

**DRAFT TERMS OF REFERENCE  
ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT**

**FOR THE**

**ALBERTA SULPHUR TERMINALS**

**SULPHUR FORMING AND SHIPPING FACILITY**

(formerly referred to as the Bruderheim Sulphur Forming & Pastille Storage Facility)

**located  
approximately 2.2km East of Bruderheim, Alberta  
within Lamont County's Industrial Heartland**

**DRAFTED BY: ALBERTA SULPHUR TERMINALS**

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## Table of Contents

<b>1.</b>	<b>INTRODUCTION.....</b>	<b>1 -</b>
1.1	Purpose.....	1 -
1.2	Scope of Environmental Impact Assessment Report.....	1 -
1.3	Public Consultation .....	2 -
1.4	Proponent’s Submission .....	2 -
<b>2.</b>	<b>PROJECT OVERVIEW INFORMATION REQUIREMENTS .....</b>	<b>2 -</b>
2.1	Alberta Sulphur Terminals Ltd.....	2 -
2.2	Project Need and Alternatives Considered .....	2 -
2.3	Project Components and Development Timing.....	2 -
2.4	Regulatory and Planning Framework and Classifications .....	3 -
2.5	Principal Development Area and EIA Study Area .....	3 -
2.6	EIA Summary.....	3 -
<b>3.</b>	<b>PROJECT DESCRIPTION AND MANAGEMENT PLANS.....</b>	<b>4 -</b>
3.1	Project Components and Site Selection.....	4 -
3.1.1	Project Components.....	4 -
3.1.2	Site Selection .....	4 -
3.2	Process Description .....	5 -
3.3	Product Handling.....	5 -
3.4	Utilities and Transportation.....	5 -
3.5	Water Supply, Water Management and Wastewater Management .....	5 -
3.5.1	Water Supply .....	5 -
3.5.2	Water Management.....	6 -
3.5.3	Wastewater Management.....	6 -
3.6	Air Emissions Management .....	6 -
3.6.1	Greenhouse Gas Emissions.....	7 -
3.7	Hydrocarbon, Chemical and Waste Management .....	7 -
3.8	Environmental Management System and Contingency Plans .....	8 -
3.9	Adaptation Planning .....	8 -
3.10	Participation in Regional Cooperative Efforts.....	8 -
<b>4.</b>	<b>ENVIRONMENTAL INFORMATION AND CUMULATIVE EFFECTS ASSESSMENT INFORMATION REQUIREMENTS.....</b>	<b>9 -</b>
4.1	Assessment Scenarios.....	9 -
4.2	Information Requirements for the Environmental Assessment .....	9 -
4.3	Modeling .....	10 -
4.4	Cumulative Environmental Effects .....	10 -
4.5	EIA Study Area .....	10 -
4.6	Climate and Air Quality .....	11 -
4.6.1	Climate Change .....	11 -
4.7	Noise and Light .....	11 -
4.8	Land Use and Reclamation.....	12 -
4.9	Terrestrial .....	12 -
4.9.1	General Terrestrial Considerations .....	12 -
4.9.2	Soil.....	13 -
4.9.3	Vegetation.....	13 -
4.9.4	Wildlife.....	13 -
4.9.5	Biodiversity and Fragmentation.....	14 -
4.10	Surface Water and Groundwater .....	14 -
4.10.1	Surface Water Hydrology and Quality.....	14 -
4.10.2	Groundwater Quantity and Quality.....	15 -
4.11	Aquatic Resources.....	16 -
<b>5.</b>	<b>ENVIRONMENTAL EFFECTS MONITORING .....</b>	<b>16 -</b>
<b>6.</b>	<b>PUBLIC HEALTH AND SAFETY .....</b>	<b>17 -</b>
<b>7.</b>	<b>HISTORICAL RESOURCES.....</b>	<b>17 -</b>
<b>8.</b>	<b>SOCIO-ECONOMIC FACTORS .....</b>	<b>18 -</b>
<b>9.</b>	<b>PUBLIC CONSULTATION REQUIREMENTS .....</b>	<b>18 -</b>

## **1. INTRODUCTION**

### **1.1 Purpose**

The purpose of this document is to identify for Alberta Sulphur Terminals (AST), a division of Hazco Environmental Services (Hazco) and CCS Income Trust (CCS), and appropriate stakeholders the information required by government agencies for an Environmental Impact Assessment (EIA) report. AST will prepare and submit an EIA report that examines the environmental and socio-economic effects of the construction, operation and reclamation of the proposed facility (the Project).

The Project includes the construction and operation of facilities for sulphur forming, sulphur pastille storage and shipment for export. The proposed facility is to be developed on a portion of Section 35, Township 55, Range 20, West of the 4<sup>th</sup> Meridian (the Site), which is located approximately 2.2 km east of Bruderheim, Alberta. The project is located within the Industrial Heartland area of Lamont County. The project includes the development of rail and road access for receiving and shipping sulphur, liquid sulphur unloading and transfer facilities, sulphur forming facilities to produce sulphur pastilles and loading and shipping facilities for formed sulphur. All project infrastructure and activities will be confined to and occupy the lands (35-55-20 W4M) owned by the Project proponent.

AST will service oil and gas production and refining operations located in the Fort Saskatchewan area as well as North Eastern Alberta. With increased applications, approvals and operation of bitumen up graders and ongoing sulphur recovery initiatives, a shortage of sulphur forming facilities in Alberta has become apparent. AST will provide area oil and gas producers with a state of the art sulphur forming, pastille storage and shipping facility that will include design elements and monitoring programs that focus on environmental protection.

### **1.2 Scope of Environmental Impact Assessment Report**

The EIA report shall be prepared in accordance with these Terms of Reference and the environmental information requirements prescribed under the Environmental Protection and Enhancement Act (EPEA), Water Act and any federal legislation which may apply to the Project. The EIA report will:

- a) assist the public and government in understanding the environmental and socio-economic consequences of the Project's development, operation and reclamation plans and will assist AST in its decision-making process;
- b) address:
  - i. project impacts;
  - ii. mitigation options; and
  - iii. residual effects relevant to the assessment of the Project including, as appropriate, those related to other industrial operations. As appropriate for the various types of impacts, predictions shall be presented in terms of magnitude, frequency, duration, seasonal timing, reversibility and geographic extent;
- c) discuss possible measures, including established measures and possible improvements based on research and development to:
  - i. prevent or mitigate impacts;
  - ii. assist in the monitoring of environmental protection measures; and

- iii. identify residual environmental impacts and their significance including cumulative and regional development considerations.
- d) include tables that cross-reference the report (subsections) to the EIA Terms of Reference; and
- e) include a glossary of terms and a list of abbreviations to assist the reader in understanding the material presented.

The EIA report will form part of AST's Application to Alberta Environment

### **1.3 Public Consultation**

The preparation of the EIA report will include a public consultation program to assist with project scoping and issue identification, documenting the results of these consultations (see Section 9.0). The public consultation program is to communicate with those members of the public who may be affected by the Project and to provide them with an opportunity to participate in the Environmental Assessment process.

### **1.4 Proponent's Submission**

AST is responsible for the preparation of the EIA report and related applications. The final submission will be based upon these Terms of Reference and issues raised during the public consultation process.

## **2. PROJECT OVERVIEW INFORMATION REQUIREMENTS**

AST is expected to provide: an overview of the Project, the key environmental, resource management, and socio-economic issues that, from the proponent's perspective, are important for a public interest decision; and the results of the Environmental Assessment process.

### **2.1 Alberta Sulphur Terminals Ltd.**

Present a corporate profile of the proponent and state who is responsible for the development, management and operation of the Project.

### **2.2 Project Need and Alternatives Considered**

Discuss the need for the Project, the alternatives to the Project, and the potential alternative of not proceeding with the Project. Address the following:

- a) an analysis of the alternative means of carrying out the Project that are technically and economically-feasible and indicate their potential environmental effects and impacts with the rationale for selecting the proposed option;
- b) how a balance between environmental, resource recovery or conservation and economic goals has been achieved through planning and preliminary design, highlighting any areas where planning focused on one goal in exclusion of others;
- c) contingency plans, if major project components or methods prove to be unfeasible or do not perform as expected;
- d) potential cooperative development opportunities and the implications of the Project for ongoing regional management and research initiatives; and
- e) environmental performance of the technology and a comparison to the alternative technologies considered.

### **2.3 Project Components and Development Timing**

Provide an overview of the project activities and physical components. Specifically, address the following:

- a) a summary list, brief description and drawings of project components and activities which are addressed in detail under Section 3.0; and,
- b) proposed activity stages or phases and a likely development schedule, explaining:
  - i. the timing of key construction, operation and reclamation activities;
  - ii. the expected duration of each for the life of the Project;
  - iii. the key factors controlling the schedule and uncertainties; and
  - iv. the implications of a delay in the Project and include the regulatory process as a consideration in the likely development schedule.

#### **2.4 Regulatory and Planning Framework and Classifications**

Identify the legislation, policies, approvals, and current multi-stakeholder planning initiatives applicable to the review of this Project. List the major components of the Project that will be applied for and constructed within the duration of any potential approvals under the EPEA and address the following:

- a) other regulatory approvals that are required and any approvals that have already been issued including provincial, municipal, and applicable federal government requirements;
- b) the primary focus of each regulatory requirement, such as resource allocation, environmental protection, land use/development, and the element(s) of the Project subject to the regulation;
- c) any regulatory classification systems which apply to the Project, such as solid waste or air pollution classifications and land use zones, and
- d) summary of the objectives, standards, or guidelines that have been used by AST to assist in the evaluation of the significance of effects.

#### **2.5 Principal Development Area and EIA Study Area**

The Principal Development Area (PDA) includes all lands subject to direct disturbance from the Project and associated infrastructure, including access and utility corridors. For the PDA, provide:

- a) the legal land description;
- b) the boundaries of the PDA;
- c) a map that identifies the locations of all proposed development activities; and
- d) a map and photo mosaic showing the area proposed to be disturbed in relation to existing topographic features, township grids, wetlands and water bodies.

Study Areas for the EIA report include the PDA and other areas based on individual environmental components where an effect from the proposed development can reasonably be expected. Provide:

- e) the rationale used to define Local and Regional Study Areas (see also Section 4.5), considering the location and range of probable project and cumulative effects including those related to regional or local developments; and
- f) illustrate boundaries, and identify Local and Regional Study Areas chosen to assess impacts on maps of appropriate scale.

#### **2.6 EIA Summary**

Provide a summary of the EIA report results that includes:

- i. a description of the development activities highlighting those which have the potential to affect the environment;
- ii. the existing conditions in the relevant Study Areas;
- iii. any residual effects;

- iv. proposed mitigation measures, monitoring and management plans; and
- v. the anticipated environmental effects including cumulative considerations.

List and discuss the key environmental issues and the issues that are important for the achievement of sustainable environmental and resource management that were identified during the preparation of the EIA report and public consultation. Differentiate between emerging issues (with ongoing uncertainties) with quantifiable and significant environmental effects, and issues that can be resolved through available technology and existing management approaches.

Provide a matrix or summary chart to describe this section.

### **3. PROJECT DESCRIPTION AND MANAGEMENT PLANS**

Describe activities and components of the Project and relevant management plans. Provide sufficient scope and detail in the project description information to allow quantitative assessment of the environmental consequences. If the scope of information varies among components or phases of the Project, provide rationale demonstrating that the information is sufficient for assessment purposes.

Technical information required in this section may also be required for an EPEA approval application. Information required in this section may be provided in other parts of AST's submission(s) provided that the location of the information is referenced in the EIA report. AST should ensure consistency in the information provided, whenever it is discussed in more than one section of the submission.

#### **3.1 Project Components and Site Selection**

##### **3.1.1 Project Components**

Describe the nature, size, location and duration of the significant components of the Project including, but not limited to, the following:

- a) the plant site and any chemical/fluids storage locations;
- b) design capacities of the Project and the changes in design capacities;
- c) temporary structures, dewatering, water control facilities, and processing/treatment facilities;
- d) buildings and infrastructure, transportation, utilities, access routes, and storage areas;
- e) the types and amounts of waste materials, and locations of waste storage, and disposal sites;
- f) a site development plan to illustrate the locations of components including an outline of the proposed phasing and sequencing of components (include pre-construction, construction, operation, reclamation, decommissioning, and end land use);
- g) how AST has used community input for project design and development; and
- h) potential cooperative ventures to minimize environmental impacts.

##### **3.1.2 Site Selection**

Discuss the site selection process including, but not limited to, the following:

- a) factors that were considered in determining the preferred plant site and associated processing facilities;
- b) the site selection process for the proposed location of the project components;
- c) the rationale for choosing the proposed sites instead of alternative sites;
- d) the technical, economical, and environmental criteria considered;

- e) potential impacts on environmental and land use conditions; and
- f) suitable maps showing the location of proposed facilities.

### **3.2 Process Description**

Provide material balances, energy balances, flow diagrams, and descriptions of the processes including:

- a) energy efficiency and process efficiency of the technologies chosen;
- b) shared facilities and utilities associated with the Project;
- c) chemicals needed for sulphur forming and storage processes included in the Project;
- d) project inputs such as energy and water, and outputs such as emissions and wastes; and
- e) source of major feed materials for the sulphur forming process.

### **3.3 Product Handling**

Identify the location and amount of all on-site storage associated with sulphur forming including storage of chemicals, products, by-products, intermediates and wastes (additional detail can be found in Section 3.7). Explain containment and environmental protection measures to be used.

### **3.4 Utilities and Transportation**

Describe and discuss the project energy requirements, and associated infrastructure and other infrastructure requirements including, but not limited to, the following:

- a) the amount and source of energy required for the Project;
- b) the options considered for supplying the thermal energy and electrical power required for the Project and their environmental implications;
- c) worker accommodations and travel routes to the plant site during construction and operation phases, including:
  - i. desired traffic routing;
  - ii. control methods; and
  - iii. road use agreements.
- d) any expected changes and impacts in traffic volume by Average Annual Daily Traffic (AADT) and any seasonal variability in traffic volume, from the Project;
- e) the result of consultation with the local transportation authorities including transportation studies that are underway or planned;
- f) cumulative impacts on the transportation network including information regarding the upgrading requirement for Highway 15 and effect on Highway 45 and Range Road 202 due to the increase of traffic as a result of the Project;
- g) the adequacy in design and upgrades required of all utility lines, roads, and pipeline crossings of roads, rivers and streams with respect to the construction;
- h) design features to prevent spills, contingencies for spill response and environmental risks associated with spills; and
- i) plans to minimize the impact on area residents.

### **3.5 Water Supply, Water Management and Wastewater Management**

#### **3.5.1 Water Supply**

Describe the Project's water supply requirements including, but not limited to, the following:

- a) the overall water balance(s);

- b) the water requirements for construction, start-up, normal conditions, worst case conditions, emergency operating situations, decommissioning and reclamation;
- c) the variability in the amount of water required on an annual and seasonal basis as the Project is implemented;
- d) the supply options including on-site storage, and
- e) the location of existing sources/intakes and associated infrastructure (pipelines) and potential modifications with the Project.

### **3.5.2 Water Management**

Provide a Water Management Plan including, but not limited to, the following:

- i. measures for ensuring efficient use of water including alternatives to reduce freshwater consumption such as water minimization, recycling, and conservation;
- ii. permanent or temporary alterations or diversions to watercourses and water bodies; and
- iii. factors used in the design of water management facilities including expected flood levels and flood protection.
- iv. Provide an explanation of how these plans will be incorporated into project design.

### **3.5.3 Wastewater Management**

Provide a Wastewater Management Plan to address site runoff, groundwater protection, deep well disposal, and wastewater discharge including, but not limited to, the following:

- a) source, quantity and composition of each wastewater stream from the proposed Project facilities;
- b) those waste substances produced by the Project in sufficient quantities to be reportable under National Pollutants Release Inventory (NPRI) requirements;
- c) design of facilities that will handle, treat, and store wastewater streams;
- d) options considered for wastewater treatment and management strategies, and reasons (including water quality and environmental considerations) for selecting the preferred options;
- e) type (chemical names) and quantity of chemicals used in wastewater treatment;
- f) potable water and sewage treatment systems that will be installed as components of the Project for both the construction and operation stages;
- g) the discharge of aqueous contaminants (quantity, quality, and timing) beyond plant site boundaries and the potential environmental effects of such releases;
- h) design parameters for managing site runoff during precipitation or snowmelt events;
- i) programs to monitor the effects of Project operations on local surface and groundwater quantity and quality;
- j) options for wastewater disposal (including zero liquid discharge) as well as the rationale for choosing the preferred options; and
- k) description of how the plan will be incorporated into project design.

### **3.6 Air Emissions Management**

Develop an emissions profile (type, rate and source) for each component of the Project including point sources, fugitive emissions and vehicle emissions. Consider both normal operating conditions and upset conditions. Include definitions for these conditions. Discuss the following:

- a) any emissions produced by the Project in sufficient quantities to be reportable under NPRI requirements;
- b) any odorous or visual emissions from the proposed facilities;

- c) the amount and nature of any acidifying emission, probable deposition patterns and rates, and programs AST may implement to monitor the effects of this deposition;
- d) control technologies used to minimize air emissions such as sulphur dioxide (SO<sub>2</sub>), hydrogen sulphide (H<sub>2</sub>S), oxides of nitrogen (NO<sub>x</sub>), volatile organic compounds (VOC), and particulate matter;
- e) the emission control technologies proposed for the Project in the context of best-available technologies, and the applicability of Canadian Council of Ministers of the Environment (CCME) emission control technology guidelines;
- f) fugitive emissions control program to detect, measure and control emissions and odours from equipment leaks and the applicability of the CCME Code of Practice for Measurement and Control of Fugitive Emissions from Equipment Leaks and the CCME Environmental Guidelines for Controlling Emissions of Volatile Organic Compounds from Above Ground Storage Tanks;
- g) technology or management programs to minimize emissions which lead to formation of particulate matter and ozone (O<sub>3</sub>) having regard to the provisions of the Canada Wide Standard for particulate matter and O<sub>3</sub>;
- h) the incremental contribution of the Project to regional emissions of PM<sub>2.5</sub> and PM<sub>10</sub> and ground-level ozone precursors including NO<sub>x</sub> and sulphur oxides (SO<sub>x</sub>);
- i) gas collection, conservation and applicability of technology for vapour recovery for the Project; and
- j) monitoring programs AST will implement to assess air quality and the effectiveness of mitigation, during the Project's development and operation. Discuss how these monitoring programs are compatible with those in use by regional multi-stakeholder air initiatives.

### **3.6.1 Greenhouse Gas Emissions**

Provide the following:

- a) the expected annual and total greenhouse gas (GHG) emissions over the construction, operation and decommissioning phases of the Project;
- b) the Project's marginal contribution to total provincial and national GHG emissions on an annual basis;

### **3.7 Hydrocarbon, Chemical and Waste Management**

Characterize and quantify the anticipated hazardous, non-hazardous, recyclable and dangerous goods wastes generated or used by the Project. Demonstrate that the selected management options are consistent with the current regulatory requirements and industry practices. Describe and address the following:

- a) the composition and volume of specific waste streams generated by the Project, and identify how each stream will be managed. Demonstrate that the selected practices comply with provincial and federal regulations including EPEA's Waste Control Regulation and Alberta Environment's Hazardous Waste Storage Guidelines;
- b) a listing of chemical products to be used for the Project. Identify products containing substances that are:
  - i. Canadian Environmental Protection Act (CEPA) toxics;
  - ii. on the PSL<sub>2</sub>, and Accelerated Reduction/Elimination of Toxics (ARET), and those defined as dangerous goods pursuant to the federal Transportation of Dangerous Goods Act. Classify the wastes generated and characterize each stream under Alberta Environment User's Guide for Waste Managers;
  - iii. on the National Pollutant Release Inventory (NPRI); and

- iv. on Track 1 substances targeted under Environment Canada's Toxic Substances Management Policy for virtual elimination from the environment due to their persistent, bio-accumulative and toxic nature;
- c) in general terms, how chemical products will be stored and managed to ensure safety and environmental protection;
- d) the strategy for on-site waste disposal versus off-site waste disposal and identify:
  - i. the location of on-site waste disposal, including landfills, if applicable;
  - ii. the suitability of the site(s) from a groundwater protection perspective (provide geo-technical information to support the siting of disposal facilities);
  - iii. the site suitability with regard to existing and potential human activities in the area;
  - iv. potential effects on the environment; and
- e) plans for waste minimization, recycling, and management over the life of the Project. Discuss methods and technologies to reduce waste quantities to the lowest practical levels.

### **3.8 Environmental Management System and Contingency Plans**

Summarize key elements of AST's existing and proposed environmental, health, and safety management system and discuss how it will be integrated into the Project, addressing the following:

- a) corporate policies and procedures, operator competency training, spill and air emission reporting procedures, and emergency response plans;
- b) plans to minimize the production or release into the environment of substances that may have an adverse effect;
- c) a conceptual contingency plan that considers environmental effects associated with operational upset conditions such as serious malfunctions or accidents; and
- d) the emergency response plan's capability to deal with unpredicted negative effects.

### **3.9 Adaptation Planning**

Describe the flexibility built into the plant design and layout to accommodate future modifications required by any change in emission standards, limits and guidelines. Discuss any follow-up programs and adaptive management considerations.

### **3.10 Participation in Regional Cooperative Efforts**

Document AST's involvement in regional cooperative efforts to address environmental and socio-economic issues associated with regional industrial development during the life of the Project, including:

- a) AST's current and planned participation in regional monitoring and management activities such as the Fort Air Partnership to address environmental, health and socio-economic issues;
- b) AST's current and planned cooperative ventures with other operators to minimize the environmental impact of the Project or the environmental impact of regional industrial development;
- c) how AST will work to develop and implement such cooperative opportunities;
- d) monitoring activities that will be undertaken to assist in managing environmental protection strategies. Discuss how any result will contribute to AST's participation in the regional efforts;
- e) how AST will use information from regional cooperative efforts to design and implement mitigation measures (to mitigate project-specific effects and cumulative

- effects), monitoring programs (project-specific and regional monitoring), and research programs; and
- f) how AST would design and implement mitigation measures (to mitigate specific effects and cumulative effects), monitoring programs (project-specific monitoring and regional monitoring), and research programs outside of these initiatives where necessary.

#### **4. ENVIRONMENTAL INFORMATION AND CUMULATIVE EFFECTS ASSESSMENT INFORMATION REQUIREMENTS**

##### **4.1 Assessment Scenarios**

Define assessment scenarios including:

- a) a Baseline Case, which includes existing environmental conditions and existing and approved projects or activities;
- b) an Application Case, which includes the Baseline Case plus the Project; and
- c) a Cumulative Effects Assessment (CEA) Case, which includes past studies, existing and anticipated future environmental conditions, existing projects or activities, plus other planned projects or activities.

Note: For the purposes of defining assessment scenarios, “approved” means approved by any federal, provincial or municipal regulatory authority. “Planned” is considered any project or activity that has been publicly disclosed prior to the issuance of the Terms of Reference or up to six months prior to the submission of the project Application and EIA report, whichever is submitted sooner.

##### **4.2 Information Requirements for the Environmental Assessment**

Basic environmental information requirements for AST’s EIA report include for each relevant section:

- a) quantitative and qualitative information about the existing environmental and ecological processes in the EIA Study Area;
- b) information about the existing and planned human activities in the EIA Study Area, and the nature, size, location and duration of their potential interactions with the environment, sometimes described as stressors (e.g., land disturbance, discharges of pollutants, changes to access status, consumption of renewable resources);
- c) information about ecological processes and natural forces which are expected to produce changes in environmental conditions (e.g., climate change, forest fires, flood or drought conditions, predator-prey population cycles), and which are relevant to the Project;
- d) the demonstrated use of appropriate predictive tools and methods, enabling quantitative estimates of future conditions with the highest possible degree of certainty;
- e) quantitative and qualitative descriptions of the effects;
- f) evaluation of the significance of the effects, including the probability of the effect occurring and the importance of the consequences (measured quantitatively against management objectives and guidelines or baseline conditions and described qualitatively with respect to the views of AST and stakeholders);
- g) a description of air quality impact assessment as it relates to the Alberta Ambient Air Quality Guidelines;
- h) management plans to prevent, minimize or mitigate adverse effects and to monitor and respond to expected or unanticipated conditions, including any follow-up plans

to verify the accuracy of predictions or determine the effectiveness of mitigation plans;

- i) a record of all assumptions, including an evaluation of impact prediction confidence in data and analysis to support conclusions; and
- j) a description of residual effects and their consequences for the environment as well as for regional management initiatives that are underway or in development.

#### **4.3 Modeling**

Document any assumptions used to obtain modeling predictions submitted as part of the EIA report. Clearly identify the limitations of the model(s) including sources of error and relative accuracy.

#### **4.4 Cumulative Environmental Effects**

Assessment of cumulative effects will be an integral component of the EIA report. AST will conduct a cumulative environmental effects assessment of the Project based on the EUB/AENV/NRCB Information Letter "Cumulative Effects Assessment in Environmental Impact Assessment Reports under the Alberta Environmental Protection and Enhancement Act," June 2000. This will include a summary of all proposed monitoring, research and other strategies or plans to minimize, mitigate and manage potential adverse effects. The identification and assessment of the likely cumulative environmental effects of the Project will:

- a) define the spatial and temporal Study Area boundaries and provide the rationale for assumptions used to define those boundaries for each environmental component examined;
- b) describe the current (baseline) state of the environment in the Regional Study Area (used for the cumulative effects assessment);
- c) assess the incremental consequences that are likely to result from the Project in combination with other existing, approved and planned projects in the region;
- d) demonstrate that relevant information or data used from other development projects is appropriate for use in this EIA report;
- e) consider and describe deficiencies or limitations in the existing database for relevant components of the environment; and
- f) explain the approach and methods used to identify and assess cumulative effects, including cooperative opportunities and initiatives undertaken to further the collective understanding of cumulative effects, and provide a record of relevant assumptions, confidence in data and analysis to support conclusions.

#### **4.5 EIA Study Area**

The EIA Study Area shall include the PDA and associated infrastructure, as well as the spatial and temporal areas of individual environmental components outside the PDA boundaries where an effect can be reasonably expected. The EIA Study Area includes both Regional and Local Study Areas.

Illustrate boundaries and identify the Study Areas chosen to assess effects. Define temporal and spatial boundaries for the Study Areas. Maps of these areas shall include township and range lines for easy identification and comparisons with other information within the EIA report. Describe the rationale and assumptions used in establishing the Study Area boundaries, including those related to cumulative effects.

## **4.6 Climate and Air Quality**

Discuss baseline climatic and air quality conditions. Review emission sources and discuss emissions from industrial development within the EIA Study Areas. Consider emission point sources as well as fugitive emissions. Identify components of the Project that will affect air quality from a local and regional perspective, and:

- a) identify any regional air monitoring in the area and describe AST's participation in regional forums (e.g., Northeast Capital Industrial Association, Fort Air Partnership);
- b) discuss appropriate air quality parameters such as SO<sub>2</sub>, carbon monoxide (CO), H<sub>2</sub>S, NO<sub>x</sub> and particulates (PM<sub>2.5/10</sub>) and O<sub>3</sub>;
- c) estimate ground-level concentrations of appropriate air quality parameters. Discuss any expected changes to particulate deposition or acidic deposition (PAI) patterns. Justify the selection of models used and identify any model shortcomings or constraints on findings. Complete modeling in accordance with Alberta Environment's Air Quality Model Guideline. Include model input files;
- d) identify the potential for reduced air quality (including odors and visibility) resulting from AST and discuss any implications of the expected air quality for environmental protection and public health;
- e) discuss interactive effects that may occur as a result of co-exposure of a receptor to all emissions and discuss limitations in the present understanding of this subject;
- f) describe how air quality impacts resulting from the Project will be mitigated;
- g) identify ambient air quality monitoring and receptor monitoring that will be conducted during operation of the Project to assess air quality and the effectiveness of mitigation; and
- h) assess project specific air quality and cumulative air quality impacts, and implications for other environmental resources, including habitat diversity and quantity, vegetation resources, water quality and soil conservation. Discuss the relative contribution of the Project (e.g., after mitigation) to regional cumulative effects.

### **4.6.1 Climate Change**

Discuss the following:

- a) review and discuss climate change and the local and/or regional, inter-provincial/territorial changes to environmental conditions resulting from climate conditions, including trends and projections where available;
- b) identify stages or elements of the Project that are sensitive to changes or variability in climate parameters. Discuss what impacts the change to climate parameters may have on elements of the Project that are sensitive to climate parameters; and
- b) comment on the adaptability of the Project in the event the region's climate changes. Discuss any follow-up programs and adaptive management considerations.

## **4.7 Noise and Light**

Discuss baseline noise and light level conditions. Identify components of the Project that will affect noise and light level, and:

- a) present the results of a noise assessment based on existing conditions as specified by EUB ID 98-08, Noise Control Directive, including:
  - i. an estimate of the potential for increased noise resulting from the Project;
  - ii. the identification of potentially-affected people and wildlife, and
  - iii. the implications of any increased noise levels;
- b) identify facilities that will affect light levels at night and evaluate the potential effects of increased light on affected residents; and

- c) discuss the effects and mitigative measures to be utilized to minimize the production of noise and light.

#### **4.8 Land Use and Reclamation**

Review current land use issues and identify the anticipated changes in nature, location and duration of land use as a result of the Project. Discuss:

- a) conformity with land use objectives and planning parameters for the Lamont County, Alberta's Industrial Heartland Area Structure Plan;
- b) potential project impact on local and regional land use management, residential areas, agricultural development, areas with native vegetation, wildlife habitat, recreation uses, and other industrial uses in the region;
- c) mitigation plans to minimize these effects; and
- d) reclamation concepts and objectives. Develop a conceptual reclamation/closure plan for the PDA considering regulatory requirements, stakeholder input, land use objectives and other factors necessary for a reclamation plan to be implemented.
- e) Discuss how the reclamation/closure plan design will:
- f) return equivalent land capability as compared to pre-disturbance conditions;
- g) integrate the proposed landscape with the surrounding landscapes including inter-connectivity to the surrounding landscapes;
- h) integrate surface- and near-surface drainage within the PDA; and
- i) be incorporated into planning and development of the Project.
- j) Provide and discuss:
- k) the anticipated timeframes for completion of reclamation activities;
- l) the applicable parameters that should be used to monitor and evaluate the reclaimed land;
- m) any constraints to reclamation such as timing of activities, availability of materials and influence of natural processes and cycles; and
- n) any soil-related constraints or limitations that may affect reclamation.

#### **4.9 Terrestrial**

##### **4.9.1 General Terrestrial Considerations**

Review current biophysical conditions and identify the nature, location and duration of changes anticipated as a result of the Project. Provide and discuss the following:

- a) maps indicating the pre-disturbance landscape, elevation and drainage patterns of the Study Areas;
- b) an assessment of the anticipated changes to the pre-disturbed topography, elevation and drainage patterns of the Study Areas;
- c) baseline biophysical conditions, including topography, soil and vegetation characteristics and wildlife capability within the Study Area. Conduct the necessary surveys to characterize the biophysical resources in the Study Area and to assist in reclamation planning;
- d) components of the Project that will potentially affect these biophysical resources including soils, vegetation, wildlife and biodiversity;
- e) mitigation plans to minimize these effects;
- f) an assessment of the relative contribution of the Project (after mitigation) to regional cumulative pressures on biophysical resources (e.g., project contributions to cumulative potential acid input [PAI]); and

- g) existing wildlife resources (amphibians, reptiles, birds, terrestrial and aquatic mammals), their use and potential use of habitats in the Study Areas, including soil and vegetation characteristics in the Study Areas.

#### **4.9.2 Soil**

- a) Describe and map the soil types and their distribution in the PDA according to appropriate soil survey procedures;
- b) characterize the pre-disturbance morphological, physical and chemical properties of the soil types and assess the pre-disturbance soil capability classes;
- c) develop a soil conservation and reclamation plan for the Study Areas. Describe the suitability and availability of soil materials within the Study Areas for reclamation. Outline the criteria to be used in salvaging soils. Describe the procedures for soil handling and storage for reclamation within the Study Areas;
- d) discuss sensitivity of local and regional soils to acidic deposition;
- e) identify any activities associated with the Project, which may cause soil contamination or soil deterioration at the local and regional scale and discuss mitigation strategies to reduce potential impact; and
- f) discuss the regulatory requirements for soil monitoring or soil management for potential impact of the Project to soils in the development area and areas that may be potentially affected.

#### **4.9.3 Vegetation**

- a) Conduct an inventory, map and describe the existing terrestrial, wetland and aquatic vegetation. Include any rare vascular and non-vascular plant species and rare plant communities in the Study Areas;
- b) describe and assess potential impacts of the project construction and operation on vegetation (abundance, diversity, health, rare species and rare plant communities) in the Study Areas;
- c) describe and discuss measures to be implemented to mitigate and monitor potential impacts of the Project on vegetation in the Study Areas; and
- d) discuss how vegetation monitoring programs will be used to adaptively manage the mitigation measures and monitoring programs.

#### **4.9.4 Wildlife**

Describe existing wildlife resources (amphibians, reptiles, birds and terrestrial and aquatic mammals), their use and potential use of habitats in the Study Areas. Document the anticipated changes to wildlife in the Study Areas. Specifically:

- a) document and describe species of conservation concern found within the Study Area, using recognized survey protocols;
- b) describe and assess potential impacts of the Project on wildlife species found in the Study Areas, including impacts on critical habitat, habitat availability and quality, and habitat fragmentation and loss. These impacts should be described for the various phases of the Project both locally and cumulatively with other activities in the Study Areas;
- c) proposed strategies to minimize and/or mitigate impacts on the species and their habitats that are found in the Study Areas. These strategies should be tailored to the various phases of the Project and meet the expectations of relevant wildlife legislation;
- d) identify and discuss proposed monitoring programs that will be implemented during various phases of the Project to evaluate the effectiveness of mitigative strategies to

reduce impacts to the species and their habitats that are found in the Study Areas. Describe how the results from the monitoring programs will also be used to evaluate the effectiveness of the programs themselves; and

- e) discuss any existing wildlife studies that may be occurring in the Study Areas and how AST plans to integrate its operational and mitigation activities with those studies.

#### **4.9.5 Biodiversity and Fragmentation**

- a) Discuss how the impacts defined in the EIA report could affect local and regional biodiversity and habitat fragmentation, both project specific and cumulatively. Use quantitative data where possible to describe the potential effects on biodiversity and habitat;
- b) discuss the contribution of the Project to any anticipated changes in regional biodiversity, including measures to minimize such changes;
- c) discuss how AST's plans for mitigation and monitoring will meet the expectations of Sustaining Alberta's Biodiversity An Overview of Government of Alberta Initiatives Supporting the Canadian Biodiversity Strategy (Alberta Environmental Protection, 1998);
- d) determine the current and proposed level of habitat fragmentation for the Study Areas;
- e) describe the techniques used in the fragmentation analysis;
- f) identify and evaluate the extent of potential effects from fragmentation (e.g., disruption of movement corridors) that may result from the Project; and
- g) discuss measures to mitigate, monitor and reclaim impacts from fragmentation.

#### **4.10 Surface Water and Groundwater**

##### **4.10.1 Surface Water Hydrology and Quality**

Discuss baseline surface hydrology conditions. Identify components of the Project that will affect these conditions from a local and regional perspective. Discuss:

- a) existing drainage patterns, surface water bodies, and wetlands within local and regional Study Areas, and the seasonal flow/water level characteristics of these water bodies;
- b) project-related temporary and permanent alterations to these drainage patterns, water bodies and wetlands;
- c) possible water diversions from and return flows to these drainage channels, water bodies and wetlands under a variety of operating conditions and scenarios including, emergency conditions, low flow, or drought conditions;
- d) effects of site runoff management on flow/level characteristics and aquatic functions in these drainage channels, water bodies and wetlands;
- e) mitigation plans to minimize these effects;
- f) the relative contribution by the Project (after mitigation) to regional cumulative pressures on surface water resources; and
- g) a monitoring program to assess hydrological impacts and assess performance of mitigation plans and water management systems.
- h) Discuss baseline surface water quality. Identify components of the Project that will affect these conditions from a local and regional perspective. Discuss:
  - i) water quality of watercourses and water bodies in the Study Areas before and after project development and operation. The description of water quality will consider all appropriate water quality parameters, (e.g., temperature, pH, conductivity, cations

and anions, metals, dissolved oxygen, suspended sediment, dissolved solids, nutrients and other water contaminants) their seasonal variations and relationships to flow and other controlling factors, and a summary of existing water quality data including necessary surveys to characterize water quality of watercourses and water bodies in the Study Areas;

- j) the significant and potential impacts to surface water quality within the Study Areas resulting from the Project, including site runoff and project-related wastewater discharges, that may indicate a potential adverse effect or exceedance of the Surface Water Quality Guidelines for Use in Alberta (November 1999) or Canadian Water Quality Guidelines;
- k) the potential project related and cumulative impacts of acidifying and other air emissions on surface water quality;
- l) the impacts to surface water quality within the Study Areas due to the change in groundwater movement, spills and contaminated groundwater resulting from spills;
- m) the proposed mitigation measures to be considered, during the construction, operation and reclamation phases of the Project, to maintain surface water quality;
- n) a plan and implementation program for the protection of surface water quality, addressing the following:
  - i. surface water monitoring program for early detection of potential contamination and assistance in remediation planning;
  - ii. surface water remediation options to be considered for implementation in the event that adverse effects are detected; and
  - iii. the relative contribution of the Project (after mitigation) to regional cumulative effects on surface water quality of watercourses and water bodies in the Study Areas (e.g., project contributions to lake acidification).

#### **4.10.2 Groundwater Quantity and Quality**

Discuss baseline groundwater conditions and identify components (e.g., dewatering, well supply) of the Project that will affect groundwater from a local and regional perspective. Provide the following:

- a) a discussion of the characteristics of major aquifers, aquitards, and aquicludes in the PDA;
- b) lithology and stratigraphic continuity of the geologic units in the Study Area;
- c) hydrogeologic information including hydraulic properties, depth to water, flow direction, velocity and connectivity with surface water bodies of the geologic units;
- d) groundwater quality information of the hydrogeologic units in the Study Area;
- e) maps and cross-sections that include groundwater table and piezometric surfaces based on identifiable groundwater systems and accurate data sources, such as drill holes;
- f) results of any new hydrogeological investigations, including methodology;
- g) an inventory of groundwater users in the PDA. Identify potential groundwater use conflicts and proposed resolutions;
- h) an assessment of potential effects of project-related water withdrawal on groundwater levels, effects on local and regional groundwater regimes, including vertical gradients and discharge areas;
- i) an assessment of the effects of groundwater withdrawal/dewatering and its implications for other environmental resources, including flows and water levels in local streams, wetlands, vegetation and soil saturation;
- j) an assessment of potential effects of project-related activities and surface releases (e.g., accidental contaminant spills) and down-hole wastewater on groundwater quality;

- k) a justification for the selection of hydrogeologic models used, including identifying any model shortcomings or constraints on findings, and any surrogate parameters that were used as indicators of potential aquifer contamination due to the Project;
- l) a plan and implementation program for the protection of groundwater resources, addressing the following:
  - i. groundwater monitoring program for early detection of potential contamination and assistance in remediation planning;
  - ii. groundwater remediation options to be considered for implementation in the event that adverse effects are detected; and
- m) monitoring the sustainability of groundwater production or dewatering effects.

#### **4.11 Aquatic Resources**

Identify components of the Project that will affect baseline conditions from a local and regional perspective. Discuss:

- a) baseline aquatic resource conditions, including fish and benthic invertebrate habitat capability and their characteristics in water bodies within the Study Area. Conduct the necessary surveys to characterize the aquatic resources in the PDA and any potential changes that could occur in this component of the aquatic ecosystem in the Study Area(s) as a result of the Project;
- b) components of the Project that will potentially affect aquatic resources within the Study Area, potential impacts of these components and their significance;
- c) cumulative effects of the impacts that already exist and potential project-related impacts on the aquatic resources in relevant water bodies;
- d) mitigation plans to minimize these effects;
- e) an assessment of the relative contribution of the Project (after mitigation) to regional cumulative effects on aquatic resources (e.g., project contributions to lake acidification); and
- f) programs to monitor aquatic habitat quality and the effectiveness of mitigation strategies.

### **5. ENVIRONMENTAL EFFECTS MONITORING**

Describe environmental effects monitoring (EEM) activities that AST will undertake to manage effects, and confirm the performance of mitigative measures. Specifically addressing:

- a) monitoring activities and initiatives that AST is proposing to conduct independently of other stakeholder activities in the region;
- b) monitoring activities that AST is proposing to conduct collaboratively with other stakeholders. Include in this discussion the role that AST anticipates taking in each of the programs. With respect to groundwater monitoring, discuss AST's participation in the Regional Groundwater Quality Study of the Beverly Channel in the Fort Saskatchewan area managed by the Northeast Capital Industrial Association (NCIA); and
- c) mechanisms for sharing results, reviewing findings, and adjusting programs should monitoring identify unanticipated consequences of AST's operations or mitigation plans, including:
  - i. corporate adaptive management strategies; and
  - ii. consultation with regulators, public stakeholders, and, if necessary, regional management forums.

## 6. PUBLIC HEALTH AND SAFETY

Describe those aspects of the Project that may have implications for public health or the delivery of regional services. Determine whether there may be implications for public health arising from the Project. Discuss the following:

- a) the data and methods used by AST to assess the impacts of the Project on human health and safety;
- b) the potential health implications of the compounds that will be released to the environment from the proposed operation in relation to exposure limits established to prevent acute and chronic adverse effects on human health and livestock;
- c) the human health impact of the potential contamination of country food and natural food sources taking into consideration all project activities;
- d) the potential to increase human and livestock exposure to contaminants from changes to water quality, air quality and soil quality taking into consideration all project activities;
- e) cumulative health effects that are likely to result from the Project in combination with other existing, approved, and proposed projects;
- f) anticipated follow-up work, including regional cooperative studies. Identify how such work will be implemented and coordinated with ongoing air, soil and water quality initiatives;
- g) health and safety concerns raised by stakeholders during consultation on the Project; and
- h) potential health and safety impacts due to higher regional traffic volumes and the increased risk of accidental leaks and spills resulting from the Project.
- i) Provide the following information:
- j) a summary of AST's emergency response plan and discuss mitigation plans that will be implemented to ensure public safety during construction, operation and reclamation of the Project. Include prevention and safety measures for wildfire occurrences, water saturated plume from the cooling towers, icy roads in winter months, accidental release or spill of chemicals to the environment and failures of structures retaining water or fluid wastes;
- k) how local residents will be contacted during an emergency and what type of information will be communicated to them;
- l) existing agreements with area municipalities or industry groups such as, safety, co-operatives, emergency response associations and municipal emergency response agencies;
- m) information on samples of selected species of vegetation known to be consumed by humans; and
- n) describe the mitigation strategies that will be utilized to ensure public safety as moist air is emitted from cooling towers.

## 7. HISTORICAL RESOURCES

Provide the following:

- a) evidence of consultation with and clearance from Alberta Community Development; and
- b) a general overview of the results of any previous historical resource studies that have been conducted in the historical resources Study Area, including archaeological resources, palaeontological resources, historic period sites, and any other historical resources as defined within the *Historical Resources Act*.

## **8. SOCIO-ECONOMIC FACTORS**

Provide information on the economic effects of the Project. Specifically, provide and address the following:

- a) the number and distribution of people who may be affected by the proposal;
- b) information on the economic status of the area and the contribution of the proposed development;
- c) information on the social impacts of the Project on the Study Area and on Alberta including:
  - i. local employment and training;
  - ii. local procurement;
  - iii. population changes;
  - iv. demands on local services and infrastructure; and
  - v. regional and provincial economic benefits;
- d) the impacts of the Project during construction and operation phases, to transportation planning, traffic and local services;
- e) the economic impacts of the Project on the Study Area and on Alberta, having regard for capital, labor, and other operating costs and revenue from services;
- f) AST's policies and programs respecting the use of local, Alberta, and Canadian goods and services;
- g) an estimated breakdown of Alberta, other Canadian and non-Canadian industrial benefits for project management/engineering; equipment and materials; construction labor, and total overall project;
- h) the employment and business development opportunities the Project may create for local communities and the region;
- i) a breakdown of the labor force, type of employment, and number of employees with respect for the construction and operational workforces. Identify when the peaks in labor requirements will occur, the extent of the peaks and the source of labor for the Project; and
- j) impacts of the proposed Project on potential shortages of affordable housing and the quality of health care services. Identify and discuss the mitigation plans to address these issues. Provide a summary of any discussions that have taken place with the Municipality and the Regional Health Authority concerning potential housing shortages and health care services respectively.

## **9. PUBLIC CONSULTATION REQUIREMENTS**

AST shall undertake a consultation program during the preparation of the EIA report and within all of the communities in the Study Area.

Describe and document in detail the public consultation program implemented with respect to the Project, record any concerns or suggestions made by the public, and demonstrate how these concerns have been addressed, including:

- a) the type of information provided and the issues discussed, differentiating between those which have been resolved and any outstanding issues;
- b) the key alternatives which have been identified by AST and stakeholders in the consideration of unresolved issues; and,
- c) any plans for ongoing consultations.