



**APPLICATION FOR APPROVAL OF THE
BLACKGOLD EXPANSION PROJECT
VOLUME 5: SUPPLEMENTAL INFORMATION
REQUEST (SIR)**

Submitted to:
Energy Resources Conservation Board
and
Alberta Environment

Submitted by:
Harvest Operations Corp.
Calgary, Alberta

March 2011

March 21, 2011

Mr. Ken F. Schulhaus
Section Leader
Energy Applications Branch
Energy Resources Conservation Board
640 – 5th Ave SW
Calgary, AB T2P 3G4

Mr. Pat Marriott
Acting District Approvals Manager
Regional Authorizations
Alberta Environment
1st Floor Twin Atria, 4999 – 98th Ave
Edmonton, AB T6B 2X3

Dear Sirs:

**Re: Supplemental Information Request for the Harvest Operations Corp.
BlackGold Expansion Project Application Numbers ERCB 1636814,
EPEA 002-00246984 and Water Act File No. 00247210**

In support of the application filed with the Energy Resources Conservation Board (ERCB) and Alberta Environment (AENV) on December 21, 2009 (Volumes 1 through 3) and the EIA Addendum submitted in March, 2010 (Volume 4), enclosed is Volume 5 – Supplemental Information Request (SIR) was submitted on March 21, 2011 in response to the ERCB and AENV Supplemental Information Requests.

Correspondence regarding these applications should be directed to:

Mark Tysowski, Legal Counsel
Harvest Operations Corp.
2100, 330 – 5th Ave, SW
Calgary, AB T2P 0L4
Tel: 403.718.7076
Fax: 403.265.3490
Email: blackgold@harvestenergy.ca

Sincerely,



Brian W. Kwak
Deputy Chief Operating Officer, VP Oil Sands
Harvest Operations Corp.

PREAMBLE

This document, identified as *Volume 5 – Supplemental Information Request (SIR)*, forms part of the application submitted by Harvest Operations Corp. (Harvest, formerly Korea National Oil Corporation (KNOC)) to the Energy Resources Conservation Board (ERCB) and to Alberta Environment (AENV) for approval of the BlackGold Expansion Project.

Harvest applied in March 2008 for an approval to construct, operate and reclaim the BlackGold Initial Project (Initial Project), a 1 590 m³/d (10 000 b/d) steam assisted gravity drainage (SAGD) facility in the Athabasca oil sands area near Conklin, Alberta. ERCB Approval 11387 and AENV Approval 246984-00-00 were granted to Harvest for the Initial Project in early 2010.

Harvest proposes to increase production through the development of the BlackGold Expansion Project (Expansion Project or project), which will produce an additional 3 180 m³/d (20 000 b/d) of bitumen over a period of 25 years.

A three volume joint application for the Expansion Project was submitted to the ERCB (Application No. 1636814) and AENV (Application No. EPEA 002-00246984, *Water Act* File No. 00247210) in December 2009, with an additional *Volume 4 – Addendum* submitted in March 2010.

The ERCB and AENV completed a review of the Expansion Project application and issued to Harvest a SIR on October 6, 2010 (*Appendix A*). This volume contains the responses to these SIR questions, first for the ERCB then followed by AENV.

Volume 5 – Supplemental Information Request (SIR) is organized as follows:

- *Project Update* provides revised information on the design and location of facilities;
- *Supplemental Information Request* is a systematic response to the 226 information requests. Information is provided in the same sequence as the questions posed by each agency in the SIR;
- *Appendix A* is a copy of the SIR request from ERCB and AENV;
- *Appendix B* is a copy of the Consent to Transfer the AENV Approval for the Initial Project;
- *Appendix C* is a copy of the reissued ERCB Commercial Scheme Approval for the Initial Project;
- *Appendix D* is the letter from Hazco Environmental Services;
- *Appendix E* is the consultation update;
- *Appendix F* is the fish and fish habitat field methods; and
- *Appendix G* is Appendix C5: Non-Saline Groundwater Thermal Modelling, which was omitted in the environmental impact assessment (EIA) submission.

Details of Harvest’s continuing public consultation program following submission of the application in March 2010 is presented in the response to [SIR ERCB 1](#).

References in this document to the “BlackGold Project” are intended to refer to the Initial Project and the Expansion Project collectively.

GLOSSARY OF ABBREVIATIONS AND ACRONYMS

$\mu\text{g}/\text{m}^3$	Microgram(s) per cubic metre
%	Percent(age)
%IF	Induced flux
°C	Degrees centigrade
AADT	Average Annual Daily Traffic
AAAQO	Alberta Ambient Air Quality Objectives
ACIMS	Alberta Conservation Information Management System
AENV	Alberta Environment
ALSA	Aquatics local study area
AMEC	AMEC Earth & Environmental
API	American Petroleum Institute
AQI	Air Quality Index
AQLSA	Air quality local study area
AQRSA	Air quality regional study area
ARSA	Aquatics regional study area
AT	Alberta Transportation
ATS	Alberta Township System
b/d	Barrels per day
BLCN	Beaver Lake Cree Nation
BFW	Boiler feed water
BMP	Best management practices
BS&W	Basic sediment and water
C&R	Conservation and Reclamation
CAC	Criteria air contaminant(s)
CAP	Concentrated ambient pollutants
CAPEX	Capital expenditures
CARB	California Air Resources Board
CCME	Canadian Council of Ministers of the Environment
CEA	Cumulative effects assessment
CEMA	Cumulative Environmental Management Association
CH₄	Methane
CNRL	Canadian Natural Resources Limited

CO	Carbon monoxide
CO₂	Carbon dioxide
CO₂E	Carbon dioxide equivalent
COPC	Chemicals of potential concern
CPDFN	Chipewyan Prairie Dene First Nation
CPF	Central processing facility
CPP	Caribou Protection Plan
CRDAC	Conklin Resource Development Action Committee
CSS	Cyclic steam stimulation
CWS	Canada-wide standards
D	Dimensional
dBA	A-weighted decibel
dBz	Linear or unweighted decibel
DE	Diesel exhaust
Devon	Devon Canada Corporation, Devon ARL Corporation and Devon NEC
DFO	Fisheries and Oceans Canada
DRU	Diluent recovery unit
EC	Environment Canada
EIA	Environmental impact assessment
EnCana	EnCana FCCL Oil Sands Ltd. and/or EnCana Corporation
EPA	Environmental Protection Agency
EPEA	<i>Environmental Protection and Enhancement Act</i>
ERCB	Energy Resources Conservation Board
ERP	Emergency response plan
ESAR	East Side of the Athabasca Range
FMFN	Fort McMurray #468 First Nation
FN	First Nation(s)
GHG	Greenhouse gas
GPS	Global Positioning System
H₂O	Water
H₂S	Hydrogen sulphide
ha	Hectare(s)
HLFN	Heart Lake First Nation
HLFNCO	Heart Lake First Nation Consultation Office

HLSA	Hydrogeology Local Study Area
HP	High pressure
h	Hour
HHRA	Human health risk assessment
IHS	Inclined heterolithic stratification
INAC	Indian and Northern Affairs Canada
IRC	Industry Relations Corporation
IRIS	Integrated Risk Information System
JACOS	Japan Canada Oil Sands Limited
kg/h	Kilograms per hour
km	Kilometre(s)
km²	Square kilometre(s)
KNOC	Korea National Oil Corporation
kPa	Kilopascal
kt/y	Kilotonne(s) per year
LCC	Land Capability Classification
LHV	Lower Heating Value
LL	Lower lift
LP	Low pressure
LSA	Local study area
LTIF	Lost time injury frequency
m	Metre(s)
mm	Millimetre(s)
m/s	Metre(s) per second
m³/d	Cubic metre(s) per day
m³/y	Cubic metre(s) per year
masl	Metres above sea level
MEG	MEG Energy Corporation
mg/L	Milligram(s) per litre
MPOI	Maximum point of impingement
MSC	Meteorological Service of Canada
MSES	Management and Solutions in Environmental Science
MVC	Mechanical vapour compression
N	Nitrogen

N/A (or) n/a	Not applicable
NaOH	Sodium hydroxide
NAAQO	National Ambient Air Quality Objective
NO	Nitric oxide (gas)
NO₂	Nitrogen dioxide (gas)
NO_x	Gaseous oxides of nitrogen (NO, NO ₂) or all nitrogen species (e.g., NO _x , N ₂ O, N ₃ O).
NPRI	National Pollutant Release Inventory
O₂	Oxygen
O₃	Ozone
OHSA	<i>Occupational Health and Safety Act</i>
OPEX	Operating expenditures
OSE	Oil sands exploration
P	Phosphorus
PAH	Polycyclic aromatic hydrocarbon
PDA	Pre-disturbance assessment
PDC	Planned Development Case
PM	Particulate matter
PO₄	Phosphate
RCMP	Royal Canadian Mounted Police
Rge	Range
RMWB	Regional Municipality of Wood Buffalo
ROW	Right-of-way
RQ	Risk quotients
RSA	Regional study area
S	Sulphur
SAGD	Steam assisted gravity drainage
scf	Standard cubic feet
Sec	Section
SO₂	Sulphur dioxide
SIR	Supplemental information request
SRD	Alberta Sustainable Resource Development
Sw	Water saturation
t/d	Tonnes per day

TDS	Total dissolved solids
TEF	Toxic equivalency factors
TEK	Traditional environmental knowledge
TK	Traditional knowledge
TLSA	Terrestrial local study area
TLU	Traditional land use
TOR	Terms of Reference
TPHCWG	Total Petroleum Hydrocarbon Criteria Working Group
TRSA	Terrestrial Regional Study Area
Twp	Township
UTM	Universal Transverse Mercator
V	Volt
VOC	Volatile organic compound
VRU	Vapour recovery unit
W4M	West of 4 th Meridian
WBEA	Wood Buffalo Environmental Association
WFN	Whitefish First Nation
WHO	World Health Organization
WSC	Water Survey of Canada
y	year

GLOSSARY OF TERMS

Application Case	The Application Case describes the Baseline Case with the effects of the project added.
Baseline Case	The Baseline Case establishes the conditions that exist or would exist prior to development of the project or the conditions that would exist if the project were not developed.
Baseline Studies	Initial scientific investigations that determine the present ecological state of an area and establish a basic reference necessary for further studies.
Concordance Table	A table in the Environmental Impact Assessment report that identifies which sections of the report contain the information for each of the Terms of Reference requirements.
Confidence	An attribute used in the evaluation of the impacts from the project. The confidence attribute and ranking is based upon the amount and adequacy of data, as well as an understanding of the relationship(s) between the potential cause(s) of the residual project impact(s). Confidence is defined as poor, moderate or high.
Constraint	Site conditions (structural, geographic or environmental) that could result in potentially higher impact from project activities. The area identified as having constraints should be avoided or special mitigation measures developed
Constraints Mapping	A technique where environmental (and other) sensitivities or constraints are identified during the project design phase and are mapped on the proposed Project Area to help planners avoid or reduce the potential environmental impact of the project.
Cumulative Effects	Changes to the environment that are caused by a project in combination with other past, present, and planned projects in the region.
Dispersion Model	A computer model that calculates a concentration or deposition value at a particular point; this value changes from hour to hour, eventually reaching an absolute maximum concentration or deposition value for the particular point.
Direction	An attribute used in the evaluation of the impacts from the project. The direction of an impact may be described as positive (beneficial), negative (detrimental) or neutral.
Duration	An attribute used in the evaluation of the impacts from the project. Some impacts may persist for short periods of time, others may be permanent. The following designations for duration of impact are used: short-term, mid-term and long-term.
Effect	Any response by an environmental or social component to a proposed project's impact.

Environmental Management System (EMS)	A set of management processes and procedures that allows an organization to analyze and reduce the environmental impact of its activities.
Environmental Monitoring	Systematic, geo-referenced observations of the environment essential to detecting changes in ecosystems over time.
Environmental Protection Plan (EPP)	A practical tool that describes the actions required to minimize environmental effects before, during and after project implementation. The plan may include details about the implementation of the mitigation measures identified in the environmental assessment, such as who is responsible for implementation, where the measures are intended to be implemented, and within what timeframe.
Final Impact Rating	For each individual impact assessment, a final impact rating of low, moderate or high is stated. This is based upon the integration of quantitative analysis (where possible) and professional judgment that takes into account the various rankings for each attribute (direction, magnitude, geographic extent, duration and confidence). This is applied to both the project specific impact and cumulative effects assessments.
Geographic Extent	An attribute used in the evaluation of the impacts from the project. Impacts from the project may be confined to small areas or may occur over a large geographic extent. These impacts may be described as local or regional:
Habitat	Land and water used by wildlife. This may include biotic and abiotic aspects such as vegetation, exposed bedrock, water, and topography.
Human Health Risk Assessment (HHRA)	A systematic and well documented process to define and quantify potential human health risks from exposure to chemicals released from a proposed project alone and in combination with other past, present, and future projects in the region.
Impact	Any aspect of a project that may cause an effect; for example, land clearing during construction is an impact, while a possible effect is loss and fragmentation of wildlife habitat.
Integrated Application	An application to the appropriate regulatory bodies that contains both the EIA report and the relevant approval applications.
Local Study Area (LSA)	The area existing outside the boundaries of the Project Area, where there is a reasonable potential for immediate environmental impacts due to ongoing project activities.
Magnitude	Defines the spatial extent directly or indirectly affected by the project. An attribute used in the evaluation of the impacts from the project. Three levels of magnitude of the impact have been selected: low, moderate or high. The definition of these levels may vary among the different disciplines examined in the Environmental Impact Assessment.
Mitigation	The elimination, reduction or control of the adverse environmental effects of the project. Mitigation includes restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or any other means.

Model	A simplified representation of a relationship or a system of relationships. Modelling involves calculation techniques used to make quantitative estimates of an output parameter based on its relationship to input parameters.
pH	A measure of the acidity or alkalinity (based upon the concentration of the hydrogen ion) of a solution. The pH is expressed as the negative logarithm of hydrogen ion concentration.
Planned Development Case	The Planned Development Case includes past, existing and anticipated future environmental conditions, based on existing and approved projects or activities, plus planned projects and activities reasonably expected to occur. The Planned Development Case describes the environmental conditions that would exist as a result of the interaction of the proposed project, other existing projects and other planned projects.
Project	The activity or group of activities proposed by the Proponent. The types of activities that could be subject to Alberta's environmental assessment process are listed in the Schedule of Activities in the <i>Environmental Protection and Enhancement Act</i> and in the <i>Water Act</i> . The project includes all associated construction, operation, decommissioning and reclamation activities and all phases of development described by the Proponent.
Project Area	The area includes all lands subject to direct disturbance from the project and associated infrastructure.
Project Footprint	The land or water area covered by a project. This includes direct physical coverage (i.e., all lands subject to direct disturbance from the project and associated infrastructure) and direct effects (i.e., the disturbances that may directly emanate from the project, such as noise).
Regional Study Area (RSA)	The area within which there is the potential for cumulative and socio-economic effects, and that may be relevant to the assessment of any wider-spread effects of the project.
Residual Effect	An effect that remains after mitigation has been applied.
Reversibility	An attribute used in the evaluation of the impacts from the project. Capability of the environment to return to a capacity or condition equivalent to the baseline after the impact ceases. Reversibility rating is either yes or no.
Scenario	A description of environmental and development conditions at a certain time to allow comparisons of change (e.g., pre-development, current, and reasonably foreseeable). The common scenarios are: Baseline Case, Application Case, and Planned Development Case.
Setback	A setback is the minimum distance that must be maintained between a development and an environmental feature (e.g., river valley, lake) or human feature (e.g., dwelling, rural housing development, urban centre, or public facility). Setbacks may vary according to the type of development and the sensitivity of the environmental or human feature.

Study Area	The sum of the areas included in the Project Area, local study area and regional study area.
Traditional Environmental Knowledge (TEK)	Knowledge and values that have been acquired through experience and observation, from the land or from spiritual teachings, and handed down from one generation to another. Also referred to as Traditional Ecological Knowledge.
Traditional Lands	Lands used by Aboriginal communities or individuals for purposes such as burial grounds, gathering sites, and historic or ceremonial locations, and existing constitutionally protected rights to hunt, trap and fish. Does not include proprietary interests in the land.
Traditional Land Use	Activities involving the harvest of traditional resources such as hunting and trapping, fishing, gathering medicinal plants and traveling to engage in these activities. Land use maps can document the locations where the activities occur. How a culture used (and uses) the land and its resources.

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