



Aboriginal Affairs and  
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Affaires autochtones et  
Développement du Nord Canada

File: S12X-006

February 1<sup>st</sup>, 2013

**To:** Angela Love  
Regulatory Specialist  
Sahtu Land and Water Board  
Box 1  
Fort Good Hope, NT X0E 0H0

Fax: 867-598-2325

**Re: S12X-006. Husky – Slater River Program Groundwater and Surface Water  
Monitoring Plans, EL 462 & EL 463 in the Tulita District, January 2013**

Aboriginal Affairs and Northern Development Canada (AANDC) has reviewed Husky Oil Groundwater and Surface Water Monitoring Plans, as per requirement of their land use permit S12X-006. AANDC provides the attached comments, in the Comment Table format, as requested by the Sahtu Land and Water Board.

Thank you for providing AANDC with the opportunity to comment on the above plans. If you have any questions or concerns, please feel free to contact Ms. Jeanne Arsenault at 669-2658 or [Jeanne.Arsenault@aandc-aadnc.gc.ca](mailto:Jeanne.Arsenault@aandc-aadnc.gc.ca).

Sincerely,

Nathen Richea  
A/Head, Water Regulatory and Science Section  
Renewable Resources and Environment  
Aboriginal Affairs and Northern Development Canada

<p><b>GENERAL INSTRUCTIONS FOR EXCEL TEMPLATE:</b></p> <ol style="list-style-type: none"> <li>1. Do not leave blank rows above or between comments.</li> <li>2. Do not modify or delete the instructions or the column headings (<i>i.e.</i> the grey areas).</li> <li>3. Each comment must have an associated topic and recommendation.</li> <li>4. All formatting (<i>i.e.</i> bullets) will be lost when this file is uploaded to the Online Comment Table.</li> <li>5. If necessary, adjust the cell width and height in order to view all text.</li> <li>6. Cutting and pasting comments from WORD documents cannot include hard returns (spaces between paragraphs).</li> <li>7. If you would like to create paragraphs within a single cell, please use a proper carriage return (ALT &amp; ENTER).</li> </ol>		<p><b>App #: S12X-006</b></p> <p><b>Review of: Husky Oil Operations Limited - Groundwater and Surface Water Monitoring Plans</b></p> <p><b>Reviewing Agency: Aboriginal Affairs and Northern Development Canada (AANDC)</b></p> <p><b>Date: February 1st, 2013</b></p>
<p><b>TOPIC</b></p> <p><i>Be as specific as you think is appropriate; for example a section or page of the document, a recommendation #, general comment, etc.</i></p>	<p><b>COMMENT</b></p> <p><i>Comments should contain all the information needed for the proponent and the Board to understand the rationale for the accompanying recommendation.</i></p>	<p><b>RECOMMENDATION</b></p> <p><i>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.</i></p>
<p><b>General Comments - Groundwater and Surface Water Monitoring Plan (GSWMP)</b> Standardized submission and review process.</p>	<p>Condition B.22 of Husky land use permit requires submission of a Groundwater and Surface Water Monitoring Plan for approval by the SLWB.</p> <p>As AANDC noted in previous monitoring plan review comments, that requirements for Groundwater and Surface Water Monitoring are located in different authorizations for different operators (<i>i.e.</i>, WL or LUP). Additionally, some plans do not require approval of the Board.</p>	<p>AANDC recommends that wherever possible, the Board require that all Groundwater and Surface Water Monitoring Plans be submitted for approval. Information to be included in the plans should be similar to maintain consistency and comparability between monitoring seasons and between operators. Doing so would avoid confusion and ensure monitoring program consistency (<i>e.g.</i>, plan details and description, sampling frequencies, sampling designs/methods, analytical parameters, QA/QC, reporting, etc.) between programs. All future monitoring plans should require review and approval by the SLWB.</p>
<p><b>Groundwater and Surface Water Monitoring Plan</b> Standardized Monitoring and Reporting</p>	<p>To be consistent and provide clarity to all operators in the region, AANDC suggests the Sahtu Land and Water Board specify data collecting and reporting requirements within each water licence (or authorization) submitted for the Canol Oil Shale Play, such that requirements are consistent between operators. Specific plan and monitoring program components can be included in schedules appended to the project authorizations. This is done in other MVLWB jurisdictions throughout the territory.</p> <p>As indicated above, the procedures and frequencies related to surface water and groundwater monitoring, water sampling methods, sample frequencies, laboratory analyses and reporting should be set to establish adequate baseline data for the region (capture seasonal and annual variability).</p>	<p>AANDC recommends that monitoring be done to capture seasonal and annual variability in the region. This would assist the interpretation of data in later years if concentrations are higher in surface or groundwater measured in 2013. If variability is limited and has been adequately characterized, the frequency of monitoring could be reduced to monitor change over time.</p>

<p><b>"Groundwater" and "Surface Water" Monitoring Plans</b></p>	<p>Husky land use permit S12X-006 requires, under section D, a "Groundwater and Surface Water Monitoring Plan". The proponent submitted 2 different plans - a "Groundwater Monitoring Plan" by <i>Waterline Resources Inc</i> and a "Surface Water Monitoring Program Description" by <i>MWH Canada Inc</i>. While valuable information is found in each document, there are inconsistencies in the monitoring plan descriptions (e.g., methods).</p> <p>For example, significant descriptions and details are missing from the surface monitoring plan (i.e., sampling methodology, QA/QC, laboratory analyses, reporting, etc).</p> <p>Groundwater and Surface Water Monitoring Plans are very important for assessing and comparing differences, if any, in existing and future environmental conditions. Monitoring plans should be complete and outline all aspects of monitoring and reporting to ensure monitoring is conducted and performed adequately.</p>	<p>AANDC recommends the proponent better align and revise the two plans prior to plan approval. Specific information on groundwater or surface water monitoring procedures should be adequately described. Revisions should include:</p> <ul style="list-style-type: none"> <li>-a single map for both monitoring programs that includes all stations (groundwater and surface)</li> <li>-complete program overviews and methods for the sampling programs (i.e., sample types, depths, frequencies, etc.)</li> <li>-QA/QC procedures (field blanks, equipment blanks, duplicates, sampling methods, chain of custody, etc.)</li> <li>-analysis and reporting protocols (field and CAEAL analysis and detection limits)</li> <li>-etc.</li> </ul>
<p><b>Modifications to the GSWMP</b></p>	<p>AANDC notes that monitoring should be conducted to ensure consistent and comparable results from season-to-season and year-to-year. Therefore, sample sites should be carefully selected to ensure continuous long-term monitoring can occur and will permit comparison between years over time. Changes to sample locations, sampling times, analytical test methods, sampling handling, QA/QC, etc. will limit comparability of monitoring programs and results.</p> <p>Any significant modifications (e.g., sampling location, frequency, analysis, reporting, etc.) must be provided to the Board and the Inspector for review and approval prior to implementation.</p>	<p>AANDC recommends that any significant modifications to Husky's Groundwater or Surface Water monitoring programs must be provided to the Board and the Inspector for review and approval prior to implementation.</p> <p>Changes to the analytical suites (i.e., chemical analysis) must be approved prior to implementation by the operator in the field.</p>
<p><b>Monitoring Results Communication</b> Plain language summary</p>	<p>Recently, in correspondence related to Conoco Phillips' monitoring program, the Sahtu Renewable Resources Board requested that regular plain language communication summaries (orally and in writing) on water monitoring results be made in addition to the already planned annual reporting process.</p> <p>Dissemination of monitoring results in plain language to local groups and interested parties is important. Communication and reporting must occur between the proponent and local communities. As such, the plain language summaries should be distributed and communicated to all parties.</p>	<p>AANDC recommends the GSWMP plan to include procedures for plain language communication of sampling results (surface and groundwater) to surrounding communities and organizations.</p>

<p><b>Groundwater Monitoring Program</b> Deep bedrock water source exploration wells</p>	<p>The Groundwater Monitoring Plan (prepared by Waterline) refers to 2 sets of planned groundwater wells to be completed:</p> <ul style="list-style-type: none"> <li>- 20 surgical groundwater wells</li> <li>- up to 15 groundwater wells</li> </ul> <p>However, Table 1 indicates that more bedrock wells are planned (9 in total, classified as deep, intermediate and shallow). While Bedrock groundwater wells will also be used to determine deeper groundwater baseline condition, the proponent may plan to use these deep groundwater wells as water sources in the future.</p> <p>AANDC notes, that the Quebec Inquiry and Public Hearing Report (February 2011) currently recommends that the shale gas industry should use surface water for water sources and that groundwater resources may only be used if considered unfit to human consumption.</p>	<p>AANDC recommends that prior to use as water sources (future exploration programs), deep groundwater wells should be assessed against drinking water quality. Should groundwater aquifers be used in the future, the following details should reported and critically evaluated:</p> <ul style="list-style-type: none"> <li>- aquifer source, depth, estimated volume/rate of flow, flow direction, recharge rate, etc.</li> <li>-Intended use of groundwater and total volume.</li> <li>- The total estimated volume to be extracted at each groundwater well and potential for aquifer drawdown.</li> </ul> <p>Approval of the SLWB must be required prior to groundwater aquifer use for oil and gas activities in the region.</p>
<p><b>Groundwater Monitoring Program</b> Groundwater depth descriptions</p>	<p>The Groundwater Monitoring Plan prepared by Waterline Resources Inc use the terms deep bedrock, intermediate bedrock, shallow bedrock (for bedrock groundwater monitoring wells) as well as the term overburden groundwater monitoring well.</p> <p>Please define and estimate depth for each types of groundwater wells. AANDC assumes that shallow groundwater wells would be less than 300 meters and deep groundwater wells would be greater than 300 meters.</p> <p>The plan should also identify, conceptually, what portion of the aquifer is being monitored (i.e. at what depth will the samples be collected).</p>	<p>AANDC recommends that the definitions and estimated depths of the wells be included in a revised GSWMP prior to approval.</p> <p>AANDC recommends that the actual number of groundwater wells as well as the portion of the aquifer where the well is to be screened and purging prior to sampling be specified in the GSWMP plan.</p>
<p><b>Groundwater Monitoring Program</b> Drilling and well development - Section 3.2.1 &amp; 3.2.4</p>	<p>The wells are to be drilled and developed to remove or eliminate the influences of drilling and well installation.</p> <p>Shallow groundwater wells will be drilling by auger drilling rig and deep groundwater wells will be drilled by a truck-mounted rotary rig.</p> <p>The groundwater plan indicates that drill mud and fluid will be removed from the well. The plan does not indicate what drill fluids or chemicals may be used to lubricate the well head or core.</p>	<p>AANDC recommends that the GWSMP include a list of potential drill fluids or chemical which may be used to drill the groundwater monitoring wells, particularly the deep groundwater wells.</p>

<p><b>Groundwater Monitoring Program</b> Drilling and well development - Section 3.2.4</p>	<p>Various types of water will require disposal during well drilling, installation and sampling (i.e., purge water). This water may have elevated levels of contaminants, compared to surface waters, and therefore must only be disposed to the land surface. The disposal site should be within natural depression which are at least 30 meters away from the normal high water mark of local waterbodies.</p>	<p>AANDC recommends that all drilling water, purge water, aquifer testing water, etc. that is to be disposed to land be disposed at an approved location, as determined by the AANDC Inspector.</p>
<p><b>Groundwater Monitoring Program</b> Sampling events for bedrock groundwater wells</p>	<p>Section 3.3.1 (should be Section 3.3.6) of the Waterline plan (Table 3) suggests two water quality sampling events completed for the overburden monitoring well baseline: the first event following well construction and development during the winter 2013 and the second during 2013 open water season, in order to capture possible seasonal variation. This section also suggests that based on the results of the initial baseline sampling program, future water quality sampling events may include a subset of the baseline of the laboratory analytical suite presented in Table 2.</p> <p>Bedrock monitoring wells are proposed to be sampled once, as deep aquifers are unlikely to be effected by seasonal variation.</p> <p>AANDC notes the land use permit has been granted for 5 years. What is the expected duration of groundwater sampling in the region?</p>	<p>AANDC recommends additional discussion on the planned duration of the groundwater monitoring program be included in the GSWMP plan.</p>
<p><b>Groundwater Monitoring</b> Qualified groundwater professional</p>	<p>CAPP - Hydraulic Fracturing Operating Practice: Baseline Groundwater Testing - recommends various operating practices which were developed in collaboration with CAPP member companies.</p>	<p>AANDC supports the CAPP recommendation that Baseline groundwater testing programs must be designed and carried out under the direction of a qualified groundwater professional. The plan should be updated to include this requirement.</p>

<p><b>Surface Water Monitoring Program</b> Clarification of sampling station number</p>	<p>Figure 2 of MWH document illustrates Husky's proposed surface water monitoring locations. A total of 39 surface water sampling stations are illustrated for the two Explorations Licences (EL 462 &amp; EL 463). The overview make reference to samples collected in 2012.</p> <p>AANDC notes the land use permit has been granted for 5 years. What is the expected duration of the surface water sampling in the region?</p> <p>AANDC also notes that no surface water samples have been collected from under ice (winter). AANDC notes that water quality is typically poorer during the winter in the NWT. Sampling under ice in the region would provide a much bigger range of natural variation and would also provide assessment of project interactions with local surface water during winter operations (road construction, water withdrawals, waste discharge, etc.).</p>	<p>AANDC recommends the GSWMP to includes details on the planned duration of the surface water sampling program.</p> <p>AANDC recommends that the GSWMP include samples collected under ice (i.e., in the winter).</p>
<p><b>Groundwater and Surface Water Monitoring Plan</b> Laboratory Analysis</p>	<p>Section 3.3.4 of Waterline plan indicates that groundwater quality samples will be analyzed by a CAEAL accredited laboratory. However, there is no such requirement indicated in the MWH document for surface water quality samples.</p>	<p>AANDC recommends that both surface and groundwater quality samples be sent to an accredited laboratory for analysis. Water sample collection should follow all standard sampling procedures and include appropriate QA/QC. This should be included in the updated GSWMP for approval by the SLWB.</p>
<p><b>Groundwater and Surface Water Monitoring Plan</b> Sampling locations &amp; frequency/Data comparisons/Trend characterization</p>	<p>AANDC would request further clarification on the proposed methodology of the monitoring program (both groundwater and surface) for:</p> <ul style="list-style-type: none"> <li>* Before-After Comparison</li> <li>* Control-Impact Comparison</li> <li>* General Trend Characterization</li> <li>* General Baseline Characterization</li> </ul> <p>Depending on the above, different sample locations and frequencies for both surface and groundwater sampling may require consideration. Will any reference areas or wells be established? If so, please indicate where. If the sampling is for baseline purposes how will the baseline data be used in the future (before-after comparison?)?</p>	<p>AANDC recommends these further description of the purpose and intent of the monitoring should be included in the plan(s). This would allow for better input into the sampling and monitoring design (before-after comparisons, trend assessments, baseline collection, potential reference sites, etc.).</p> <p>AANDC recommends that additional discussion be included in the reporting section of the document. Will data be compared between seasons (between spring, summer, fall, winter; between years; etc.)?</p> <p>AANDC recommends that the company review AANDC's AEMP Guidelines (2009) to provide some context on monitoring requirements for development projects in the NWT. A copy of the guideline summary report can be provided to Husky upon request.</p>

<p><b>Groundwater and Surface Water Monitoring Plan</b> Water quality assessments, change detection and thresholds limits that trigger Response Actions</p>	<p>During the data evaluation and reporting stage, how are water quality assessments going to be preformed (data analysis, comparisons with guidelines, toxicity reviews, etc.). This information should be provided within Husky SWGMP.</p> <p>Furthermore, a discussion of how monitoring results will be compared between pre and post activities should be included, as well as discussions on the following:</p> <ul style="list-style-type: none"> <li>- Are pre- and post- water quality conditions assessed to detect statistical differences?</li> <li>-How will the Risk of contaminated groundwater, if it occurs, be determined?</li> <li>- How will the plan help differentiate between contamination as a result of well drilling and installation activities vs. contamination as a result of hydrocarbon exploration/hydraulic fracturing activities?</li> <li>-What actions or mitigations would occur if surface or groundwater is determined to be contaminated as a result of drilling or fracturing activities?</li> </ul>	<p>AANDC recommends additional details be included in the plan to describe how the monitoring data will be used to identify difference in water quality pre and post development. The plan should also describe actions that may be triggered in the event that post development water quality is impacted.</p>
<p><b>Groundwater and Surface Water Monitoring</b> Best practices</p>	<p>On December 21 - 2012, the US Environmental Protection Agency (EPA) released a Progress Report titled "Study of the potential Impacts of Hydraulic Fracturing on Drinking Water Resources". This Progress Report identifies many areas of concern and investigation when monitoring and analyzing active O&amp;G areas.</p> <p>The progress report identifies numerous chemicals that should be considered when monitoring surface, groundwater, flowback water and wastes generated from hydraulic fracturing activities. It also identifies that analytical methods are extremely important to ensure accurate and precise measurement (including presence and absence) of chemicals and contaminants. The document highlights that additional work on analytical test methods is required for some parameters of potential concern (POPC).</p>	<p>AANDC recommends that all companies and the Boards be aware of the science and ongoing work on items described by the USEPA to ensure that best practices are or will be used to assess conditions in the development area.</p> <p>AANDC recommends that Husky review any new information as it is released from the US EPA to ensure their GSWMP are effective at detecting and measuring potential contaminants of concern from their operations. This includes absence of these chemicals.</p> <p>AANDC recommends that the existing surface and groundwater monitoring include detecting the presence or absence of alcohols, biocides, disinfectants and radionuclides. Husky has already included analysis of various Glycols and ultra low mercury. AANDC previously recommended that Conoco Phillips include these analyses in their plan which would ensure consistency between the two programs.</p> <p>AANDC recommends that low laboratory detection levels should be used as many surface water concentrations are much lower than standard detection levels.</p>

<p><b>Groundwater and Surface Water Monitoring Reporting</b></p>	<p>All information collected during the monitoring programs (groundwater and surface water quality and surface flow information) should be included in the GSWMP annual report. Field notes such as temperature, field sampling conditions, sample numbers, purge water volumes, ice presence, ice thickness, etc. should be included in the annual report. Typically this information is included as an appendix to the main report document.</p> <p>All data should be available in an usable electronic format (i.e., excel). This requirement is becoming standard across all jurisdictions of the Mackenzie Valley.</p>	<p>AANDC recommends that all field notes and information collected during the sampling period should be included in the annual report.</p> <p>AANDC recommends that all analytical results be provided in an usable electronic format (i.e., excel).</p>