

Review Comment Table

Board:	SLWB
Review Item:	S03L1-016 - 2017 Annual Water Licence Report - Nogha B-23 and Nogha K-14
File(s):	S03L1-016
Proponent:	MGM Energy
Document(s):	2017 Annual Report - Nogha B-23 Wellsite and Sump (4.9 MB) 2017 Annual Report - Nogha K-14 Wellsite and Sump (6.7 MB)
Item For Review Distributed On:	Feb 13 at 14:31 Distribution List
Reviewer Comments Due By:	Mar 13, 2018
Proponent Responses Due By:	Apr 16, 2018
Item Description:	<p>MGM Energy has submitted the 2017 Annual Water Licence Reports in accordance with the requirements of Water Licence S03L1-016, Part B, conditions 2 and 8. Although formal Board approval is not required under the Licence, the Board must be satisfied that the Licensee has met the requirements of the Licence. The purpose of this review is also to consider the progress made on reclamation of the Project Site (Nogha B-23 Wellsite and Nogha K-14 Wellsite) as well as whether the results and conclusions have been appropriately and accurately reported and support the recommended further reclamation activities.</p> <p>This Type B Water Licence was issued on December 13, 2003 for a period of five years, with a renewal of 2 yrs granted April 1, 2009, and expired December 12, 2010 but is not closed. The Licence was for winter exploratory oil and gas drilling of three wells approximately 50-70km south of Colville Lake. The associated Land Use Permit is S03A-008 which also has expired but not closed.</p> <p>*NOTE* The Proponent response deadline has been extended to April 16, 2018</p>
General Reviewer Information:	The Board encourages reviewers to submit any questions, comments, and recommendations on these submissions by the review comment deadline specified. All documents that have been uploaded to this review are also available on our public registry. If you have any questions or comments about the ORS or this review, please contact Board staff identified.
Contact Information:	Sabrina Sturman 867-598-2413

Comment Summary

GNWT - ENR: Central Email GNWT				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Staff Response
2	General File	Comment (doc) ENR Letter with Comments and Recommendations Recommendation		
1	Topic 1: Proposed 2018 Monitoring Plans	Comment None. Recommendation 1) ENR supports the proposed 2018 Monitoring Plans presented in the 2017 Annual Environmental Inspection Reports	Apr 16: No response required.	
GNWT- OROGO: Ed Hardy				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Staff Response
1	General File	Comment (doc) General - 2018-03-12 Letter SLWB S03L1-016 WID 1998 and 2006 Recommendation		
Sahtu Renewable Resource Board: Colin Macdonald				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Staff Response
1	General Report	Comment Nogha K-14 Site contains a wellsite and a sump, each with a surrounding area. In general, the inspection provides a good evaluation of the current state of the site and the status of revegetation, however the chemical and statistical analysis is poor. Recommendation MGM should re-analyse the soil and surface water chemical analysis to determine appropriate spatial trends. The comparison of surface soil values with standards	Apr 16: Acknowledged. The objectives of the soil and standing water sampling are discussed in Section 3.3 of the report. In future monitoring programs the reference samples will be grouped based on type (i.e., organic soils vs mineral soils). Soil type will be determined based on field observations, saturation percentage, organic matter and/or total organic carbon analysis. Statistics (i.e., reference concentrations) will be	

		<p>from CCME, GNWT and Alberta are good, but comparisons with reference sites with small sample sizes are inaccurate. QA/QC of the program is very weak. The proponent should provide the objectives of the sampling program before the sample collection and analysis start to ensure the program meets its goals.</p>	<p>calculated using median values and 95% upper confidence limits of the means (UCLMs). Samples collected deeper than 0.5 m below ground surface will be excluded from the statistical calculations. (References: Protocol 4 for Contaminated Sites: Establishing Background Concentrations in Soil (BC Ministry of Environment and Climate Change Strategy [MOECCS], Nov. 2017); Technical Guidance 2 (Statistical Criteria for Characterizing a Volume of Contaminated Material (BC MOECCS, Jan. 2009)). We disagree that the QA/QC program is weak. Laboratory replicate analyses were conducted by the laboratory for their QA/QC program to determine precision. The analytical laboratory runs laboratory replicates at a predetermined frequency per sample batch. If the sample batch analyzed by the laboratory included samples from other projects, laboratory replicates are only reported if they are run on one of the samples from this project. There is no obligation, or technical basis, for running laboratory replicates on samples from every project included in a sample batch. Consequently, we are not able to select which samples undergo laboratory replicate</p>	
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			<p>analysis, nor are we able to select which parameters the replicates are analyzed for. The results are tabulated based solely on the data provided by the laboratory. Discussion of the laboratory replicates is provided in Section 4.5. Field blind duplicates were used to assess the precision of the sampling and analysis program for the parameters analyzed, and the same analysis was requested on the primary and duplicate samples with the exception of texture. The field duplicates met the acceptable relative percent difference (RPD) target of 60%. The QA/QC program included field duplicates of 14% (1 in 7) of the soil samples, which is in within the typical recommendation of 10% to 20%.</p>	
2	Pg i	<p>Comment “Overall, vegetation growing on the Site did not show any evidence of plant disease, and appeared healthy at the time of the 2017 site visit.”</p> <p>Recommendation It seems unlikely that the field crew conducted a quantitative assessment of plant health while at the site. Perhaps the statement can be modified to say that there were no dead zones of vegetation that indicate large scale contamination.</p>	<p>Apr 16: Correct. A quantitative assessment of plant health was not conducted in which plant foliage samples were collected and underwent laboratory analyses . Plant health assessments at the sites were based on visual observations (qualitative assessments) of the plant foliage and noting any outward signs of health such as yellow (chlorotic) leaves, wilting or dead foliage, infestations by insects or disease, etc. It is recommended not to change the statement because we</p>	

			cannot say for sure that any dead zones or dead vegetation observed were due to contamination, or some other factor, without having quantitative information to support that conclusion	
3	Pg i	<p>Comment "Since 2015 the sump was observed to have an irregular surface topography. The western portion of the sump was raised approximately 1 m above the surrounding ground surface while the southern portion was marked by a shallow depression."</p> <p>Recommendation This is significant and indicates that the structure of the sump has changed and the materials inside the sump may have moved. Tests should be conducted to assess the integrity of the sump and determine why the surface topography has changed and what the long-term impacts might be. This test of integrity of the sump is in the list of recommendations (Pg iii).</p>	<p>Apr 16: The lack of precise historical topographic data greatly limits the assessment of ground subsidence over time. For this reason, it was recommended to carry a ground survey during the 2018 field program.</p>	
4	Pg 4-1 Terrain Conditions	<p>Comment It isn't clear how the sump "topography" was assessed. The surface topography was irregular, with the western portion of the sump elevated and a depression in the southern portion. There was no water in the depression during the site visit, but may occur at other times of the year. The text says that "no changes in overall sump topography</p>	<p>Apr 16: Surface topography was visually described while in the field. Topographic profiles were generated by measuring slopes along 1m increments across from the sump. Compiling these consecutive "micro" slope segments in a spreadsheet allowed for the creation of topographic profiles. The irregular topography and</p>	

		<p>were observed during the 2017 site visit”, although a tension crack was visible. It is tough to reconcile the irregular surface topography with “no”changes. Does the “overall” sump topography include the surface and the margins?</p> <p>Recommendation Given the irregular surface topography, which could affect drainage and containment of sump materials, MGM and the SLWB should inspect the integrity of the sump using any means possible, particularly in light of climate change and permafrost erosion.</p>	<p>tension crack observed during the 2017 site visit showed no changes when compared with site conditions observed by Stantec in 2015 and 2016. The irregular topography matches the footprint of the sump, and does not extend outside its perimeter. It is currently impossible to assess the internal structure of the sump without using intrusive methods. A more precise ground survey using an RTK base station was recommended for 2018. In addition, it was recommended to conduct an EM survey to investigate potential seepage.</p>	
5	Section 4.3.3 “ Wellsite Area	<p>Comment No reason is given for the analysis of soil samples from the wallow areas.</p> <p>Recommendation Provide an explanation for why samples are collected from these areas and the types of chemical analysis conducted. This would help to determine if the objectives of the sampling program have been met.</p>	<p>Apr 16: The objectives of the soil and water sampling program along with the chemical analysis schedule are discussed in Section 3.3.1.</p>	
6	5.5.2 Sump Area	<p>Comment High concentrations of salts in standing water restricts plant growth in the sump bare area. Does the analysis of soils in the area also reflect these high salt levels?</p> <p>Recommendation Recommend steps to reduce salt levels in standing water, which would promote revegetation at the sumps.</p>	<p>Apr 16: Soils in this area are within the "Fair" salinity rating category. There may be partitioning of salinity between the soil and standing water at the Site. Options to prevent the accumulation of standing water on the sump will be considered during future field planning and monitoring programs.</p>	

7	2.3 Reference Data Table F1	<p>Comment There are a lot of issues with the statistical analysis of the reference data. First, the samples sizes are very small, which means that the 95% limit is inflated, meaning that virtually all site data will fall below the upper limit. The proponent also groups surface and subsurface samples, even though they are autocorrelated and should not be grouped. Parametric stats assume independent samples. Also, assuming the detection limit for reference samples pushes the range of background values higher. The samples collected in 2012 and 2013 were collected at different depths than later samples and they should not be grouped together for statistical analysis. The minimum SAR value is 0, even though there is a minimum value for the Na concentrations and hence the SAR should be 0. With the high F3 fraction in the reference samples (probably natural) how is it possible to determine F3 contamination on the wellsite?</p> <p>Recommendation MGM needs to re-assess their sampling program to ensure appropriate comparisons between the site and reference samples. The methods that they are using now (compare to the 5% and 95% ile) is not a standard technique and some of their methods artificially inflate</p>	<p>Apr 16: Agree that samples from different depth ranges should not be grouped together. As stated above, the 95th percentile ranges were calculated for all parameters but were used for comparison purposes only where there was no applicable guideline value, or where a anomalous analytical result above the guideline value may be representative of natural soil conditions. In future monitoring programs the reference samples will be grouped based on type (e.g., organic soils vs mineral soils) based on field observations, saturation percentage, organic matter and/or total organic carbon analysis. Background estimates will be calculated using medians and 95% upper confidence limits of the means (UCLMs). Soil samples collected deeper than 0.5 m below ground surface will be excluded from the statistical calculations. For petroleum hydrocarbons fraction 3 and the introduction of alternative tools (e.g. biogenic interference calculation index) for assessing for the presence of biogenic hydrocarbons in organic soils will aid in determination of petrogenic verses biogenic sources.</p>	
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		the 95% value of the reference sites. The chemical concentrations can be compared to the CCME, NWT and Alberta guidelines to assess elevated values.		
8	Tables F-1 to F-3	<p>Comment There doesn't seem to be any rationale for the types of analyses being conducted. There are no data reported for the lab replicate in F1. There are no BTEX/PHC data reported for the sump. There are very few analyses for Wallow 1 and the lab replicate has only 1 analysis (F-2). There are no physical properties or metals reported in F-3. The lack of consistency does not permit comparison between sites. Also the lack of analysis of replicates and duplicates does not allow an evaluation of QA/QC performance.</p> <p>Recommendation The proponent needs to re-evaluate the objectives of the sampling program to determine what compounds they are trying to assess. Presently they are trying to analyse too many compounds and have no way to detect whether compounds are elevated relative to background. Blank columns and rows can be removed to simplify the tables.</p>	<p>Apr 16: As discussed in our response to comment 1, the laboratory replicate analysis was conducted by the laboratory as part of their QA/QC program to determine precision of analysis for laboratory-selected parameters.</p>	
9	Table F-4	<p>Comment Surface water samples were only analysed for 6 parameters in 2016 and 2017 and the Sump water samples were not analysed at all.</p> <p>Recommendation Please</p>	<p>Apr 16: The analysis for metals in standing water was omitted from the 2017 program. Standing water samples will be analyzed for metals in future monitoring programs.</p>	

		provide an explanation for the reduced number of compounds that were analysed. Remove columns with no data from the tables.	Tables will be formatted more clearly in future reports.	
10	6.3 Remediation	<p>Comment The report provides a method to determine the distribution of subsurface materials to determine if drilling fluid is migrating to the surface.</p> <p>Recommendation This recommendation should be followed through, although MGM needs to devise a sampling design for review before proceeding.</p>	<p>Apr 16: As MGM hires qualified professional contractors to design and implement our environmental monitoring, reclamation and remediation projects which are reviewed by MGM staff both of whom are competent in sampling design. Further the methodology and results are reported on an annual basis to the SLWB and reviewers are provided opportunity to ask questions and provide comments. As a result, MGM is of the opinion that sampling design should not be subject to a review and is not aware of any License condition that requires sampling design review.</p>	



March 13, 2018

Sabrina Sturman
Regulatory Specialist
Sahtu Land and Water Board
Box 1,
Fort Good Hope, NT X0E 0H0

Dear Ms. Sturman,

**Re: Paramount Resources Ltd.
Water Licences – S01L1-003, S03L1-015, S04L1-011, S04L1-012,
S03L1-016, S12L1-001
2017 Water Licence Annual Reports
Request for Comment**

The Department of Environment and Natural Resources (ENR), Government of the Northwest Territories has reviewed the plan at reference based on its mandated responsibilities under the *Environmental Protection Act*, the *Forest Management Act*, the *Forest Protection Act*, the *Species at Risk (NWT) Act*, the *Waters Act* and the *Wildlife Act* and provides the following comments and recommendations for the consideration of the Board.

2017 Annual Water Licence Report – S01L1-003 - Nogha C-49 Wellsite and Sump and Nogha M-17 Wellsite

Topic 1: Proposed 2018 Monitoring Plans

Comment(s):

None.

Recommendation(s):

- 1) ENR supports the proposed 2018 Monitoring Plan presented in the 2017 Annual Environmental Inspection Reports.

2017 Annual Water Licence Report - S03L1-016 - Nogha B-23 and Nogha K-14

Topic 1: Proposed 2018 Monitoring Plans

Comment(s):

None.

Recommendation(s):

- 1) ENR supports the proposed 2018 Monitoring Plans presented in the 2017 Annual Environmental Inspection Reports

2018 Annual Water Licence Report - S03L1-015 - Maunoir C-34 & L-80

Topic 1: Proposed 2018 Monitoring Plans

Comment(s):

In the previously submitted Inspection Report, (2015 – no report was submitted in 2016 by Paramount), ENR recommended surface water samples should also be conducted with ground investigations in 2016 to delineate potential zones of contamination due to the potential for contaminated soil at these two well sites. Paramount responded stating that water samples will be taken from areas within the vicinity of the bare areas. However, due to the omission of the 2016 report and the lack of mention in the 2017 report on surface water sampling, GNWT carries forward this recommendation unless Paramount can provide the sampling results from 2016 (and 2017 if collected).

Recommendation(s):

- 1) ENR recommends Paramount provide the water sampling results from 2016 (and 2017 if collected) that was committed to by Paramount.
- 2) If no surface water samples have been collected to date as requested, or if the analytical results indicated further testing is warranted, ENR recommends adding water sampling analysis in 2018 to delineate potential zones of contamination for both areas. This should include testing for petroleum hydrocarbons regardless of whether the surface waters pass the “stick test”.

2017 Annual Water Licence Report - S04L1-011 - Maunoir E-35 Sump

Topic 1: Proposed 2018 Monitoring Plans

Comment(s):

In 2016, slumping along the northern corner of Sump 2 was identified and Stantec recommended a mitigation plan be developed. In the 2017 Annual Environmental Inspection Report it is explained that a mitigation plan has not yet been developed as more information is required for proper development.

In 2017, further slumping and tension cracks were observed and soluble parameters in standing water were higher than background levels for a second consecutive year. Under current conditions Paramount suggests that the sump's side slope will further collapse, however this will not impact the drilling wastes that are contained at lower depths.

Recommendation(s):

- 1) ENR supports the proposed 2018 Monitoring Plans presented in the 2017 Annual Environmental Inspection Report.
- 2) ENR supports the recommendation made by Stantec that a remediation plan be developed to address the unstable slopes and depressions present along the perimeter of Sump 2. Further, ENR recommends additional detail is provided as to when a mitigation plan will be developed.

2017 Annual Water Licence Report - S04L1-011 - Maunoir A-67 Wellsite

Topic 1: Proposed 2018 Monitoring Plan

Comment(s):

None.

Recommendation(s):

- 1) ENR supports the proposed 2018 Monitoring Plan presented in the 2017 Annual Environmental Inspection Report.

2017 Annual Water Licence Report - S04L1-012 - Turton G-47 Wellsite and Sump

Topic 1: Proposed 2018 Monitoring Plan

Comment(s):

None.

Recommendation(s):

- 1) ENR supports the proposed 2018 Monitoring Plan presented in the 2017 Annual Environmental Inspection Report.

2017 Annual Water Licence Report - S12L1-001 - East Mackay I-78 Wellsite and Staging Area

Topic 1: Proposed 2018 Monitoring Plan

Comment(s):

Section 3.2.1 states that evidence that would trigger the collection of a soil and standing water samples includes the presence of a hydrocarbon-like sheen on the surface of standing water.

In 2017, standing water as observed at the wellhead with a slight sheen. However, water samples were not collected and Paramount identified that the delineation of the impacts surrounding the wellhead will be addressed when the wellhead is cut, capped and abandoned.

Recommendation(s):

- 1) ENR supports the proposed 2018 Monitoring Plan presented in the 2017 Annual Environmental Inspection Report.
- 2) ENR recommends surface water samples be conducted in 2018 should a sheen be observed on the standing water at the wellhead.

Comments and recommendations were provided by ENR technical experts in the Water Resources Division and the Sahtu Region and were coordinated and collated by the Environmental Assessment and Monitoring Section (EAM), Conservation, Assessment and Monitoring Division (CAM).

Should you have any questions or concerns, please do not hesitate to contact Patrick Clancy, Environmental Regulatory Analyst at (867) 767-9233 Ext: 53096 or email patrick.clancy@gov.nt.ca.

Sincerely,

A handwritten signature in black ink, appearing to read 'P. Clancy', written in a cursive style.

Patrick Clancy
Environmental Regulatory Analyst
Environmental Assessment and Monitoring Section
Conservation, Assessment and Monitoring Division
Department of Environment and Natural Resources
Government of the Northwest Territories



NWT OFFICE OF THE REGULATOR OF OIL AND GAS OPERATIONS

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Sahtu Land and Water Board
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MAR 12 2018

Dear Board Members:

Comments S03L1-016 2017 Annual Water Licence Report NOGHA B-23 WID 1998 and NOGHA K-14 WID 2006

This letter is in respect to the Sahtu Land and Water Board request for reviewer comments on the above captioned matter, dated March 12th 2018. Wells NOGHA B-23 WID 1998 and NOGHA K-14 WID 2006 operated by Paramount Resources Ltd. is regulated by the Office of the Regulator of Oil and Gas Operations (OROGO) under the *Oil and Gas Operations Act*.

Section 56 of the *Oil and Gas Drilling and Production Regulations* requires that all wells be permanently plugged and decommissioned in order to isolate all oil and gas bearing, pressure and potable water zones and to prevent any formation fluid from flowing through or escaping from the well-bore, a process known as abandonment. This well is currently classified as suspended and still requires abandoned.

Reviewers should note that abandonment of a well may require intensive, short duration activity and heavy machinery access (e.g. service rig) to a well site, to complete well abandonment or suspension operations. All well operations require authorization from OROGO. Compliance with the terms of an authorization and other legal requirements is monitored and enforced by OROGO's compliance team.

OROGO's *Suspension and Abandonment Guidelines and Interpretation Notes* (the Guidelines), issued under section 18 of the *Oil and Gas Operations Act* describe the technical requirements for well suspension and abandonment and compliance with section 56. To promote safety and environmental protection, they also impose a deadline for a company to abandon a well if it will not be used for the production of oil or gas. The Guidelines came into effect on February 1, 2017 and can be accessed on OROGO's website at:

www.oro.go.gov.nt.ca/en/well-suspension-and-abandonment-guidelines-and-interpretation-notes

If you have any questions about this letter and OROGO's role, please contact us at OROGO@gov.nt.ca

Regards,



Ed Hardy
Technical Specialist