board prior to the commencement of the project.	Surface water quality locations have been identified and approved.

Surface Water Monitoring Baseline Water Quality Exceedences	The EPP indicates, in Table 7-18, that there were numerous exceedences of aquatic life and drinking water guidelines recorded during the 2012 baseline monitoring events. As such, 39 exceedences were recorded for Total coliforms; 30 for Iron (total), 23 for Aluminum; 11 for Manganese (total) and Copper (total), etc. Does Husky have a rationale for these exceedences? How can Husky be assured that they represent background conditions (e.g. E.coli, fecal colliforms, etc.)? Did any sampling errors or sample contamination occur during the water sampling program? Conducting baseline data is important to assess potential effects. It is equally important to ensure that QA/QC procedures are adequately followed to avoid sampling/analytical errors. While exceedences may be linked to background conditions, exceedences should be further explained in order to validate the quality of the data sets and ensure comparison can subsequently be made once operations have started.	AANDC understands that Husky has submitted the results of the 2012 sampling program to the SLWB. AANDC looks forward to reviewing the documents. AANDC recommends that Husky further assess the results and ensure that monitoring methods are conducted according to QA/QC protocols. This analysis is required to guarantee that the sampling results are reliable for future comparisons.	The 2012 annual report has been submitted to the board. The 2013 program is underway with some modifications requested by the Board.
Groundwater Monitoring Sampling locations potentially monitoring impacts of N-09, but not O-41, G-70 and H-64	At present, section 7.4.2.1 specifies that 4 groundwater wells were installed during the winter 2013 under LUP S12X-006 (2 bedrocks groundwater monitoring wells, 2 shallow groundwater monitoring wells), as well as 7 permafrost monitoring stations. The information that is current available appears to indicate that groundwater monitoring may only occur at the N-09 groundwater well. How will groundwater be monitored and assessed for the O-41 and G-70 wells. Note the upstream and downstream method also applies to groundwater sampling once groundwater flow direction has been established. Note it is likely that more than one deep groundwater well would be required to assess groundwater flow direction.	AANDC recommends that to acquire groundwater baseline monitoring data, groundwater monitoring wells needs to be installed and sample collected prior to drilling the O-41 and G-70 wells. AANDC recommends that more groundwater monitoring locations be added to the adequately assess groundwater baseline conditions and flow direction.	Husky plans to install up to three shallow groundwater monitoring wells per site at the O-41 and G-70 locations. These will be permitted under LUP S12X-006 which is the permit associated with groundwater investigations.

Waste Management Plan Map illustrating waste management activities locations	AANDC notes that as per the MVLWB Guidelines for Developing a Waste Management Plan, the proposed locations for all waste management sites (tank farm, fracking trucks, etc.) should be represented on a map to scale, with respective GPS coordinates. Identifying these locations on a map will also aid with determining/illustrating appropriate surface sampling locations to monitor waste management activities. Details are to be included relating to physical, surface & subsurface characteristics, site water management (i.e. flow/drainage patterns), permafrost areas and geotechnical characteristics. These components should be represented on a map.	AANDC recommends that a Map be provided with the proponent WMP to illustrate each location where waste management activities (storage, handling, transfers, etc.) is planned to occur for operation at each O-41 and G-70.	Waste management activities are described in the WMP. The map accompanying the application can be referred to for the locations described. Coordinates for the sites identified on the map are presented in tables at the bottom of the map.
Waste Management Plan Waste management Summary Table - Estimated Volumes	The Waste Management Summary Table provided in Appendix A of the WMP should be updated to include products by volume/mass that are provided within Table 6 - List of Chemicals stored at O-41 and G-70.	AANDC recommends that the Waste Management Summary Table be updated to contain all waste to be used or produced during Husky operations.	The table will be amended.
Waste Management Plan MSDS Sheets	AANDC acknowledges the Board for requesting MSDS sheets for all chemicals outlined in the Water Licence application and associated plans.	AANDC acknowledges Husky for providing MSDS sheets for all chemicals outlined in the water licence application and associated plans.	Acknowledged
Waste Management Secondary containment	As a proposed environmental protection and mitigation measure, the EPP specifies in Table 7-19 that all fuel storage containers will have secondary containment to avoid potential impacts on surface water. However, it is unclear if secondary containment also planned for other hazardous wastes and chemicals stored onsite (including frac fluids, crosslinker, gel breaker, gelling agents - as listed in Appendix A of the WMP - Waste Management Summary Table). The Spill Contingency Plan should specify that secondary containment will be used for each hazardous waste including fracturing fluids and chemicals stored on site. Contingency storage may also be required for contaminated snow, ice, flow back fluids, etc.	AANDC recommends that fuel, chemicals and waste storage areas should be located 100 meters from any water body at all times, unless approved by an inspector. AANDC recommends secondary containment to be provided for all hazardous wastes and chemical stored on site. Contingency storage should be available for contaminated snow, ice, flow back fluids, etc.	Agreed

Spill Contingency Plan Spill Response Team	To ensure an efficient and effective response in the event of a spill, Husky should establish a Spill Response Team for the Slater River O-41 and G-70 project. The necessary responsibilities/duties to be executed by staff should be identified and subsequently relayed in the plan. Once the Spill Response Team is known, a flowchart with names, assigned responsibilities and contact information should be drafted, provided to the Board, and included in the SCP. This is in line with AANDC's Spill Contingency Guidelines (2007).	AANDC recommends that the duties of the Spill Response Team be provided. Once personnel/team members are determined, their contact information, including a 24-hour telephone numbers, should be provided in a flowchart and submitted in the SCP. The team and their associated duties should be provided to the Board and the Inspector prior to the commencement of operations at the site. The SCP and flowchart should also be kept on-site in an accessible location.	Agreed
Spill Contingency Plan Training frequency and log	AANDC believes that the Spill Contingency Plan's effectiveness will be enhanced through mock spill exercises and general familiarization with spill response equipment. Such training ensures that employees understand most probable spill emergencies, as well as standard spill response procedures. Details relating to spill emergencies training and frequency specific to the current O-41 and G-70 operations were not provided. It is also recommended that general spill response training and orientation occurs on a regular basis. Husky should keep a log of training to ensure, at a minimum, all employees have received training.	AANDC recommends that details relating to spill emergencies responses and the frequency of spill response training exercises be provided within the SCP. A spill training log should be kept and provided to the inspector upon request.	A spill training record can be provided upon request
Spill Contingency Plan On-site and Off-site resources	There was information was provided on spill containment on land, water, ice, under ice and snow, spill kit locations and Bulk Plant Spill Kit contents, however the project specific information relating to the quantities/contents of other on-site resources (spill kits, sorbent materials, earth moving equipment) were missing. The location of earth moving and other equipment located in the project area as stated on page 16 of Appendix 8 Emergency Response Plan - Spill Contingency Plan (ERP-SCP) was missing as well.	AANDC recommends the ERP-SCP be updated to include this information. Husky is to be commended for the maps contained in the ERP-SCP that can be used to locate the closest spill equipment and supplies in case of emergency.	The spill response equipment inventories are currently being assessed. An update to the SCP/ERP will include a revised inventory.

Hydraulic Fracturing Nearby faults and potential seismicity	Fracturing has been possibly linked to mini-earthquakes in the UK and earlier this year in BC. It is expected that seismic events may only occur when fracturing activities are conducted in proximity of existing fault lines. AANDC understands that regional faults were identified within the Canol/Bluefish system.	AANDC recommends that Husky confirm whether there are existing fault lines in proximity to well sites O-41 and G-70. AANDC recommends that best practices be adopted by Husky to ensure fracturing activities are conducted within safe distances of any existing fault lines. AANDC recommends that hydraulic fracturing operations cease if a seismic event occurs during active fracturing operations.	The well locations have been sited with the objective of avoiding existing natural fault lines. No anomalous seismic events are contemplated but the operation will cease if they are encountered
Hydraulic Fracturing Underground geology characterization	AANDC notes that it is challenging to predict the fracture networks generated by fracturing/fluid injection. These fractures can be complex and difficult to predict for numerous reasons such as the nature of the shale (anisotropic granular rocks) making them more or less resistant. As well, it is stated that two or three fracture events will occur in the Canol Shale formation (estimated to be 930 and 1360 m below the surface). Will the propagation height and width be monitored as they occur? Will the actual/estimated fracture trajectory be recorded and reported?	AANDC recommends adoption of best practices with respect to hydraulic fracturing operations including monitoring of well pressures, propagation heights and widths, etc. AANDC assumes that the NEB will be reviewing and assessing the proposed fracturing operations. AANDC recommends that the actual propagation dimensions be monitored and reported to the most appropriate authority (i.e. NEB and the SLWB upon request). This information may be reported within Husky's annual report.	As a member of CAPP, Husky has adopted industry best practices for its fracturing operations. It is standard practice to assess the effectiveness of the fracture stimulation and the fracture patterns and lengths are assessed as part of this process.
Security Estimate	AANDC prepared an estimate of the reclamation security for the proposed project. AANDC notes that it was a challenging undertaking given that security is held for various portions of the project under numerous other land use permits and water licences. The total RECLAIM estimate for activities associated with water licence application S13L1-005 is i) $374,195 land and ii) $361,659 water. The total estimate for the land related liability for the project is $477,141 (includes land portion estimated by the NMD for the land use permit). This should be held under the land use permit S13A-002. The total estimate for the water related liability is $361,659 which is to be held under water licence S13L1-005.	AANDC recommends a total of $361,659 be held under S13L1-005. AANDC recommends a total of $477,141 be held under S13A-002.	