

**Yukon Water Board**  
*Office des eaux du Yukon*



**TYPE A AND B**

**OIL AND GAS INDUSTRIAL UNDERTAKINGS**

**INFORMATION PACKAGE FOR APPLICANTS**

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**INTERIM**

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## **1 INTRODUCTION**

The purpose of this information package is to assist applicants in developing and submitting Water Use Licence applications for industrial undertakings involving oil and gas exploration and on-site production activities. This information package also provides information to understand the deliberation process that will be completed by the Yukon Water Board ("the Board") in rendering a decision on the application in adjudicating applications for the use of, and deposit of waste in, water in the Yukon.

The Board also recognizes the jurisdiction of other government regulators. The Yukon Territory employs many agencies in the protection of health, safety and environment in industrial settings. These interim guidelines are subject to change as the Board discovers and seeks to minimize duplication of information requirements amongst itself and other governing authorities.

The specific information requirements and licensing principles presented in this package are not intended to serve as fixed standards for licensing. Rather, they are intended to set out a framework of information expectations for applications and of principles and position statements that the Board will apply in its licensing deliberations. The Board may deviate from or supplement the criteria or general information requirements identified in this package. This information package is intended to provide guidance on applications for new licences, and amendments or renewals of existing Type A or B Water Licences for existing oil and gas industrial undertakings. It is understood that depending on the scope of the proposed activities, not all information requirements will apply.

Prior to submitting a water licence application, it is recommended that project activities are discussed with an inspector from Government of Yukon, Environment, Water Inspections. An inspector can assist in

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the determination of licensing requirements for project activities directly associated with oil and gas industrial undertakings and supporting activities (e.g. camps, ice roads, etc.).

Oil and gas industrial undertakings are comprised of projects designed for:

- exploration, requiring drilling or other methods potentially affecting ground and surface waters, including formation stimulation techniques
- drilling of wells or the use of other extraction methods for oil and gas production, and
- construction and operation of oil and/or gas extraction support and processing facilities.

Oil and gas is found at varying depths below surface and stored within a range of geologic strata and settings. Surface and landform features, through which extraction technologies are deployed and supported, also vary widely. The technological processes used for extraction and production are evolving rapidly to greater economic effect, but also with more potential side effects.

The potential for significant and long term impact of oil and gas industrial undertakings upon Yukon surface waters and ground waters is quite considerable, necessitating careful review and consideration by the Board. Licence applications that consider and describe all anticipated water uses, impacts and risks will best assist the Secretariat in processing the application for public review and the Board in deliberating on project conditions and acceptability.

For example, a ***licence for an oil/gas industrial undertaking*** may include:

- test drilling in support of exploration activities; and,
- production drilling for commercial extraction activities.

Along with procedures and protocols for:

- well construction and installation;
- formation stimulation and safeguards;
- well plugging;
- tank design, construction, installation and maintenance;
- pit design, construction, installation and maintenance;
- waste materials characterization and management;
- deposition of wastes;
- hazardous material spill prevention and management;
- temporary closure of wells;
- permanent closure of wells;
- decommissioning and reclamation;
- comprehensive environmental monitoring;
- routine operations and maintenance management programs; and,
- adaptive management contingencies.

All of the relevant aspects affecting the design, operation, maintenance and performance of an oil and gas industrial undertaking need to be fully described and supported in an applicant's package before the Board can consider the submission.

The Board anticipates proposed oil and gas industrial undertakings to vary in scope, design, operational complexity and potential environmental effects. However, the Board also understands there to be engineering and environmental factors common to most programs. This guidance document and the accompanying application form will provide the applicant with a base listing of materials required for a licence application submission along with guidance for submission of additional materials needed to define their specific undertaking.

The information package contains the following sections:

Section 1: Introduction – an outline of this information package.

Section 2: Statutory Requirements – An overview of relevant statutory requirements related to applications for water use licences for oil and gas industrial undertakings.

Section 3: Yukon Water Board and the Licensing Process – A description of the Yukon Water Board and its licensing process.

Section 4: Licensing Principles and Position Statements – presentation of the principles and position statements considered by the Board in deliberating and rendering decisions on oil and gas industrial undertaking applications.

Section 5: Information Requirements for Applications – an outline of the expected information required to support a water use licence application for oil and gas industrial undertakings.

Section 6: Guidance Documents – information on the use of third party guidance documents in applications and identification of guidance documents considered relevant for oil and gas activities in Yukon.

Section 7: Application Contents and Format - The required contents and format of applications.

Section 8: Licensing Conditions - Typical conditions that may be associated with issued licences.

## **2 STATUTORY REQUIREMENTS**

Under the terms of the *Waters Act* (the Act or “WA”), the Yukon Government has delegated to the Board the authority to adjudicate applications for the use of, and deposit of waste in, water in the Yukon. As the adjudicating body, the Board can deny an application or approve an application with conditions. For Type A Water Use Licence applications or Type B applications that were adjudicated on the basis of a public hearing, the water use licence also requires the approval of the Yukon Government Minister responsible for the administration of the WA (the Minister) before it can be issued by the Chair of the Board.

In exercising its powers, the Board recognizes and respects its objects that are described in Section 10 of the WA, as follows:

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“The objects of the Board are to provide for the conservation, development and utilization of waters in a manner that will provide the optimum benefit therefrom for all Canadians and for the residents of the Yukon Territory in particular.”

The Board also has statutory obligations under Chapter 14 of the Umbrella Final Agreement (“UFA”) between the Governments of Canada, Yukon and Yukon First Nations. Section 14.8.0 of the UFA provides that the Board shall not authorize any substantial alteration of the quantity, quality or rate of flow of water on or adjacent to settlement land, unless it is satisfied that:

- there is no alternative which could reasonably satisfy the requirements of the applicant, and
- there are no reasonable measures by which the applicant could avoid causing the alteration.

Section 14.9.0 imposes similar obligations upon the Board where a traditional use of water by a First Nation person in their traditional territory may be adversely affected by a licensed use.

In addition, under the *Yukon Environmental and Socio-economic Assessment Act* (“YESAA”) the Board’s actions in enabling a project, i.e. issuance of a licence, cannot occur until all Decision Bodies for the project have issued decision documents allowing for the project to proceed to the regulatory stage, i.e. in this case the possible granting of a Water Use Licence. Where such decision documents include conditions, the Board may not issue a Water Use Licence with conditions that conflict with those of the Decision Document. It is important to note, though, that interaction with the Secretariat of the Yukon Water Board in preparing a water use licence application for public comments can occur concurrently with the YESAA process.

Finally, oil and gas projects must, at a minimum, also meet all requirements specified within applicable federal and territorial regulatory mandates and adhere as closely as possible to recommendations within relevant guidelines. These include, but may not be limited to:

- *The Yukon Waters Act*
- *The Yukon Waters Regulation (Schedule 5 – Industrial Undertakings)*
- *The Yukon Oil and Gas Act*
- *Yukon Oil and Gas Regulations: Order In Council (O.I.C.)*
  - *Drilling and Production Regulations* O.I.C. 2004/158
  - *Geoscience Exploration Regulations* O.I.C. 2004/156
- *Canada Oil and Gas Operations Act*
- *Canada Petroleum Resources Act*
- *The Yukon Environment Act*
- *The Pollution Prevention Provisions (Section 34) of the Federal Fisheries Act*
- *The Canadian Council of Ministers of the Environment (CCME) Water Quality Guidelines for the Protection of Aquatic Life*
- *Reporting Requirements for the Oil & Gas Sector*

The Board cannot issue a licence with terms or conditions that do not at least meet the combined requirements of these acts and guidelines with respect to well construction and operation, surface water and aquifer protection, waste storage and disposal. For clarity, the Board can and often does require

more stringent requirements than those specified within the governing acts.

### **3 YUKON WATER BOARD AND THE LICENSING PROCESS**

The Yukon Water Board is an independent quasi-judicial board with members nominated by the Government of Canada, the Government of Yukon, and the Council of Yukon First Nations and then appointed by the Yukon Government Minister responsible for administration of the WA.

Board members are independent of their nominating government. As a quasi-judicial body, the Board's adjudication of applications must be conducted according to the principles of natural justice and the decisions of the Board are final and conclusive. The decisions of the Board are only subject to appeal to the Supreme Court of the Yukon Territory on questions of jurisdiction or law.

It is a fundamental principle of natural justice that, other than during a public hearing, the Board members not interact with the Applicant or other parties with an interest in the application. Such interactions include those required to determine the adequacy of an application. Therefore, all communications with the Board, except for questioning and representations during a public hearing, must be directed to the Board's staff: the Yukon Water Board Secretariat ("Secretariat").

To ensure adherence to natural justice, the Board has assigned to the Secretariat the role of reviewing applications for licences or for amendment or renewal of existing licences to ensure that they satisfy all mandatory requirements, are of acceptable scope and clarity to allow for the effective participation of other parties who may wish to intervene ("Interveners") and will facilitate the efficient adjudication of the application by the Board. This process termed "adequacy review" must be completed to the Secretariat's satisfaction prior to the application being made public by the Secretariat and accepted for adjudication by the Board.

There is currently no timeline to complete the adequacy process, but the Secretariat is planning to draft guidelines intended to provide more process and timelines certainty. The staff of the Secretariat makes best efforts to work with the Applicant to ensure that the application is adequate and provide direction as necessary to address deficiencies as may be found in the application.

Once deemed adequate, the Secretariat will post the application on the Board's online registry, WATERLINE, and will publicly advertise that the application has been accepted for adjudication by the Board. The advertisement will identify an intent date for interested parties to provide comments on the application and to identify whether they wish to have and/or wish to participate in a public hearing. In addition to public advertisement, parties signed up for notifications on WATERLINE including Yukon First Nation Governments potentially affected by the undertaking, will receive automated notifications.

The adjudication of a Type A oil and gas industrial undertaking application, amendment or renewal may include a public hearing. For Type B applications or for applications to amend or renew Type B Licences, a public hearing is not required unless the Board determines it to be in the public interest for a hearing to be conducted. In the absence of a public hearing the Board will deliberate upon an application during a scheduled Board meeting. Such Board meetings are typically held on a monthly schedule. In its deliberations, the Board will consider the arguments of the Applicant and of any Interveners, will assess and evaluate the evidence submitted to the Board by the Applicant and any Interveners, and will

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apply the licensing principles and position statements of the Board. The current licensing principles and position statements of the Board are presented in section 4 of this information package.

If the Board agrees to issue a licence or renew a licence, it will develop a licence document complete with conditions acceptable to the Board and consistent with any statutory requirements associated with YESAA, or any other applicable legislation. If the Board agrees to amend an existing licence, it will modify the existing licence document to that effect and include or modify any relevant conditions related to the amendment. An amended licence must still be consistent with any statutory requirements associated with YESAA, or other applicable legislation. Irrespective of whether the Board agrees to issue (or amend or renew) a licence or not, the written reasons for its decision will be issued and made available publicly.

The written reasons for decision issued by the Board presents the rationale applied by the Board in reaching its decision and in developing the conditions of an issued licence, it provides context to licences if a licence is issued, and identifies how the Board has adjudicated any disputed evidence or disputed interpretations of evidence arising during the licensing processes.

If an application is approved by the Board, a water use licence issued for an oil and gas industrial undertaking will be based on the proposals and commitments made in the application by the Applicant and the submissions of Interveners to the process. The Board cannot change the nature of the work proposed by the Applicant other than to establish conditions for that work in a licence under the WA.

Prior to finalizing a new licence or an amendment or renewal of a licence, particularly for a very complex project, the Board may elect to distribute a draft of the licence to the Applicant and Interveners to seek technical comments on the contents. The distribution of a draft licence by the Board is not to re-hear or reconsider its decision but only to seek feedback on the clarity and/or correctness of specific parameters, names, and terminology presented in the licence. For example, an error in the units of a given parameter may be identified and subsequently corrected as a result of technical comments received based on distribution of a draft licence.

Type A water use licences, including amendments and renewals, approved by the Board are submitted to the Minister for approval and do not become effective until the Minister's and the Chairperson's signatures are applied. Type B water use licences approved by the Board become effective upon the signature of the Chairperson.

The above described licensing process is summarized graphically in Figure 1, below.

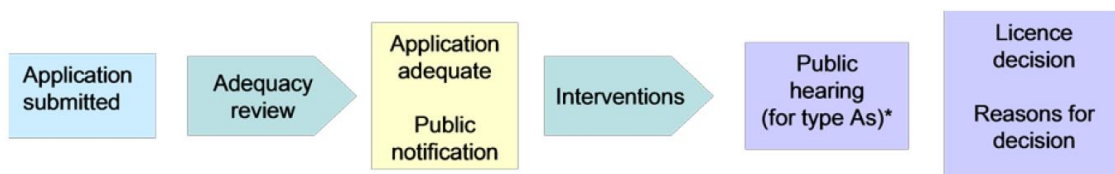


Fig. 1: Yukon Water Board Licensing Process  
(\* Some type B applications may also require a Public Hearing)

### **4 LICENSING PRINCIPLES AND POSITION STATEMENTS**

#### **4.1 Licensing Principles**

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In deliberations and rendering decisions on oil and gas industrial undertakings, the Board will apply the following principles:

4.1.1 avoid, minimize and/or mitigate significant adverse environmental effects from the potential uses of waters authorized by it under the WA;

4.1.2 only issue water use licences where doing so is consistent with the objectives of the Board and supported, on the balance of probabilities, by the evidence presented;

4.1.3 only issue licences that, on the balance of probabilities are expected to at least achieve the objectives set out in the mitigation included in the YESAA decision document, subject to the Board's authority and responsibility under the WA and the UFA;

4.1.4 issue licences that do not grant or renew rights in respect to water contrary to a YESAA decision document;

4.1.5 issue licences with conditions that address the specific aspects of the project being authorized and the site under development;

4.1.6 consider impacts on other applicants and authorized water users, consistent with its other obligations to the public;

4.1.7 act openly, pursuant to the principles of procedural fairness and natural justice;

4.1.8 protect public health and safety and, in particular, minimize risk to human life;

4.1.9 issue licences that are clear and enforceable and administratively consistent;

4.1.10 issue licences only when there is a reasonable certainty that an acceptable level of protection can be maintained during the oil and gas industrial undertaking and acceptable reclamation can be achieved upon cessation of undertaking; and,

4.1.11 encourage the use of robust, proven technologies, but allow for the use of innovative technologies where significant advantages can be shown. In the case of innovative yet unproven technologies, the Board will take a cautious approach, expecting Applicants to provide detailed rationales and contingency plans to manage the performance risk the innovative approach may entail.

### **4.2 Board Position Statements**

The Board gives notice to potential Applicants that its deliberations will apply the following Board position statements:

4.2.1 source controls must be implemented to the extent practical to minimize the potential mobilization of contaminants resulting from the proposed undertaking. This includes, but is not limited to, avoiding exposure of potential sources of contaminants and managing non-process waters to avoid contamination of surface and ground waters.



4.2.2 that the reuse and recycling of water used in the operations should be maximized to the extent practicable to limit the need for raw water withdrawals from the environment.

4.2.3 that the management of various sources of potentially contaminated water on a project site be designed to the extent practical to minimize the potential load of contaminants that may be release to the environment.

4.2.4 that the proposed technologies and systems be considered, explained and supported within the context of northern climate and potential for climate change.

4.2.5 that all effluents are considered non-toxic according to Environment Canada criteria<sup>1</sup>.

4.2.6 given the uncertainty of the response of natural systems to disruption by water, wastewater and/or formation stimulation activities, development of an adaptive management plan is an essential element for management of oil and gas industrial undertakings. The plan should describe the process(es) of decision making that will be undertaken to achieve the operational objectives set out in the additional plans required to form part of the application, as detailed in section 5. However, note that while required, the adaptive management plan shall itself not be the basis for the management of the project.

## **5 INFORMATION REQUIREMENTS FOR APPLICATIONS**

The Board expects that Applicants for water use licences for oil and gas industrial undertakings will at a minimum require the following information (note that additional detail is provided in Appendix A):

5.1 submit an overall project description that details the project:

- Rationale for selected technology(ies);
- location(s);
- setting and history;
- major facility components;
- development and commissioning schedules;
- expected operations and maintenance tasks and schedules;
- expected facility lifecycle;
- monitoring, reporting and compliance assurance systems and protocols; and,
- other relevant details to provide a full understanding of the proposed project.

The project description must be of sufficient detail to facilitate an understanding of the project, its purpose, life cycle, and to support more detailed sections of the application as described in subsequent sections of this list and Appendix A.

5.2 submit comprehensive information regarding the project environment. It is assumed that the majority of these data will have been generated for the YESAA process. Such information will normally be required to be based on measurements and/or observations from a period of at least two consecutive

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<sup>1</sup> Environment Canada single concentration procedure, reference method EPS1/RM/13; 96 hour rainbow trout mortality of 50% or less (LT50) is considered nontoxic. On a case by case basis, the Board may also require other toxicity criteria be met to conclude that an effluent is non-toxic.

years, inclusive of all available monitoring programs conducted at the site by the Applicant and/or past parties managing the site and will include:

- surface water and groundwater quality and quantity, including seasonal variations in quality and quantity;
- surface water and groundwater flow patterns and characteristics;
- climate data, including a description of airsheds surrounding planned emission sites;
- characterization of the geologic strata, soils and permafrost conditions at the site;
- descriptions of aquatic and terrestrial ecosystems; and,
- descriptions of current human activities and uses of resources.

Investigations should be sufficiently specific and detailed that they provide an appropriate understanding of the variability of the site, including seasonal variability. Historical information, if any, shall be summarized and limitations on its accuracy and precision identified.

5.3 predict and/or describe the chemical and biological composition, physical characteristics and quantities of the waste streams that will be created and/or managed through this undertaking. This may vary considerably by project type and complexity, affected by geology, lithology, drilling technology and modes of formation stimulation.

Discuss separately well drilling, process waters and waste streams from 'produced' waters evolved during operations. The composition and projected quantity of each waste stream must be understood and described in detail sufficient to predict and quantify their potential impacts upon the receiving environment(s), including sub-surface injection areas and surface discharge sites.

5.4 submit a comprehensive water balance model and modelling results incorporating all components, water uses, and waste deposits of the project. Clearly note and explain all model assumptions and calculations. The model results shall be of sufficient detail and precision to assess normal and extreme operations for all phases of the undertaking. The water balance model shall also address the potential implications of climate change on the water balance for the proposed undertaking.

5.5 using the information developed in 5.3 and 5.4 select or develop and apply a water quality model that illustrates the range of impacts expected from the type and quantity of waste effluents to be discharged into the environment. Clearly state and justify all model assumptions and then use the model to predict and illustrate the impacts of the undertaking during normal, seasonal and extreme conditions that affect both the project processes and the receiving environment on a short-term and long-term basis. Provide a rationale for the applicability of the submitted water quality model, its limitations, and its sensitivity to assumptions and input parameters.

5.6 submit infrastructure designs and process flow diagrams that describe and illustrate the treatment and handling of all water, wastewater, sludge and solid waste streams, and processes managed through the undertaking. Present a comprehensive management plan outlining the objectives, strategies and activities to manage water and waste either produced or affected by the development. The water management plan must be integrated with all of the waste management plans to show how water will be managed from source to discharge.

5.7 submit hazardous materials management plans for toxic substances that will or may be produced, transferred, stored, or utilized at the site. Such materials include but are not limited to:

- reagents and/or additives for water, wastewater, sludge, drilling and formation stimulation processes;
- biogeochemical bi-products of extraction and/or recovery processes;
- petrochemicals, volatile and semi-volatile organic compounds;
- inorganic metals and associated contaminants;
- radiological isotopes and sources; and,
- other forms of toxic materials or by-products.

The management plans will detail safe handling, storage, and disposal of such materials. The plans will also detail response plans to contain and clean up any spills of hazardous materials. It is assumed that the majority of this information will have been generated for the YESAA process.

5.8 submit preliminary designs of site specific project components related to water use and waste deposition to be used in this undertaking. For clarity, the Board considers that the preliminary design stage builds upon feasibility and/or conceptual studies required to determine the desirability of proceeding with a particular project. The objectives of preliminary designs submitted to the Board are to:

- provide evidence that the proposed project component(s) can perform to specification within normal and extreme operational and environmental conditions during its projected life cycle; and,
- show compliance with relevant standards or guidelines, including hazard or risk classifications that may apply to that class of infrastructure, whether that is for human health and safety or environmental protection.

To accomplish these objectives, preliminary designs for project components should be based upon engineering analysis and environmental impact assessments that establish the location, function, construction, and operation of the components. In addition, preliminary designs should identify provisions for lifecycle management of wells and supporting infrastructure, including temporary closure, permanent closure, and decommissioning and reclamation plans.

Preliminary designs are normally expected to be based on the results of specific site investigations, although additional investigations may be required later in the detailed design process. All engineering drawings and specifications submitted to the Board must be sealed by a Professional Engineer licensed to practice in Yukon.

The Board advocates that preliminary designs be based on the application of robust and proven technologies both in terms of the design methodology utilized and of the materials or components incorporated into the designed object. The use of more innovative approaches may also be acceptable; however, the proposed use of innovative approaches will require the Applicant to submit clear, technically defensible and comprehensive explanations and justifications to the Board to utilize an

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innovative or less proven technology. Regardless of whether a technology is considered to be proven or innovative, evidence of its applicability for the project environment will be required.

Preliminary design briefs or reports submitted as part of the application should include:

- a complete description of the designed project component and its intended function, the data and analysis supporting the design, and design standards or criteria utilized in the design;
- performance specifications of critical materials and equipment utilized in the component;
- scaled preliminary plans showing layouts and general dimensions of structures and components; and,
- a project schedule covering further engineering, and construction activities.

Preliminary design briefs or reports must be sealed by a Professional Engineer licensed to practice in Yukon.

5.9 submit a temporary closure plan and preliminary decommissioning reclamation plan for closure of the project. It is assumed that these plans will have been generated as part of drilling and production protocols under the Yukon Oil and Gas Act licensing process. These plans need to show detailed security calculations with a complete estimate of the cost of implementing the temporary closure plan and the reclamation plan, covering each stage of the development.

The Board advocates that facility lifecycle and/or decommissioning plans be based on the application of robust and proven science, technologies, and methodologies. The use of innovative approaches may also be acceptable; however, the Applicant will be expected to submit clear, technically defensible and comprehensive explanations and justifications to the Board to utilize innovative or less proven science, technology, or methods. Regardless of whether a decommissioning and reclamation approach is considered to be proven or innovative, evidence of its applicability for the project environment will be required.

5.10 submit a detailed monitoring plans and programs for all phases of the undertaking that allows for the collection of data to validate assumptions and predictions of:

- the climate, geochemical, hydrologic, and hydrogeologic inputs affecting the undertaking;
- induced and triggered seismic events from drilling and formation stimulation processes;
- the quantity and quality of input waters diverted, extracted or consumed for use in the undertaking;
- the quantity, composition and materials characteristics of solid wastes produced;
- the performance and efficiency of all treatment, storage and transmission infrastructures;
- the effectiveness of measures taken to mitigate any adverse environmental effects of the project; and,
- the effects of water use and waste deposition on surface and sub-surface environments.

Describe the approaches and technologies to be used to affect monitoring and reporting. Include all aspects of the monitoring approach:

- the Data Quality Objectives (DQOs) established for monitoring sites and stations;
- the QA/QC and chain-of-custody approaches used to assure data veracity;
- brief description and locations of any telemetry and or SCADA (Supervisory Control and Data Acquisition) systems used to automatically monitor sites and stations; and,
- monitoring data storage, archival and retrieval protocols.

5.11 submit an adaptive management plan specifically designed to guide management decisions arising from unexpected performance of the project. In particular, the plan must identify trigger levels for management actions and the potential management actions that would be enacted based on the results of monitoring activities. The adaptive management plan should focus on aspects of the project performance that can directly or indirectly lead to unexpected or unacceptable impacts to the aquatic environment.

Applicants should be aware that licences, if issued, are based upon the information submitted in the application. This includes any additional submissions and/or revisions provided to the Board by the Applicant, up to the date of the Board's decision. Any significant change to the project following licensing will likely trigger a requirement for an amendment of the licence and may also prompt the need for an additional project assessment under YESAA. Therefore, it is imperative to ensure that the application accounts for all currently planned or foreseen activities within the oil and gas industrial undertaking.

## **6 GUIDANCE DOCUMENTS**

Within and outside of Canada there are numerous guidance documents that have been developed to assist owners and operators of oil and gas facilities with responsible planning, design, and operation.

The Board recognizes the following guidance documents, or their most recent revisions, as being reference material for oil and gas industrial undertakings in Yukon:

### **6.1 Canada Council of Ministers of the Environment**

- 6.1.1 Canadian Water Quality Guidelines for the Protection of Aquatic Life, 1999
- 6.1.2 Canadian Environmental Quality Guidelines and Summary Table, 2011

### **6.2 Environment Canada**

- 6.2.1 Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products, 2003

It is the Board's view that these documents present guidelines and not standards and therefore constitute a less stringent form of support for the application. If used to support a method or technology, guidance criteria should then be reinforced by other forms evidence in the application.

In addition to the above list of guidance documents, the Board acknowledges that numerous other guidance documents exist that may be relevant to oil and gas industrial undertakings. Where the Applicant or Interveners believe it is appropriate they may identify and submit such documents as

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evidence to support either the application or interventions and the Board will give due consideration to the value of the guidance document in deliberating upon the application.

### **7 APPLICATION CONTENT AND FORMAT**

The Board expects that water use licence applications for oil and gas industrial undertakings will be accompanied by the following (\* indicates mandatory form):

7.1 Completed Schedule 4 application form\* (available on the Board's website)

7.2 Copies of any approved regulatory authorizations

7.3 Proof of business entity

7.4 Environmental Health form for camps serving less than 50 people

7.5 Applicable fees

7.6 Agent Authorization Form\* (if applicable)

7.7 Completed Project Confirmation Form\* (available on the Board's website), as well as a copy of the YESAA evaluation/screening report and the signed decision document(s).

The above information would be included in an application report that presents at least the information identified in section 5 and that follows the general Table of Contents outlined in Appendix A of this information package. In addition to the application report, the Board expects that technical appendices would be provided to present detailed supporting studies and preliminary design briefs.

The Board expects that the completed application report and technical appendices would be submitted in draft form for adequacy review by the Secretariat and that it would be resubmitted in final form complete with any revisions, modifications, updates, or additions, resulting from the adequacy review by the Secretariat.

Both the draft and final application documents shall be provided in hard copy and unsecured, searchable electronic form such as PDF document(s). Numerical data associated with the application shall also be provided in useable electronic spreadsheet format.

### **8 POTENTIAL LICENCE CONDITIONS**

If the Board decides to issue a water use licence for oil and gas industrial undertakings, the licence may contain some or all of the following conditions:

8.1 requirements to submit to the Board, prior to the commencement of construction, the final detailed design drawings, construction plans and specifications for all proposed structures and facilities including, but not limited to:

- All primary production and supporting infrastructures:

- Access roads, pads and site configuration;
- Wells and casings; and,
- Sumps, pits, tanks and other fluid containment structures
  
- Fresh water supply and process water systems:
  - intake and supply methods and routing;
  - distribution systems;
  - treatment and supply routing systems; and,
  - storage structures and areas.
  
- Wastewater collection and treatment systems:
  - waste collection systems and collection network configuration;
  - interim storage or retention structures and areas;
  - treatment and discharge routing systems; and,
  - sludge treatment, holding and disposal systems.
  
- Site-wide infrastructures and configuration:
  - site support systems;
    - transportation, power, communications
  - containment, diversion and flood protection systems; and
    - dams, coffer dams, berms and impoundments
    - drainage works, diversions and spillways
    - pits and tanks
  
- any other structure or facility relevant to the conditions of the licence.

A detailed design is the last level of project design. It will integrate the results of any additional investigations identified during the preliminary design process and all of the final detailed drawings and specifications required to construct the project. All engineering drawings and specifications submitted to the Board must be sealed by a Professional Engineer licensed to practice in Yukon.

8.2 requirements for additional water quality and flow monitoring points in addition to the points proposed in the application and/or more frequent sampling of proposed monitoring points. Such modifications to the monitoring plan may be established for the purposes of monitoring the overall performance of the project, early stage identification of emerging problems, added protection for human and ecosystem health.

8.3 a requirement to submit to the Board details of any modifications to, or variations from the preliminary designs previously submitted, in advance of any related construction. Such submissions must include an explanation of the reasons for the change, and present evidence that the change results in water use and/or waste deposition that is already permitted under the terms of the issued licence.

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Moreover, it is required that the licensee confirm that the modifications or variations do not require an additional assessment under YESAA. All such design modifications must be sealed by a Professional Engineer licensed to practice in Yukon.

8.4 a requirement to submit to the Board a comprehensive:

- Facility Lifecycle Plan – for facilities with anticipated operations lasting longer than the projected duty cycle of major infrastructures, or
- Temporary Closure plans;
- Decommissioning and Reclamation plans – for fixed lifespan facilities not requiring major systems upgrades.

These plans will be based on the preliminary design submitted with the application, with requirements for periodic updates, including the cost estimates, as circumstances warrant.

8.5 a requirement to submit to the Board final record (as-built) drawings of all structures and facilities following the completion of construction. All drawings must be sealed by a Professional Engineer licensed to practice in Yukon.

8.6 a requirement to submit to the Board a detailed construction quality assurance/quality control manual before beginning the construction of structures or facilities authorized by the licence and to submit the results of the monitoring following the completion of construction. Such a manual should be designed to ensure that construction materials and methods conform to the designs and specifications for the project, as well as generally accepted practices, and that proper documentation of construction is maintained. All construction monitoring should be carried out under the supervision of Professional Engineers licensed to practice in Yukon.

8.7 a requirement to submit to the Board specific plans or studies in a time frame specified.

8.8 a requirement to submit to the Board comprehensive Operations and Maintenance plans for the licensed facilities and systems, including monitoring systems.



**Yukon Water Board**  
*Office des eaux du Yukon*



**APPENDIX A:**

**RECOMMENDED TABLE OF CONTENTS FOR  
WATER USE LICENCE APPLICATION REPORTS  
FOR OIL AND GAS INDUSTRIAL UNDERTAKINGS**

August 2013  
**INTERIM**

## **Preamble**

The Yukon Water Board (“the Board”) has developed this document to guide Applicants in the development of application reports required to support Type A and Type B water use licence applications for oil and gas industrial undertakings. The document presents an annotated outline of the recommended table of contents and provides guidance in regards to the nature of information expected within identified sections of the application report.

The Board recognizes that each oil and gas industrial undertaking is a unique project. However, following the recommended outline of the table of contents will aid the Board and third parties in efficiently reviewing applications. Moreover, the guidance provided within this document should allow Applicants to prepare applications that more readily meet the Board’s information requirements and therefore shorten the adequacy review period.

The Board expects the application report to be a summary document for the detailed plans, studies, assessments, and preliminary designs that have been completed to advance and support the project. It is expected that the supporting documents that present the evidentiary basis of the project will be included as appendices to the application report.

## WATER USE LICENCE APPLICATION REPORT

### TABLE OF CONTENTS

#### Front Matter

**Section i: Transmittal & Cover Letter**

**Section ii: Mandatory Forms**

The mandatory forms section must include the following Yukon Water Board forms:

- Schedule 4;
- Agent Authorization Form (if applicable); and,
- Project Confirmation Sheet.

**Section iii: Executive Summary**

**Section iv: Abbreviations and Acronyms**

#### Report Body

### 1. INTRODUCTION

#### a. PROJECT OVERVIEW

Provide a high level, concise overview of the project including:

- a description of the planned water, wastewater and materials processing activities and technologies including extraction, injection and transmission venues;
- projected facility life cycle and a maintenance management overview;
- description of site location;
- a summary of the magnitude and scope of any associated activities; and,
- summaries of water uses and waste deposits associated with the undertaking.

A more detailed project description is required under section 4(b) of the Table of Contents.

#### b. PROPONENT INFORMATION

Provide a description of the proponent organization, including corporate, NGO or government structure, experience, and relevant policies on environmental management, stakeholder engagement, or sustainable development.

#### c. REGULATORY AUTHORIZATIONS AND APPROVALS

##### i. SUMMARY OF YESAA PROJECT ASSESSMENT

Provide a concise summary of relevant YESAA assessment materials that have been completed for the project. This should include the Project Evaluation, Project Screening Report and Decision Document(s).

**ii.SUMMARY OF POST ASSESSMENT STAKEHOLDER ENGAGEMENT**

Provide a summary of stakeholder contacts and discussions that have occurred since and/or concurrent to the YESAA project assessment. Stakeholders should include but not be limited to: First Nations governments; federal and territorial regulators; non-government organizations; and any other interested parties identified through the YESAA assessment process.

**iii.EXISTING REGULATORY APPROVALS**

List the Applicant's currently held regulatory approvals and submitted regulatory applications. Define the scope (term, spatial limits, and enabled activities) of all held approvals.

**iv.EXISTING WATER USERS**

List existing water use licences or pre-existing water use licence applications held by other parties within the watershed area(s) that could potentially be affected by the proposed project and/or contribute to potential cumulative effects to the water source(s) or receiving environment(s) that will be utilized for this project. Also list any known, un-licensed water users including traditional First Nation water users that may be affected by the project.

A broad approach should be utilized in this section to define the spatial limits, both upstream and downstream, of potential water licences or water users.

In the event that significant numbers of water users need to be identified, summary information can be presented and detailed information attached as an appendix to the application report.

**v.REQUESTED WATER USES AND WASTE DEPOSITS**

Identify all proposed water uses and waste deposits that require a Type A or Type B water use licence to authorize as defined by the licensing criteria presented in Schedule 5 of the *Waters Regulation*. For direct water use identify the volume, frequency, source, and timing of the proposed use(s). For other water uses (watercourse crossings, watercourse training, flood control or diversions) provide general information on the nature of the use.

For proposed waste deposits, including formation injection fluids and substances, identify the location, rate, timing, frequency, and duration of the deposit. Also identify the anticipated constituents of the deposit and the concentration (or anticipated range of concentrations) of the constituents.

For both water uses and waste deposits that may vary significantly in nature or magnitude or temporal variations over the course of the project identify the anticipated nature and/or magnitudes at key stages over the course of the life cycle of the project.

**2. PROJECT LOCATION & BACKGROUND**

**a. LOCATION**

Provide a description of the project location(s) including but not limited to information such as:

- Geographic Location;
- Legal Land Description;

- Study Area Boundaries for YESAA effects assessments;
- Land Tenure within the study area(s), including First Nation Traditional Territory and First Nation Settlement Lands, and known First Nation uses;
- Access roads and public highways serving the location;
- Surface and Sub-Surface Rights;
- Registered Trap line Concessions; and,
- Outfitting Concessions.

Provide scaled, geo-referenced figures conveying the above information.

#### **b. PROJECT BACKGROUND**

##### **i. PAST DEVELOPMENT OR EXPLORATION**

Describe the rationale and any related developments at the project site.

##### **ii. EXISTING OIL AND GAS INSTALLATIONS AND WASTE EMPLACEMENTS**

Identify the nature and extent, if any, of existing oil and gas installations, facilities, infrastructures and waste emplacements at the project site.

### **3. PROJECT ENVIRONMENT**

Provide detailed descriptions of the project environment in the context of pre-development or of the current development status if development already exists. The amount of information presented should be sufficient to establish baseline conditions for all relevant parameters of the project environment. It is assumed that the majority of these data will have been generated as part of the YESAA process.

Depending on the level of information available for each aspect of the environment and the complexity of the environment and/or the project, it is also likely that additional subsections will be necessary for each of the primary topics identified below; the subsections should be grouped or split so that the information is logically presented.

For each section also provide a clear summary of the sources of data that have been used to develop the description of the project environment. This should include listing public data sources (regional climatic records, etc.) and project specific data collection programs undertaken by the Applicant.

For data highly relevant to water licensing, such as water quality, water quantity, aquatic biota, and geochemistry provide details on data collection methodologies, quality assurance and limitations.

Also summarize site specific data and data collection programs (if any) undertaken by others at the site as part of previous studies or site developments. Where such historical data are known to exist and are not being used in the development of baseline conditions or for the prediction of project effects identify why it is not being considered (for example insufficiently sensitive detection limits, etc.).

Contemporary and historical data collection reports should be included as appendices to the application report. For historical reports that contain significant amounts of information that is not

relevant to the application, or is excessively repetitive, a summary of the completed program(s) and excerpts of relevant data can be provided.

**a. CLIMATE**

Provide an overview of the regional and local climate setting, temperature, wind and precipitation statistics and trends based on regional and project-specific climate station data. Use tables and figures to help summarize and depict data.

For precipitation, provide statistics on:

- the proportion of precipitation occurring as snow;
- snow depth and water content;
- magnitude and timing of the snow melt;
- other major runoff events; snow-free period; and,
- estimates of evapo-transpiration.

The Board expects that the site specific climate dataset will build upon data presented during the preceding project assessment phase conducted under YESAA. Data acquired after or not considered during the Project Assessment by YESAB are expected to be incorporated into any description or analysis of the climatic environment.

The Board also expects that a discussion of the possible implications of climate change to key climatic parameters will be addressed in the context of the project life cycle.

**b. GEOLOGIC AND HYDROGEOLOGIC SETTING**

Present descriptions of the regional and project-specific geologic and hydrogeologic setting. Use well logs, geophysical remote sensing, maps, air photo mosaics, tables, and summary figures to help summarize and depict data and information. Include the following information:

- Soils and bedrock geology
  - physical and geochemical soil characterizations;
  - geologic strata, structural setting and production unit(s) description; and,
  - resource characterization, including material types and composition, physical characteristics and properties.
- Groundwater
  - spatial occurrence, quality and resource capacity;
  - detailed descriptions of aquifers and confining strata ;
  - probable recharge zones and groundwater flow patterns; and,
  - other surface/subsurface hydrogeologic connectivity.
- Known geologic hazards/complications
  - detailed seismic domain and potential for induced or triggered seismicity;
  - tectonic and geo-hazard features; and,
  - permafrost and significant cryogenic features.
- Physiographic features
  - Topography, relief and drainage patterns.

## **C. WATER AND WATER QUALITY**

### **i. SURFACE WATER**

Describe the surface water environment including surface water bodies, water courses, and drainage systems in proximity to the project area. Water bodies that may be either water sources or receiving environments for the project should be specifically identified. For oil and gas industrial undertakings that include discharges via atmospheric emissions, water bodies potentially affected by airborne deposition of contaminants should also be included in this discussion. Key subsections are to include hydrology and water quality.

For surface water, the Board expects that near continuous flow monitoring data will be provided for key watercourses at or near the site unless it can be shown that the stream flows are such that near continuous monitoring was or is not feasible. Such flow information will normally be required to be based on measurements and/or observations from a period of at least two consecutive years, inclusive of all available monitoring programs conducted at the site by the Applicant and/or past parties managing the site.

Based on the collected dataset, provide representative measurements of annual stream flow/volume distribution including annual peak and low flows. The measurements should be sufficient to develop proper stage-discharge curves.

For surface water quality, the Board expects that sampling will encompass conditions representative of the range of seasonal flow conditions that have occurred at the site over at least two consecutive years of monitoring. Moreover, it is expected that more intense sampling will have been conducted during the higher discharge periods of the project's water courses. Best efforts should also be made to sample during storm events or during the flow recession from storm events.

Finally, the Board also expects that surface water data collection (both for flow and quality) will be continued during and subsequent to the YESAA project assessment and that data collected after the submission of the Project Proposal will be incorporated into the water use licence application.

### **ii. GROUNDWATER**

Identify and describe all groundwater resources and groundwater users within proximity to the project area and/or potentially affected by the undertaking. Determine and map groundwater gradients and natural flow rates for groundwater within the project region including spatial and temporal variability. Groundwater aquifers that will be used for water supply, disposal of project wastes and/or affected by formation stimulation methods should be specifically identified.

The frequency of the baseline groundwater monitoring will be relative to initial groundwater quality, existing and future use(s), and flow rates/transmissivity and should be sufficient to adequately define the baseline hydrogeological conditions at the site. Identify linkages between hydrogeological and surface flows particularly for base flow conditions and where groundwater reports to surface. Identify if, and where, permafrost and/or other cryogenic phenomena may affect groundwater flows.

Baseline groundwater sampling should characterize spatial and temporal (seasonal) variation in groundwater flow and quality over the project area. Sampling stations should be established at sites suitable as future monitoring and compliance points. Sampling stations should be situated to provide adequate spatial coverage relative to the project including both reference/control locations

and potentially affected stations. Provide measurements of baseline water quality where project-affected groundwater reports to surface (i.e., seeps).

At a minimum the Board expects that characterization of baseline groundwater conditions will require monitoring over at least two consecutive years. Regardless of the period of monitoring prior to assessment of the project under YESAA, the Board also expects that groundwater data collection (both for flow and quality) will be continued during and subsequent to the YESAA project assessment and that data collected after the submission of the Project Proposal will be incorporated into the water use licence application.

Develop and submit a statistically robust groundwater monitoring program for use during and after the project period sufficient to definitively assure that project activities, introduced materials, recovered products and other waste streams do not significantly alter local and regional baseline groundwater conditions.

#### **d. FISH AND FISH HABITAT**

Describe the aquatic organisms and aquatic habitat in the environmental assessment study area, including in waterbodies on the site, as well as upstream and downstream watercourse and water bodies that may be affected by the development. Describe the following for key aquatic species:

- seasonal and life cycle movements;
- local and regional abundance and distribution;
- known or suspected sensitive habitat areas (i.e. spawning or rearing areas) for different development stages and times of year;
- the food chain that supports the species;
- the effects of the water use on fish and their habitats, as per section 14.8.4.1 of the First Nation Final Agreements; and,
- any known issues currently affecting fish and other aquatic life forms in the area.

#### **e. WILDLIFE AND WILDLIFE HABITAT**

The Board anticipates that wildlife and wildlife habitat descriptions provided during the project assessment by YESAB are sufficient to utilize for this section. Having said this, the Board recommends that added emphasis be placed on describing wildlife interactions with water resources, as well as the effects of the water use on wildlife and its habitat, as per section 14.8.4.1 of the First Nation Final Agreements.

#### **f. VEGETATION**

The Board anticipates that vegetation descriptions provided during the project assessment by YESAB are sufficient to utilize for this section. Having said this, the Board recommends that added emphasis be placed on describing riparian vegetation and wetland vegetation that may be affected by the project.

#### **g. SOCIAL ENVIRONMENT**

The Board anticipates that the socio-economic descriptions developed for the YESAA project assessment supplemented with reference to any compensation or benefits agreements developed subsequent to the project assessment can be summarized in this section. This section should specifically focus on the relationship between the project and existing water users including First Nations traditional use of water resources. In particular, it is required that the nearest and/or most potentially affected First Nation Settlement Lands for each watershed of the project are identified and any compensation plans with First Nations or other users also be identified.



## 4. PROJECT DESCRIPTION

### a. INFRASTRUCTURE DEVELOPMENT PLAN

Provide a narrative overview of the oil and gas development, operation, and life-cycle phases of the project. The narrative overview should include descriptions of development activities, schedules and required infrastructure for the project.

The narrative should include figures and tables sufficient to present the information. In regards to figures, an overall development site plan or plans at a scale not less than 1:5,000 should be included in the application report. This site plan or site plans should show the locations of all of the main components of the project, including all well heads, storage components, transmission and disposal areas and any other facilities proposed to be licensed through this application.

### b. DESCRIPTION OF PROJECT COMPONENTS

Following from the narrative description, this section should include more detailed descriptions of the project components. Where appropriate, the descriptions should draw from completed preliminary designs that will be included as appendices to the report. No significant changes to project components should be made after the completion of the preliminary design, although it is anticipated that additional details of the design will be developed. Significant changes to project components are likely to require licence amendments, as well as a requirement for further assessment under YESAA.

Note that preliminary designs submitted to the Board will be required to be sealed by Professional Engineers registered to practice in Yukon.

Where a given project component has a hazard classification of high, very high, or extreme based on a relevant hazard classification system (e.g. Canadian Dam Association), the Board will expect that a Failure Modes Effects Assessment ("FMEA"), or similar hazard/risk study will be completed as part of the preliminary design process for that infrastructure. Such studies normally involve the participation of a wide range of stakeholders and the Board would expect that the Applicant has made and or can show that best efforts have been made to include stakeholders in any FMEA studies completed to support the submitted application.

#### i. DESIGN AND PERFORMANCE CRITERIA

Include an overview of the design and performance criteria (codes, standards, guidelines, and specific performance criteria including selected hazard or risk classifications) that have been adopted for the project. Key points can be summarized and additional details provided in an appendix.

For criteria related to risk, such as the selection of the inflow design flood and design earthquake ground motion parameters, provide the rationale for the selection of the criteria. The rationale should be linked to the risk level of the project component and should reference criteria for similar infrastructure in Canada.

The Board believes that the Applicant should be forward looking in terms of risk criteria and should utilize more conservative risk tolerances where international trends indicate a movement towards increasingly protective tolerances.

#### ii. DRILLING AND WELL CONSTRUCTION

Include a detailed description of the drilling and well construction processes, including all aspects of directional drilling and formation stimulation used to optimize production. Provide a detailed description of the methods and means to be used to minimize the risk of vertical migration (leakage) of contaminants

through or along well casings and other pathways. Present any contingency plans or redundant systems for drilling and well construction.

**iii. TREATMENT AND PROCESSES**

A description of the process is required. Flow sheets that indicate process streams, quantities and significant equipment can be used to describe the process(es). All chemicals or reagents that will be used in the process must be identified explicitly and the use of any particularly hazardous products must be noted.

**iv. WATER MANAGEMENT STRUCTURES**

Include descriptions of all water management structures including, but not limited to water supply dams, water intake structures, groundwater supply wells, water conveyance systems, water diversion systems, water storage and treatment ponds, underground sumps, water treatment plants and treated wastewater discharge facilities.

All such structures and infrastructure must be described on the basis of completed preliminary designs that must be attached to the Application report.

**v. WASTE EMPLACEMENTS**

Provide a description based on developed preliminary engineering plans for all proposed waste emplacements that should be attached as appendices to this application.

The Board looks favourably upon waste emplacement designs that eliminate or minimize long-term geological risk posed by water/fluid retaining structures and that creates landforms with similar or better potential for long term performance with respect to erosion and other mass wasting phenomenon as exhibited by stable natural landforms in the development area.

Where the Applicant presents designs contrary to the above preferences of the Board it is expected that strong rationale will be supplied by the Applicant to justify the use of the submitted designs.

**vi. ADDITIONAL INFRASTRUCTURE**

Any additional structures, including on-site accommodations and offices, workshops, storage facilities, fuel storage facilities, chemical/reagent storage and/or manufacturing facilities must be described in terms of location and construction. Items of particular relevance to the reclamation plan are locations, foundations, and nature of construction (e.g. movable modular units or 'permanent' structures).

Access and transportation modes and routes for facility personnel and supplies and products must be described. Specific mention must be made of any requirements that restrict road access.

**5. PREDICTED PROJECT PERFORMANCE**

In this section the predicted performance of the project, as well as the tools and analytic models used to predict the performance will be presented.

### **a. PRODUCTION OF PRODUCTS AND WASTES**

On the basis of the oil and gas extraction, production and processing plan, describe the products (recoverable hydrocarbons/petrochemicals) and the waste streams that will be produced by the project over its life cycle. All identified products and waste streams must be characterized such that there is sufficient information to incorporate the waste streams into predictions of drainage chemistry from the storage and disposal or reinjection into the reservoir of any residuals. Furthermore, the characterization is necessary to support monitoring activities that are proposed during the project life and to provide bench marks for potential adaptive response plans.

Characterization of products and wastes should include volumes, composition, presence of reagents and/or biochemical residuals, physical and toxicological properties, depositional form, and production schedules over the life cycle of the project.

### **b. PREDICTION OF DRAINAGE CHEMISTRY FROM WASTE STREAMS**

In the context of a water use licence application, drainage chemistry includes the water quality of surface or groundwater originating from waste emplacements at the project site. For oil and gas installations, waters used for drilling shall also be considered as waste streams. These flows are considered to be the inputs into project effluent treatment systems or if suitable direct effluent releases into the environment. Contaminant streams affecting waterways through indirect pathways (e.g. non-point source) are also to be considered.

For the application report, predict the drainage chemistry for each waste stream.

This will entail the application of bio-chemical and engineering modelling of the oil and gas production, extraction and processing procedures to predict resulting effluent chemistry. Various modelling and chemical speciation methodologies may be used for this purpose. A detailed discussion of the modelling process, parameters, confidence/uncertainties and sensitivities is required. Special attention should also be paid to seasonal glaciation of effluent streams and the possibility of rapid contaminant release during melting periods.

### **c. WATER BALANCE MODELLING**

In this section Applicants must present a summary of a developed site-wide water balance model for the project and the results of that modelling. A comprehensive report on the development and application of the model must be included as an appendix to the application report.

The developed model will need to incorporate, where appropriate:

- surface water inputs into the site and outputs from the site;
- precipitation inputs and evaporation/evapo-transpiration outputs;
- seasonal snow-pack development and melt;
- glacial and permafrost melting (i.e., negative storage);
- groundwater contributions from treatment processes, groundwater supply wells, natural springs, and groundwater inputs to surface water systems;
- process waters used in drilling fluids, concretes and/or for formation stimulation;
- existing and project-affected point and non-point runoff conditions;
- influence of project components that could affect the water balance, such as storage of water in sludges or other wastes;
- hydrological variability between wet years and dry years especially flood volumes and frequency; and,

- results of sensitivity analyses and numerical simulations on the developed water balance model.

The water balance model must be used to develop results and projections for a variety of operating and climatic scenarios including specific consideration of all key stages of the facility life cycle and variations on climatic cycles (dry, normal, and wet years or periods). The rationale for the selected scenarios that have been modelled must be provided. In particular the return period of selected wet and dry years/scenarios must be presented and defended.

The water balance must also include a discussion of climate change implications on the water balance and how climate change implications have been incorporated into the water balance scenarios.

Output from the model must specifically identify all transfers of water between aquifers, surface waters and watersheds and must explicitly identify and quantify the reuse and recycling of water that will occur. In this context reuse is where water from one process is used in a subsequent process without treatment and recycling is where water from one or more uses is collected and treated so that it can be used again for some purpose at the site. The Board expects that reuse and recycling of water will be maximized wherever possible in proposed activities for oil and gas industrial undertakings.

Proponents should consider providing a functional electronic version of their water balance model that is broadly accessible. This allows reviewers to fully understand the assumptions, inputs, mass balances, etc. which were used.

#### **d. WASTEWATER DISCHARGE**

##### **i. WASTEWATER AND SLUDGE TREATMENT**

Describe the wastewater and sludge treatment processes that will be applied to wastewater discharges that will be released to the environment. The description should build upon the drainage chemistry and water balance predictions to show the resulting water quality of all discharges and pathways from all waste locations to the receiving environment(s) throughout the life of the project.

The predicted composition and quantity of known and potential contaminants of concern must be provided both in terms of mean expectations as well as potential variance. The predictions should identify achievable outcomes for the applied processes and not just back calculated maximum concentrations that may allow for maintenance of receiving water quality objectives.

The sensitivity of predicted outcomes to changes to input water quality or quantity should be discussed.

It is expected that wastewater and sludge treatment technologies that are proposed will be supported by at least bench scale trials and preferably by field-scale trials or applications of similar scale to that being proposed. Evidence from such trials must be provided in appendices to the application report.

##### **ii. RECEIVING ENVIRONMENT(S)**

Provide a summary of the characterization of the receiving environments for the project. For surface waters, the characterization should include identification of critical species and water quality objectives suitable for those species. For groundwater, the characterization should focus on water quality, potability, recharge and residence times. In rare circumstances (e.g. near-surface karst features), identification of critical species found in groundwater may also be necessary. If site specific water quality objectives are proposed the development of those objectives should be summarized. If standard water quality objectives such as CCME objectives are proposed these should be identified and their applicability discussed.

In circumstances where the receiving environment is comprised of shallow and/or exposed bedrock, characterization of the geochemistry of the receiving environment should be included.

Any proposed degradation of the background water quality in the receiving environments must be identified and the rationale for the level of degradation provided.

Relevant studies and analysis supporting the selection of proposed water quality objectives must be included as appendices

The Board advises Applicants that water quality objectives are normally considered by the Board in the context of evaluating and establishing effluent discharge and receiving water criteria that will be included as conditions in the water use licence.

### **iii. WATER QUALITY MODELING**

This section should summarize and describe a surface and ground water quality model or models developed for the project and present the results of water quality modelling for a robust set of development, operational, and closure scenarios considered for the project.

The water quality model or models must be developed utilizing the predicted drainage chemistry, water balance and predictions of water treatment processes, to predict the resultant water quality of receiving environment(s) proposed for this project. The water quality model(s) must be clearly coupled to the water balance model and must be suitable to make accurate predictions for all phases of the project life cycle. The model(s) should account for variability in both the discharge effluent streams and the receiving environment water quality and quantity parameters. The sensitivity of the model to its input parameters and assumptions should be examined and reported.

Full details on the development of the model and the applicability of the modelling methodology should be included with the full results of completed modelling in an appendix to the Application report.

### **iv. PROPOSED EFFLUENT DISCHARGE STANDARDS**

Proposed discharge standards for effluent discharges from the project need to be presented and substantiated. The proposed standards shall identify all contaminants of concern and potential contaminants of concern. The standards shall also include release timing and quantity elements as may be required as part of the effluent discharge strategy. If applicable, proposed standards for various phases of the project must be presented.

The proposed effluent discharge standards must be compared to the identified water quality objectives for the receiving environment and shown through completed water quality modelling to be protective of the receiving environment(s).

As previously noted the proposed effluent discharge standards should be based on achievable outcomes of proposed treatment processes as determined by suitable scale testing and not just back calculated maximum concentrations that may allow for maintenance of receiving water quality objectives. The rationale for selecting the scale of testing completed for proposed treatment processes must be provided.

### **e. PREDICTED EFFECTS ON SETTLEMENT LAND AND TRADITIONAL WATER USES**

Chapter 14 of the Umbrella Final Agreement (“UFA”) and specific Yukon First Nation Final Agreements between the Government of Canada, the Government of Yukon and the Council of Yukon First Nations creates specific duties that the Board must fulfill in terms of considering the possible effects that proposed water uses (including deposit of a waste in water) may have on First Nation Settlement Lands and on the traditional use of water by a Yukon First Nation people on non-Settlement Land.

Specifically a Yukon First Nation has the right to have water which is on or flowing through or adjacent to its Settlement Land remain substantially unaltered as to quantity, quality, and rate of flow, including seasonal rate of flow.

Also where an applicant is proposing to substantially alter the quantity, quality, or rate of flow, including seasonal rate of flow, in a drainage basin such that the traditional use of water by a Yukon

First Nation person in that person's Traditional Territory will be adversely affected, a First Nation can request that the Water Board consider alternatives and reasonable measures to avoid the adverse impact.

Therefore, in this section the Applicant must provide the results of analyses that show whether:

- (a) The quantity, quality, and rate of flow, including seasonal rate of flow of water through or adjacent to Settlement Lands will be substantially altered; and
- (b) Traditional uses of water by a Yukon First Nation person (or people) will be adversely affected by a proposed substantial alteration of the quantity, quality, or rate of flow, including seasonal rate of flow in that person's Traditional Territory.

The analyses must be accompanied by sufficient drawings or figures to clearly define the Settlement Lands and Traditional Territories that will be potentially affected by the project. The analyses must also be explicit, based on evidence, and continue downstream to the extent that any reasonably predicted substantial alteration of quantity, quality, and rate of flow, including seasonal rate of flow is expected to occur. The analyses must consider all drainage basins or watersheds that may be affected by the proposed oil and gas activity. Finally the analysis must describe the definition(s) of "substantial alteration" used in evaluating the results of completed analyses and the rationale supporting that definition(s).

In the event that the completed analyses find that:

- (1) the quantity, quality, or rate of flow, including seasonal rate of flow will be substantially altered where water flows through or adjacent to Settlement Land; or,
- (2) that the traditional use of water by a Yukon First Nation person in that person's Traditional Territory will be adversely affected by a substantial alteration of quantity, quality or rate of flow, including seasonal rate of flow, in that person's Traditional Territory.

Then this section should include or reference evidence and arguments showing that:

- (a) there is no alternative which could reasonably satisfy the requirements of the Applicant; and
- (b) there are no reasonable measures whereby the Applicant could avoid the interference.

In addition, this section must also provide or reference evidence regarding the effect of the proposed water uses on fish, wildlife and their habitats and the effect of the water use on the Yukon First Nation or on a Yukon Indian Person enrolled pursuant to that Yukon First Nation Final Agreement.

Finally, if the Applicant is proposing water use resulting in an adverse effect to the water rights of a First Nation or First Nation person, then the Board would expect that a compensation agreement would be provided as part of the application and summarized in this section of the Application report.

## **6. WATER, WASTEWATER AND SLUDGE MANAGEMENT PLANS**

Water and waste management plans are documents that outline the objectives, strategies, activities and methods to manage water and waste either produced or affected by the project. The plans should highlight the use of strategies for source reduction of potential contaminants, potential reuse or recycling of waste products, the treatment of waste products (before or after placement) and the application of diversions and barriers to prevent contaminants from entering the receiving environment. Proposed contingency plans should be presented. Achievable management objectives based on the results of modelling and testing should be proposed.

For most oil and gas applications, the Board anticipates that waste management plans would be required for, but not limited to, residual process waters, sludge, muds and fluids used for formation stimulation. The water management plan must be integrated with the various waste management plans to show how water will be managed from sources to discharge from the site.

Special consideration should be given to oil and gas sludge management planning, taking into consideration the chemical, physical, and biological characteristics of the wastes and including:

- Pollution potential of the sludge/wastes with respect to local environmental conditions;
- Options for recovery of oil from sludge;
- Appropriate methods for storage and required storage conditions;
- Competing options for stabilizing the sludge;
- Types of bulking agent(s) to use;
- How to prevent contamination of the environment by sludge leachate;
- Factors to consider with respect to future treatment methods;
- Transportation planning when necessary; and,
- Sludge treatment and recycling options.

This plan is condition specific and it will be developed using information obtained from precise chemical, physical, and biological analysis of the sludge/wastes you generate and information on local environmental conditions and regulations.

It is expected that the various plans will be included as standalone appendices and that summaries of the various waste management plans and of the integrated water management plan will be presented in this section and its subsections. Typical subsections may include:

- Well Drilling Bi-Products and Waste Management Plan;
- Produced Water Management Plan;
- Sludge Management Plan;
- Management of sewage and domestic waste; and
- Integrated Water Management Plan.

In describing the water and waste management plans, the emphasis can be placed on the development, operations and projected project lifecycle phases.

## **7. HAZARDOUS MATERIAL MANAGEMENT PLAN(S)**

The Applicant is required to develop management plans for the transportation, storage, use and disposal of all hazardous materials to be used or produced in the oil and gas industrial undertaking. Hazardous material more generally refer to hazardous materials used in the direct or indirect support of the oil and gas operation including by not limited to fuels, lubricants, antifreeze, process chemicals, pesticides, and explosives. In addition, contingency plans to respond to, contain, and treat spills of these materials must also be developed.

It is anticipated that a single overarching plan may be suitable for smaller or less complex projects. For larger or more complex projects or projects utilizing very hazardous, reactive or persistent materials, standalone plans for various categories of materials are likely required.

In any case, the plan or plans should be summarized in this section of the application report and the full plans included as appendices. The Applicant is cautioned that hazardous material management plans must be consistent with any applicable Federal or Territorial legislation governing the management of hazardous materials. It is the duty of the Applicant to ensure this consistency irrespective of the decision of the Board to accept (or not) the management plans submitted as part of this application.

## **8. TEMPORARY CLOSURE, DECOMMISSIONING AND RECLAMATION**

During the project assessment process undertaken by YESAB, the Applicant will have developed and submitted a temporary closure plan and preliminary decommissioning and reclamation plan that

account for potential temporary and final closure of the proposed development. It is generally expected that such plans would have been based upon conceptual planning of the project.

The Board expects that these original “conceptual” plans will have been expanded or revised to include any changes or additions of detail necessary or beneficial as a result of:

- the findings of the project assessment (i.e. Conditions within a Decision Document);
- the results of any further studies, such as on, but not limited to, product processing, water and waste treatment, and the logistical development and operation of the project site;
- the implications of expanded environmental data sets;
- the input of further stakeholder engagement; and,
- the knowledge of more advanced engineering designs that has been completed or in progress since the original plan was prepared for the project assessment.

The updated preliminary decommissioning and reclamation plan must be included as a supporting document to the application report and in this section of the application report, key aspects of the preliminary decommissioning and reclamation plan must be summarized. In particular the following must be presented:

- Statements of the overarching decommissioning and reclamation goal(s) (i.e. permanent closure of the development, including well abandonment<sup>1</sup>) and the specific objectives needed to achieve that goal(s);
- Summary of temporary closure activities, including well suspension<sup>2</sup>;
- Measurable permanent closure criteria that are proposed to identify when the component specific objectives have been achieved and the rationale for those criteria;
- Realistic descriptions and expected results of proposed reclamation activities;
- Conceptual descriptions of proposed contingency measures to augment proposed activities if required;
- A description of the evidentiary basis that shows the stated reclamation objectives can be achieved through the described activities and proposed contingency measures;
- The need and plans for reclamation research necessary to further refine the proposed closure activities and contingency plans, thereby reducing the level of uncertainty regarding the likelihood of these activities achieving the closure criteria selected for the project;
- Present any contingency or adaptive managements strategies for reclamation activities;
- The proposed post-closure monitoring requirements and the rationale for the selection of those monitoring activities;
- The schedule of proposed reclamation activities, including studies associated with refinement of the plan, with specific identification of progressive reclamation activities proposed for the operational phase(s) of the oil and gas industrial undertaking;
- Projections of the likely post-reclamation risks to the aquatic environment resulting from completion of the proposed decommissioning and reclamation plan. The projections are to include consideration of uncertainty in at least a qualitative level; and,
- Reclamation liability costs and financial security estimates to a level of detail consist with the preliminary engineering designs completed and scientific understanding available. The Board

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<sup>1</sup> “Abandoned”, in relation to a well, means a well that has been permanently plugged and whose well site has been cleaned up in accordance with the Yukon Oil and Gas Act.

<sup>2</sup> “Suspended”, in relation to a well, means a well in respect of which drilling or production operations have temporarily ceased and which is plugged in accordance with the Yukon Oil and Gas Act.



requires that the security estimates be based on third parties undertaking the closure activities and include incidental costs, such as project familiarization, mobilization/demobilization, and project management, for third parties to complete the tasks.

In addition to these requirements, the Board also requires the Applicant to include a separate temporary or interim closure plan, that is summarized in the preliminary decommissioning and reclamation plan. Specifically the following must be provided in the temporary closure plan:

- Definition of temporary closure of the development, including well suspension;
- Statements of the temporary closure goal(s) and objectives;
- Measurable temporary closure criteria that are proposed to confirm that the component specific objectives are being achieved and the rationale for those criteria;
- Realistic descriptions of activities necessary during temporary closure, including identification of systems and processes (water treatment, heating, dewatering, water collection, snow removal, etc.) that must be maintained during the temporary closure period;
- Expected staffing and security requirements and identification of required consumables necessary to maintain the site;
- Conceptual descriptions of proposed contingency measures to augment proposed activities if required;
- The proposed monitoring and reporting requirements during temporary closure and the rationale for the selection of those monitoring activities; and,
- An estimate of the cost of maintaining the site during temporary closure with the cost estimate to include staffing, consumables, and external resources. The cost estimate shall be based on annual time units and shall incorporate costs that may be associated with specific seasonal activities, for example management of the annual freshet or winter operations. A range of potential costs that might be expected based on the point in time that the temporary closure occurs can also be provided. Lacking this level of detail, the costing should be specific to the most critical time that a temporary shutdown could occur.

In evaluating these plans, the Board will be conscious of whether the Applicant has clearly designed and planned the undertaking for temporary closure without imposing undue levels of risk as to the potential success of those actions. The Board will expect that to the extent possible permanent closure will achieve a “walk away” solution that requires only minimal future management and monitoring. Where passive treatment options of long term site discharges are proposed the Board will seek strong evidence that such options can be expected to perform as required.

Moreover, the Board will expect that field trials of proposed temporary and permanent closure measures and technologies, for example cover systems and passive water treatment technologies, will be proposed and scheduled for as early as possible in the project life cycle.

## **9. MONITORING AND REPORTING PLANS**

Monitoring and reporting is an essential part of managing oil and gas projects; therefore, the Board requires that applicants develop and submit detailed monitoring and reporting plans as part of the Application report. Monitoring and reporting plans are expected to include various monitoring programs designed to monitor different aspects of the project performance. These programs may be relatively straight forward or extremely complex depending upon:

- the nature and scale of the proposed oil and gas activities;
- the nature, complexity, and sensitivity of the project and receiving environments; and,
- the potential challenges associated or anticipated with the project.

Depending on the complexity of the developed monitoring and reporting plan, the plan can either be presented in its entirety in this section of the application report, or summarized in this section with full plans presented in an appendix to this report. Regardless of how it is presented it is essential that the developed plans state the objectives of their component programs and include the justification for their proposed program activities. Moreover, the developed plans should utilize descriptive figures, tables, and plain language descriptions to convey the plan to the Board and third parties.

In respect to the Board's expectations for monitoring and reporting plans, the Board expects that the monitoring programs comprising the plans will encompass all phases of the undertaking and that they will be sufficient to ensure the collection, analysis, and reporting of data necessary to validate assumptions and predictions of:

- a) Climatic, geochemical, hydrologic, and hydro-geologic inputs to the project;
- b) The nature and quantity of waste materials and bi-products produced;
- c) The quality, quantity, and time history of water use and waste deposition;
- d) Seismic and tectonic responses reactions to drilling and formation stimulation;
- e) The performance of water and waste management infrastructures and technologies;
- f) The effectiveness of measures taken to mitigate any adverse environmental effects of the project; and,
- g) The effects of water use and waste deposition on the receiving environment.

With respect to monitoring of infrastructure, the monitoring effort should be designed to reflect the hazard associated with potentially poor performance. Therefore, visual inspection of a diversion ditch, for example, may be acceptable whereas detailed instrumentation would likely be expected for elements such as tanks, pits, sumps and sludge storage units.

The monitoring programs must also be designed to guide management decisions and adaptive management strategies related to the environmental performance of the project.

Accordingly, the monitoring plans shall include programs designed to capture data related to, but not necessarily be limited to:

- Site climatic parameters;
- Surface water quality and quantity;
- Groundwater quality and quantity;
- Process water quality and quantity;
- Stream sediment quality;
- Physical performance of water retaining and waste containing structures, including any embankments, liners, covers, and water management systems associated with those structures;
- Physical performance of well casings, cements and sealants used to isolate and separate products and wastes from exposure to groundwater and surface waters;
- Physical performance of flow conveyance infrastructure;
- The production, nature, deposition, and release (if any) of waste materials;
- Seismic and tectonic responses to drilling, stimulation and production activities; and,
- Project effects on the receiving environment.

The individual programs developed to monitor these aspects of the project shall detail sampling or measurement locations, sampling media, procedures, frequency, analytical techniques – including

expected precision and accuracy, and monitored parameters for both field and, if relevant, subsequent laboratory measurement. Programs shall identify quality control and quality assurance processes, means of recording and managing collected data, and internal and external reporting protocols that will be followed to utilize and present the collected data.

For each program it is expected that an annual or more frequent reports will be prepared and that the report(s) will include analysis of the collected data that interprets any implications that the data may imply with respect to the current and future performance of the project. Irrespective of proposed reporting frequencies, the Board encourages applicants to include provisions in its monitoring plan to release monitoring data, in its raw form, in a publicly accessible media, such as websites, on a timely and routine basis.

## **10. ADAPTIVE MANAGEMENT PLAN**

The Board accepts that planning for oil and gas industrial undertakings will contain uncertainties that may result in the unexpected performance of the project leading to effects of some magnitude in the aquatic environment. The monitoring plans must be designed to monitor the performance of the project and thereby directly or indirectly allow for the potential impacts of the project on the aquatic environment to be determined. However, the monitoring plans do not necessarily describe the actions that will be taken and the trigger levels to initiate those actions if or when unexpected and/or more significant impacts are or may be indicated based on the results of monitoring.

In order to ensure that the Applicant can reasonably foresee and prepare for potential variations in the performance of the project and the potential resulting changes to aquatic effects that may occur, the Board requires that an adaptive management plan be prepared and submitted with the application. In this section of the application report, the adaptive management plan must be summarized and the basis for its development presented.

To assist in completing this section and the required adaptive plan document, the Board notes that the purpose of the adaptive management plan will be to identify the response of the Applicant to monitoring results that could be suggestive of a future adverse impact on the receiving environment. In particular, the plan must identify trigger levels for management actions and potential management actions that would be enacted based on the results of monitoring activities.

Therefore, the contents of an adaptive management plan will include the following:

- a summary of environmental interactions and predictions of project-related effects on the aquatic environment;
- a summary of monitoring programs and how monitoring results are linked to potential effects on the aquatic environment;
- a description of how environmental change in the aquatic environment will be measured and considered;
- a description of significance thresholds for valued aquatic ecosystem components and/or contaminants of potential concern, where the significant thresholds represent the on-set of adverse impacts on valued aquatic ecosystem components;
- a description of appropriate action levels, specific to monitoring results, that would be set well below significance thresholds so that action is necessarily taken prior to an adverse impact arising; and
- a description of the management response plans that would be enacted if a given action level is reached.

With respect to action levels and management response plans, the Board expects that action levels may be tiered for any given monitoring result or group of results. For example, a lower action level may lead to a management response such as repeating the monitoring activity and re-assessing results. A higher

action level may lead to a management response that includes changes in the monitoring program or in the operations of the project. In either case all action levels must be set below the significance threshold(s).

## **Supporting Documents**

The following is a list of generally expected categories of supporting documents that will provide much of the evidentiary support for the proposed project. These supporting documents should be grouped into appendices as indicated below. It is expected that many of the appendices will include multiple reports in sub-appendices. As an aid to the Board and third parties, appendices with multiple documents should include an overall summary document that describes in general the contents and purpose of the various sub-appendices included.

- Appendix 1: Decision Document and YESAB Screening or Evaluation Report
- Appendix 2: Project Environment Baseline Data Reports
- Appendix 3: Preliminary Design Reports
- Appendix 4: Geochemical Characterization and Drainage Chemistry Prediction Reports
- Appendix 5: Water Balance Modelling Reports
- Appendix 6: Wastewater Treatment Reports
- Appendix 7: Receiving Environment Reports
- Appendix 8: Water Quality Modelling Reports
- Appendix 9: Water and Waste Management Plans
- Appendix 10: Hazardous Material Management Plans
- Appendix 11: Temporary Closure, Preliminary Decommissioning and Reclamation Plans
- Appendix 12: Monitoring and Reporting Plans
- Appendix 13: Adaptive Management Plan