

# EXECUTIVE SUMMARY

Summary  
December 2007

Synenco Energy Inc. (Synenco), on behalf of the Northern Lights Partnership, has prepared a Supplemental Submission, including a Project Update, Environmental Impact Assessment (EIA) Update and responses to the Supplemental Information Requests (SIRs) received from the Alberta Energy and Utilities Board (EUB) on August 27, 2007, regarding the Northern Lights Mining and Extraction Project Application (Application) submitted November 30, 2006. The Supplemental Submission includes:

- descriptions of refinements to the Project since the Application was filed;
- incorporation of recent developments with regard to the regulatory and social environment for the Oil Sands Region; and
- responses to the SIRs.

Since the submission of the Application for the Northern Lights Mining and Extraction Project (the Project), Synenco has refined the design of some components of the Project. These refinements are part of the continued advancement of engineering design and incorporation of new, site-specific data, but the refinements do not result in fundamental changes to the Project as a whole or to the assessment of potential effects associated with the Project. The most notable refinements to the Project include:

- relocation of the External Thickened Tailings Cell (ETTC) and fresh water reservoir from the north-central portion of the Project area to the neighbouring lease (OSL 900 - SE half of Township 99, Range 7, W4M);
- location of sand disposal area A-2 on OSL 900;
- relocation of the Plant site, which is now transposed with waste disposal area A-1 (referred to as sand/ waste dump area A in the Application);
- updated mine pit boundaries based on the results of the 2006 winter drilling program;
- refinement of the river water pipeline design to avoid the risk of freezing so that a baseline minimum flow is no longer required;
- removal of the tailings solvent recovery unit (TSRU) thickener from the froth treatment process; and
- revision of the water license request for Athabasca River water withdrawal (reduction in the maximum water withdrawal amount and non-staged request).

Additional general updates to the Project include:

- discussion of a Modularization Construction Strategy (MCS), rather than a Conventional Construction Strategy (CCS), as an option being pursued to build the facility;
- new Project capital cost estimate of \$4.4 Billion (2006 Canadian Dollars) for the MCS and \$5.6 Billion (2006 Canadian Dollars) for the CCS (up from \$1.7 billion presented in the Application);
- adjustment to the Project's planning basis schedule<sup>1</sup>, with construction starting in 2009 and the end of mining in 2038; and
- initiation of an Extraction Pilot Project and a Froth Treatment Pilot Project, scheduled for late 2007 and early 2008 to test the technology selected for the Project.

The SIR responses address questions raised through the review of the Application. Some responses address issues that have been amended in the context of the Project and EIA Update information presented in the Supplemental Submission.

Synenco has also updated the following Application components as a result of Project refinements, questions raised in the SIRs and recent developments in the regulatory and social environment:

- Environmental Impact Assessment;
- Socio-Economic Impact Assessment;
- Community and Stakeholder Engagement;
- Water Management Plan; and
- Closure, Conservation and Reclamation Plan.

The updated environmental and socio-economic assessments completed to address Project refinements do not change the original assessment conclusions. No unacceptable environmental or social effects are predicted to occur as a result of this Project.

Synenco is confident that the information provided in this Supplemental Submission meets the requirements and intent of the Terms of Reference issued for the Project. Synenco thereby requests the Application be deemed complete.

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<sup>1</sup> The development schedule for the Project, announced December 2006, which anticipated first oil by mid-2011 has been retracted. The schedule presented in the Supplemental Submission is provided as a planning basis.

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## 1.0 INTRODUCTION

The Northern Lights Partnership, comprising Synenco Energy Inc. (Synenco) and SinoCanada Petroleum Corporation (SinoCanada), proposes to construct, operate and reclaim the Northern Lights Mining and Extraction Project (the Project), located approximately 100 km northeast of Fort McMurray, within the Regional Municipality of Wood Buffalo (RMWB) in northeast Alberta.

Synenco submitted an Application for the Project in June 2006, with sequenced material provided in November 2006. The Application was deemed administratively complete in January 2007. Synenco received SIRs from the Alberta Energy and Utilities Board (EUB) and Alberta Environment (AENV) regarding the Application. In response to the SIRs and to address both refinements to the Project since the Application was filed and the recent developments to the regulatory and social environment for the Oil Sands Region, Synenco has prepared a Supplemental Submission.

The Supplemental Submission includes:

- a Project Update that presents a discussion of changes that have occurred in Project planning and design since the Application was filed;
- an Environmental Impact Assessment (EIA) Update, including a Socio-Economic Impact Assessment (SEIA) Update; and
- responses to the SIRs (the Project and EIA Update directly supports and provides the basis for the responses to many of the SIRs).

All of the supporting documentation in this Supplemental Submission pertains to the oil sands mining and bitumen extraction facilities and associated infrastructure, utilities and access related to the Project. The Project has not fundamentally changed from the Application and the purpose of this Supplemental Submission is to provide additional details and clarifications on aspects of the Project that have been further defined since the Application was filed. Updated management plans and environmental assessment information is provided to address any changes to the project design affecting environmental components. Where appropriate, the SIRs are responded to in the context of the updated Project and assessment information.

## 2.0 DOCUMENT ORGANIZATION

This Supplemental Submission is organized as follows:

- **Part 1 - Summary of Supplemental Submission**, which provides an overall summary of the Project Update components and a summary of the updated effects assessment information.
- **Part 2A - Project Description Update - Application Volume 2**, which outlines changes to the oil sands mining and bitumen extraction facilities and associated infrastructure, utilities and access that were presented in the Application Volume 2.
- **Part 2B – Management Plans Update – Application Volume 3**, which outlines changes to, or provides additional information on, various management plans associated with development of the Project that were presented in the Application Volume 3.
- **Part 2C - Environmental Impact Assessment Update**, which presents additional environmental and socio-economic assessment work that has been completed to address the SIRs and refinements to the Project, and to present additional information that has been gathered since the Application was filed.
- **Part 2D – Additional Information**, which includes Community and Stakeholder Engagement Information and updates to the Water Act Applications.
- **Part 3 - Responses to Supplemental Information Requests** which presents responses to all SIRs submitted on the Project from the EUB, AENV and other regulatory agencies with interest in the Project.
- **Part 4 – Appendices** which includes further details related primarily to the EIA Update.

## **3.0 CORPORATE UPDATE**

### **3.1 STRATEGIC OPTIONS REVIEW**

A separate regulatory application was submitted on September 29, 2006 for the proposed Northern Lights Upgrader Project (the Upgrader) located in Sturgeon County, northeast of Edmonton. In May 2007 Synenco's Board of Directors announced plans to assess options for a strategic repositioning of the company. The plan has a range of possible outcomes including: restructuring the Northern Lights Partnership's downstream business to capture economies of scale by including other partners, alternative downstream commercial ventures, and other corporate-level options that enhance shareholder value.

The key consideration in the decision to put the Northern Lights Upgrader project on hold was the significant increase in the capital cost estimate for construction of the Sturgeon County Upgrader and expected rates of return which were incompatible with Synenco's weighted average cost of capital. One of the key objectives of Synenco's current strategic options review is to determine whether lower cost upgrading alternatives can be found elsewhere in Alberta, Canada, the United States or Asia.

On July 4, 2007 the EUB issued a letter to Synenco accepting the company's request for a temporary regulatory timeout in the EUB's review of the Northern Lights Upgrader application. The EUB stated that it is prepared to keep the application open until December 31, 2007 by which time Synenco is to provide the EUB with a status update. The strategic options review is ongoing and a decision on the upgrader has not been made at this time. Synenco will update the EUB on the status of the Northern Lights Upgrader application by December 31, 2007.

While the Upgrader Application is on hold, work in support of the Northern Lights Mining and Extraction Project Application continues to be a priority.

The ultimate decision on the Northern Lights Upgrader project is not expected to affect the Mining and Extraction project schedule in any way.

## 3.2 CONSTRUCTION EXECUTION STRATEGY

On December 6, 2006 Synenco released the updated capital cost estimate for the Northern Lights Mining and Extraction Project. Two capital cost estimates were provided based on different construction execution strategies to build the Project. These two capital cost estimates and construction strategies are:

- \$4.4 Billion (2006 Canadian dollars) for the Modularized Construction Strategy (MCS); and
- \$5.6 Billion (2006 Canadian dollars) for the Conventional Construction Strategy (CCS).

The CCS is based on the typical Alberta-build concept currently used to develop oil sands projects (i.e., high volumes of smaller pre-fabricated plant components transported via highway) and was the basis for information presented in the Application which considered the former capital cost estimate of \$1.7 Billion (2005 Canadian dollars). The MCS includes the overseas fabrication of larger modules used to construct the mining and extraction facilities, the transportation of these modules to the Project site by a transportation provider, and their assembly at the Project site. Modularization is a proven successful strategy for constructing large industrial plants and is used by many companies around the world.

The use of either construction strategy will provide the means to build the Project as described in the Application and Supplemental Submission. The design, technology and environmental effects assessment for the Project will be the same, regardless of the construction strategy used.

Synenco continues to pursue the MCS for the Project to reduce costs where feasible. Until this strategy is further developed, Synenco will progress the regulatory application for the Project with the inclusion of both the CCS and a discussion on the MCS. A discussion of the implications of the MCS to the project description and EIA is provided where applicable throughout the Supplemental Submission. The Project as applied for is the same fundamental project regardless of which construction strategy is ultimately chosen. Therefore, regulatory approvals required for the Project are the same for the CCS and MCS and Synenco is seeking approvals under the *Oil Sands Conservation Act*, the *Water Act* and the *Environmental Protection and Enhancement Act* that would accommodate either construction option.

Notable aspects of the MCS in the context of the Application and Supplemental Submission are:

- reduced capital cost of approximately \$1.2 Billion (2006 Canadian dollars) and the potential for earlier royalty payments at the higher post payout rate;
- overseas fabrication larger modules (e.g., adjusted spending profile) used to construct the Project facilities based on the same fundamental design and technology (e.g., same bitumen extraction technology);
- enables consideration of a single phase start-up as opposed to a two phase start up under the CCS, with the Project reaching full production (114,500 barrels per day) sooner without affecting resource recovery (the overall life of the Project is unchanged with a 2009 construction start and an end of mine in 2038);
- built within the same physical and environmental footprint regardless of the module size and construction strategy;
- reduced highway traffic volumes during construction associated with the transportation of smaller pre-fabricated plant components via highway;
- lower required workforce numbers on the site during construction due to overseas fabrication of larger, more complete modules; and
- pre-commissioning testing of the fewer, larger modules at the fabrication location, thereby reducing start-up complexity.

The updated Project Description and Management Plan information presented in the Supplemental Submission is primarily a result of further engineering work and changes to the regulatory and social environment in the Oil Sands Region and not due to the construction strategy.

For most Application components, the MCS has no implications on the Project or its potential effects and the overall effects assessment conclusions have not changed. The following presents a discussion of the differences of the construction strategy that do exist as they relate to the Project Description, Management Plans, the Environmental Impact Assessment and Socio-Economic Impact Assessment.

## ***Project Description***

The use of either construction strategy (i.e., Modularization or Conventional) does not affect the geology, oil sands resource, potential resource recovery or mine plan as those are based on site-specific data obtained through exploration programs within the lease areas. The site development, mining technology, bitumen production, tailings management strategy, and utilities and infrastructure are unchanged by the selection of construction strategy. The camp facilities may be down-sized to match the reduced construction workforce if the MCS is used to construct the Project.

The MCS will allow for a single phase start-up as opposed to a two phase start-up for the CCS. A single phase start-up would accelerate the mine production schedule in the first few years of mining to supply the appropriate amount of ore to meet full production earlier than in the two phase CCS scenario. This accelerated ramp-up period would adjust the mine production schedule, and tailings production and deposition schedule by less than a year over the life of the mine. As such, the end of mining would still occur in 2038 with closure in 2049.

## ***Management Plans***

The management plans for the Project will be unchanged with the use of either construction strategy. The water management plan objectives, strategies and efficiency measures as described in the Application will remain, as will the objectives and strategies of the Closure, Conservation and Reclamation Plan. Start-up phasing does not change the peak water demand. Similarly, the mine schedule will be adjusted by less than a year over the life of the Project and end of mining will occur in 2038 with closure in 2049.

## ***Environmental Impact Assessment***

The construction strategy does not affect the conclusions of the EIA. As the highest magnitude predicted effects generally occur during operations (the EIA considers maximum build-out) and the overall production capacity or maximum footprint will not be affected (i.e., 114,500 bpd and same Project Development Area [PDA]), the environmental effects predictions do not change. The two construction strategies are simply alternative mechanisms by which the same fundamental project is built, and the components by which the Project is assessed are the same. Emissions, effluents, wastes, water requirements, physical footprint and the overall operation will be within the parameters assessed regardless of the construction strategy. The components or modules used for construction, regardless of their size or where they were fabricated, will result in the same Project and same predicted environmental effect within the study areas.

## ***Socio-Economic Impact Assessment***

The use of either construction strategy does not affect the overall conclusion of the SEIA. When compared to the MCS, the CCS has a higher capital cost, larger construction workforce and longer construction period. The MCS reduces Project effects during construction as compared to the CCS largely because of the smaller construction workforce. The operational workforce and operational costs are the same for both construction strategies, therefore the effects assessment for operations is unchanged.

The lower capital costs for the MCS will lead to earlier payout, all else being equal, and thus to earlier royalty payments at the higher post payout rate. In addition, the construction of the Project in a single phase enabled by the use of the MCS will increase the Project's output and hence revenues in the early years, reducing the time to reach for reaching Project payout.

## ***Summary***

Synenco continues to pursue the development of the MCS as a cost-effective approach to build the Project facilities. Since the use of the MCS or CCS will result in the same Project and fit within the same footprint, Synenco believes that the overall environmental and socio-economic effects assessment conclusions (i.e., no unacceptable environmental or social effects) remain valid for the implementation of either construction execution strategy.

## **4.0 SUMMARY OF PROJECT DESCRIPTION UPDATES**

The following sections provide a brief summary of refinements made to the Project design and additional information that has been gathered since the Application was filed. Part 2A provides the detailed description of the changes to the technical sections originally provided in Volume 2 of the Application. The refinements to the Project are not considered fundamental changes to the Project as a whole. The basics of the development scheme proposed in the Application have not changed.

The updated Project layout is presented in Figure 4.0-1.

### **4.1 GENERAL**

The planning basis schedule for the Project has changed since the Application was filed.

The updated production profile for the Project using the MCS and a single phase start-up is as follows:

- single phase: start-up in Q2 2012 with a ramp-up to approximately 114,500 barrels per day by Q4 2012; and
- full production of approximately 114,500 barrels per day from Q4 2012 for the remainder of the mine life.

The updated production profile for the Project using the CCS and a two phase start-up is as follows:

- first phase start-up in Q4 2011 with a ramp-up to approximately 57,250 barrels per day by Q3 2012;
- second phase start-up in Q2 2013 with a ramp-up to approximately 57,250 barrels per day by Q1 2014; and
- full production of approximately 114,500 barrels per day from 2014 for the remainder of the mine life.

The development schedule for the Project, announced in December 2006, which anticipated first oil by mid-2011 has been retracted.

As noted in Section 3.2, the capital cost of the Project has increased since the Application was filed and is currently anticipated to be approximately \$4.4 billion (2006 Canadian dollars) for the MCS or \$5.6 billion (2006 Canadian dollars) for the CCS. The CCS cost estimate presented in the Application was \$1.7 billion (2005 Canadian dollars).

Two pilot projects to test the technology selected for the Project are expected to be completed in 2007 and 2008. The Extraction Pilot Project was approved by the EUB in August 2007 (Approval No. 10999) and pilot testing is underway. Synenco recently submitted an application for the approval of the Paraffinic Froth Treatment Pilot Project that is expected to begin in early 2008.

## **4.2 GEOLOGY AND RESOURCE BASE**

Since the Application was filed, the results of the 2006 exploration program have been incorporated into the analysis of site geology and resource base estimates. The 2006 program was focussed on sparsely drilled areas to improve the bitumen resource estimation of the Project. Additional drilling undertaken on the Northern Lease (then still a Permit) allowed for its conversion to an oil sands lease.

The best estimate of bitumen resources for the Project increased approximately 12% based on the results of the 2006 exploration program. The new best estimate is 1,673 million barrels, an increase from the 1,492 million barrels that was presented in the Application. The distribution of the resources has also changed based on the 2006 drilling results.

The 2007 exploration program was primarily focussed on the Pit 1 area of the Western Lease in order to provide additional geologic information in advance of initial mining operations. Results of the 2007 program have not been fully analyzed and are not included in this Update.



### 4.3 SITE DEVELOPMENT

Since the Application was filed, further refinements to the site development plans have been made. Notable refinements include:

- relocation of the Plant site as a result of detailed muskeg probe data collected in 2006;
- relocation of the external thickened tailings cell (ETTC), the fresh water reservoir and an external tailings sand disposal area to the OSL 900 lease area;
- realignment of construction access to correspond to the main access for the Project instead of the using the Aerodrome access road;
- realignment of the main access road to take advantage of the existing winter access road approximately 1.6 km south of the alignment presented in the Application;
- refinements to the temporary and permanent bridges across the Firebag River; and
- realignment of the Aerodrome Access Road to account for recently approved developments.

The relocation of the ETTC and fresh water reservoir to OSL 900 has several advantages including:

- considerably less infrastructure requirements, capital costs and construction costs by having shorter water pipelines, tailings pipelines, access and haulage roads and power distribution lines;
- better foundation conditions for the fresh water reservoir;
- lower operating costs are expected for items including energy use, equipment transportation and equipment maintenance; and
- lower ongoing capital expenditures for items including, among others, pipeline replacement and subsequent lifts for additional storage volume.

Synenco Energy Inc., on behalf of the Northern Lights Partnership, has signed a joint venture agreement to become a participant in the Fort McKay / Firebag Aerodrome. The Fort McKay / Firebag Aerodrome joint venture consists of Suncor Energy (owner and operator), Husky Energy (owner) and the Northern Lights Partnership (owner).

## 4.4 MINING

Synenco has not changed the mining technology used for the Project. Results of the 2006 exploration drilling program were incorporated into the mine plan, allowing for enhanced resource estimates and mine pit delineation. The most notable changes that have been made to the mine plan are:

- updated mine pit boundaries based on the 2006 drilling program resulting in an increase in the estimated resource located in Pit 1, with a decreased estimate of resource in Pit 5 (other mineable areas are similar in size to how they were presented in the Application);
- re-configuration of the external waste and sand disposal areas to account for the adjustment of the mine plan including the relocation of an external sand tailings disposal area on the OSL 900 lease area north of the Plant site; and
- adjustment of the mine development schedule as a result to changes to the Project schedule.

## 4.5 BITUMEN PRODUCTION

The bitumen production process has not fundamentally changed since the Application was filed but it has been refined slightly as a result of ongoing design. The most notable changes are:

- the distribution bin in the slurry preparation process has been replaced with a surge pile which adds retention time and improves reliability;
- the removal of the Tailings Solvent Recovery Unit (TSRU) thickener from Froth Treatment. The removal of the TSRU thickener results in un-thickened tailings reporting directly to the ETTC for natural settling rather than thickened tailings as indicated in the Application; and
- the Project heat and mass balance was adjusted to reflect the changes to the process.

## 4.6 TAILINGS MANAGEMENT

Changes to the tailings management approach that have been incorporated into the Project include:

- the coarse sand tailings stream from the vacuum belt filter will be dewatered to approximately 13%, as opposed to the 7 to 10% presented in the Application;

- un-thickened TSRU tailings from Froth Treatment will report directly to the ETTC;
- the volume of tailings over the life of the Project has increased due to the removal of the TSRU thickener and slightly revised tailings factors. The volume of thickened tailings and TSRU tailings will require a storage volume of approximately 213 Mm<sup>3</sup>, an increase from the 147 Mm<sup>3</sup> presented in the Application; and
- the tailings placement schedule has been adjusted to accommodate the increased volume of tailings. Thickened tailings and TSRU tailings will be report to the ETTC for approximately 18 years prior to being directed to the Pit 1 Tailings Cell, compared with the 14 years described in the Application.

## **4.7 UTILITIES AND INFRASTRUCTURE**

Key changes to utilities and infrastructure since the Application was filed include:

- the Fresh Water Reservoir has been combined with the Raw Water Pond into what is now collectively referred to as the Fresh Water Reservoir, with this facility positioned on OSL 900 lease area north of the Plant site;
- the river water pipeline, which has been realigned to terminate at the new Fresh Water Reservoir, has been designed to avoid the risk of freezing so that no minimum flow is required;
- the Recycle Water Pond referred to in the Application is now referred to as the Cold Process Water Pond, though these terms are interchangeable and refer to the same pond; and
- the electrical interconnection plan has been updated based on an Alberta Electric Systems Operator (AESO) proposal presented to Synenco.

## **4.8 MATERIALS AND ENERGY BALANCES**

The material and energy balances have been updated to reflect the refinements to the Project since the Application was filed.

## **5.0 SUMMARY OF MANAGEMENT PLANS UPDATE**

The following sections provide brief summaries of refinements made to the management plans (Part 2B) for the development of the Project. Part 2B provides the detailed description of those management plans that were updated and originally provided in Volume 3 of the Application. The refinements to the management plans are not considered to be fundamental changes to the Project.

### **5.1 GENERAL**

The following management plans from Volume 3 of the Application have not been updated for the Supplemental Submission:

- Health, Safety and Environment Management;
- Integrated Landscape Management;
- Air Emissions Management;
- Conceptual Fish Habitat Compensation Plan; and
- Chemical and Waste Management.

SIRs related to the information presented in these management plans have been responded to in Part 3 of the Supplemental Submission. In the case of the Conceptual Fish Habitat Compensation Plan, Synenco is currently working with Fisheries and Oceans Canada and stakeholders to develop a more detailed No Net Loss Plan.

The following management plans were updated and are summarized below:

- Community and Stakeholder Engagement Program (summarized in Part 1, Section 7.0);
- Water and Wastewater Management;
- Closure, Conservation and Reclamation Plan; and
- Participation in Regional Cooperative Efforts.

## 5.2 WATER MANAGEMENT PLAN

The Water Management Plan has been modified based on refinements to the Project since the Application, the completion of the Water Management Framework for the Lower Athabasca River (AENV and DFO 2007) and stakeholder concerns. The key modifications include:

- an updated water balance resulting in a decrease in the maximum water license request for water withdrawal from the Athabasca River (from 20.9 to 17.8Mm<sup>3</sup>);
- a non-staged water license request over the life of the Project as opposed to the staged request indicated in the Application (i.e., 17.8 Mm<sup>3</sup> per year for the life of the Project based on conservative estimates); and
- a modified water storage and contingency plan that includes the provision of at least three months equivalent storage to meet water demands in the case of a complete restrictions for withdrawals from the Athabasca River.

These modifications have created a more robust plan to ensure a secure water source for the Project and to accommodate potential withdrawal restrictions as a result of the Water Management Framework for the Lower Athabasca River.

## 5.3 CLOSURE, CONSERVATION AND RECLAMATION PLAN

The Closure, Conservation and Reclamation Plan (CC&R Plan) has been updated to reflect the following:

- AENV's updated reclamation criteria as provided in recent *Environmental Protection and Enhancement Act* approvals for oil sands mining operations; and
- the updated mine plan and the associated baseline information for the revised footprint.

There are no fundamental changes to the CC&R Plan.

## 5.4 PARTICIPATION IN REGIONAL COOPERATIVE EFFORTS

This section has been updated to reflect Synenco's ongoing commitment to strategic participation in regional cooperative efforts.

## **6.0 SUMMARY OF ENVIRONMENTAL IMPACT ASSESSMENT UPDATE**

### **6.1 INTRODUCTION**

This section provides updates for the Environmental Impact Assessment (EIA) components presented in Volumes 5 through 8 of the Application. These updates directly support or supply responses for the Supplemental Information Requests received from Alberta Environment (AENV) and the Alberta Energy and Utilities Board (EUB). These updates also consider design refinements to the Northern Lights Mining and Extraction Project (the Project), address issues that were raised in discussions with stakeholders after submission of the Application, and address issues resulting from regulatory change (e.g., EUB Noise Control Directive 038 and approval of other oil sands projects since the submission of the Application).

The updates for each of the EIA components indicate that there are no fundamental changes to the conclusions identified in the Application and no unacceptable environmental or social effects are predicted in association with the Project.

A summary of the updated information for each of the assessments is described in this section. More details of the updates are provided throughout Part 2C, with supporting information provided in Part 4 of the Project Update.

### **6.2 AIR QUALITY AND CLIMATE**

The air quality and climate assessment in Volume 5, Section 2.0 of the Application, was updated to evaluate refinements in the Project design. These refinements include the relocation of facilities, an updated mine fleet, refinements to stack parameters and an update of the assessment cases to reflect recent approval of regional developments and disclosure of additional planned projects.

Based on these refinements and the consideration of predictions, the Project is not expected to contribute to a substantive increase in maximum ground-level Criteria Air Contaminants (CAC) concentrations. Dispersion modelling results indicate that maximum predicted ground-level concentrations for all CACs have declined substantially relative to the predictions provided in the Application. As concluded in the Application, Project changes to air quality and climate change are not considered to be of consequence.

Relative to the predictions provided in the Application, dispersion modelling results for the Project Alone Case indicated that maximum predicted ground-level concentrations for all CACs have declined between 23 and 98%. There are no exceedances of any Alberta Ambient Air Quality Objectives (AAAQO) associated with the Project Alone Case. With the exception of predicted PM<sub>2.5</sub> concentrations, there are no predicted exceedances of any of the AAAQO within the Local Study Area (LSA) for any assessment case.

The Project is not predicted to substantially contribute to an increase in maximum ground-level concentrations compared to the Baseline Case. The maximum predicted ground-level sulphur dioxide (SO<sub>2</sub>) and nitrogen dioxide (NO<sub>2</sub>) concentrations in the LSA and the Regional Study Area (RSA) are predicted to remain essentially unchanged between the Baseline and Application cases. The maximum predicted ground-level carbon monoxide (CO) concentrations in the LSA are predicted to increase 0.2 to 13.5% between the Baseline and Application cases; however, remain unchanged in the RSA. The maximum predicted ground-level particulate matter (PM<sub>2.5</sub>) concentrations in the LSA are predicted to increase 1.9% in the LSA and 0.4% in the RSA.

### **6.3 NOISE**

The noise assessment in Volume 5, Section 3.0 of the Application was updated to account for refinements to the Project and to meet the requirements of the revised EUB Noise Control Directive 038 issued in February 2007.

The updated assessment indicates that the effects of noise are not substantially different from the results presented in the Application in which noise from the Project was determined to be not of consequence during all Project phases.

A slight reduction in residual noise at 1.5 km is predicted, although no substantial change is expected in residual noise at the hunter-trapper cabins or at the Project camps. A review of the cumulative environmental noise was conducted which included ambient conditions, the Kearl project and the Project. No changes are expected in cumulative noise.

Compliance with the revised directive is expected at all locations.

### **6.4 SOILS AND TERRAIN**

The soils and terrain assessment in Volume 6, Section 2.0 of the Application was updated by reviewing changes in areas and volumes of soils related to the updated Project footprint, re-assessing the effects of Potential Acid Input (PAI)

and nitrogen (N)-deposition for soils as a result of the updated air quality modelling, and incorporating the results of a fall 2006 soil survey on the OSL 900 lease area.

Residual environmental effects to soil and terrain from the Project include positive increases in total land area capable of sustaining forest vegetation, and negative effects with respect to soil moisture regime, change of landforms and potential soil acidification. Project activities in the construction, operations and reclamation phases are expected to result in a loss of wetlands and organic soils within the LSA, and a small increased potential to acidify sensitive soils in the RSA. With the exception of potential for acidification of soil, there are no changes to the evaluation of environmental consequence as a result of changes to the Project design. The potential acidifying effect is considered negligible in magnitude and negligible in consequence.

Overall, the effects on soils and terrain are not considered to be of consequence.

## 6.5 VEGETATION

The vegetation assessment in Volume 6, Section 3.0 of the Application was updated by reviewing changes of vegetation related to the updated Project footprint, the change in the distribution and extent of critical levels of NO<sub>2</sub> and SO<sub>2</sub>, and critical loads of PAI and N-deposition for vegetation. Baseline vegetation information, including rare plant data, collected during a fall 2006 survey of the OSL 900 lease area has been incorporated into the update.

Overall residual effects remain unchanged between the update and the Application. Although the Project will have moderate overall local effects on vegetation types, wetlands, riparian habitats and old growth forests due to land clearing associated with facility construction, these effects are low in the regional context. Other overall effects on habitat diversity from dewatering and Project emissions were assessed as low. The Project will have a high combined overall effect on species diversity both locally and regionally. Reclamation of the Project will result in a positive effect to the number of natural patches, linear developments and level of anthropogenic edge to area in the LSA. Effects on both traditional use plant potential and berry species availability following closure were assessed as moderate (plant potential) or are positive (berry availability). The overall vegetation assessment conclusions remain unchanged from the Application.

## **6.6 WILDLIFE**

The wildlife assessment in Volume 6, Section 4.0 of the Application was updated to account for refinements to the Project footprint. The updated baseline description incorporates additional field programs carried out on the OSL 900 lease area. These consisted of a waterfowl staging survey and beaver lodge aerial survey in September 2006 and a winter tracking survey in March 2007. Results of a nocturnal rail survey conducted across the Project area in June 2007 have also been incorporated into the Wildlife component update.

Overall, the Project will have high local effects on wildlife habitat availability during operations due to land clearing associated with facility construction. However, positive effects for all wildlife species groups were assessed for closure, with the exception of woodland caribou, for which residual effects remained as high.

Overall, the conclusions from the Application remain unchanged.

## **6.7 BIODIVERSITY**

The biodiversity assessment in Volume 6, Section 5.0 of the Application was included with the updated vegetation and wildlife sections. The predictions for the updated assessment of vegetation habitat, vegetation species and wildlife species diversity resulted in the same residual effects predictions as were described in the Application.

## **6.8 GROUNDWATER**

The groundwater assessment in Volume 7, Section 2.0 of the Application was updated by adding information from the 2006/2007 winter drilling program in the OSL 900 lease area and groundwater pumping tests in the Project area. Additional information on groundwater quality was also added.

Quaternary dewatering and Devonian depressurization is essential for mining operations. The temporary depletion of these groundwater resources was previously assessed as being of low consequence at a medium level of confidence. The level of confidence has increased to high supported by the 2007 winter pumping tests. The results of the tests indicate that the broader area drawdown predicted in the Application is unlikely to occur.

There are no other changes to the conclusions for groundwater quality as detailed in the Application. Process-affected water sources will continue to be engineered for containment, complemented with regularly conducted groundwater quality monitoring.

Early detection through the planned groundwater monitoring program will enable prompt implementation of management measures. Management options, depending on the actual nature of the developing effect, would range from natural attenuation to intervention. Possible effects, as before, are assessed as having a low environmental consequence. Confidence is high in this assessment.

For comparatively low strength process-affected water sources, some relatively low-grade groundwater quality degradation is expected to occur. However, concentrations are generally expected to be only slightly elevated above background. More discrete plumes (e.g., in association with the ETTC and Pit Lake 1) are possible, but would be of a focused spatial nature and of relatively low chemical strength.

In summary, the changes to the magnitude and geographical extent of groundwater quantity and quality remain the same as the Application except that drawdown in the Devonian and in the quaternary blanket at the LSA level is reduced compared to the Application.

## **6.9 SURFACE WATER QUANTITY**

The surface water quantity assessment in Volume 7, Section 3.0 of the Application, was updated by adding information on waterbodies in the OSL 900 lease area and through a review of the effects of the updated PDA on the waterbodies and watercourses across the entire Project area. In association with the surface water quantity assessment, revisions to the closure drainage plan were also completed for the modified PDA.

The surface water quantity assessment update has resulted in effects ratings that are mostly lower than those described in Volume 7, Section 3.0 of the Application. The updated effects are generally in the negligible to low category, except at the mouth of the Marguerite River tributary Beaver Creek (Node U0), where effects could be in the moderate category. For Node U0, the predicted moderate level of flow reductions has been accounted for in the water quality and fish habitat assessments.

## **6.10 SURFACE WATER QUALITY**

The surface water quality assessment in Volume 7, Section 4.0 of the Application was updated through additional water quality data from the waterbodies in the OSL 900 lease area and through remodelling of the effects of the updated Project footprint on water quality.

Project activities during the active life of the mine are generally predicted to result in negligible to minor changes to water quality in waterbodies and watercourses potentially affected by the Project. Levels of acute and chronic whole effluent toxicity are predicted to be below the threshold values. More notable changes to receiving water quality are predicted to occur after final site reclamation, because of pit lake outflows and, to a lesser extent, groundwater seepage. The magnitude of change is greatest in the small streams and waterbodies located immediately downstream of the pit lakes, with much smaller changes predicted to occur in the Firebag and Marguerite rivers. Water quality in the Athabasca River is largely unaffected by reclamation activity under all cases.

Acidifying emissions from the Project are not expected to result in any additional critical load exceedances beyond the 23 lakes that are predicted to potentially exceed critical loads under the Baseline Case. For the lakes where lake net PAI values are above critical loads under the Baseline Case, the percent increase in net PAI from the Baseline Case to Application Case is not expected to change the number of lakes at risk of acidification. Therefore, the release of acidifying substances from the Project is expected to have a negligible effect on pH levels in lakes in the region. Similarly, Project-related emissions are not predicted to affect the frequency and severity of potential episodic stream acidification.

## **6.11 AQUATIC RESOURCES**

The aquatic resources assessment in Volume 7, Section 5.0 of the Application was updated by adding data from field work completed within the OSL 900 lease area in September 2006 to document existing fish habitat conditions at an unnamed tributary to the Firebag River and an unnamed tributary to the Marguerite River. The effects of the updated Project footprint and updated reclamation and closure plans on aquatic resources are included in the update.

The updated assessment determined that there would be no changes to the effects ratings for aquatic resources compared to the Application. The Project will result in an increase in direct effects to fish-bearing watercourses and a decrease in direct effects to fish-bearing and non fish-bearing lakes. A detailed No Net Loss (NNL) Plan is being prepared that will replace directly affected fish habitat at a

2:1 ratio. No changes to the effects rating for benthic invertebrate habitat, surface water levels or angling pressure are expected due to the Project refinements.

## **6.12 LAND USE, ACCESS TO PUBLIC LANDS AND RESOURCE CONSERVATION**

The land use, access to public lands and resource conservation assessment in Volume 8, Section 2.0 of the Application was updated. The refinements to the Project design that motivated an updated assessment included surface and mineral dispositions and timber reserves within the updated LSA as well as updated oil sands developments in the RSA. All other components of the land use section in the Application remain current.

The effects of the refinements to the Project design on land use, access to public lands and resource conservation are the same as in the Application.

## **6.13 ECOLOGICAL AND HUMAN HEALTH**

The ecological and human health assessments in Volume 8, Section 3.0 of the Application were updated to reflect refinements to the Project and updated air quality and water quality predictions. In addition, an assessment was completed for airborne emissions from the mine operations at the maximum point of impingement (MPOI) outside the fenceline (i.e., beyond the Project area).

### **6.13.1 Human Health**

Hazard quotients for PM<sub>2.5</sub>, acrolein and formaldehyde exceeded the benchmark for Application and CEA cases at the fenceline MPOI; however, given that there are no receptors at the fenceline or the MPOI, and that the 1-hour and 24-hour toxicity values are based on 14- and 30-day exposure periods respectively, risks to human health as a result of the Project are ranked as low.

Exceedances for nickel are based on maximum concentrations that do not account for land use activity patterns (i.e., predicted human occupancy at those locations). Predictions made in the multi-media risk assessment, based on sensitive receptor locations, did not exceed the benchmarks. Therefore, Project contribution to estimated human health risks were ranked as negligible.

Exceedances were noted for the Fort McKay First Nation and Métis receptor associated with COPC accumulation in fish. However, in consideration of the confidence in the assessment discussed above, effects to human health at the

sensitive receptor locations are ranked as low and not of consequence due to conservatism associated with guideline values and evaluation of the results in consideration of background health risks and exposures.

### **6.13.2 Ecological Health**

For the Baseline Case, acute exposure of aquatic receptors to zinc (maximum of median and median of median concentrations) is the only situation for which HQs were expected to exceed 1.0. An HQ value of greater than 1.0 does not automatically indicate that there is an unacceptable level of risk. In this case, the HQ associated with zinc indicates that adverse environmental effects may occur and this risk is rated as moderate in magnitude.

For both the Application and CEA cases, HQs greater than 1.0 were predicted for mallard and belted kingfisher exposed to naphthenic acids, and for chronic exposure of aquatic receptors to labile and refractory naphthenic acids and cadmium. Potential risks from acute exposure to aquatic receptors were identified for zinc, while for sediment receptors, mercury and strontium were identified as presenting a potential risk. The incremental chronic HQ values based on the median of median concentrations were all less than 1.0. As was the case in the Baseline Case, acute exposure of aquatic receptors to zinc (maximum of median and median of median concentrations) is expected to result in an HQ greater than 1.0. For sediment receptors, chronic HQs based on the maximum of median concentrations of total mercury and strontium exceeded 1.0 but were below this threshold when median concentrations were used.

Results of the updated ERA predicts that mallard and belted kingfisher may experience adverse effects from exposure to naphthenic acids in the Application and CEA cases and the potential for this risk is rated as moderate in magnitude. It also suggests that there is a low potential for future acute or chronic adverse effects in wildlife exposed to aged oil sands tailings or process waters.

There is a probability that adverse environmental effects may be observed as a result of aquatic receptors being exposed to these COPCs, and since HQs were between 1.0 and 10, this risk is rated as moderate in magnitude. However, examination of the underlying water quality data suggests that the EPC values for these substances tend to be driven by conditions that are predicted to occur at specific nodes proximal to the pit lakes, and at specific times in the future (i.e., 2052). On this basis, risks to aquatic and other receptors associated with COPCs originating from the pit lakes would be amenable to monitoring and management, as required.

## **6.14 TRADITIONAL ECOLOGICAL KNOWLEDGE AND LAND USE**

The traditional ecological knowledge and land use assessment in Volume 8, Section 4.0 of the Application was updated only through the addition of a statement acknowledging that a Traditional Ecological Knowledge (TEK) and Traditional Land Use (TLU) study was completed with the Mikisew Cree First Nation requesting that the report remain confidential.

Synenco worked with the Athabasca Chipewyan First Nation (ACFN), Mikisew Cree First Nation (Mikisew), Fort Chipewyan Métis Local 125 (Métis 125) and Fort McKay First Nation (FMFN) to complete TEK and TLU assessments for the Application. The assessments for ACFN, FMFN and Métis 125 were included in the Application. Mikisew decided to not share specific TLU information with Synenco, but did participate in TEK-focused interviews that were in progress at the time of the submission of the Application. The interviews have been completed and the final report approved by the Mikisew IRC. Mikisew has requested that the report remain confidential and not be included in the Supplemental Submission. Synenco is honouring that request. There is no further update on the TEK/TLU component of the Application.

## **6.15 HISTORICAL RESOURCES**

The historical resources assessment in Volume 8, Section 5.0 of the Application, was updated by adding information collected in field programs for the Project area, as requested by Alberta Tourism, Parks, Recreation and Culture (ATPRC), and an Historical Resources Impact Assessment (HRIA) carried out specifically for the OSL 900 lease area.

The results of the additional field and archival research on the historical resources of the LSA have not altered the assessment of the residual effects of the Project on heritage resources.

## **6.16 SOCIO-ECONOMIC IMPACT ASSESSMENT**

Volume 8, Section 6.0, Socio-Economic Assessment was updated by re-assessing the Project effects based on Project changes including, increased Project costs, revision to the construction schedule and the identification of a Modularization Construction Strategy (MCS) in addition to the Conventional Construction Strategy (CCS) described in the Application.

The Project effects as identified in the Application are not materially affected by the increased capital and operating cost estimates for either the MSC or the CCS. The social effects of the Project are muted due to its camp-based operations, its fly-in, fly-out operations, the refinements in the construction strategy and scheduling, and the mitigation measures identified in the Application as well as the mitigation measures announced by governments after the Application was filed. The effects assessment in the SEIA Update is based on the more conservative CCS to evaluate maximum predicted effects. The MCS will have smaller effects during construction owing to its reduced construction workforce, shorter construction period and reduced reliance on highway transportation.

In summary:

- The Project constructed using the MCS will use overseas fabrication shops to construct large modules which will be transported to the Project site by a transportation provider. This enables the Project to be constructed in a single phase over a 39 month construction schedule starting in Q1 2009 and completed in 2012. The peak on-site construction workforce is 910.
- The Project's economic benefits include:
  - capital cost of \$4.4 billion, of which 26%, or nearly \$1.1 billion, is estimated to be spent in Alberta;
  - an estimated \$25 million of construction spending accruing to the local area.
  - total annual operation expenditures of approximately \$564 million, 81% of which or \$457 million is expected to be spent in Alberta;
  - approximately \$42 million annually in local spending on operations-related purchases of materials, supplies and services and a total direct, indirect and induced income effect in the region of \$45 million annually during the operations phase;
  - approximately 1,260 person-years in direct employment and an estimated 3,340 person-years in direct, indirect and induced employment over the construction period;
  - a regional employment effect including direct, indirect and induced employment of 240 person-years during construction;
  - an operational workforce of 1,275 workers including employees and contractors;
  - a total annual employment effect in Alberta of 3,210 person-years during operations;
  - a regional annual employment effect including direct, indirect and induced employment of 208 person-years during operations; and

- an estimated \$6.2 billion in revenues accruing to all levels of government over the life of the Project (based on the tax and royalty schemes in place as of September 1, 2007).

## **7.0 SUMMARY OF COMMUNITY AND STAKEHOLDER ENGAGEMENT UPDATE**

The Community and Stakeholder Engagement Plan has been updated to provide details on the progress since June 2006 and further describe the next phases of the engagement and consultation activities that will be undertaken as part of the Project. There are no fundamental changes to the principles of the engagement program and Synenco remains committed to engaging and consulting with communities and stakeholders in all aspects of the Project - from Project design, through construction, operations, progressive reclamation, final closure and decommissioning to post closure. Part 2B, Section 2 provides additional details on the Community and Stakeholder Engagement Update.

Since June 2006, Synenco continued into Phase 4 of the engagement program (Phases 1 through 3 are described in Volume 3, Section 2 of the Application). Phase 4, Maintain Support for the Sequenced Application, took place during the summer and fall of 2006. The purpose of this phase was to continue to build on community and stakeholder relationships developed during prior engagement efforts, explain the sequenced Application, confirm expectations regarding the Application process, provide communities and stakeholders the opportunity to review the Project Description and supporting material filed in June 2006, and identify any initial concerns or issues. During this phase, a number of one-on-one meetings were held with First Nations, Métis, communities and other stakeholder potentially affected by the nature and scope of the Project.

Phase 5, Reinforce Commitment to the Community, took place in late 2006/ early 2007. The purpose of this phase was to identify and record community and stakeholder concerns or issues in regard for the completed filing of the Application in November 2006 and to identify options for how those concerns and issues would be addressed. Additional one-on-one meetings were held with First Nations, Métis, communities and other stakeholders potentially affected by the nature and scope of the Project.

Phase 6, Notice of Application and Public Review, took place during the public review period leading up to the deadline for Statements of Concern (SOCs). The purpose of this phase was to be present and visible in the communities potentially affected by the Project and to be available for First Nations, Métis, other Aboriginal peoples and key stakeholders during the formal public review period to address issues and concerns where possible.

Synenco is currently in Phase 7, Supplemental Information, of the engagement program. The main purpose of this phase is to continue to work with

communities and stakeholders, provide them with the Supplemental Submission (which includes the SIR responses), respond to their SOCs and keep them up to date on the Project. One-on-one meetings with First Nations, Métis, communities and other stakeholder potentially affected by the nature and scope of the Project will also take place during this phase.

Synenco continues to collaborate with communities and stakeholders at every potential opportunity. Synenco will continue to apply a phased approach to our efforts and detailed community and stakeholder engagement and consultation plans will be developed, linked to both the Project regulatory process and the stage of the Project development.