



Sahtu Land and Water Board

Staff Report

Division: Water Program	Report No. 9
Date Prepared: March 13, 2018	File No. S13L1-007
Meeting Date: March 26, 2018	
Subject: Imperial Oil Resources N.W.T. Limited – Norman Wells Operation 2018 Quality Assurance and Quality Control Manual for Board Approval	

1. Purpose/Report Summary

To inform the Board about the re-submission by Imperial Oil Resources Ltd. (IORL) of an updated Quality Assurance and Quality Control Manual submitted for Board approval to meet conditions of the Water Licence S13L1-007.

2. Background

In accordance with Annex A, Surveillance Network Program, item B.3: “The Licensee shall review the Quality Assurance and Quality Control Manual annually and shall revise the manual as necessary to reflect changes in field and laboratory quality control and quality assurance testing, procedures and technology. The proposed revision(s) shall be submitted to the Board for approval. The manual shall be implemented as approved by the Analyst.”

On October 30, 2017 the Board considered but did not approve Imperial Oil Resource N.W.T. Limited's (IORL) September 2017 version of the Norman Wells Operations Laboratory Quality Assurance Quality Control Manual. The Board required IORL to update the Manual in accordance with the QA/QC Guidelines for Class “A” Licensees (1996, INAC Waters Division and Northwest Territories Water Board) with increased emphasis on methods used to ensure accuracy and precision and analysis procedures. The Board also requested that the revised Manual be submitted to an Analyst for approval prior to submitting to the SLWB for approval (Attachment 1). The revised Manual was to be submitted by January 30, 2018.

Previous versions of the Manual have been approved by the Board and the Manual has been used by IORL for the duration of the previous and current water licences without significant changes. However; based on comments received about the Manual during the review period, it was a decision of the Board to have the Manual revised to meet current standards.

2.1 Process Requirements

Updated QA/QC Manual Received: January 30, 2018

Distributed for Review: February 5, 2018

Number of Review Agencies: 41

Review Period End Date: February 26, 2018

Proponent Responses due: March 5, 2018

3. Discussion

IORL submitted the (January 2018) QA/QC Manual with updates in response to the SLWB letter received on 30 October 2017. Included in the submission was a concordance table (see summary below) with Plan requirements identified as missing from the submitted manual (Reviewer comment bold) and the proponent response to those deficiencies to aid the Board in its review of the updated plan and provide context where updates were not included.

After Imperial reviewed the comments provided by the Board it was evident that one of the first changes that need to take place was a renaming of the manual. The original name of the manual, "Laboratory QA/QC Plan", represented a time when the Norman Wells Operation did have an in-house laboratory. Considering that there is not an in-house lab operated at the site at this time the manual was renamed to be the "Quality Assurance and Quality Control Manual" as found in the Water Licence S13L1-007 section B.3.

QA/QC Plan Requirements Missing from IORL QAQC Manual	Reviewer Comment	Proponent Response
Field Sampling - Sample Collection & Handling Equipment - Must include detailed section on equipment used for sampling, rationale behind choices of equipment and descriptions of how equipment is maintained and calibrated. If sampling bottles are reused, must describe handling procedures used including how maintained, stored, and cleaned. Methods - Does the Licensee describe all sampling methods and how often field blanks and replicate samples are collected?	There is no description of how equipment is maintained and calibrated. What does daily inspection entail and are records maintained? Section 6.4 does not include a description of the procedure used to validate that the washed bottles are clean. composite samples - does not include any detail on how it is collected to be representative, or methods to ensure no contamination when the sample is transferred to third party bottles. Grab samples - does not include any	1. Description of how equipment is maintained and calibrated is outlined in Section 6.1. 2. Added a new section to describe the bottle washing procedure in Section 6.4. 1. Details on how composite samples are to be representative are outlined in Section 6.2. 2. Details on methods to ensure no contamination are outlined in Section 6.3. 3. Grab samples are considered

QA/QC analysis. These methods should be presented in the main body of the manual. Field blanks and replicate samples are not collected. INAC guidance section 2.1.3 Sampling methods explains the importance of field blanks and duplicate sampling.

QA/QC samples. Generally there are not QA/QC analysis or additional samples taken for the grab samples. See **Section 6.5.**

4. Details on field blanks and replicate samples are outlined in **Section 6.6.** The intent of the INAC guidance is being met given the number of reoccurring samples, the history of water quality released, and the procedure used to stop release if anomalous results are seen.

Transportation - Does the Plan describe how sample integrity preserved from time of collection to completion of delivery?

does not describe how sample integrity is preserved.

1. Description of sample integrity preservation is outlined in **Section 6.3.**

Laboratory Analysis - Outside/Third-party laboratories

Lab Accreditation - The Licensee should identify the lab that will be conducting analyses and a letter from the company must be included indicating that they are accredited to conduct analyses on each of the required sampling parameters.

A letter from the company has not been included in the manual.

Maxxam letter is included in **Appendix D.**

Detection Limits - Are the detection limits for the commercial lab identified for all parameters?

Detection limits for the commercial lab are not included.

1. Laboratory Detection Limits are outlined in **Table G.**

Methodology - Are descriptions for methods of analysis provided that are not outlined in the "Standard Methods for the Examination of Water and Wastewater"?

Methods for analysis are not included in the manual.

1. Methods for analysis are outlined in **Appendix D.**

Laboratory Analysis - In-house laboratory

N/A – Norman Wells Operation does not operate an in-house laboratory.

Reporting Requirements

<p>General Submission – Does the plan include a description of what information will be included in SNP Reports? This should include any control charts or graphs which demonstrate the precision and accuracy of the methods used to analyze the samples.</p>	<p>Section 11 describes reporting requirements but does not include details of what information will be included in the reports or control charts or graphs which demonstrate the precision and accuracy of the methods used to analyze the samples.</p>	<p>N/A – Norman Wells Operation does not operate an in-house laboratory and all information required for SNP Reports is included in Water Licence S13L1-007. All control charts and graphs used to demonstrate the precision and accuracy of analytical methods are managed by Maxxam. 1. Details on replicate samples are outlined in Section 6.5 and 10.1.</p>
<p>Outside Laboratories - Does the plan identify the number of replicate samples that will be collected and submitted with each SNP report</p>	<p>The Plan does not identify the collection of replicate samples. INAC guidance section 2.1.3 Sampling methods explains the importance of field blanks and duplicate sampling.</p>	

4. Comments

At the end of the review comment period, ending on February 26, 2018, comments were received from three organizations: Environment and Climate Change Canada (ECCC), Government of the Northwest Territories – Environment and Natural Resources (GNWT-ENR), and Sahtu Renewable Resource Board (SRRB).

ECCC (ID 1-4) recommended updates to terms in the glossary which IORL agreed to.

ECCC (ID5) recommended an update to Table D which IORL agreed to.

ECCC (ID6) recommended that the Proponent review recent data for discharge samples, and identify any parameters above detection limits; if there are parameters that are regularly detected, include replicate or split samples at a frequency of 10% in the water quality testing program.

IORL responded that Lab duplicates are done on each sample sent to Maxxam for analysis. The argument for reproducibility is that there is over 10 years of water quality data that has shown similar results with respect to the water quality released. Water quality samples always meet the SLWB release criteria with minimal variance from one sample to the next. Given that these samples are taken twice a week throughout the year (and again when any other release is required) and considering the length of time which Imperial has taken these samples and that Maxxam frequently does lab duplicates, the risk of failing to address the aspect of reproducibility is low.

Board staff agree with IORL response. Sampling is done on a very frequent basis, so the need for replicate or split samples is redundant given the frequency of sampling.

GNWT-ENR and CIMP (ID 1-3) recommends that Imperial Oil Norman Wells should submit water quality data associated with their Annual Water Use Report to the public registry in an accessible format (e.g., csv or spreadsheet file) and they provided a copy of the template.

IORL responded that this is something that should be discussed after this year's annual report. Water Licence S13L1-007 has a specific list of items that must be included in the Annual Report. IORL would have to discuss with the SLWB if additional data is being requested under Schedule 1 Part B1.

Board staff agree with IORL that should the request from GNWT-ENR be acceptable to the Board, there would need to be an amendment made to the Schedule for the list of requirements to be included in the Annual Water Use Report.

SRRB (ID1) noted that the manual was improved from the previous version; however, still needs to include procedures to ensure that chemical analysis meets pre-set performance standards. Sampling should include duplicate samples and blanks to ensure reproducibility and no contamination. The environmental advisor needs to be able to review QA/QC results from the lab and reject batches of analysis if they are not up to performance standards.

IORL responded that part of the purpose and benefit for using a 3rd Party Laboratory is that they manage their own QA/QC procedures and must meet certain standards to be considered an accredited lab. Imperial does not manage their chemical analysis methods and trusts that they will be meeting their own internal standards by which they were able to obtain their accredited status. As discussed within the manual, Imperial believes that given the amount of data collected to date, the frequency at which the samples are taken, the lab duplicates that are completed, and low risk regarding contamination in general the intent of the QAQC Guidelines are being met. Imperial is always willing to review and make improvements to their submitted manuals to the SLWB. That being said, it is also worth noting that this QAQC Manual has already been approved by the SLWB. The intent of this review is to address only the revisions made from previous versions of the manual.

Board staff agree with IORL in that sampling is done on a very frequent basis, so the need for replicate or split samples is redundant given the frequency of sampling. IORL has identified the lab that conducts the analyses and included a letter from the lab indicating that they are accredited to conduct analyses on each of the required sampling parameters. IORL has made substantive changes to the manual at the direction of the Board, even though the previous versions of the manual had already been approved by the Board. The manual meets the intent of the INAC Guidelines.

SRRB (ID2) recommended an update to the glossary similar to ECCC comment which IORL has agreed to.

SRRB (ID3) recommended that IORL provide further specific details for sampling protocols. IORL responded that sampling procedures are described within the Appendix.

SRRB (ID4) recommended that IORL indicate the performance standards that the chemical analysis must meet before the results are accepted. IORL responded that the performance standards for analysis are covered within the Maxxam QAQC Manual.

SRRB (ID5) recommended that IORL add protocols for samples for testing QA/QC performance. IORL responded that in the worst case scenario with respect to sample contamination or other problem,

Imperial retains the water until confirmatory samples can prove the water quality is sufficient for release.

SRRB (ID6) recommended that samples should include duplicates and field blanks to ensure no contamination from lab procedures. IORL responded that there is a low risk for contamination of samples and in the worst-case scenario Imperial must retain the water longer than is needed. This has been the case for all approved iterations of the QAQC Manual used at the Norman Wells Operations for many years.

Board staff agree with Imperial in that the protocol for sample collection and response has been in place for many years of the operation including the previous water licence. The intent of the Board requested changes to the manual were to bring it up to standards of the INAC Guideline which has been achieved.

SRRB (ID7) recommended that Imperial add procedures for reviewing and evaluation of third party lab analytical performance. IORL responded that the Environmental Analyst does review the Maxxam results to ensure that the lab has not flagged any performance standard issues.

SRRB (ID8) recommended a change to Table G which IORL responded they could not make as it is a table prepared by the accredited laboratory and as such has no control over how the lab performs or meets their precision targets.

SRRB (ID9) recommended a change to the detection limits and IORL accepted this correction and will continue with the standard method of using 50% of the DL.

5. Recommendation

Staff recommend that the Board approve the January 2018 Norman Wells Operations Quality Assurance and Quality Control Manual and request that IORL resubmit the Manual with the changes as requested by the reviewers and agreed to by IORL.

6. Reference Material Attached

- 6.1 Letter from Analyst
- 6.2 Review Comment Table
- 6.3 Draft Issuance Letter

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Bonnie Bergsma". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Bonnie Bergsma
Regulatory Specialist

Executive Director Comments:

A handwritten signature in black ink, appearing to read "Paul Dixon". The signature is bold and stylized, with a large initial "P" and a long horizontal stroke.

Paul Dixon
Executive Director

S13L1-007 – Analyst review of QA/QC Manual

From: Simms, Darryl
Sent: Friday, February 02, 2018 7:24 PM
To: Leavitt, Sloan N <sloan.n.leavitt@esso.ca>
Cc: Crawford, Jody A <jody.a.crawford@esso.ca>
Subject: RE: QAQC Manual

Sloan,

I have reviewed the attached QA/QC Manual for the Norman Wells Operations and confirm the document contains the recommendations we discussed during our meeting on Jan 15, 2018. I understand the revisions were required to address some quality assurance concerns recently identified by the Sahtu Land and Water Board and, to the best of my knowledge, I believe the updated QA/QC Manual satisfies this requirement.

If you have any questions please let me know.

Regards,

Darryl Simms, Env Tech
Kearl Laboratory Coordinator
Operations Technical
Quarry Park | W3C.226
C 403.554.8791 O 587.476.4616
Darryl.Simms@esso.ca
imperialoil.ca | [Twitter](#) | [YouTube](#)

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Review Comment Table

Board:	SLWB
Review Item:	S13L1-007 - Revised Quality Assurance Quality Control Manual - Imperial
File(s):	S13L1-007
Proponent:	Imperial Oil Resources
Document(s):	Cover letter - concordance table of revisions (118.9 kB) QA/QC Manual Update (2.4 MB) Analyst review of QA/QC Manual (220.9 kB)
Item For Review Distributed On:	Feb 5 at 12:35 Distribution List
Reviewer Comments Due By:	Feb 26, 2018
Proponent Responses Due By:	Mar 5, 2018
Item Description:	<p>On October 30, 2017 the Board considered but did not approve Imperial Oil Resource N.W.T. Limited's (IORL) September 2017 version of the Norman Wells Operations Laboratory Quality Assurance Quality Control Manual. The Board required IORL to update the Manual in accordance with the 1996 INAC QA/QC Guidelines with increased emphasis on methods used to ensure accuracy and precision and analysis procedures. The Board also requested that the revised Manual be submitted to an Analyst for approval prior to submitting to the SLWB for approval. The revised Manual was to be submitted by January 30, 2018.</p> <p>Reviewers are invited to submit questions, comments, and recommendations using the Online Review System (ORS) by the review comment deadline specified below. Please provide comments and recommendations on the:</p> <ul style="list-style-type: none"> • Cover letter and concordance table of revisions • revised QA/QC Manual • Analyst approval letter
General Reviewer Information:	<p>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 Bonnie Bergsma at (867) 496-2778 or bonnie.bergsma@slwb.com.</p>
Contact Information:	Bonnie Bergsma

Comment Summary

Environment and Climate Change Canada: Melissa Pinto				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Staff Response
1	General File	Comment (doc) ECCC Cover Letter Recommendation		
2	Glossary - Acute Lethality Page 4	Comment The definition states: an effluent is deemed acutely lethal if the undiluted (100%) effluent kills 50% or more of the fish within 96 hours or Daphnia magna within 24 hours. The duration of the Daphnia magna test should be corrected to 48 hours. Recommendation ECCC recommends that Imperial Oil Resources (the Proponent) correct the test duration for Daphnia magna to 48 hours.	Mar 5: Thank you for the comment. This change has been made within the document.	
3	Glossary - Coagulant and Flocculent Pages 4 & 5	Comment Flocculent (the adjective form) was used in both definitions. The correct spelling of the noun is flocculant. Recommendation ECCC recommends that the Proponent correct the spelling of “flocculent”.	Mar 5: Thank you for the comment. This change has been made within the document.	
4	Glossary - Microtox Test Page 6	Comment This definition could include a reference to the biological test method EPS 1 RM/24 (Biological test method - toxicity test using luminiscent bacteria, Environment Canada, http://publications.gc.ca/pub?id=9.579452&sl=0). Recommendation ECCC recommends Including the test method reference for EPS 1 RM/24 in the definition of Microtox Test.	Mar 5: Thank you for the comment. This change has been made within the document.	
5	Table D: Laboratory Bottle and Sample Preparation Page 18	Comment The Acute Lethality section should note samples must be kept from freezing. During transport, samples should be kept in the dark, and at a temperature of 1 to 8° C if more than two days are spent in transit. Recommendation ECCC recommends that the Proponent include holding temperature requirements (kept from freezing, in dark and at temperature between 1 and 8° C if more than two days) for acute lethality samples.	Mar 5: Thank you for the comment. This change has been made within the document.	
6	6.6 Field Blanks and Replicate	Comment The Proponent does not currently do Quality Assurance/Quality Control (QA/QC) sampling, stating that it is not necessary ".given	Mar 5: Lab duplicates are done on each	

<p>Samples Page 25</p>	<p>the quantity of samples, the historic data showing a majority of non-detect results, the Water Licence release criteria, Maxxam's own QA/QC process, and the process to deal with any abnormality within the data at the field level." The Proponent further states that there is low jeopardy should there be false positives (contaminants detected at higher levels than are actually present) as it simply results in them holding water and retesting. While this may be a reasonable argument for not doing trip or field blanks, it does not address the aspect of reproducibility of sample analyses. Quality control measures are designed to demonstrate that the test results are representative of the true quality of the samples being analysed, and replicate samples confirm precision of the entire program (laboratory + field). Replicate samples are typically done at a rate of 1 sample per 10 analyses, and only for parameters that are known to be above detection limits. The Proponent should review recent data and revisit the need to collect replicate (or do split) samples. This could give confidence that water is not being held when it doesn't need to be, and that the sampling program is being done well.</p> <p>Recommendation ECCC recommends that the Proponent review recent data for discharge samples, and identify any parameters above detection limits; if there are parameters that are regularly detected, include replicate or split samples at a frequency of 10% in the water quality testing program.</p>	<p>sample sent to Maxxam for analysis. The argument for reproducibility is that there is over 10 years of water quality data that has shown similar results with respect to the water quality released. Water quality samples always meet the SLWB release criteria with minimal variance from one sample to the next. Given that these samples are taken twice a week throughout the year (and again when any other release is required) and considering the length of time which Imperial has taken these samples and that Maxxam frequently does lab duplicates, the risk of failing to address the</p>	
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			aspect of reproducibility is low.	
GNWT - ENR: Central Email GNWT				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Staff Response
5	General File	Comment (doc) Attachment to Letter: Metadata Template Recommendation		
6	General File	Comment (doc) ENR letter with comments and recommendations Recommendation		
1	Topic 1: Part 11 Reporting - 11. 2. Annual Water Use Report	Comment Information on the water quality of lakes and rivers in the Northwest Territories (NWT) that is collected on a regular basis by industry, as part of their various monitoring programs, represents a large source of water quality knowledge. This knowledge could inform decision makers about trends and natural variation in water quality in the NWT, as well as the cumulative effects from multiple use activities within an area or region. However, in order to use this information to understand water quality conditions in the NWT, the information must first be available in an accessible format. It is important to provide metadata that provides context for the water quality data. Metadata refers to a description of data that was collected as part of a water quality sampling program, and includes field conditions and a description of laboratory analyses conducted. Metadata standards are required to ensure the proper use and interpretation of the data by the users. Recommendation 1) CIMP, ENR recommends that Imperial Oil Norman Wells should submit water quality data associated with their Annual Water Use Report to the public registry in an accessible format (e.g., csv or spreadsheet file).	Mar 5: Thank you for the suggestion. This is something we should discuss after this year's annual report. Water Licence S13L1-007 has a specific list of items that must be included in the Annual Report. We would have to discuss with the SLWB if additional data is being requested under Schedule 1 Part B1.p.	
2	None	Comment None Recommendation 2) CIMP, ENR recommends that Imperial Oil Norman Wells complete the attached metadata template annually in the same spreadsheet as the associated water quality data and submit it to the public registry in an accessible format (e.g., csv or spreadsheet file).	Mar 5: Thank you for the suggestion. This is something we should discuss after this	

			<p>year's annual report. Water Licence S13L1-007 has a specific list of items that must be included in the Annual Report. We would have to discuss with the SLWB if additional data is being requested under Schedule 1 Part B1.p.</p>	
3	<p>Topic 2: Metadata Template Attachment</p>	<p>Comment CIMP ENR has attached the Metadata Template for use by the proponent. Recommendation 1) CIMP ENR recommends that the Board require the use of the attached Metadata Template to ensure consistency of reporting of data.</p>	<p>Mar 5: Thank you for the suggestion. This is something we should discuss after this year's annual report. Water Licence S13L1-007 has a specific list of items that must be included in the Annual Report. We would have to discuss with the SLWB if additional data is being requested under Schedule 1 Part B1.p.</p>	

ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Staff Response
1	General Report	<p>Comment The report is improved from the last version but there is a lot of material missing from a QA/QC viewpoint. There is a general lack of quantification for what is required to ensure that samples are representative and that there are stringent performance standards for the analysis by in-house or third-party labs. Standards for analytical accuracy, precision and maximum detection limits should be applied throughout the program.</p> <p>Recommendation The manual needs to include procedures to ensure that chemical analysis meets pre-set performance standards. Sampling should include duplicate samples and blanks to ensure reproducibility and no contamination. The environmental advisor needs to be able to review QA/QC results from the lab and reject batches of analysis if they are not up to performance standards.</p>	<p>Mar 5: Thank you for the feedback with respect to the improvements Part of the purpose and benefit for using a 3rd Party Laboratory is that they manage their own QA/QC procedures and must meet certain standards to be considered an accredited lab. Imperial does not manage their chemical analysis methods and trusts that they will be meeting their own internal standards by which they were able to obtain their accredited status. As discussed within the manual, Imperial believes that given the amount of data collected to date, the</p>	

			<p>frequency at which the samples are taken, the lab duplicates that are completed, and low risk regarding contamination in general the intent of the QAQC Guidelines are being met. Imperial is always willing to review and make improvements to their submitted manuals to the SLWB. That being said, it is also worth noting that this QAQC Manual has already been approved by the SLWB. The intent of this review is to address only the revisions made from previous versions of the manual.</p>	
2	<p>Glossary: Acute lethality and EC50</p>	<p>Comment Samples are collected for these tests but there is no further discussion of them, or how the results are interpreted. Recommendation Add a section on the objectives, how the tests are performed and how QA/QC for the studies is measured.</p>	<p>Mar 5: See comments from ECCC regarding the EC50 methods. Also, field test</p>	

			procedures are described within the appendix sections.	
3	Section 5.1.2. Category B Locations series of representative samples	<p>Comment Please define the number in “series”. How is “representative” defined (surface, at depth, inlet, outlet?). What duplicates and blanks are collected at the same time? What general water quality measurements (temperature, O2, etc.) are taken at the same time?</p> <p>Recommendation Provide further specific details for sampling protocols. Number of samples, duplicates, blanks and how they are to be collected (by hand at surface, at 1 m depth, etc.)?</p>	<p>Mar 5: Frequencies are described earlier in the document. As discussed earlier, duplicates are generally not taken as was the case in the originally approved QAQC Manual. Sampling procedures are described within the Appendix.</p>	
4	Figure D	<p>Comment There is not a box for the Environmental Advisor to review duplicate sample results and QA/QC from analytical lab to determine if the analysis falls within the limits of good analysis.</p> <p>Recommendation Indicate the performance standards that the chemical analysis must meet before the results are accepted.</p>	<p>Mar 5: The performance standards for analysis are covered within the Maxxam QAQC Manual. Imperial trusts that Maxxam will live up to their status as an accredited lab. On an annual basis, Imperial reviews Maxxam’s performance to ensure they are living up to</p>	

			<p>their own standards. Each lab is also audited on a specified frequency to ensure they are maintaining their facilities.</p>	
5	Page 22	<p>Comment “representative grab samples using the same laboratory methods will be collected and analyzed before, middle, and at the end of discharge” Again, no indication of duplicate or blank samples to check analytical performance Recommendation Add protocols for samples for testing QA/QC performance.</p>	<p>Mar 5: No duplicate samples are taken. The testing of this freshwater for release has a low risk for contamination. If there is an issue with bottle contamination then the worst case scenario is that Imperial retains the water until confirmatory samples can prove the water quality is sufficient for release.</p>	
6	Page 24 Sample Collection and Shipment	<p>Comment Samples should include duplicates and field blanks to ensure no contamination from lab procedures. What methods are used to check that they have no residual hydrocarbons or metals in composite bottles? Recommendation Third party labs usually supply new or pre-cleaned sample containers. Field and sample blanks confirm that there is no contamination.</p>	<p>Mar 5: As discussed above and within the document, there is a low risk for there to be contamination. The worst case scenario is that Imperial is penalized and</p>	

			<p>must retain the water longer than is needed. This has been the case for all approved iterations of the QAQC Manual. The intent of this review is to analyze the updates made to the manual from the previous version.</p>	
7	<p>Pg 26 Third Party Analytical Service</p>	<p>Comment “Maxxam is responsible for analyzing the water samples collected from the Norman Wells Operation.” It is remarkable that IOR does not have a process to ensure analytical performance for all analytes. Most analytes required for the Water Licence have specific methods, detection limits, and performance standards, etc. Recommendation Add procedures for reviewing and evaluation of third party lab analytical performance.</p>	<p>Mar 5: Third party labs are accredited for this very reason. It is not industry practice to QAQC every sample that comes back from the lab. However, the Environmental Analyst does review the Maxxam results to ensure that the lab has not flagged any performance standard issues. This is why we hold annual reviews with Maxxam project managers and frequent lab</p>	

			audits.	
8	Table G	<p>Comment A column could be added to the table providing limits for precision (e.g., 10%) and accuracy of individual analytes.</p> <p>Recommendation Add performance targets to table.</p>	<p>Mar 5: Imperial does not operate a lab and as such has no control over how the lab performs or meets their precision targets. Reviews for such are done annually as indicated above. For more detail on this I would suggest reading the Maxxam lab QAQC Manual and reviewing the accreditation criteria for labs.</p>	
9	Pg 29	<p>Comment “Any result below the detection limit would be considered as the detection limit value and included in calculating average concentrations.”</p> <p>Recommendation The standard is to use a value of 50% of the detection limit, with a limit on the number of samples below detection to be included in the calculation of a mean value (e.g. 50% < DL). A higher proportion of samples than 50% would give a mean value for all samples of less than the DL. Assuming a DL value will inflate the mean value and give an erroneous standard deviation.</p>	<p>Mar 5: Thank you for the suggestion. We will make the correction here and continue with the standard method of using 50% of the DL.</p>	



Sahtu Land and Water Board

P.O Box 1
Fort Good Hope, NT
XOE 0H0

Phone: 867-598-2413

Fax: 867-598-2325

www.slwb.com

March 26, 2018

S13L1-007

Sloan Leavitt
Environmental & Regulatory Advisor
Conventional Oil and Gas, Imperial
505 Quarry Park Blvd. SE
Calgary, AB T2C 5N1

e-mail: sloan.n.leavitt@esso.ca

Dear Mr. Leavitt,

RE: Board Decision for Norman Wells Operations 2018 Quality Assurance and Quality Control Manual

The Sahtu Land and Water Board (SLWB) met on March 26, 2018 to consider Imperial Oil Resources Ltd.'s January 2018 updated Version of the Norman Wells Operations Quality Assurance and Quality Control Manual. The Board has reviewed all of the evidence presented during the review process and considered the requirements outlined in the [Quality Assurance \(QA\) and Quality Control \(QC\) Guidelines](#) (1996, INAC Waters Division and Northwest Territories Water Board) to which the Board provided direction on October 30, 2017 for Imperial to address. The Board is satisfied that all of requested changes have been made to the manual to be consistent with the INAC Guidelines. The Board approves the QA/QC Manual and requests that Imperial resubmit the Manual to the SLWB with changes as requested by reviewers and agreed to by Imperial during the review comment period.

A copy of this letter has been filed on the Public Registry at the office of the SLWB. Please be advised that this letter, all Inspection Reports, and correspondence related to this file is part of the Public Registry and is intended to keep all interested parties informed of the manner in which the Water Licence requirements are being met. If you have any questions or concerns, please contact Bonnie Bergsma at (867) 496-2778 or email at bonnie.bergsma@slwb.com.

The Board appreciates IORL's continued efforts and cooperation of IORL in meeting the requirements of this submission is anticipated.

Sincerely,
Sahtu Land and Water Board

Phillippe Di Pizzo
A/Chair

Copied to: Distribution List