



**SECTION 5.0 – ENVIRONMENTAL PROTECTION AND
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5.0 ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT APPROVAL REQUIREMENTS

The following information is responsive to *Environmental Protection and Enhancement Act (EPEA) Approvals and Registrations Procedure Regulation, Applications for Sour Gas Processing Plants and Heavy Oil Processing Plants, A Guide to Content (AENV 1996)*.

3(1)(a): APPLICANT INFORMATION

1. Registered Company Name	Korea National Oil Corporation (KNOC)
2. Mailing Address in Alberta	Korea National Oil Corporation Suite 2010 520 – 5 th Avenue SW Calgary, Alberta T2P 3R7
3. Mailing Address of Applicable Plant	Korea National Oil Corporation Suite 2010 520 – 5 th Avenue SW Calgary, Alberta T2P 3R7
4. Phone and Telecopier Numbers	Telephone: 403-718-7076 Fax: 403-269-8081
5. Date of Application	18 December 2009
6. Contact Information	Brian Kwak Korea National Oil Corporation Canada Office Suite 2010 520 – 5 th Avenue SW Calgary, Alberta T2P 3R7 Tel: 403-718-7076 Fax: 403-269-8081
7. E-mail Addresses for Company Contact	publicaffairs@knoc.ca

3(1)(b): LOCATION, CAPACITY AND SIZE OF THE PROJECT

1.	Legal Land Description:	<p><i>Central Processing Facility (CPF)</i> Section 14, Township 76, Range 7, W4M.</p> <p><i>Other Facilities</i> Well pads, roads, pipelines and other facilities will be located in Sections 1, 2, 3, 10, 11, 12, 13, 14, 15, 22, 23 and 24 of Township 76, Range 7, W4M. These sections make up the project area for the Expansion Project.</p>
2.	Nearest Communities	<p>Communities located near the Expansion Project include:</p> <ul style="list-style-type: none"> • Conklin, sited approximately 8 km northwest of the project CPF; and • Chard and Chipewyan Prairie Dene First Nation, located approximately 40 km north/northwest of the project CPF.
3.	Geographical Description and Area Map	Refer to Volume 1, Section 1.0 of the Application.
4.	Gas Processing Capacity	Not applicable.
5.	Other Processing Capacity	3 180 m ³ /d oil sands bitumen production
6.	Material Balance	Refer to Volume 1, Section 2.3 of the Application
7.	Size of the Affected Area (ha)	<p>Refer to Volume 1, Section 2.3 of the Application</p> <ul style="list-style-type: none"> • Total Disturbed Area (ha) 228 • Temporary Construction Laydown Area (ha) 3 • Well Pads (ha) 143 • Water Supply Well (ha) 1 • Roads, gathering lines corridors & power lines (ha) 81
8.	Size of the Project	<p>Refer to Volume 1.</p> <p>The estimated number of employees on-site to operate the Expansion Project following completion of the construction phase is 50 persons. Additional information on project employment is presented in Volume 1, Section 1.0 and in the Socio-Economic Impact Assessment (SEIA) section of the EIA (Volume 2, Section 17.0).</p>

3(1)(c): NATURE OF THE ACTIVITY

Classification

The Expansion Project will include components with the following classifications:

- “Enhanced recovery in-situ oil sands or heavy oil processing plant,” as defined in *Alberta Regulation 276/2003 (Activities Designation)*, Section (2)(p).
- “Oil sands processing plant,” as defined in *Alberta Regulation 276/2003 (Activities Designation)*, Section (2)(pp).

Purpose

The general purpose of the facility is to extract bitumen from oil sands using an in-situ Steam Assisted Gravity Drainage (SAGD) process. The facility will process the recovered bitumen into a product capable of being shipped via a pipeline.

Major Unit Operations

The major unit operations in the Expansion Project covered under this application include:

- well pads for steam injection, fluid production, separation and metering;
- steam and production fluid pipeline transportation and collection system;
- plant inlet facilities;
- bitumen, produced water, and produced vapour separation and treating system;
- produced water de-oiling and excess water disposal system;
- produced water and make-up water treatment for boiler feed water;
- steam generation;
- water and sales oil storage tankage;
- vapour recovery system;
- product custody transfer unit;
- fuel gas processing;
- flare system;
- cooling and heating systems; and
- utilities.

Major Environmental Controls

Design concepts are included in the Expansion Project that minimize waste and reduce emissions to the environment and provide a safe environment for workers and neighbours. Design details required by Alberta Environment (AENV) will be submitted when detailed engineering is complete.

Major environmental controls include storm water collection, leak detection, vapour control, containment barriers, monitoring wells, appropriate equipment seals, and wastewater treatment.

- *Storm Water Collection* – Storm water retention ponds will collect runoff from the plant and wellsite leases. Water accumulated will be tested and if suitable will be released to the surrounding watershed with appropriate erosion controls. If water conditions do not meet pumpoff criteria, runoff waters will be reused in the plant as a substitute for source water.
- *Leak Detection* – Leak detection for tankage and process ponds will be provided following established guidelines outlined in standards such as the Energy Resource Conservation Board (ERCB) Directive 55: *Storage Requirements for the Upstream Petroleum Industry*.
- *Vapour Control* – Tanks and low pressure vessels that contain hydrocarbon or other volatile vapour will be connected to a sweet gas blanket and vapour recovery system. Normally the vapour will be collected, compressed and mixed with sweet fuel gas and burnt in the Steam Generators. During maintenance or emergency shutdown of the vapour recovery unit the gases will be directed to the flare for combustion of the vapours before release to the air.
- *Containment Barriers* – Containment barriers will be used where necessary to prevent leakage from being introduced to the ground. Clay liners or flexible polymer liners will be used where detailed design calls for an appropriate liner system. Secondary or tertiary containment will be used to protect soils and groundwater at fluid transfer points and in areas where, based on experience, leaks or drips are likely to occur. Secondary containment will follow requirements of the *Guideline for Secondary Containment for Above Ground Storage Tanks* (AENV 1997).
- *Monitoring Wells* – A groundwater monitoring network will be designed prior to plant commissioning. Details will be provided to AENV as specified in the EPEA Approval issued for the Expansion Project.

Tank Specifications

Information on above ground storage tanks for the project is provided in tabular form in [Volume 1, Section 2.4](#) (purpose, environmental controls, volume). The proposed locations of above ground tanks will be found in the plot plan ([Volume 1, Section 2.3](#)).

There are no buried process tanks proposed for the Expansion Project.

Leak Detection System

Leak detection for tankage and process ponds will be provided following established guidelines outlined in standards such as ERCB Directive 55: *Storage Requirements for the Upstream Petroleum Industry* (ERCB 2001).

Water Considerations

Refer to [Volume 1, Section 2.5](#), Water Management.

Reciprocating or Turbine Engines

There are no reciprocating or turbine engines proposed for the project.

Plot Plan Showing Stacks

A Plot Plan showing the stack locations is provided in [Volume 1, Section 2.3, Figure 2.3-5](#).

Details of air emissions and dispersion modelling are presented in [Volume 2, Section 4.0](#), Air Quality.

Peak Height of Buildings

This information is provided in [Volume 1, Section 2.4](#).

Natural Gas Fired Emission Source Details

Natural gas fired emission source details are provided in [Volume 3, Appendix B1](#).

Other Emission Sources

All emission sources are overviewed in [Volume 1, Section 2.4](#). Detailed information is provided in [Volume 3, Appendix B1](#).

Flare Stacks

There are no new flare stacks associated with the Expansion Project. The Expansion Project will connect into the existing flare header for the Initial Project. The existing flare system is designed to accommodate production at 4 770 m³/d.

Flare Pit

No flare pit is proposed for the Expansion Project.

On-site Incineration

No on-site incineration is proposed for the Expansion Project.

NO_x Dispersion Modelling

Refer to [Volume 2, Section 4.0](#), Air Quality.

Sour Gas Processing Plant

Not applicable.

Emergency Flaring

Under normal operating procedures there will be no flow from the flare stack other than a purge volume of sweet natural gas. In emergency situations requiring plant depressurization, the produced gas and vapour recovery system will be directed to the flare system along with any emergency relief valves and vents.

Sulphur Storage

No sulphur storage is required for the Expansion Project.

Emissions from Glycol Dehydrators

A glycol dehydrator is not required in the process to be used.

Produced Gas

Produced gases will be treated and used as fuel gas.

3(1)(d): ERCB APPROVAL

Presently, there are no ERCB approvals for the Expansion Project. KNOC will apply for ERCB approval at the same time as the application is made to AENV for approval.

3(1)(e): ENVIRONMENTAL IMPACT ASSESSMENT

An Environmental Impact Assessment (EIA) is required to be filed as part of Alberta regulations. Final Terms of Reference for preparation of the Expansion Project EIA were issued by Alberta Environment on 2 December 2009. An EIA has been prepared and is an integral part of the application for the Expansion Project. The EIA is included in the project application as Volumes 2 and 3.

3(1)(f): EXISTING APPROVALS

Not applicable.

3(1)(g): PROJECT SCHEDULE

A summary schedule is provided in [Volume 1, Section 1.5](#).

3(1)(h): SUBSTANCE RELEASES TO THE ENVIRONMENT

Quantities of Substances Used

Substances used in the production process in terms of a typical operating day are provided in [Volume 1, Section 2.3](#).

Water Demand

Process water to be used in the project will be sourced from a saline groundwater supply in the Clearwater Formation. Raw process water (saline) will be supplied from nearby source water wells ([Volume 1, Section 2.6](#)).

Sources of Substances Released to the Environment

Sources of substances released to the environment are discussed in [Volume 1, Sections 2.3 to 2.6](#).

Substance Amounts Released to the Environment

Amounts of substances released to the environment are discussed in [Volume 1, Sections 2.3 to 2.6](#).

Methods of Release

Methods of substance releases to the environment include the following:

- at the well pads, accumulated surface water will be tested and, if suitable, released to the natural environment. If not suitable for release to the environment, the water will be transported back to the CPF for recycling (see [Volume 1, Section 2.6](#)); and
- SO₂, NO_x, volatile organic compound (VOC) and greenhouse gas (GHG) from various combustion sources (steam generators, glycol heaters, flash treater, emergency flare stack, emergency generator, as well as fugitive emissions from equipment leaks and accidental leaks) (see [Volume 1, Section 2.4](#)).

Pollution Prevention and Control Measures

KNOC, as an expression of its policy and commitment to environmental stewardship, will evaluate pollution prevention and control measures at the Expansion Project through detailed design of infrastructure and application of appropriate operational procedures, including emergency preparedness and response ([Volume 1, Section 2.7](#)). Pollution prevention and control is to be achieved through various means, including:

- low emissions and fugitive emissions control systems ([Section 2.4](#));
- water recycling ([Section 2.6](#));

- tank leak detection systems for a series of above ground tanks to be used in the Expansion Project ([Section 2.4](#));
- surface runoff collection ([Section 2.6](#));
- spill containment system (see below);
- groundwater monitoring (as identified in [Volume 2, Section 6.0](#) and provided as requirements pursuant to issuance of regulatory approvals);
- soil monitoring, including both a program for remediation purposes where contamination is at issue, and monitoring for the purposes of reclamation (see [Volume 1, Section 3.0](#)); and
- site selection of facility locations to avoid construction and operations impacts on sensitive environments and landscapes identified through constraints mapping and the EIA process ([Volume 1, Section 2.1.2](#)).

Runoff Drainage System

The runoff drainage system is discussed in [Volume 1, Section 2.6](#). The estimated plant industrial runoff volume for the plant developed area will be provided in detailed engineering.

Spill Containment

A detailed statement on spill containment design for individual facilities will form part of detailed design for the Expansion Project.

3(1)(i): ENVIRONMENTAL MONITORING INFORMATION

There is no monitoring data for existing operations as the Initial Project has not been constructed. A detailed EIA has been completed for the Expansion Project. The EIA includes collection and analysis of baseline ambient environmental data (air, soils, water, etc.), as well as information regarding the human community. The EIA is presented in Volumes 2 and 3 of the application. Baseline hydrogeologic information is provided in [Volume 2, Section 6.0](#) of the EIA.

3(1)(j): SUBSTANCE RELEASE CONTROL SYSTEMS

Not applicable; no data exists as the Initial Project has not yet been constructed.

3(1)(k): JUSTIFICATION FOR SUBSTANCE RELEASE

KNOC is designing the Expansion Project according to best available practices technology and industry standards, including engineering practices. Information on substance releases is addressed in: [Volume 1, Sections 2.4 and 2.5](#); [Volume 2, Section 4.0](#); and [Volume 3, Appendix B](#).

3(1)(l): WASTE MINIMIZATION**Waste Management Summary**

Expansion Project waste volumes (construction and operation) are presented in [Volume 1, Section 2.7](#) and include discussion of the waste content, ERCB waste code, storage locations, disposal sites, disposal method, and estimated annual quantities.

Waste Minimization Measures

Measures to minimize production of waste for disposal are discussed in [Volume 1, Section 2.7](#).

3(1)(m): SURFACE DISTURBANCE

Construction of the Expansion Project will result in surface disturbance estimated to be approximately 228 ha. This disturbance will take place in the project area described in [Volume 1, Section 1.0](#).

Surface disturbance will occur due to three development activities: well pads (143 ha); temporary construction laydown area (3 ha); and, gathering pipeline corridors and source water wells (82 ha). Areas of disturbance have been calculated for these three sets of activities at three stages in the life cycle of the Expansion Project: disturbance at project start-up (2013), peak net disturbance (2034), disturbance over the lifetime of the project (2013-2043). The latter disturbance will be subject to progressive reclamation as the project moves through the operations phase and is presented in [Volume 1, Section 3.0](#).

3(1)(n): EMERGENCY RESPONSE PLANS**Confirmation**

KNOC has a corporate level emergency response plan (ERP) available upon request. A project-level ERP (discussed in [Volume 1, Section 2.8](#)) will be developed upon receipt of regulatory approval for the project.

Agency Submissions

No filings of KNOC's ERP to agencies or to the local communities have been required to date.

3(1)(o): CONTINGENCY PLANS

Contingency plans will be developed as part of the Expansion Project's detailed operating procedures. Contingency plans will be prepared for handling and mitigating spills, process upsets or other abnormal occurrences that may arise and have potential to impart significant variations to normal environmental expectations regarding operation of the project.

3(1)(p): CONSERVATION AND RECLAMATION

A detailed Conservation and Reclamation (C&R) Plan for the Expansion Project is provided in [Volume 1, Section 3.0](#).

3(1)(q): PUBLIC CONSULTATION

The public involvement process for the Expansion Project is described in [Volume 1, Section 4.0](#). Public involvement to date and KNOC's plans for ongoing consultation are described in [Section 4.0](#).

3(1)(r): OTHER INFORMATION REQUIRED UNDER THE ACT

No other information requirements have been identified.

3(1)(s): OTHER INFORMATION REQUIRED BY THE DIRECTOR

No other information requirements have been identified.