SUNCOR ENERGY

Project Millennium Application

Submitted to **Alberta Energy and Utilities Board** and **Alberta Environmental Protection**

Project Millennium
Taking Suncor into the 21st Century

PROJECT MILLENNIUM

APPLICATION SUMMARY

Suncor Energy Inc.,

Oil Sands

April 1998

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A INTRODUCTION

Suncor Energy Inc. is applying for regulatory approval to proceed with the construction, operation and reclamation of the proposed Project Millennium located at its current operations near Fort McMurray in the Regional Municipality of Wood Buffalo in northeastern Alberta. On 31 July 1997, Suncor released a disclosure document for the proposed project. Since then, a comprehensive public and regulatory consultation and communication program as well as an Environmental Impact Assessment have been underway in parallel with engineering studies.

This document comprises the application for approval of Project Millennium and serves to meet requirements under the Alberta Oil Sands Conservation Act and the Alberta Environmental Protection and Enhancement Act. It also includes the Environmental Impact Assessment.

A1 CORPORATE OVERVIEW

In 1992, Suncor Energy Inc. (Suncor) unveiled a strategic plan to improve its long-term profitability and to make its production costs competitive with those of Canada's top producers of conventional crude oil. The series of initiatives announced by Suncor at the time was intended to make its oil sands business economically viable and environmentally responsible, as well as to ensure that oil sands operations would be sustained well into the twenty-first century.

The strategy included:

- a change in mining technology
- expansion of plant design capacity
- acquisition of additional oil sand leases
- enhancement of revenues through product mix
- improvements in environmental performance

By 1997, this strategy had achieved operating costs averaging $14.75/bbl, providing confidence in the long-term viability of sustained oil sands production. Production capacity increased—from 60 000 bbl/d in 1992 to 85 000 bbl/d by the end of 1997—through capital and operating improvements in the mine and fixed plant. Concurrent with these production increases, Suncor has achieved dramatic reductions in air emissions and improvements in energy efficiency and has implemented a dry landscape reclamation technology.

Steepbank Mine and Fixed Plant Expansion will increase production capacity to 105 000 bbl/d by late 1998, and in 2001 the Production Enhancement Phase (at an estimated cost of $190 million) will further increase capacity to 130 000 bbl/d. These increases will be realized by changing plant processes and optimizing the capacity of certain plant units.

The proposed Project Millennium will increase the annual operating capability of Suncor's oil sands facility to a minimum of 210 000 bbl/d by 2002. Sufficient reserves have been acquired to sustain that rate for over thirty years. The projects estimated $2 billion cost includes an expansion to Steepbank Mine, additional bitumen extraction capacity and a second upgrading train.

Through a comprehensive consultation program, Suncor provided residents of the region and other stakeholders with continuing opportunities to ensure the best project decisions were made and that economic benefits are balanced with environmental responsibilities. This commitment to address the needs of all community interests resulted in an overall project design which will:

- reduce emissions for each unit of production
- reduce energy intensity
- decrease water use over the long term
- continue with an integrated reclamation plan which will eliminate the long-term storage of liquid fine tailings and return the land to pre-development capability

In addition to maintaining Suncor's current workforce of 1 600 full-time employees and 380 contractors, Project Millennium will result in the creation of about 800 direct jobs and 1 200 indirect jobs. The on-site construction work force will be about 2 500 to 3 000 peaking in the year 2 000.

Average annual operating expenditures for Project Millennium are estimated at $285 million (incremental). Suncor's target to acquire goods and services from locally-owned businesses will generate substantial economic benefits for both the Regional Municipality of Wood Buffalo and the Province of Alberta.

A project of this magnitude will not be without social impact. Suncor is striving to ensure any adverse impacts will be minimal and short-lived. A heightened level of collaboration among developers, government institutions and the local communities is acting to mitigate social and environmental impacts from the cumulative effects of a number of announced oil sands projects. This collaboration manifests itself in many ways including: community planning; joint cumulative effects assessment; cooperative effects monitoring; regional infrastructure planning and

coordination; and facilitation of advance funding for infrastructure. The project will increase the Municipality's assessment base (and thus its fiscal capacity) in the order of 30 to 35 percent.

A1.1 Suncor Energy Inc.

Suncor Energy Inc. is a growing Canadian integrated oil and gas company with international interests and assets of $3.5 billion. The company employs 2 350 people domestically in three operating divisions.

Oil Sands (based near Fort McMurray, Alberta) mines and extracts oil sands and markets high-quality crude oil products. Exploration and Production (based in Calgary, Alberta) explores for and produces natural gas and conventional crude oil. Sunoco (based in Toronto) refines and markets transportation fuels, petrochemicals and heating oils with a retail network in Ontario.

Internationally, construction has begun at the joint-venture Stuart Shale Oil demonstration plant in Queensland, Australia. Initial production of 4 500 bbl/d from the $225 million demonstration plant is targeted for the end of 1999.

Suncor is a publicly-traded company with shares traded on the Toronto, Montreal and New York Stock Exchanges.

Suncor believes that its future success depends on its ability to become a "sustainable energy company". This means caring about maintaining a healthy environment, economy and society. By demonstrating responsible action and leadership in these areas, Suncor will continue to earn its licence to operate and grow.

A1.2 Suncor Energy Inc., Oil Sands

Suncor pioneered commercial development of the Athabasca oil sands in 1962 as Great Canadian Oil Sands Ltd. and in 1967 began operation of the world's first commercially-successful oil sands mining and upgrading facility. Suncor's mine ranks as one of the five largest in Canada.

The Oil Sands operation is located within the Athabasca oil sands deposit, from which a viscous, tar-like substance called bitumen is extracted. The mine's ore body lies beneath an overburden of muskeg, sand, clay and silt. Large shovels excavate the bitumen-laden sand and heavy haulers carry it from the pit, dumping the ore into sizers to break up the lumps. From there, mine ore enters the Extraction plant, where bitumen is separated from sand. In the Upgrading plant, bitumen is heated, cracked and separated into three petroleum distillates: naphtha, kerosene and gas-oil. These components can

be hydrotreated and custom-blended into a variety of products ranging from light, sweet crude oil to sour distillate to diesel fuel. Energy for the operation is provided by the Energy Services plant, which generates electricity, steam and process water for the entire site. Suncor Oil Sands products are marketed domestically and in the United States through a pipeline network.

Throughout its history, Suncor has implemented innovative and practical technologies to develop the potential of the vast Athabasca oil sands deposit. Despite engineering challenges, fluctuating oil markets and turbulent economic events, the company has remained committed to the oil sands industry, considering it an abundant and increasingly important source for Canada's energy future.

Suncor's commitment begins with the people of the Regional Municipality of Wood Buffalo. Since the early 1960s, the company and its employees have supported the local community in the development of a mature community infrastructure. Suncor's partnership with the community continues through support of regional initiatives such as local health, civic, educational, cultural and environmental activities.

A1.3 Economic Viability

The oil sands are a national resource and may soon become the main source for Canada's long-term fuel supply as conventional supplies are declining. Oil sands products are in demand both domestically and in the United States, and Suncor is in a position to increase its oil sands production further. For the company's long-term economic viability, Suncor must ensure its oil sands operation can compete with North America's leading low-cost producers of conventional crude. Suncor's efforts make this resource a valuable and key part of Canada's economic success and energy self-sufficiency. Key accomplishments of the 1992 strategy include the following:

- Production costs in 1997 ($14.75/bbl) were nearly $5.00/bbl lower than in 1992 as a result of technology improvements and increased production.

- Production rose from 60 000 bbl/d in 1993 to 85 000 bbl/d by the end of 1997 through increased capacity of various units within the mine and fixed plant, accompanied by improvements in environmental performance.

- A daily average production goal of 105 000 bbl/d and further environmental improvements through the Fixed Plant Expansion and Steepbank Mine projects are on track for full production by late 1998.

- A commitment to install the Production Enhancement Phase (PEP), which will further increase production to 130 000 bbl/d in 2001.

- Additional oil sands leases were acquired to sustain oil production well into the twenty-first century.

- Market development has secured long-term demand for Suncor's products, both domestically and in the United States.

- Improved environmental performance.

The economic viability of Suncor's oil sands operation has been demonstrated. Project Millennium is expected to further enhance economic viability through:

- increasing company revenues through higher sales volumes and increased prices as a result of meeting customer needs

- reducing unit operating costs through technology enhancements, operating efficiencies and economies of scale

- implementing environmental and technological enhancements that improve Suncor's ability to meet stakeholder expectations into the future

- integration with other potential Suncor initiatives including other Suncor, Athabasca and Cold Lake Leases and pipeline arrangements

After full production is reached, Project Millennium operating costs (including sustaining capital), are expected to average $10/bbl to $11/bbl. The lower operating costs further improve the competitiveness of oil sands production in the marketplace, reduce the vulnerability of the operation to world oil price volatility and secure the company's future.

A1.4 Environmental Protection

Suncor has developed the "We Care" environmental policy which is incorporated into all aspects of its activities. Environmental management involves continuous improvement through planning and disciplined implementation at all levels to eliminate, minimize or mitigate the impacts associated with its operations.

Since 1992, Suncor has accomplished the following environmental improvements:

- Completion of a $15 million upgrade to the sulphur plant (in 1994), increasing sulphur recovery from 96% to 98%.

- Odour abatement enhancement (in 1995) with the installation of a vent collection and treatment system on the diluted bitumen storage tankage, the secondary Extraction plant and the Naphtha Recovery Unit (NRU) at a cost of $15 million.

- Further reductions of sulphur dioxide emissions with the 1996 startup of a $190 million Flue Gas Desulphurization unit to treat Energy Services plant stack emissions. In tandem with improvements in the sulphur plant this project reduced overall plant-wide sulphur dioxide emissions by approximately 75% from 1995 levels. Suncor received an Emerald Award (in the large business category) from the Alberta Foundation for Environmental Excellence in 1997 in recognition of this dramatic improvement.

- Technology and energy utilization improvements have reduced the emission of greenhouse gases from the operation per unit of production. While oil production increased by 37% from 1990 to 1997, greenhouse gas emissions increased only 5 percent.

- The application of new technology to consolidate tailings (produced by the extraction process) commenced in late 1995. This technology has been commercially demonstrated by Suncor and will produce tailings which can be reclaimed to a dry state.

At Suncor, environmental management systems include planning and program implementation to mitigate the impacts associated with operations. Suncor has developed a comprehensive environmental compliance and assurance process which is integrated throughout all areas of the business. Life cycle analysis and eco-efficiency determinations are being incorporated into project design and decision-making at all levels.

Additional precautions are being taken during the planning and construction phases to ensure the minimization of any environmental impact resulting from Suncor's activities. For Project Millennium, the Environmental Impact Assessment (EIA) terms of reference were established through public investment process, and consultation with stakeholders is as a continuing process.

Suncor's commitment with Project Millennium is to continuously maintain and build upon the stakeholder relationships and environmental improvements that were achieved as part of the Steepbank Mine and Fixed Plant Expansion projects.

A2 PROJECT OVERVIEW

A2.1 Project Millennium Scope

Suncor's oil sands activities, 35 km north of Fort McMurray (Figures A2-1 and A2-2), straddle the Athabasca River. The present operations are situated on the west side of the river and include Lease 86/17 Mine (which commenced operation in 1967) and a Base plant comprising Extraction, Upgrading and Energy Services. A new development linked by a bridge (commissioned in 1997) over the Athabasca River is situated on the east side of the river. This development, which includes Steepbank Mine, Steepbank ore preparation plant and a service complex, will commence operation in late 1998.

Steepbank Mine, together with Fixed Plant Expansion Project (to be commissioned in mid-1998) will boost Suncor Oil Sands production capacity to 105 000 bbl/cd from the current 85 000 bbl/cd by year-end. The Production Enhancement Phase will raise production in increments to the 130 000 bbl/cd level in 2001.

Project Millennium will further increase the production capacity of upgraded crude oil products to a minimum of 210 000 bbl/cd by 2002, through the expansion of Steepbank Mine and additional plant capacity.

At a cost of $2 billion, the scope of Project Millennium includes all activities required to plan, construct and operate a major facility expansion. These activities include:

- an expansion of Steepbank Mine
- Millennium Extraction plant (a second primary separation plant) located on the east side of the Athabasca River to produce raw bitumen
- raw bitumen pipeline to the existing Base Extraction plant
- modifications to the Base Extraction plant to clean the raw bitumen and produce a diluted bitumen product
- a second upgrader train to produce a slate of upgraded crude oil products
- modifications and additions to Energy Services steam and power generation, as well as other infrastructure to facilitate the increased production level

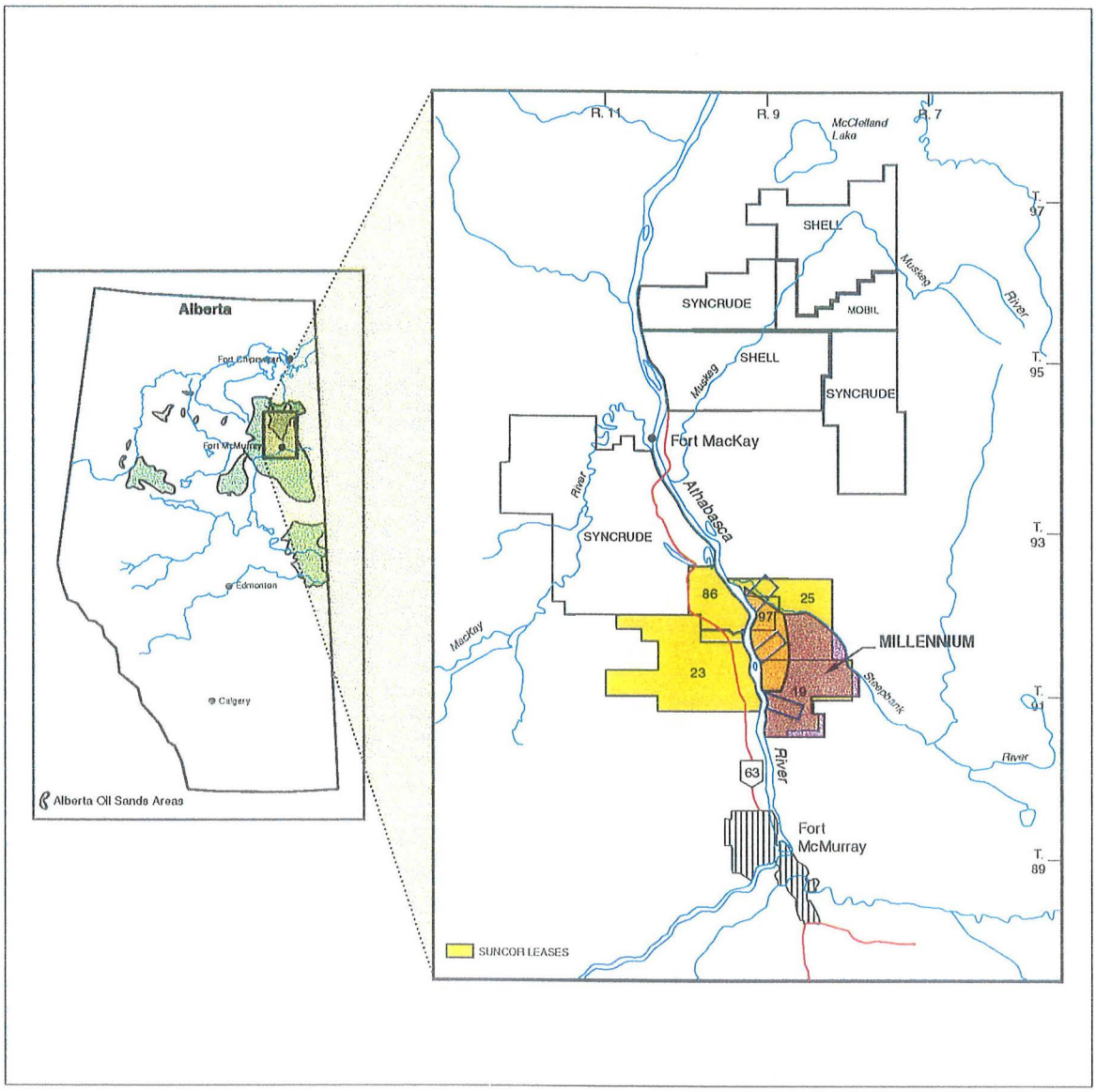

Figure A2-1 Location Map

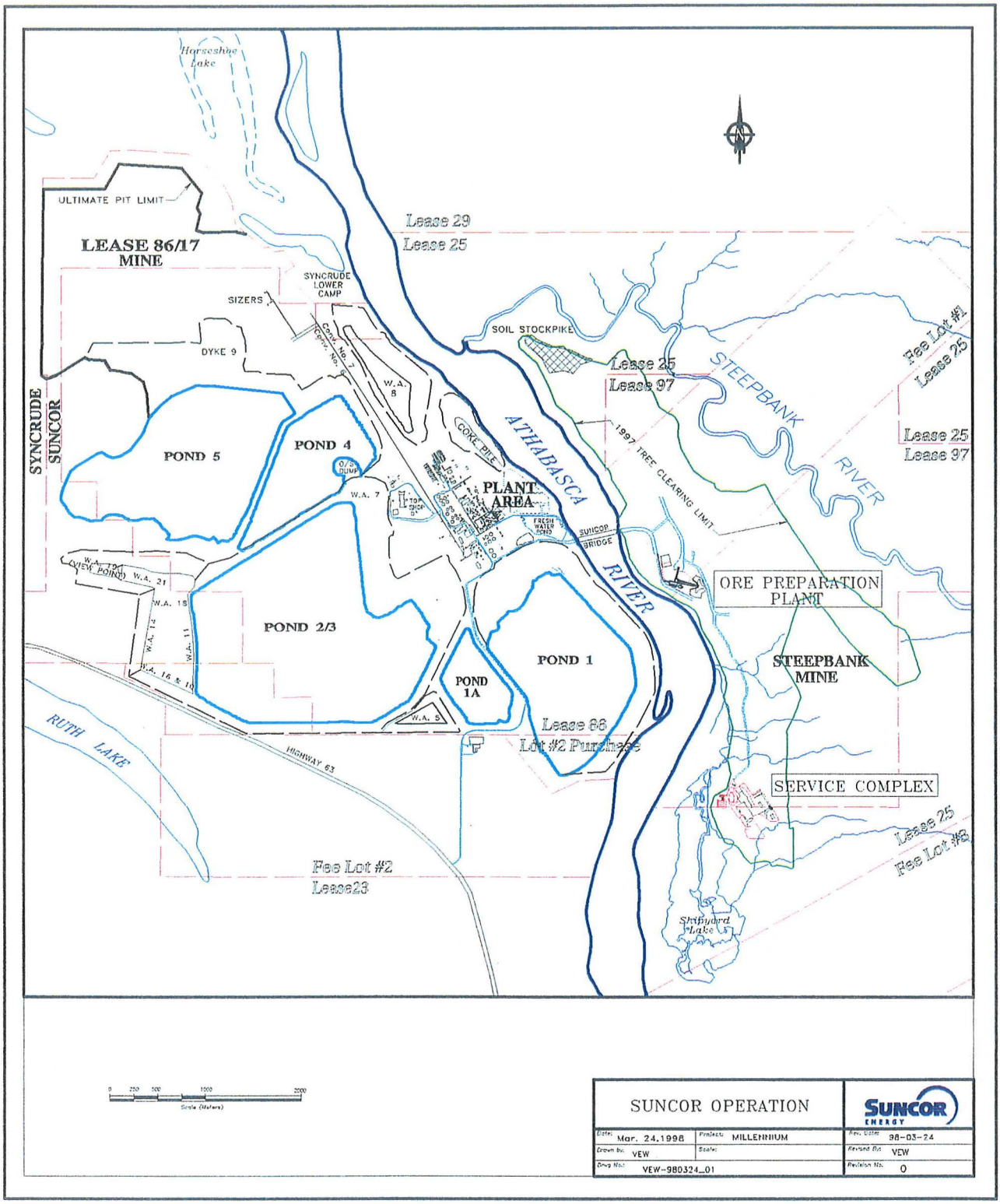

Figure A2-2 Map of Suncor Operation

- management, control and mitigation of environmental impacts during construction and operation of mine and plant facilities

- an integrated management plan for all tailings produced by both Extraction plants and an integrated reclamation plan for current and future tailings ponds and other disturbed areas

In approximately 2012, additional primary extraction capacity will be installed in the area of the expanded Steepbank Mine. Over its thirty-year life the project will produce and upgrade 2.8 billion barrels of bitumen for market.

A2.2 Rationale for Project Millennium

A favourable business climate and a significant net societal benefit for oil sands development combined with Suncor's experience and positive track record provide the impetus for Project Millennium. Specifically, Suncor can proceed with Project Millennium with confidence because:

- There exists a market window of opportunity for oil sands products with an integrated transportation system. Suncor has the experience and ability to take advantage of these markets.

- Suncor has demonstrated the economic viability of oil sands operations, even in an environment of low commodity prices.

- Suncor has exhibited continuous improvement in its operation through collaborative research, application of technology, management and operating practices.

- The business climate is favourable, with a generic fiscal tax and royalty regime, as well as a responsible regulatory environment that is fair, predictable and timely.

- Suncor believes the environmental and social impacts of the proposed development can be mitigated to a level acceptable to its communities.

- The net economic benefit accruing from the project is very significant to the Region, Alberta and Canada.

Detailed planning and a continuing comprehensive consultation program for Project Millennium will ensure that development can proceed as a logical, orderly extension to Suncor's existing operations. Recent application of new technologies will improve energy efficiencies. The

application of Consolidated Tailings will facilitate reclamation to a dry landscape. And the commissioning of the Flue Gas Desulphurization unit in 1996 has reduced plant-wide SO_2 emissions by over 75 percent. Project Millennium will present further opportunities for gains in energy and environmental performance. These include:

- Significant reduction of discharge water to the Athabasca River from the Upgrader cooling and wastewater systems.

- Improvement in unit energy consumption site-wide by 18% over 1997

- Minimal increase in SO_2 emissions, although production more than doubles from today's level.

Project Millennium will create 800 permanent direct positions and in the order of 1 200 indirect jobs. The on-site construction workforce will peak at 2 500 to 3 000 workers. The new permanent positions, combined with normal workforce attrition, will provide significant new opportunity for local employment. Suncor will be working in collaboration with educational institutions and neighbouring communities to ensure that there are sufficient numbers of potential employees with acceptable skills and qualifications.

The $2 billion investment in Project Millennium will create sizable benefits to Alberta and Canada. These include the following:

- Development expenditures will create $1.2 billion in household income within Alberta.

- Operating expenditures will generate $140 million in household income annually in Alberta.

- Taxes and royalties to federal and provincial governments over the project life will exceed $4.2 billion.

A heightened level of collaboration among developers, government institutions and local communities is serving to mitigate social and environmental impacts from the cumulative effects of a number of projects including those of Suncor, Syncrude Canada Ltd., Shell Canada Ltd., and Mobil Oil Canada. This collaboration manifests itself in many ways including: community planning; joint cumulative effects assessment; cooperative effects monitoring; regional infrastructure planning and coordination; and facilitation of advance funding for infrastructure.

A2.3 Overview of Project Millennium Operations

Project Millennium's configuration and integration with present operations is depicted on Figure A2-3.

When Project Millennium comes on-stream, Lease 86/17 Mine will have been depleted and all ore will be supplied by an expanded Steepbank Mine.

Approximately half of the ore will be produced from the initial mining pit (Pit 1), then converted to a slurry at the Steepbank Ore Preparation plant and hydrotransported to the Base Extraction plant for primary and secondary extraction.

The other half of the ore will be produced from a second mining pit (Pit 2). That ore will be delivered to the Millennium Extraction plant (located on the east side of the Athabasca River near Pit 2) for primary extraction. Raw bitumen produced by this plant will be pipelined to the Base Extraction (secondary) plant for further cleanup. The bitumen will then be upgraded in the Upgrader into a slate of crude oil products.

As previously indicated, Steepbank Mine will commence operations in 1998 in Pit 1. Ore will be mined using truck and shovel methods, then delivered to truck dumps and ore sizers and on to the Steepbank Ore Preparation plant. Facilities there include rotary drum breakers, at which point warm water is added to form a slurry. This slurry is pumped to agitation/surge tanks and then hyrotransported across the bridge to the Base Extraction plant for primary extraction.

There, the ore is introduced into separation cells, where the majority of oil is recovered from the top of the cell as bitumen froth. Other circuits, including the processing of separation cell tailings, recover additional bitumen. Bitumen froth is heated, deaerated and sent to secondary extraction, where it is diluted with naphtha, then cleaned of fine minerals and residual water. The diluted bitumen product is transferred to intermediate storage, which acts as a buffer between the bitumen production and upgrading processes.

Tailings (coarse sand, fine minerals, water and some hydrocarbon) from the primary extraction separation cells are piped to the tailings pump house for conversion to Consolidated Tailings and then disposal in ponds in mined areas. Included in Consolidated Tailings will be mature fine tailings recovered from existing ponds. Ultimately an existing inventory of fine tailings will be converted to Consolidated Tailings that will be reclaimed into a dry landscape.

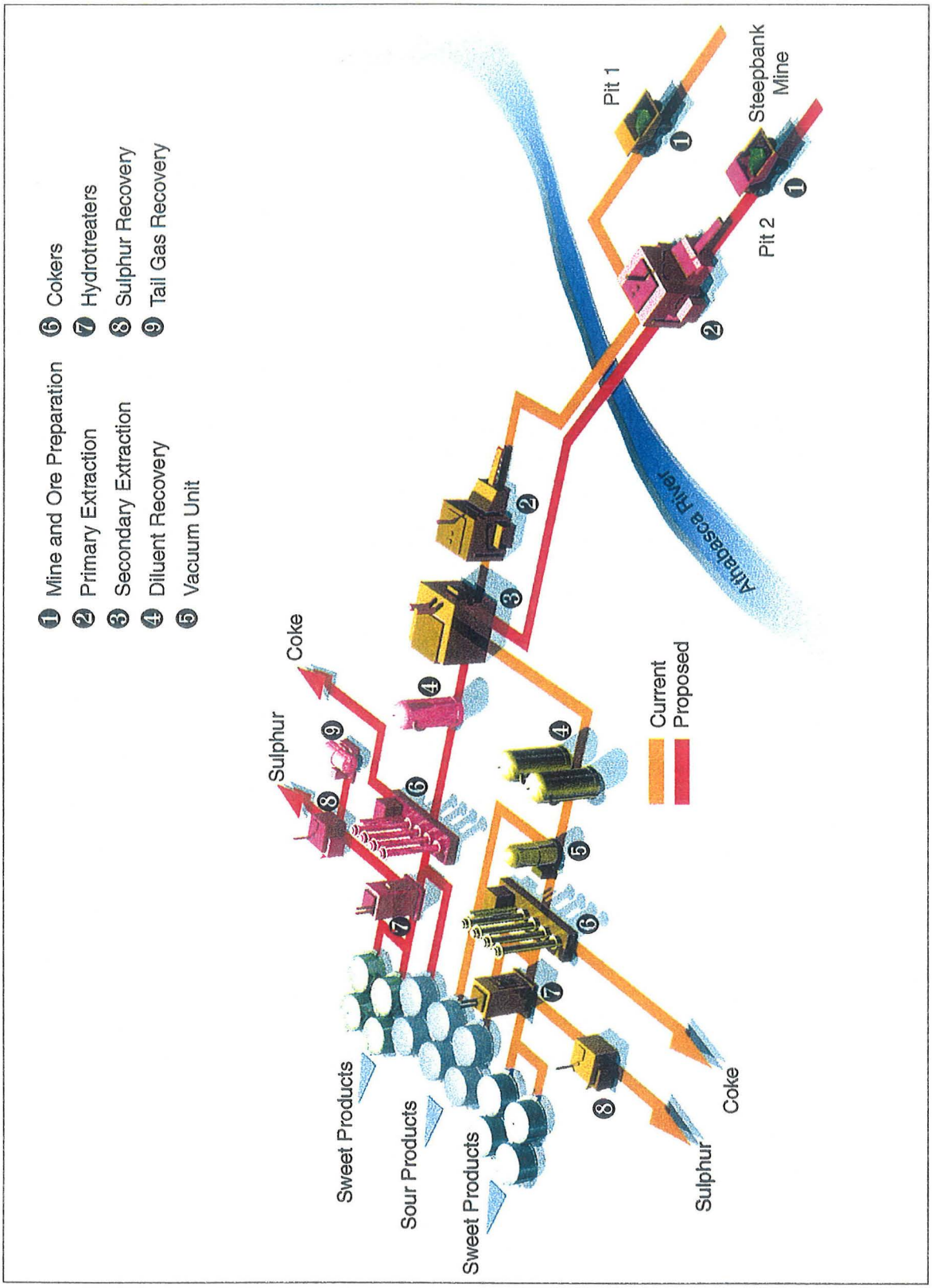

Figure A2-3 Project Millennium

Water releases rapidly from the Consolidated Tailings and is recycled for use in the Extraction plant. Consolidated Tailings will be placed in available space on Lease 86/17 and subsequently in the mined areas of Steepbank Mine.

Tailings from secondary extraction include fine clays and minerals, water and residual diluent. Much of the diluent is recovered in a naphtha recovery unit, resulting in an overall diluent recovery of 99.3 percent minimum.

Preparation for the start of mining in Pit 2 of Steepbank Mine will begin in 2000 with clearing and salvage of commercial trees, drainage, removal and salvage of surface soils, and prestripping of overburden.

Mining will begin in 2002 using existing truck and shovel methods. Ore will be prepared at the Millennium Ore Preparation plant using Steepbank technology and then piped to the Millennium Extraction plant. This plant will use similar warm-water separation-cell technology as previously described. Bitumen froth will be heated and deareated with steam from gas-fired package boilers constructed for that purpose near the Millennium Extraction plant. The resulting "raw bitumen" will be pipelined across the Suncor Bridge to the Base Extraction plant for secondary extraction. In approximately 2012, additional primary extraction capacity will be installed in the east bank mining area. The combined bitumen production operation will produce at a level of 260 000 bbl/cd of bitumen, which will be upgraded into a variety of crude oil products to meet customers needs.

A second upgrader train will be added, using essentially the existing process, but with the latest technology enhancements. The major upgrading steps include:

- recovering diluent
- processing bitumen, using delayed coking to produce sour intermediate products and fuel gas by rejecting carbon as petroleum coke
- manufacturing hydrogen from steam and natural gas for use in hydrotreating
- hyrotreating coker products to remove sulphur
- removing sulphur from byproduct gases

The typical product slate for Project Millennium will be in about the following proportions:

- Light Sweet Crude 100 000 bbl/cd
- Light Sour Crude 80 000 bbl/cd
- Diesel 30 000 bbl/cd

These products are transported through an extensive pipeline network to reach markets in Eastern Canada, Central United States, the West Coast and offshore. Some of the diesel production is used by Suncor's mine fleet and for local transportation.

Other products are petroleum coke (a portion of which is used to generate steam and electricity) and sulphur.

The Millennium upgrading train, while using present technology will introduce several enhancements including:

- Improved utilization of extraction recycle water for process cooling purposes, thereby transferring heat energy to the extraction process.
- A reconfigured cooling and wastewater system, which will reduce withdrawals of water from the Athabasca River and significantly reduce discharge of treated water to the Athabasca River.
- An improved sulphur recovery facility which will recover 99.5% of sulphur from Millennium Upgrader acid gases.
- No new continuous-flaring sources.
- Low NO_x burners which will be used throughout the new train.

Energy Services provides the steam and electricity for Bitumen Production and Upgrading. Three coke-fired boilers (supplemented by smaller gas-fired boilers) supply the steam demand. Two in-plant steam turbo-generators currently supply the majority of the operation's electrical demand; the remainder is imported from the Alberta power grid.

Utilization of warm-water extraction technology and heat integration with the Upgrader serve to reduce the steam demand per unit of bitumen production such that additional steam generation is also reduced. However, additional electricity is required and will be supplied with on-site gas turbine generators.

Project Millennium will force the relocation of certain support infrastructure. Development of the Fee Lot 2 area (held by Suncor, in the vicinity of its Security Gate) is contemplated. Currently included in preliminary plans are:

- an administration and warehouse complex
- a relocated camp (approximately 3 000 persons)
- a natural gas liquids plant and storage facility (owned and operated by others)
- provision for a Suncor tank farm
- a tank farm and pipeline terminal for the proposed Athabasca Pipeline Project (owned by others)
- tanker truck loading and unloading facilities

Surface reclamation occurs as areas become available. Reclamation objectives are to re-establish forest vegetation common to the area with a capability equivalent to pre-disturbance conditions. The final landscape will be capable of developing into a self-sustaining cover of forest vegetation that could provide a range of uses.

Suncor's Steepbank Mine plan recognizes the environmental sensitivity in disturbing areas surrounding the Steepbank and Athabasca Rivers. On the south side of the Steepbank River, an undisturbed 100-m setback is maintained from the crest of the escarpment. Along the Athabasca River, the mine plan removes ore out to the edge of the escarpment with the constraint that the intersection point with the escarpment will be well above the 1-in-100-year flood level. As this escarpment has a relatively gentle slope, the result is an undisturbed setback which exceeds 300 m (however, there is a pinch point along the Pit 1 mining area, where the undisturbed area is reduced to 120 m over a 100-m stretch). By 2005, the Pit 1 escarpment will be rebuilt, with a dyke constructed from suitable overburden materials to an elevation approximately equivalent to the top of the present escarpment. The area will then be reclaimed. Similarly, the Pit 2 escarpment will be rebuilt by 2008.

Steepbank Mine's expansion requires an external starter tailings pond to contain additional tailings that are generated before mined-out space becomes available. This pond will be situated above the escarpment and will be enclosed by an overburden and sand structure.

The reclamation plan will be integrated with Lease 86/17. Figures A2-4 and A2-5 show a rendering of the reclamation progress for the combined area at mid-operation and in the far-future.

An end pit lake will result in the final mining area. Criteria for this lake will include that it be geotechnically secure, can be filled with water within a reasonable timeframe and is capable of supporting a healthy aquatic ecosystem.

After the end of the mine life (in about 2035) all mining, ore preparation and other facilities will be removed.

A2.4 Objective- and Criteria-Based Process

In April 1997, AEUB and AEP introduced a document "A Proposal for the Introduction of: Regulatory Objectives and Operating Criteria-Based Approval Process for Integrated Oil Sands Developments" (AEUB and AEP 1997), regarding the use of regulatory objectives and operating criteria in

Figure A2-4 Suncor Operations Mid-Life

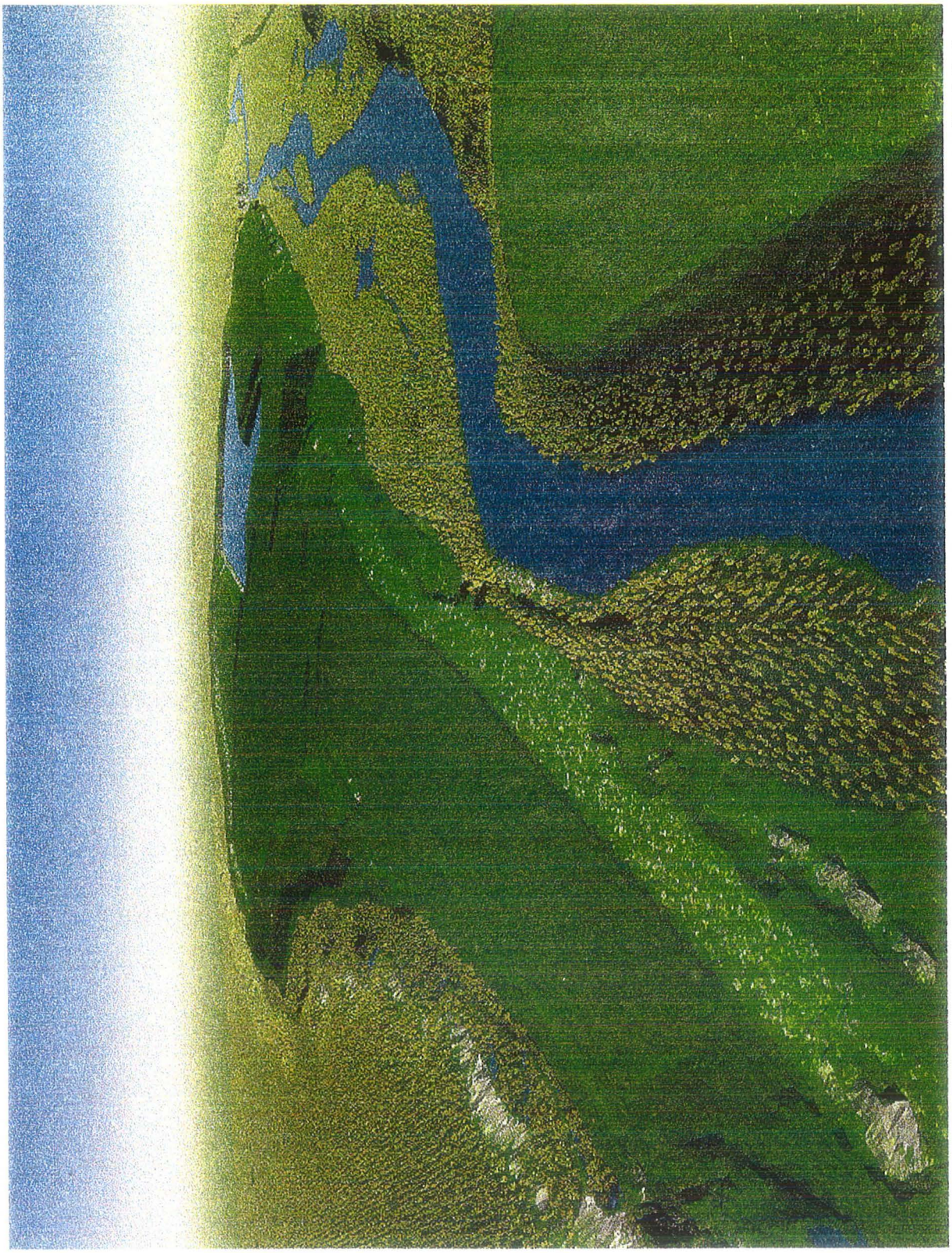

Figure A2-5 Suncor Operations Far-Future

future approval processes. The document reviews and defines the concept of approvals based on regulatory objectives and operating criteria, highlights the benefits of such an approach, and summarizes the process used to define appropriate criteria. The document also describes the joint AEUB and AEP regulatory objectives and an operating criteria proposal.

Benefits of a regulatory objectives and criteria-based approval process stated to be:

- to make the regulation of integrated oil sands projects more efficient and effective with respect to the management of important public interest issues

- to provide regulators, project operators and the public with clearly-defined and documented expectations regarding the operating performance of projects

- to provide a clear focus for defining reporting requirements and conducting other surveillance activities

- to establish a definitive basis on which to measure regulatory compliance and determine appropriate actions

- to establish objectives and criteria which would provide a common and independent basis on which the industry's performance can be reported to, and judged by, public stakeholders

The proposal supports the shift in regulatory priority from the approving function to those of standard setting and enforcement. Suncor is generally in favor of the approach. Table A2-1 sets forth a list of issues, project objectives and operating criteria (that parallels the AEUB/AEP proposal) for Project Millennium. Additionally, the table highlights technology and operating improvements incorporated into the project to achieve the operating criteria.

Where the terms "minimize" or "maximize" are used in the table, Suncor's intent is to use technology that is best to accomplish the objective, considering cost, performance and commercial viability factors.

Table A2-1: Project Millennium Operating Criteria, Technology and Operating Improvements

Issue and Sub-Issue	Regulatory Objectives	Operating Criteria	Technology and Operating Improvements
Energy Resource Management			
Oil Sands Mined	• Maximize Oil Sands Recovery • Minimize ore sterilization	• 7% cut off grade • 3 m mining thickness cut-off	• truck and shovel operation
Bitumen Recovery	• Maximize bitumen Extraction efficiency	• 92.5% overall bitumen recovery	• inclined plate separators • tertiary recovery • lower operating temperature
Dilluent Recovery	• Maximize diluent recovery (minimize absolute losses to tailings)	• 99.3% of diluent recovery	• new recovery tower • lower D/B ratio to use less diluent • make up diluent reformulated to have narrower boiling range (reduced light and heavy ends and benzene)
Sulphur Recovery	• Maximize overall sulphur recovery • Maximize sulphur plant recovery	• 98.1% overall recovery of all sulphur in acid gases produced	• new sulphur plant will raise overall recovery capability • tail gas treating unit will process all gases from the new sulphur plants and a portion of the gases from the base plant
Upgraded Product yield	• Maximize the yield of oil sands products	• 81.2% gross liquid yield	• enhanced delayed coking technology selected on basis of yield, operability and cost.
Byproduct Recovery	• Minimize discard of coke, sulphur or other byproducts	• byproducts stored in a manner that enables recovery at a later date and meets environmental location conditions	• coke will be used as fuel or sold as first priority • all sulphur produced will be sold to market
Plant Integration	• optimize site-wide plant integration	• facilities designed to optimize overall conservation - energy, water, land • facilities designed to maintain partial production during planned maintenance turnarounds	• technical integration across entire facility • segregation of certain units to provide maximum flexibility for turnaround avoidance

Issue and Sub-Issue	Regulatory Objectives	Operating Criteria	Technology and Operating Improvements
Energy Efficiency	• Maximize use of produced gas • Minimize use of external energy • maximize co-generation power	• design for optimum heat recovery and minimum heat rejection to atmosphere or cooling water	• waste heat recovery loop capturing heat from upgrading to use in the bitumen extraction process • closed cycle gas turbine generators with heat recovery steam generation
Flaring	• Minimize amount of flared gas	• flare less than 0.5% of the energy value of bitumen feeding the upgrader	• flare gas recovery project to increase capture of flare gases in base plant • no new continuous flaring sources
Environmental Protection			
Substance Release and Contaminant Emissions	• minimize air emissions • controlled release of industrial waste water • ensure safe drinking water is available	• Sulphur Dioxide emissions at 79 t/cd (365 day rolling average) • potable water quality maintained to meet the Guidelines for Canadian Drinking Water Quality	• use commercially proven pollution prevention and control technologies • dedicated potable water supply
Water Use and Management	• minimize the volume of fresh water used • protect the sustainable supply of surface and groundwater	• as licenced	• reconfiguration of coolling and wastewater system will maximize water recycling
Tailings	• ensure tailings are stored in a manner that protects environment • minimize the volume of fluids in the final reclaimed landscape	• water release (operational and reclamation) must meet acceptable standards • all tailings impoundment structures will meet appropriate Dam Safety Guidelines	• commercial use of Consolidated Tailings • all fluid tailings will be removed from external tailings pond
Land Conservation and Reclamation	• minimize total land disturbance • maximize progressive reclamation	• land will be reclaimed to equivalent capability from pre-disturbance conditions	• soil amendment materials stockpiled for future use • use of Consolidated Tailings to return the land to a dry landscape
Waste Management	• ensure proper identification, storage, minimization and disposal of waste generated in the operation	• all hazardous waste to be disposed of in approved facilities	

Issue and Sub-Issue	Regulatory Objectives	Operating Criteria	Technology and Operating Improvements
Public Interest			
Socio-Economic	• ensure orderly, efficient and economic development of Alberta's oil sand resource • optimize the use of Alberta goods and services • maximize the use of local resources for employment and business opportunities • prevent and/or mitigate the impact on cultural resources of the area	• project must have acceptable economic return balanced with environmental impact	• 65% of goods and services expected to be supplied in Alberta • creation of business Alliance with 8 major Alberta companies • target for 12% of all Suncor employees to be aboriginal

A3 PUBLIC CONSULTATION PROGRAM

A3.1 Suncor's Policy and Objectives

Suncor is committed to sharing information and encouraging open dialogue with individuals and groups that have an interest in, or are affected by, its operations. These communities of individuals and groups include:

- neighbouring and regional residents
- special-interest groups representing the broader public interest in Suncor's development
- government regulators
- company shareholders
- employees
- business associates

The aboriginal communities in the region, as represented by First Nations and Metis governments, are essential in the consultation process because of the land-based nature of oil sands development.

Suncor defines public consultation as:

> *The communication of the company's strategic intent and the facilitation of dialogue with interested communities or individuals so their needs and concerns can be reflected in how Suncor manages, plans and develops its business.*

This means Suncor involves regional communities on an ongoing basis in discussions relating to both its day-to-day operations and long-term plans. The company consults with these communities before detailed plans for projects requiring regulatory approval are finalized.

Suncor wants those affected by its activities to be able to agree that their input has been fairly considered in arriving at the best business decision.

A3.2 Description of Program

Since 1994, a comprehensive approach to consultation has been developed to reflect the needs of the region's residents. Developments include the following: the role of Suncor's Vice-President of Human Resources and Community Affairs has expanded to include community affairs; an internal stakeholder relations committee has been established; and a menu approach to consultation has been developed, to ensure all information is available to interested parties on all aspects of Suncor's oil sands development.

Community groups sought an effective, efficient process to receive information necessary for informed decision-making and to have their input incorporated into the company's evolving development plans. To manage the process, Suncor established the following prerequisites and principles of consultation:

Prerequisites:

- belief that consultation adds value
- commitment from senior management
- willingness to be influenced and to make changes

Principles:

- integrity of regulatory process is preserved
- process is open and transparent
- information is shared early, freely and in draft form
- participation of stakeholders is effective
- sensitivity to all needs of participants is maintained

By developing a number of avenues for involvement, each interested community selected its areas and levels of interest. Four types of consultation evolved:

- information-sharing
- continual consultation
- project consultation
- regional consultation

This approach was applied to the Steepbank Mine and Fixed Plant Expansion Project, and is continuing for Project Millennium.

A3.2.1 Information-Sharing

To better inform the general public, Suncor has held community forums, issued a "Report to the Community" (a newsletter on Suncor's future plans delivered semi-annually to 15 000 households in the region) and developed a Web site on the Internet (www.suncor.com). Suncor has issued a public disclosure document outlining plans for the development of Project Millennium. The disclosure document, together with Environmental Impact Assessment Terms of Reference are available on Suncor's web site. Media releases and advertising have informed the communities of Suncor's plans and how those interested may become involved. For additional information, names and telephone numbers of contact people have been provided. Copies of Suncor's materials are also available at the Fort McMurray Public Library and the Oil Sands Discovery Centre.

A3.2.2 Continual Consultation

The stakeholder relations committee, chaired by Suncor's Vice-President of Human Resources and Community Affairs, is responsible on an ongoing basis for consultation efforts about Suncor's existing operations. The mandate of the committee includes: communicating to stakeholders about environmental performance; socio-economic matters; and health and safety concerns.

A number of communities have sought further involvement in Suncor's day-to-day business and strategic development. Meetings with representatives from these communities have been held to exchange information and to provide input for Suncor's activities.

Stakeholders' needs have been assessed in consultation with them and an ongoing consultation plan has been developed. Memoranda of Understanding (MOU), which outline specific consultation plans, have been developed with Fort McKay, Fort Chipewyan and the Oil Sands Environmental Coalition (OSEC). These plans are reviewed each year to ensure they remain current.

A3.2.3 Project-Specific Consultation

Both the Steepbank Mine and Fixed Plant Expansion projects provided a learning opportunity about the consultative process. Project-specific relationships have been developed one-on-one with those communities indicating a desire to participate in the future development of Project Millennium.

To help accomplish this, Suncor developed a framework which integrates community input into the project design and the Environmental Impact Assessment (EIA) process. Project consultation progresses through a series of phases (from pre-feasibility to application filing) as follows:

- disclosure and project concept
- EIA terms of reference development
- project feasibility updates and EIA issues and methods review
- EIA results and documentation

The EIA builds on previous projects (Suncor's and others), thus avoiding over-consultation and stakeholder confusion. For example, consultation on EIA key indicator resources was limited to verifying those identified in the Steepbank Mine process as well as in other projects.

A3.2.4 Regional Consultation

With the 1997 announcements of development plans by Suncor and other oil sands developers, it became apparent that stakeholders in the Regional Municipality of Wood Buffalo (RMWB) could soon be overwhelmed with information and issues about which to respond. Cumulative effects assessment was identified as the greatest concern to the majority of stakeholders. Accordingly, three major initiatives have begun:

1. The Regional Infrastructure Working Group (RIWG) was formed to review infrastructure issues and to develop a population model as a planning tool for local agencies. This work will effectively minimize duplication and simplify the consultation process for communities. RIWG consists of at least one representative from each of the oil sands developers in this region and the planning director from the Regional Municipality of Wood Buffalo. Suncor has a representative on this committee and participates in several subcommittees dealing with infrastructure topics. RIWG's work is detailed in the EIA.

2. During the development of the EIA, oil sands developers met to discuss a regional development scenario for 2010 that would form the basis of the cumulative effects assessment (CEA) of all the projects proposed for the region. This group (Cumulative Effects Assessment Working Group) focused on environmental effects and the development of a framework to enable each company to complete an assessment. Their work is covered in the EIA.

3. In October 1997, the need for overall regional coordination of development issues was addressed by the formation of the Athabasca Oil Sands Development Facilitation Committee. This committee consists of a senior executive from each of five of the oil sands developers, the two MLAs and representation from the RMWB. A coordinator has been hired by this group to work on regional development issues and to liaise with governments and the RIWG. Suncor's Vice-President of Human Resources and Community Affairs participates in this initiative.

Suncor is an active participant in all three committees and has found them to be very effective in arranging and implementing action plans to address development issues within the RMWB. Regional planning and coordination is charted on Figure A3-1.

In both project-specific and regional consultation, Suncor has continued the practice of sharing information freely and in draft form, thus allowing interested parties the maximum opportunity to provide ideas and input for

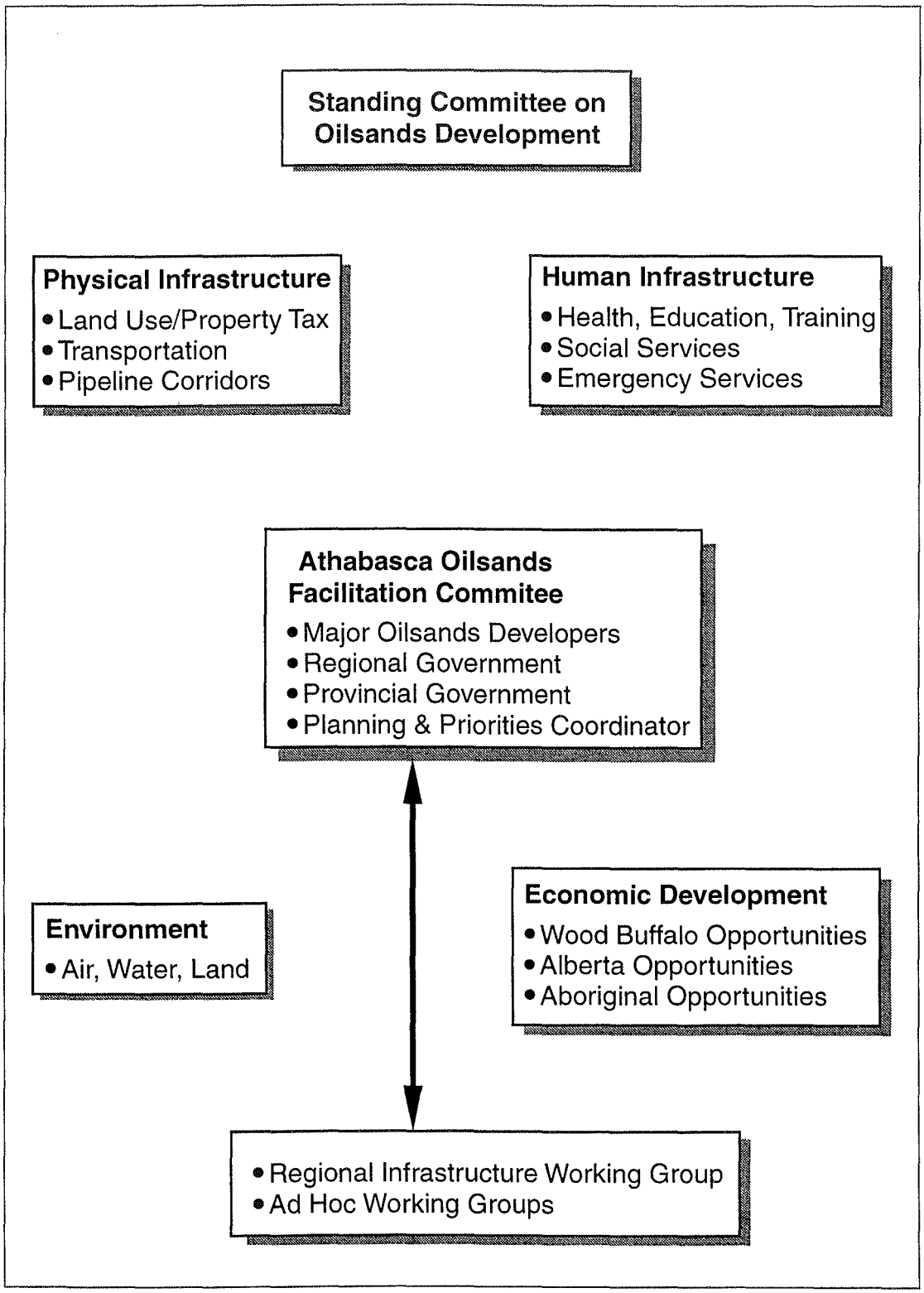

Figure A3-1 Regional Planning and Coordination Model

consideration by the company. The resulting improvements can then be incorporated into the project. Communities appreciate this approach and have agreed to review draft information for this purpose, taking into account that it may change as the project progresses.

Through this process the parties have worked toward identifying opportunities and resolving concerns before filing this application. The objective is to develop projects which reflect the combined efforts of Suncor and its neighbours as well as maximizing the benefits for all concerned. When this project application is filed, no issue should be unresolved because of a lack of understanding of the project and all the parties' needs. Suncor views consultation as a part of maintaining long-term relationships.

Table A3-1 lists public consultation events to mid-April 1998 and names the individuals or groups involved in each event. This list includes stakeholder activities associated with Suncor's Project Millennium, regional consultation meetings as well as other closely-related activities. Numerous other meetings have been held (particularly with regulators) as part of doing business.

A3.3 Outcomes of Consultation

A3.3.1 Interested Groups and Communities

Suncor's prime interested groups and communities are:

- residents and leaders of the Regional Municipality of Wood Buffalo (RMWB)
- the First Nations of the Athabasca Tribal Council
- Zone 1 Metis Locals within RMWB
- consolidated Metis Locals
- local and provincial environmental groups, represented by the Oil Sands Environmental Coalition (OSEC) which includes:
  - the Pembina Institute for Appropriate Development
  - the Fort McMurray Environmental Association
  - the Toxic Watch Society
  - the Environmental Resource Centre
- regulatory agencies
- employees and shareholders

A3.3.2 Agreements with Interested Communities

Agreements have been developed between Suncor and several prime interested communities to better manage the public consultation process. For example, Suncor has:

Table A3-1 Public Consultation for Project Millennium

Event Date	Community	Activities
19 August 1997	Fort McKay Environmental Services	EIA interface
29 August 1997	Fort McKay First Nation	Introduce Project Millennium, request consultation plan
3 September 1997	Athabasca Chipewyan First Nation	Memo of Understanding (MOU) development
3 September 1997	Fort McMurray Chamber of Commerce	Relationship and communication, request consultation plan
4 September 1997	Athabasca Chipewyan First Nation (ACFN)	MOU development
5 September 1997	Mayor, RMWB	Update of Suncor plans
8 September 1997	Communications, Energy and Paperworkers Union (CEP) executive	Introduce Project Millennium
9 September 1997	ACFN	Introduce Project Millennium and request consultation plan
11 September 1997	ACFN	MOU development
12 September 1997	Miskisew Cree First Nation	Introduce Project Millennium and request consultation plan
12 September 1997	ACFN	MOU development
15 September 1997	ACFN	MOU development
16 September 1997	Regional Infrastructure Working Group (RIWG)	RIWG - Socio-Economic Impact Assessment (SEIA) model review
16 September 1997	ACFN	MOU development
18 September 1997	ACFN	MOU development
26 September 1997	Shell, Syncrude, Mobil, OSEC, Fort McKay	CEA workshop
30 September 1997	Fort McKay	Consultation plan
5 October 1997	ACFN	MOU development
6 October 1997	OSEC	Introduce Project Millennium to OSEC
7 October 1997	RIWG	Community baseline data review
8 October 1997	ACFN	MOU development
9 October 1997	ACFN	MOU development
10 October 1997	RMWB, Member of the Legislative Assembly (MLA), Syncrude, Shell, Mobil	Regional infrastructure to support oil sands development, initiated by Syncrude
10 October 1997	Miskisew Cree, ACFN	MOU action

Event Date	Community	Activities
14 October 1997	Provincial Task Force, Community	School Task Force
16 October 1997	Fort McMurray Community	Project Millennium Open House
17 October 1997	ACFN	Terms of Reference (TOR) consultation
21 October 1997	Industry, public	CEA Working Group
28 October 1997	OSEC	EIA TOR review
30 October 1997	RMWB regional manager, department heads	Strategy consultation
30 October 1997	ACFN	TOR review
31 October 1997	Standing Committee on Oil Sands Development (RMWB)	RIWG presentation of Urban Population Impact Model
06 November 1997	Regional Economic Development Authority (RMWB)	Discussion of need for economic development during period of growth
13 November 1997	School Boards, Keyano, Regional Health Authority (RHA), RMWB	RIWG presentations, training on urban population impact model for community
18 November 1997	RMWB, Department of Energy	RIWG meeting
19 November 1997	Fort McMurray First Nation (Gregoire Lake Reserve)	Open House for Project Millennium
20 November 1997	Chipewyan Prairie Dene First Nation (Janvier)	Open House for Project Millennium
26 November 1997	Fort McKay and Companies	Industry Exchange (Trade Show)
26 November 1997	Fort McKay	Consultation proposal
26 November 1997	ACFN	Conference call to discuss EIA TOR
26 November 1997	Fort McKay	Consultation planning
27 November 1997	ACFN	Fish monitoring flight
3 December 1997	ACFN	EIA TOR conference call
3 December 1997	RMWB	Project Millennium presentation
9 December 1997	RIWG	Update and planning for subcommittee meetings
10 December 1997	RIWG	Regional Communities meeting, sub-committee of RIWG: kick-off meeting for collection of socio-economic data on a regional basis
10 December 1997	CEA working group	CEA approach and aboriginals' role

Event Date	Community	Activities
10 December 1997	RIWG	RIWG Transportation subcommittee
10 December 1997	RIWG, Keyano	Jobs and Education subcommittee
17 December 1997	Keyano College Business Department	Presentation of Suncor's Strategic Direction
06 January 1998	RIWG, Regional Council	Presentation of RIWG, coordinator's role and facilitation committee
07 January 1998	RIWG	Regional communities meeting, sub-committee meeting to plan for baseline and cumulative socio-economic effects in outlying communities
12 January 1998	RIWG	Regional Communities full-group meeting
13 January 1998	ACFN	MOU development
19 January 1998	Fort McKay	Consultation
22 January 1998	RMWB	Meeting with Regional Manager and Planning Director to review Project Millennium consultation plan
05 February 1998	RIWG Small Communities Subcommittee	Planning meeting for full-group meeting - February 17
05 February 1998	Al-Pac, Northlands and AEP Forestry	Project Millennium preliminary consultation
09 February 1998	OSEC and Fort McKay	Project Millennium detailed consultation kick-off
10 February 1998	ACFN	MOU development
12 February 1998	Anzac Community	Project Millennium Open House
17 February 1998	RIWG, Small Communities Subcommittees	Full-group meeting to discuss next steps for verifying community baseline and collecting impact assessment
19 February 1998	Fort McMurray Community	Project Millennium Open House to update and present preliminary EIA and SEIA results
20 February 1998	RIWG	Full-group meeting to report progress on transportation, jobs and education, small communities
27 February 1998	ACFN	MOU development
5 March 1998	Anzac, Gregoire Lake	Regional Communities/RWIG presentation on data survey to Executive committee at a public meeting
9 March 1998	RMWB Department Heads	Presentation on Project Millennium
12 & 13 March 1988	CEA workshop	Environmental thresholds

- signed a MOU with the Fort McKay community which is regularly reviewed and its action plan updated as needed.

- signed an MOU with the community of Fort Chipewyan which demonstrates the parties' commitment to developing a long-term relationship for facilitating ongoing consultation, mutual respect, business development, and social and cultural support. This memorandum is regularly reviewed and action plans are updated as necessary.

- entered into a consultation agreement with OSEC which defines the roles and responsibilities of each party in project-specific consultation relating to Project Millennium. Objectives of this agreement are to:

  - increase the level of understanding and accord between parties
  - improve the project
  - ensure an effective, efficient regulatory review of the project

- entered into an agreement (as have Syncrude, Shell and Mobil) in December 1997 with representatives of Fort McKay First Nation and Metis Local to provide funds for a staff position. This director, employed by Fort McKay Industrial Relations Corporation, works closely with developers to review applications, assess environmental impacts and ensure Fort McKay's needs are identified.

- engaged the Athabasca Chipewyan First Nation (ACFN) to facilitate their input.

- worked with other oil sands developers, OSEC and local aboriginal groups to participate in the development of a cumulative effects assessments framework.

- worked with other developers and the communities to develop and execute a regional process to validate outlying community baseline data, provide consolidated project data and receive impact assessments from a number of communities in the region through the RIWG.

- Suncor jointly funded the coordinator position for the associated projects related to regional development.

Suncor expects that these initiatives will form the foundation for long-term, open and mutually-beneficial relationships between the company and the community.

Suncor does not intend that the consultation process for this project will create undue expenses for participants. However, duplication of efforts will not be funded. All agreements with interested parties for participation in the consultation process will be public. Suncor believes it is in everyone's best interest for the company to:

- provide the necessary financial resources in the pre-filing consultative stage to facilitate effective consultation
- benefit from the ideas of others and identify opportunities for improvement
- clearly define (and if possible) resolve concerns before filing a project application

A3.3.3 Issues Management

Early in the consultation process for Steepbank Mine and the Fixed Plant Expansion, Suncor developed an issues management database to record questions, opportunities and concerns raised about its development plans. This system has been extended for Project Millennium

The issues database forms the foundation for the EIA. The work is focused to address the concerns raised.

A3.3.4 Impact of Consultation on Project

Consultation has an impact on Project Millennium in the following general areas:

- relationship building and understanding both parties' needs
- enhancement of the EIA program
- enhancement of application documents
- contribution to regulatory process efficiency
- project design
- impact mitigation

The project description (as presented in this application) and the supporting EIA reflect the results of consultation to the time of filing. Consultation will continue, which could result in further project refinement.

A number of project improvements were made as a result of stakeholders' influence. These include:

- reduction of SO_2 emissions, by treating some of the Base plant acid gases through Millennium Upgrader Tail Gas Treatment Unit
- reduction of wastewater discharge through system reconfiguration
- use of co-generation, to reduce emissions and conserve energy
- use of existing Naphtha Recovery Unit during planned maintenance on new tower, to maintain diluent recovery
- improvements in diluent quality, to reduce VOC emissions
- broader understanding of desired end land use
- target to increase Aboriginal hiring (to 12%)
- facilitation and development of regional cooperative initiatives

A3.4 Other Related Consultation Initiatives

Suncor's Aboriginal Affairs Department is responsible for maintaining regular communication with aboriginal communities in the region to facilitate joint pursuit of:

- socio-economic opportunities
- environmental initiatives
- education and training initiatives
- community cultural activities

Suncor's Aboriginal Business Development Committee (ABDC) identifies business opportunities and works with aboriginal communities to maximize the associated benefits for the communities. The volume of contracts with aboriginal suppliers reached $16 million in 1997 (up more than 50% over the previous year) and is targeted to increase to $25 million. Aboriginal employment has increased from about 2% of the Suncor workforce to 4% currently. The target for aboriginal hiring is to reach 12% of the Suncor workforce by 2002.

Suncor is an active participant in the Fort McMurray Regional Air Quality Coordinating Committee (RAQCC), which deals with air quality issues in the region.

Suncor is a founding participant in the Regional Aquatics Monitoring Program (RAMP), dealing with water quality and fish habitat.

Suncor is a participant in the Regional End Land Use Committee, a group that reviews and recommends alternatives for end land use at the closure of various mining properties.

Suncor is taking part in the Alberta Oil Sands Community Exposure and Health Effects Assessment Program, which is managed by a community committee.

A3.5 Ongoing Plans

Suncor will continue to:

- distribute its "*Report to the Community*" newsletter
- maintain its Web site on the Internet
- hold community forums
- meet with interested parties on both a project-specific and a continual-consultation basis
- participate in committees as long as needs exist
- meet with the local MLA, MP and Region Council
- host community events to clarify business opportunities for the people of the region, including aboriginal businesses
- maintain proactive relationships with local media to convey understanding and information on Suncor activities

Events planned following the filing of this application are listed in Table A3-2. Suncor will continue to take a forward-looking approach to sharing information with, and seeking input from, all interested parties. Consultation will continue through all phases of Project Millennium to ensure the best ideas are identified, explored and incorporated into the project.

Suncor will continue to focus its efforts on regional coordination. These efforts will help to enhance benefits and minimize impacts of prolonged growth in the region.

This integrated approach to regulatory approvals in Alberta has been a success for stakeholders, regulators and industry. Suncor will continue to facilitate a process which both preserves the integrity of the regulatory approval regime and engages all interested parties in an effective, efficient regulatory review.

Table A3-2 Continuing Public Consultation - Planned Activities

Target Date	Community	Activities
April 1998	Region	Report to the Community
April 1998	Fort McKay	Survey Completion on Project Millennium
April 1998	Standing Committee on Oil Sands Development (RMWB)	Presentation on Project Millennium
May 1998	Administrative Committee (RMWB)	Presentation on Project Millennium
May 1998	OSEC	Application Review
May 1998	CEA Working Group	Continue discussion on cummulative effects approaches
June 1998	Regional Council	Presentation on Project Millennium
October 1998	Region	Report to the Community

A4 SUMMARY OF ENVIRONMENTAL IMPACT ASSESSMENT

A4.1 Introduction

Project Millennium's Environmental Impact Assessment (EIA), which includes the Socio-Economic Impact Assessment (SEIA), has been prepared to assess the impacts associated with Project Millennium, including the expansion of Steepbank Mine (development, operation and reclamation), as well as the net impacts associated with increasing plant production of upgraded oil products to the 210 000 bbl/cd level.

The EIA predicted impacts that could result from the proposed project, identified mitigations to avoid or reduce those impacts and evaluated the residual effects. This EIA follows and extends the EIA prepared for the "Steepbank Mine Project Application" (Suncor 1996b). It was prepared over a period of sixteen months, and focuses on issues raised by communities, stakeholder groups and regulatory bodies, as reflected in the EIA terms of reference (Volume 1, Section A5, Table A5-5). The EIA describes the assumptions used, is quantitative wherever possible and explains the effects of Project Millennium from a regional perspective. In preparing the regional impact analysis, cumulative effects of other oil sands developments and forest harvesting were considered.

This section summarizes the Environmental Impact Analysis (EIA) and mitigation plans which are presented in greater detail in Volume 2 of the application.

The focus of the EIA is on addressing key concerns identified by the public and regulators (particularly concerns incremental to those addressed during the Steepbank Mine EIA). It also focuses on the cumulative effects of regional development. Additionally, the EIA considered the "Fort McMurray Athabasca Oil Sands Subregional Integrated Resource Plan" (AEP 1996a). Key concerns addressed include:

- cumulative effects of oil sands development on local and regional air quality
- protection of water quality and aquatic ecosystem health in the Athabasca and Steepbank Rivers and Shipyard Lake wetlands
- impacts of surface disturbance on the terrestrial ecosystem (terrain and vegetation), especially within the Athabasca and Steepbank River valleys
- cumulative effects of oil sands development on wildlife
- health protection of local and regional residents
- effects on traditional and historical resources
- economic and employment opportunities
- cumulative impacts on infrastructure and community services in the Regional Municipality of Wood Buffalo, particularly transportation, housing, health care and education

A4.2 Summary Conclusions

The EIA supports Suncor's application to AEUB and AEP for the proposed Project Millennium and meets obligations under AEPEA to provide information relating to the potential environmental effects of the project. Suncor is committed to implementing measures that will ensure that the proposed project will not create significant adverse impacts. Notable conclusions are:

- While cumulative air emissions will increase as a result of Project Millennium and other projects, when taken together the modelled emissions generally remain under Alberta Environmental Protection guidelines for ground-level concentrations. Acid deposition is predicted to increase, but further work is required to understand the relationship between loading and environmental sensitivity. A comprehensive, cooperatively-planned and integrated air monitoring system will continue to monitor regional air quality. As well, a program for effects monitoring is in place.

- Athabasca River water quality will not be impacted by the Project nor combined developments. Any potential impact would be reduced with a substantial reduction of plant wastewater and cooling water discharged to the river. The Shipyard Lake wetland ecosystem's will be protected. There will be no net loss of fish habitat in the east bank mining area.

- A closure plan which integrates Lease 86/17 and the east bank mining areas was assessed to have a high likelihood of meeting objectives. Consolidated Tailings technology is proving to be a key factor in reclamation performance. At the closure of the mine, the end pit will be reclaimed to a lake. Further research and development is required to establish design criteria.

- Based on available information, the cumulative health impacts of Project Millennium together with regional projects, will be of acceptable risk. Work is progressing in the area of naphthenic acids and particulates to add further knowledge to the health risk assessment database. Also, Suncor is participating in cooperative health studies and environmental effects monitoring in the region.

- There will be moderate impacts on the local community during Project construction and as the Project comes on-stream, heightened by the significant cumulative oil sands development in the region. This is to be expected for resource development of the proposed scale. These cumulative effects are being addressed through a high level of cooperation among the Regional Municipality of Wood Buffalo (RMWB), the Province of Alberta, community stakeholders and the developers.

- The project will provide very significant economic benefits to the region, Alberta and Canada. Suncor is committed to ensuring that the aboriginal community shares in the benefits through employment and business opportunities.

A4.3 EIA Process

A4.3.1 Scope

The EIA has been completed in accordance with the Final Terms of Reference for Project Millennium. The Terms of Reference which were issued by AEP following input from federal and provincial regulators, stakeholder groups, regional communities, and Suncor, required the EIA to:

- identify the environmental resources affected by Project Millennium
- predict positive and negative impacts and the extent to which negative impacts could be mitigated
- quantify and assess impact significance where possible
- identify information sources
- explain the selection of key components to be examined in the EIA and the influence of the consultative process in the selection
- describe the following for each environmental parameter:
  - existing baseline conditions
  - the nature and significance of effects and impacts of the proposed project
  - how biodiversity is addressed (where appropriate)
  - plans to eliminate, minimize or mitigate negative effects and impacts
  - residual impacts and their significance
  - a plan to monitor effects and impacts and to demonstrate acceptable environmental performance
  - a plan to address those adverse impacts that require cooperative resolution by government, industry and the community

Also, the EIA has been required to address the cumulative effects that are likely to result from the project in combination with other existing and planned projects or foreseeable activities in the region.

A4.3.2 Local and Regional Considerations

Two study areas (Figure A4-1) have been defined to provide local focus and a regional perspective for the EIA. The Local Study Area (LSA) centred around Suncor's plant and the mine development area. The Regional Study Area (RSA) extended south of Fort McMurray and north to the Birch Mountains area. Both the RSA and the LSA were variable dependent on the environmental component being assessed.

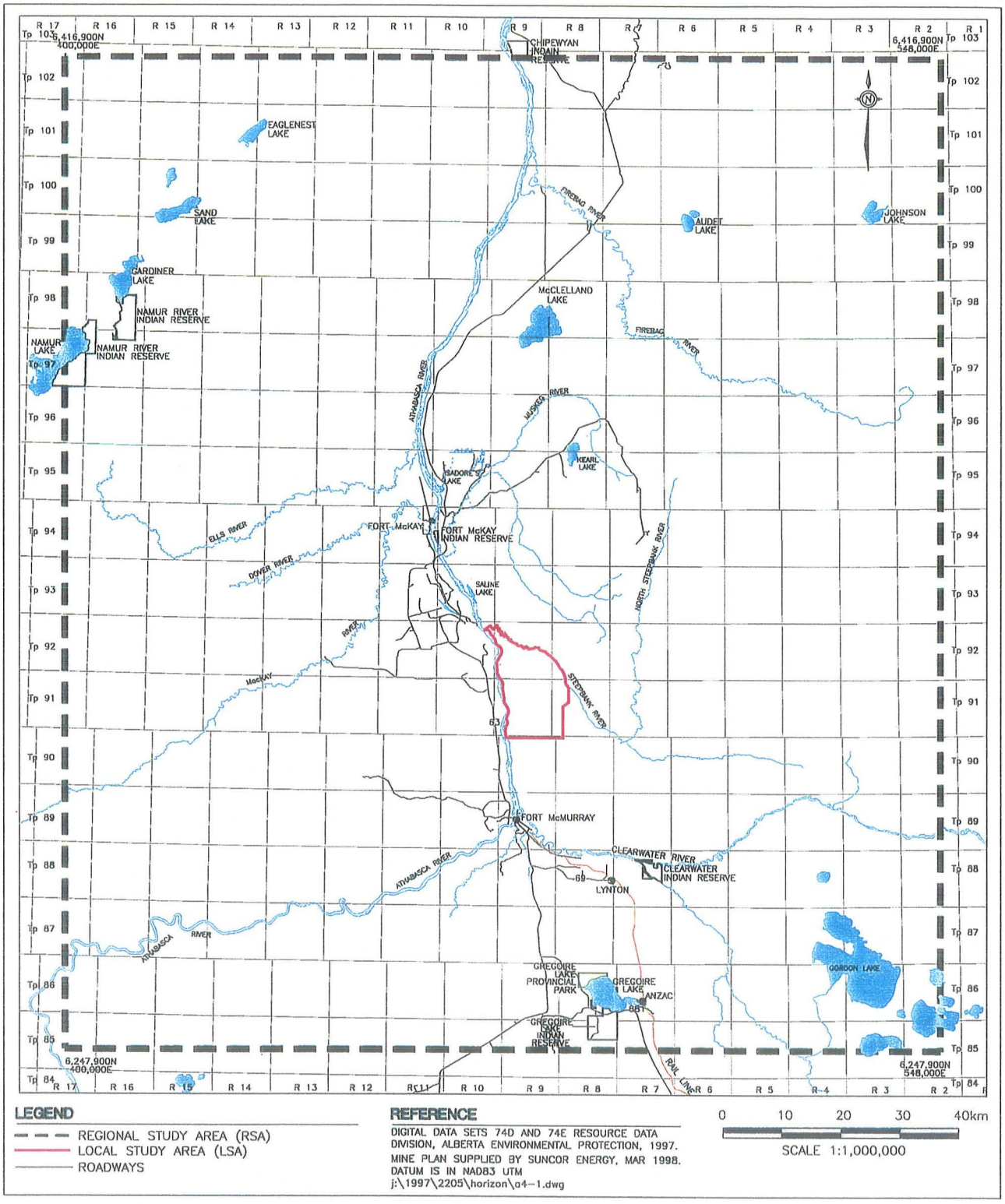

Figure A4-1 Regional and Local Study Areas

A4.3.3 Impact Assessment

Table A4-1 illustrates the two EIA assessment levels that were conducted.

Table A4-1 Project Millennium Impact Assessment Levels

	Baseline	Impact Assessment	Cumulative Effects Assessment
	EXISTING + APPROVED DEVELOPMENTS	EXISTING + APPROVED DEVELOPMENTS + SUNCOR PROJECT MILLENNIUM	EXISTING + APPROVED DEVELOPMENTS + SUNCOR PROJECT MILLENNIUM + PLANNED DEVELOPMENTS
EXISTING	**Suncor Lease 86/17**	Suncor Lease 86/17	Suncor Lease 86/17
	Syncrude Mildred Lake	Syncrude Mildred Lake	Syncrude Mildred Lake
	Suncor Steepbank Mine	Suncor Steepbank Mine	Suncor Steepbank Mine
	Northstar Energy	Northstar Energy	Northstar Energy
	SOLV-EX	SOLV-EX	SOLV-EX
	Municipalities	Municipalities	Municipalities
	Pulp mills for water quality	Pulp mills for water quality	Pulp mills for water quality
	Forestry	Forestry	Forestry
	Pipelines/roadways/others	Pipelines/roadways/others	Pipelines/roadways/others
APPROVED	**Suncor Steepbank Mine and Fixed Plant Expansion**	Suncor Steepbank Mine and Fixed Plant Expansion	Suncor Steepbank Mine and Fixed Plant Expansion
	Syncrude Mildred Lake Debottlenecking Phase ½	Syncrude Mildred Lake Debottlenecking Phase 1/2	Syncrude Mildred Lake Debottlenecking Phase ½
	Syncrude Aurora Mine	Syncrude Aurora Mine	Syncrude Aurora Mine
	Forestry	Forestry	Forestry
PLANNED		**Suncor Project Millennium - Mine Expansion and Upgrader**	Suncor Project Millennium - Mine Expansion and Upgrader
			Shell Muskeg River Mine Project
			Syncrude Project 21 Mildred Lake Upgrader Expansion
			Mobil Kearl Oil Sands Mine and Upgrader
			Shell Lease 13 East Mine
			Gulf Surmont - In situ
			Petro-Canada MacKay River - In situ
			JACOS Hangingstone - In situ
			Fee Lot 2 Development
			Major pipelines, utility corridors and roadways
			Municipal Growth

Baseline conditions were defined to include existing oil sands and forestry plus approved developments. The incremental impact of Project Millennium alone on the baseline conditions was assessed. Cumulative effects assessment also included known planned projects together with Project Millennium.

A4.4 Air Quality Impacts

Stakeholder concerns about air emissions from the proposed Project Millennium have focused on:

- sulphur dioxide (SO_2), which can acidify surrounding soils and water bodies
- oxides of nitrogen (NO_x), which contribute to ground-level ozone and acidification
- hydrocarbon emissions, including volatile organic compounds (VOCs) which could cause odours, health impacts and contribute to ground-level ozone
- sulphur compounds, which could cause odours
- greenhouse gas (GHG) emissions, which have a possible impact on global environment
- particulate emissions, which could affect human health

Project Millennium will dramatically reduce Suncor's emissions on a unit of production basis from current levels. However, due to the magnitude of the production increase, absolute emissions will increase.

Emissions of SO_2 have been effectively reduced with the commissioning of the Flue Gas Desulphurization (FGD) plant in 1997. Through Project Millennium design opportunities and improvements within the Base plant, Suncor is targetting to meet ambient air quality guidelines when the Project comes onstream.

Regionally and combined with other projects, an increase in acid deposition is predicted because of overall increase in SO_2 and NO_x emissions. Suncor is working through the Clean Air Strategic Alliance (CASA) and Regional Air Quality Coordinating Committee (RAQCC) framework to further understanding of the relation of acid loading and environmental sensitivity.

Major contributors of NO_x emissions are the Mine fleet and Energy Services. The maximum ambient NO_2 concentrations will be less than hourly guidelines. The daily and yearly guidelines are exceeded in the mine pit areas due to the equipment emissions. There is a potential for increased acidification in the region when these emissions combined with SO_2 are added to other baseline developments. Strategies to minimize NO_x emissions include: use of low-NO_x burners for new plant equipment; a site-wide NO_x management plan; and use of mine fleet vehicles with improved emission control technology.

There is the potential for ground-level ozone concentrations to exceed provincial guidelines for limited periods at some locations during the summer because of a predicted increase in regional NO_x. Suncor is participating in a regional ground-level ozone modelling program with other oil sands developers. This program (expected to be completed by October 1998) will employ a new modelling framework that replaces the current model, which is recognized as having been inaccurate. Suncor has worked with AEP and other developers to achieve consensus on the modelling framework.

Suncor recently identified a significant increase in emissions from its Tar Island tailings pond (Pond 1). These emissions include methane as well as volatile organic compounds (VOC) associated with the naphtha diluent used in the secondary extraction process. Assessment of sources indicates that these emissions are restricted to Pond 1. The emissions are related to unrecovered bitumen and diluent lost to tailings ponds. Project Millennium will improve the diluent character and thus reduce VOC unit emissions. Suncor is committed to investigate these emissions thoroughly in order to develop an action plan by the first quarter of 1999. Suncor will further quantify and characterize existing emissions, assess environmental and human health impacts, determine cause of emissions, and evaluate control options.

Suncor is a member of the Canada Climate Change Voluntary Challenge and Registry Program, and will manage greenhouse gas emissions corporate-wide following a seven-point plan. The Suncor plan includes progressive greenhouse gas management; developing alternative sources of energy; research; pursuing offsets; public policy advocacy; education; and reporting progress.

Particulate emissions from Suncor's operations will continue to be low. These emissions have been were substantially reduced with commissioning of the FGD.

An enhanced air quality monitoring network has been recently installed in the oil sands region. Called the Wood Buffalo Zone Air Monitoring Program, the initiative combines expertise and leadership of government, health and community organizations, industry as well as other stakeholders. Data collected by the monitoring network will help guide government and industry decisions to protect human health, vegetation and wildlife and to examine soil and water acidification, as well as to minimize odours in the region over the long term.

A4.5 Athabasca River Water Quality and Aquatic Ecosystem Impacts

Potential effects on Athabasca River quality, fisheries and fish habitat or aquatic health that could result from Project Millennium activities include:

- reduced river flows caused by river-water withdrawal or diversion of natural groundwater or surface water flows from mined leases

- sedimentation caused by minesite and river valley erosion

- water quality changes resulting from release of operational waters (pre-mine drainage, treated sewage and wastewaters) and reclamation waters (reclamation landform seepage and runoff) to the Athabasca and Steepbank Rivers. (This includes an end pit lake left after mine closure)

- impacts resulting from drainage changes to Leggett, Wood and McLean Creeks as well as Unnamed Creek, which drains to the Shipyard Lake wetlands

Mitigating measures that Suncor will employ to protect aquatic habitat and water quality include:

- collecting all process-affected waters for reuse as process water

- routing drainage water and runoff from cleared areas into sedimentation ponds before discharge to receiving streams

- constructing a seepage collection system around mine and tailings pond areas

- maintaining water flows to Shipyard Lake wetlands during mine operations as well as long-term redevelopment of surface drainages to wetlands

- maintaining vegetation buffers along Athabasca and Steepbank Rivers, to control mine erosion

- implementing a reclamation plan that includes wetlands systems for natural treatment of runoff and seepage water

- achieving rapid revegetation of land disturbances for erosion control

- modifying the Upgrader cooling and wastewater treatment systems, to substantially reduce discharge of cooling and wastewater to the Athabasca River

- releasing operational CT water only when proven acceptable. (Includes waters associated with the end pit lake.) This is the subject of continuing research and monitoring.

In 1997, Suncor (in partnership with other parties) initiated a long-term Regional Aquatics Monitoring Program (RAMP). The objectives of the program include the following:

- monitoring to allow assessment of regional trends and cumulative effects
- providing data against which assessment predictions for water quality and aquatic resources will be verified

It has been concluded that water releases and aquatic habitat changes associated with Project Millennium will not impair Athabasca River water quality, reduce fish abundance or affect aquatic ecosystem health if the above mitigation measures are taken. Downstream users will not be affected. Changes to surface runoff and groundwater flows to the Athabasca and Steepbank Rivers and to Shipyard Lake wetlands are minimal and will have a negligible impact on fish habitat. Suncor will develop a mine and operating plan which will result in no net loss of fish habitat associated with Shipyard Lake wetlands, Leggett, Wood and McLean Creeks.

No tainting of fish is predicted. Suncor will conduct a fish health and tainting study on CT release waters with a taste panel of regional residents.

A4.6 Terrestrial Resource Impacts

The terrestrial environment (i.e., landforms, soil and vegetation) on the east side of the Athabasca River will be affected by the following east bank mining area activities:

- mining of the Athabasca River escarpment and uplands in the Pit 2 ore body
- placement of both the Millennium Extraction and Ore Preparation plants, and a connecting corridor in the Athabasca River Valley
- construction of an external tailings pond above the escarpment
- altering surface drainages

Most of these issues are similar to those considered in the Steepbank Mine application. Project Millennium accelerates opening of the Pit 2 area by about seven years and mines the entire Pit 1 and Pit 2 resource in a space of about thirty years - rather than fifty or more years. Suncor will continue with mitigating measures identified in the Steepbank EIA including:

- no disturbance of the Steepbank River Valley

- maintaining a 100-m no-disturbance setback from the Steepbank River escarpment crest

- contouring (including introducing surface irregularities) dyke and overburden storage overburden area slopes where possible

- restoring vegetation on constructed landforms to a diversity and community type compatible with regional vegetation communities

- managing flows into Shipyard Lake wetlands during mine operations to protect water quality, and maintaining flows to this area in the long term

- adopting a dry landscape reclamation strategy through implementation of CT technology

- creating new wetlands as part of the uplands reclamation

Three Steepbank Mine application commitments are modified by Project Millennium:

- Movement of all infrastructure from the Athabasca River Valley except the mine access road and bridge will be delayed by about three years, to from 2033 to 2030.

- The Athabasca River escarpment in the Pit 1 mining area will be replaced with an overburden dyke (as previously indicated) but four years earlier, by 2005. The escarpment in the Pit 2 area will be rebuilt by 2008, also with an overburden dyke.

- Project Millennium will require an external tailings pond. That pond will be constructed in a geotechnically-secure manner, with gentle slopes of overburden and sand, and will have a minimum 300-m no-disturbance buffer to the Athabasca River.

Despite mitigation, there will be some landform alteration. After reclamation, the mined area of the Athabasca River escarpment will be somewhat more linear and there will be topographic features created where overburden has been placed.

Revegetation of disturbed areas will restore the potential to achieve regional diversity and vegetation community types but it will take some time for vegetation communities to mature.

Vegetation buffers and setbacks from the Athabasca River will minimize the visual impact of the mine during operations. With removal of facilities from the river valley in 2033, the most notable long-term visual impact will be provided by the bridge and existing plant (on the west side of the river) plus landform alterations mentioned above.

Overall integrated reclamation of the east bank mining area and Lease 86/17 with CT technology will allow the natural diversity of pre-development habitats to be restored. However, in the Local Study Area, there will likely be more mixedwood forests and fewer wetlands. There is flexibility to adjust the mix of habitat types to meet preferences of end land users and to maintain sustainable ecosystems.

The overall size of the Shipyard Lake wetlands will be relatively unchanged and its supply of water will continue to be maintained in both the short and long term.

An end pit lake will be created in the uplands area. Objectives for this lake include: geotechnical security, relatively rapid filling (ten years or less) and a healthy aquatic ecosystem. Suncor will develop detailed design criteria during the life of the Millennium project, prior to closure.

This project's impact on the terrestrial environment is considered to be moderate to high during the operation period and low following final reclamation. The Integrated Resource Plan (IRP) guidelines for Athabasca River Valley development will be satisfied. None of the terrestrial impacts are regionally significant.

A4.7 Wildlife Habitats and Population Impacts

The upland boreal forest ecosystem in the vicinity of the east bank mining areas provides moderately-productive habitat for moose, terrestrial furbearers and breeding birds. Habitats in the Athabasca River Valley are substantially more productive for most wildlife species and provide high quality over-wintering habitat for moose.

Potential impacts on wildlife populations due to east bank mining area activities include:

- direct loss of habitat, especially high-value habitat in the Athabasca River Valley
- fragmentation of habitats by some restriction of wildlife movement along the Athabasca River Valley
- direct mortality during clearing and overburden removal
- effects to health from exposure to chemicals in the air and water, as well as vegetation on CT deposits

Major wildlife impact mitigations that will be implemented by Suncor in the course of the mining development include:

- phasing the clearing and reclamation, to limit the area of habitat disturbance at any one time
- accelerating the reclamation process through enhanced revegetation techniques
- reclaiming CT landforms to a mixture of wetlands and stands of deciduous and mixedwood forests
- maintaining vegetation buffers along the Athabasca and Steepbank Rivers and minimizing disturbance where possible

During the operational phase of the east bank mining areas, there will be a moderate to high local impact on wildlife populations caused by habitat loss due to the project. In the longer term, reclamation of the east bank mining areas with a relatively high proportion of deciduous and mixedwood forest will restore overall habitat potential for most of the area's wildlife species.

Projections of contaminant accumulation in plants and animals, and its associated toxicity due to use of CT indicate a low potential for impact on wildlife populations.

A4.8 Human Health Impacts

Suncor considers the most important factor associated with its growth initiatives to be that the health of the local communities, future users of reclaimed landscapes and Suncor employees is not negatively affected.

Potential impacts on human health from Project Millennium come from:

- chemicals in water releases
- chemicals in air emissions
- consumption of local plants and animals exposed to project air emissions and water releases during the operational phase
- chemicals in soils, plants and water from the reclaimed landscape

To protect human health, Suncor will:

- strive to reduce air emissions, especially those parameters that have potential consequences to human health
- manage water discharges to ensure potential downstream water uses are protected
- design and develop reclaimed landscapes that are safe for future land users

Based on available information, Project Millennium will not result in unacceptable chemical exposures for people who live or work in the project area. This conclusion is based on a conservative analysis of predicted exposures that might arise from:

- contacting or ingesting surface waters
- ingesting local plants and animals
- inhaling airborne chemicals

A recent assessment was initiated to address stack particulates and associated polycyclic aromatic hydrocarbons and metals in response to stakeholder concerns. This information will be available upon completion of assessment. Work is also progressing in the area of naphthenic acids and toxicity. This information will add further knowledge to the overall health risk assessment database. Suncor will continue to participate in the Fort McMurray regional health study and the aquatics and air effects monitoring programs in the region.

A4.9 Socio-Economic Impact Analysis

Project Millennium will provide a number of significant economic benefits to the Wood Buffalo Region, to the Province of Alberta and to Canada. These include:

- creation of 800 direct jobs and about 1 200 indirect jobs
- direct on-site construction employment peaking at 2 500 to 3 000 workers
- capital expenditures of $2 billion to be spent:
  - 17% within the Region
  - 48% in the rest of Alberta
  - 15% in the rest of Canada
- average annual project operating expenditures that will generate $140 million in household income each year in Alberta
- Project Life income taxes and royalties to Alberta and Federal governments will exceed $4.2 billion
- municipal assessment base (and thus its fiscal capacity) will increase by about 30% to 35%

The incremental impact of Project Millennium would be to increase the population of the region, primarily in the urban service area of Fort McMurray, by about 1 100. While such an increase would cause some stress on the existing community infrastructure, the impact would be readily manageable. However, the cumulative effect of the proposed developments in the region (should they all proceed) is to increase the population in Fort McMurray from the current estimate of 38 700 to 49 500 by 2006.

As well, the cumulative effect of all announced projects will have a noticeable impact on the community infrastructure. Paramount among community concerns are:

- transportation safety, primarily north of Fort McMurray on Highway 63, but also south to Edmonton
- provision of adequate health care and attraction of sufficient physicians
- provision of sufficient housing
- provision of adequate education and training infrastructure
- aboriginal employment
- provision of sufficient social services
- provision of appropriate emergency services
- municipal financial needs prior to project startups
- equitable sharing of economic benefits

To enhance local socio-economic benefits and to minimize negative impacts, Suncor will:

- work actively with local government, stakeholder groups and other developers to mitigate adverse community impacts
- work in partnership with the communities and with education institutions to develop a diversified pool of successful employment candidates from the region
- work with municipal and provincial authorities and other developers in the region to find ways of funding necessary infrastructure so growth will proceed on planned timelines
- continue to work with the aboriginal communities to ensure their participation in the economic benefits of development through employment and business opportunities
- give preference to local suppliers and contractors when purchasing goods and services
- provide camp accommodation for the construction workforce and temporary accommodation for the permanent workforce

A heightened level of cooperation existing among the Municipality, the Province of Alberta, community stakeholders and the developers will help to understand and mitigate the cumulative effects of proposed development. Suncor is an active participant on a number of committees and is confident that the requisite infrastructure can be developed in a timely and orderly fashion. The transition period will produce stress in the community, as may be expected for a development of this magnitude. However, over the long term, Project Millennium will confer significant benefits to the region.

A4.10 Historical Resources

Extensive on-site investigations, of the area to be affected by mining, located four sites where recent cultural materials were subsequently identified. The potential for significant undiscovered sites within the area is low and further mitigation requirements prior to mining are not considered necessary. One outcrop of the Devonian Waterways Formation containing

fossil remains was also identified in the LSA, but this was outside the development area. As this will not be affected, no mitigation is required.

A4.11 Traditional Land Use and Resource Use

Assessment of Project Millennium's effects on traditional land and resource use included considering changes in:

- surface and subsurface minerals
- environmentally-significant areas
- forestry
- use of local plants for food or spiritual and medicinal purposes
- hunting
- trapping
- fishing
- non-consumptive recreational use

Suncor will mitigate the impacts of the east bank mining areas on existing land uses by:

- protecting surrounding resources from the effects of air emissions and water discharges through continuous improvement processes and effective reclamation of disturbed areas
- in consultation with aboriginal groups, designing a closure plan that accommodates traditional land uses

Hunting and trapping potential will be disrupted during construction and operations as a result of access restrictions and habitat disruption. Timber and gravel resources will be salvaged and not wasted.

A5 APPLICATION GUIDE AND DESCRIPTION

A5.1 Application Scope and Purpose

This application, supported by the EIA, describes the proposed Project Millennium. The application is an integrated application to AEUB and AEP.

Suncor is seeking an amendment to Approval No. 8101 from AEUB for the following:

- Approval of the scheme (as described in this application) for the expansion of mining activities, construction of new facilities, modification of existing facilities and the integrated reclamation plan to support a production increase to a minimum of 210 000 bbl/cd

Suncor is seeking an amendment to its approval No. 94-01-00 (as amended) from AEP for the following:

- expansion of mining activities, construction of new facilities and modifications of existing facilities (as described in this application) to support a production increase to a minimum of 210 000 bbl/cd including:
  - an expansion of Steepbank Mine
  - modifications to the Steepbank Mine service complex
  - modifications to the Steepbank Mine drainage plan
  - construction of an external tailings pond
  - construction of an ore preparation plant at Pit 2
  - construction of the Millennium Extraction plant
  - installation of associated pipelines crossing Suncor Bridge to the Base plant
  - modifications to the Base Extraction plant
  - construction of the Millennium Upgrader
  - modifications to Energy Services facilities including co-generation facilities
  - addition of associated air emissions points
  - modifications to the freshwater, wastewater and cooling ponds
  - associated potential development on Fee Lot 2 (including tank farm, administration building, warehouse and camp)

- modifications to the approved integrated Conservation and Reclamation plan for the current approval period (to June 24, 2006).
- modifications to the integrated closure plan to accommodate the expansion in mining activities
- operation of the modified existing and proposed new facilities

Suncor will apply at a later date for approval (as required) for the construction (in about 2012) and operation of additional extraction capacity in the east bank mining area.

Suncor is seeking amendments to File No. 27549/27551 and Licence No. 10400 from AEP for the following:

- An increase in the allocation for water diversion in the course of mine development and operation. This water will be diverted to prevent runoff exposed to oil sand, by Suncor's mining operation, from entering the environment.
- An increase in the allocation for the consumptive use of water from the Athabasca River to build an operating inventory for the Millennium Extraction Plant.

A5.2 References to Applicable Legislation

A5.2.1 This Application

This application seeks approval from the Alberta Energy and Utilities Board (AEUB) and Alberta Environmental Protection (AEP) in accordance with the following legislation:

- Review and acceptance of the Project Millennium Environmental Impact Assessment Report by the Director of Environmental Assessment Division, AEP under the *Alberta Environmental Protection and Enhancement Act* (AEPEA).
- Amendment of Approval No. 8101 under the Alberta *Oil Sands Conservation Act* (OSCA).
- Amendment of the existing Approval No. 94-01-00 (as amended) under AEPEA.
- Amendment of the existing File No. 27549/27551 and Licence No. 10400 under the *Water Resources Act.*

A5.2.2 Other Associated Project Applications

Suncor will file applications for other aspects of Project Millennium under other statutes. The following is a list of identified federal and provincial application and approval requirements applicable to this project:

Federal:

- *Fisheries Act,* for disturbance to Wood Creek, McLean Creek and Shipyard Lake fish habitat.

Provincial:

- Alberta *Hydro and Electric Energy Act,* for exemption under the act to construct and operate turbogenerators.

- Alberta *Electric Utilities Act*, for exemption under the act for power rates and tariffs for power generated by Suncor in its operations.

- Alberta *Pipeline Act*, for the construction and operation of hot water, raw bitumen, natural gas, gypsum and water pipelines.

- *Municipal Government Act, Part 17*, for a development permit from the Regional Municipality of Wood Buffalo for the construction and operation of Project Millennium and related infrastructure

- *Public Lands Act,* for surface rights

- *Historical Resources Act,* for clearance to construct the facilities

A5.2.3 Other Applications

Suncor is proceeding with those amendments to its AEPEA approval as required for the Production Enhancement Phase (Appendix I)

A5.3 The Applicant

The name of this applicant is Suncor Energy Inc.

The address of the applicant is:

Suncor Energy Inc., Oil Sands
P.O. Box 4001
Fort McMurray, Alberta
T9H 3E3

Correspondence about this application should be directed to the above address to the attention of:

Mark Shaw, Director, Sustainable Development
Phone: 403 743 6892
Fax: 403 791 8344
E-Mail mshaw@suncor.com

A5.4 Guide to the Application

The applications for approval to AEUB and AEPEA have been integrated to:

- reduce the amount of duplication, particularly in the area of project descriptions
- facilitate an efficient review of the application by regulators and the public

This application is presented in two volumes:

- Volume 1 contains the requisite information as specified by:
  - AEPEA "Regulatory Requirements for Application"
  - AEUB "Application Guidelines"
  - Information Requirements under the *Water Resources Act*
  - EIA Terms of Reference (in part)

- Volume 2 contains the remaining information as specified by the EIA Terms of Reference

The following series of tables identifies locations of the required information within this application, cross-referenced to the information guidelines.

Table A5-1 AEPEA Regulatory Requirements for Application, Cross-Referenced with Suncor Volume 1, Project Description and Volume 2, EIA

AEPEA Regulation Clause	Regulation Information Required (Abbreviated)	Volume 1 Project Description	Volume 2 EIA
3(1) a	Name and address of Applicant	A5	
3(1) b	Location, capacity and size of the activity to which the Application relates	A5	
3(1) c	Nature of the activity and the change to the activity (amendment, addition or deletion as the case may be)	A5	
3(1) d	Where the Applicant requires an approval from the Energy Resources Conservation Board, the date of the written decision in respect to the Application	A5	
3(1) e	An indication of whether an environmental impact assessment report has been required	A5	
3(1) f	Copies of existing approvals that were issued to the Applicant in respect of the activity under this Act or a predecessor of this Act	B1.3	
3(1) g	Proposed or actual dates for construction commencement, construction completion and commencement of operations	C6	
3(1) h	List of substances, their sources; the amount of each substance that will be released into the environment as a result of the activity, the change to the activity or amendment, addition, deletion, as the case may be; the method by which the substances will be released; and the steps taken to reduce the amount of the substances released	F3	B3 C2.2 C3.2
3(1) i	Summary of the environmental monitoring information gathered during the previous approval period	Suncor 1996b Suncor 1995a	
3(1) j	Summary of the performance of substance release control systems used for the activity during the previous approval period	F Suncor 1996b Suncor 1995a	
3(1) k	Justification for the release of substances into the environment as a result of the activity, the change to the activity or the amendment, addition or deletion, as the case may be	F3	

AEPEA Regulation Clause	Regulation Information Required (Abbreviated)	Volume 1 Project Description	Volume 2 EIA
3(1) l	Measures that will be implemented to minimize the amount of waste produced, including a list of the wastes that will or may be produced, their quantities and the method of their final disposition	F2	
3(1) m	Any impact, including surface disturbance, that may or will result from the activity, the change to the activity or the amendment, addition, or deletion, as the case may be	F E	EIA
3(1) n	Confirmation that any emergency response plans required to be filed with the local authority of the Municipality or with Alberta Public Safety Services have been so filed	Emergency Response Information in Section B6, Suncor 1996a	
3(1) o	Confirmation that there are contingency plans in place to deal with any unforeseen sudden or gradual releases of substances to the environment	B6.1, Suncor 1996a	
3(1) p	Conservation and reclamation plan for the activity	E	
3(1) q	Description of the public consultation undertaken or proposed by the Applicant	A3	
3(1) r	Information required under any other regulation under the Act to be submitted as part of or in support of the Application	A5	
3(1) s	Any other information required by the Director, including information addressed in a standard or guideline pertaining to the activity that is published or adopted by the Department	A5	

Table A5-2 AEUB Guidelines (September 1991) Respecting an Application, Cross-Referenced with Suncor Volume 1, Project Description and Volume 2, EIA

AEUB Guideline	Guideline Information Required (Abbreviated)	Volume 1 Project Description	Volume 2 EIA
1.5.1	Identification of act and section under which Application is made	A5	
1.5.2	Name and address of the Applicant	A5	
1.5.3	Statement of need and timing for the project	A2, C1	
1.5.4	Overall description of the proposed scheme, including location, size, scope, schedule, pre-construction, startup, duration and reasons for proposed schedule	A2, C1	
1.5.5	Description of the regional setting of the development; reference to existing and proposed land use	E1, E2	A2 F3
1.5.6 (a) 1.5.6 (b)	Lease map Location of landowners and their dwellings in relation to proposed site	B1 A2	
1.5.7	Topographic map	C2.3	
1.5.8	Aerial Photo	B1, C2.3	
1.5.9	General description of storage and transportation facilities of the final hydrocarbon product	B3, C3	
1.5.10	Proposed rate of production of the hydrocarbon product over the term for which approval is requested	A5	
1.5.11	Description of the subject oil sands owned by or leased to the Applicant	B1	
1.5.12	Description of status of negotiations held or to be held with the freehold, leasehold and mineral surface rights owners	C2.4.1	
1.5.13	Description of proposed energy sources with a comparison to possible alternative sources, rates of resource utilization; and description of sources and supply	C4	
1.5.14	Description or results of public information programs planned or initiated for the project	A3	
1.5.15	Term of the approval sought, including expected start and completion dates of the scheme	A5	

AEUB Guideline	Guideline Information Required (Abbreviated)	Volume 1 Project Description	Volume 2 EIA
1.5.16	Name of person responsible to Application, to whom correspondence should be addressed	A5	
2.1.1 (a) to (k)	Geological description	C2.2	
2.1.2 (a) to (g)	Evaluation of the reserves within the project area, the mine site, tailings sites and surface facilities	C2.2	
2.1.3 (a) to (c)	Description of the project layout and mining equipment selected	C2.4	
2.1.4 (a) to (d)	Description of the mine development plans	C2.4	
2.1.5 (a) to (e)	Description of the design, stability analysis, construction method and schedule of pit slopes and discard, including tailings	C2.4	
2.4.1 (a) to (d)	Separate description of the bitumen extraction, upgrading, utilities, refining and sulphur recovery facilities	C2.5	
2.4.2	Overall material and energy balances, including information about hydrocarbon and sulphur recoveries, water use and energy efficiency	D	
2.4.3	Quality of products, byproducts and discard generated and a general description of their disposition	C1.4	
2.4.4	Manner in which surface drainage within the areas of the processing plant, product storage and discharge would be treated and disposed	F3.2.3 Suncor 1995a Suncor 1996a	
2.4.5	Comparison of the proposed process, with alternative processes considered on the basis of overall recovery, energy efficiency, cost, commercial availability and environmental considerations; and reasons for selecting the proposed process	C2.5, C3, C4	
2.4.7	Sample set of production accounting reports for the processing facility, with each entry explained using flows from identified measurement points and calculated flows	D1.6	
2.5.1	Description of any facilities to be provided for generation of electricity to be used by the project	C4	
2.5.2	Identification of the source, quality and quantity of fuels, electricity or steam to be obtained from beyond project site	C4	

AEUB Guideline	Guideline Information Required (Abbreviated)	Volume 1 Project Description	Volume 2 EIA
2.5.3	Where energy resources from outside the project boundaries are to be supplied: a detailed appraisal of the options available to eliminate the need for such resources, with consideration for overall recovery, energy balances, costs, technical limitations and environmental implications	C4	
2.6.1	Description of air and water pollution control and monitoring facilities as well as a liquid spill contingency plan	F Suncor 1996a	
2.6.2(a)	Description of the water management program including: (a) proposed water source and expected withdrawal; (b) source water quality control; (c) wastewater program; and (d) water balance for the proposed scheme	C3, C4, D, F3.2.4	
2.6.3	Manner in which the surface drainage within the project area would be collected, treated and discarded	C2.4.3, F3.2	
2.6.4 (a) to (d)	Description of the emission control system	F Suncor 1995a	
3.1.1 (a) to (g)	Commercial viability information	A1, C1	
3.1.2 (a),(c) and (d)	Description of project capital and operating costs	C1.6	
3.2.1	Summary of quantifiable public benefits and costs incurred during both construction and operation and how they pertain to Alberta and Canada	A4.11	
3.2.2	Summary of non-quantifiable public benefits and costs incurred each year during construction and operation of the project and how they pertain to Alberta and Canada	A4.11	
3.3.1	Appraisal of the economic impact of the project on the region and on provincial and national levels	A4.11	
3.3.2	Discussion of any initiatives undertaken to accommodate regional economic priorities	A4.11, A3.4, C6	
3.3.3 (a) to (d)	Assessment of direct and indirect employment opportunities	A4.11	

Table A5-3 Water Resources Act Information Requirements

Dam Safety Guideline Clause	Information Required	Volume 1 Project Description	Volume 2 EIA
1	Key plan showing principal topographic features of the drainage area (watershed) and downstream channel at an appropriate scale	C2.4.3	
2	General plan of tailings ponds and adjacent areas at an appropriate contour interval showing location of all appurtenant structures and reference bench marks	C2.4.1	
3	General plan of tailings pond at an appropriate scale showing borrow areas, extent of reservoir, water surface and reservoir capacity curves	C2.4.1	
4	Centerline profile of dykes	C2.4.1	
5	Typical cross-sections(s) of dykes at maximum section	C2.4.1	
6	Gradation curves of granular filter materials and the base material being protected	C2.4.2	
7	Calculations showing analysis of embankment stability including the effect of rapid drawdown of the reservoir	Not Applicable	
8	Details of the hydrologic studies carried out to establish the size of the spillways(s)	Not Applicable	
9	Detailed plan of spillway	Not Applicable	
10	Detailed plans(s) of outlet works showing locations and dimensions of all valves or sluice gates, intakes, trash racks, outlet towers, gate houses and appurtenant structures	Not Applicable	
11	Discharge rating curve for the outlet works	Not Applicable	
12	Subsurface exploration results	C2.2	
13	Miscellaneous plans of construction features not covered above such as pilings, fish ladders, flash boards, timber details, radial gates or mechanical operating devices, fuse plug spillways, etc	Not Applicable	
14	Construction specifications	C2.4.2	
15	Proposed construction schedule	C2.4.2	
16	Spillway and outlet model studies	Not Applicable	
17	Plans for handling river diversion during construction	Not Applicable	
18	Flood inundation maps, flood action plans, and emergency preparedness plans	N/A	
19	Instrumentation drawings, reports and reading schedules	C2.4.2	
20	Schedule of first filling of reservoir, operating methodology	C2.4.1	
21	Design reports	C2.4.2	
22	Additional information required at discretion of the Dam Safety Branch	C2.4.2	

Water Diversion Guideline Clause	Information Required	Volume 1 Project Description	Volume 2 EIA
1	The application form (WR1) must be completed and signed by the owner or an authorized official of the company	Separate application to be filed	
2	Plans should be on a material suitable for microfilming, and should have title block which includes: 1. company name 2. drawing number 3. the stamp or seal of a registered professional engineer	Separate application to be filed	
3	A key plan showing the overall project and its location in Alberta	A2	
	A general location plan tied to quarter-section lines, including the configuration of the river, meander, location of intake, pumphouse and other associated works (including control structures, spillway, dam location)	C2.4	
	Detailed design drawings of the intake and pumphouse (if it is a permanent pumpsite) or diversion works, including the location, elevations and extent of the diversion works	Provided in final design	
	If a sewage treatment plant or lagoon is used, provide plans of the plant and/or lagoon including outfall and discharge channel	Provided in final design	
	Conceptual plans may be accepted for initial processing on the understanding that construction plans will be forwarded for review (one set of plans will be required for processing)	Provided in final design	
4	Quantitative analysis of the effect the proposed diversion of water may have on: 1. the source of supply and current water users 2. neighbouring lands and works 3. aquatic habitat 4. the environment in general		C2 C3 C4
5	Other reports may include: 1. project description 2. construction specifications 3. proposed construction schedule 4. operational strategy(ies)	C2.4	
6	Written permission must be obtained from the appropriate provincial or municipal authority if the project affects road or road allowance	Not Applicable	
7	The appropriate pump specifications are required for the intake pump(s) only, including the rate capacity and expected operating capacity of the pump(s)	Not Applicable	

Water Diversion Guideline Clause	Information Required	Volume 1 Project Description	Volume 2 EIA
8	The Crown (under Section 4 of the *Public Lands Act*) claims ownership of the bed and shore of all waterbodies, therefore, a Licence of Occupation (LOC)/easement may be required	Will be obtained when appropriate	
9	If permanent works are to be constructed in a watercourse, approval may be required under the *Navigable Waters Protection Act*	Not Applicable	

Table A5-4 EIA Terms of Reference, Cross-Referenced to Suncor Application

TOR Section	Environmental Assessment Topic or Issue (Abridged)	Volume 1 Project Description	Volume 2 EIA
	Purpose		
1.1	Purpose of document	A4	A1, A2
	Scope of EIA Report		
1.2	EIA report prepared in accordance with Terms of Reference and information requirements under AEPEA, *Alberta Energy and Utilities Board Act* and *Canadian Environmental Assessment Act* and Regulations	A4	A1
	EIA to address all impacts, mitigation options and residual effects relevant to project including, as appropriate, Lease 86/17 and Steepbank Mine	A4	A2
	EIA will form part of application to AEUB	A5	
	Public Participation		
1.3	Public consultation	A3	
	The Proponent and Project History		
2.1	Name of legal entity operating Project	A5	
	Suncor history, existing plant, proposed development	B Suncor 1996a	
	The Project Area		
2.2	Project area	C4	A2
	Legal description of the Steepbank Mine extension, lease boundaries, perimeter of current approval and area proposed to be disturbed in relation to existing features	B1	D1
	Show additional extraction and upgrading facilities to be constructed	B1	
	Project Components and Development Schedule		
2.3	Describe and locate major project components	A2, C	
	Key factors controlling schedule of proposed stages of development	C6	
	Description and schedule of land clearing	E5	
	Placement information and schedule for out-of-pit storage	C2.4, E5	

TOR Section	Environmental Assessment Topic or Issue (Abridged)	Volume 1 Project Description	Volume 2 EIA
	Project Need and Alternatives		
2.4	Need for the Project and alternatives	A2.2, C1	
	Decision basis for major project features	C2, C3, C4, E	
	Potential use of alternative technologies to reduce environmental impacts	C2, C3, C4, E	
	Contingency plans if selected major components prove unfeasible	C2, C3, C4, E	
	Regulatory Approval		
2.5	Applicable approvals and legislation; policies and initiatives and their implications	A5	
	Major Project components applied for within duration of AEPEA and WRA approvals	A5, C, F	
	Process Description		
3.1	Oil sands preparation, extraction and upgrading processes; material and energy balances; flow diagrams	B, C, D	
	Technology used, alternative technologies considered and their effects on water requirements, waste generation, chemical use, tailings, air emissions and bitumen recovery	C	
	Hydrocarbon and sulphur balances, energy efficiency of technologies chosen	D	
	Mining Description		
3.2	Mining methods, alternative mining methods considered and their environmental implications	C2.4, E	
	Effect of minimum ore grade selected on tailings volume, fine tailings volume, water requirements and long-term reclamation	B2.3, C2.2, C2.5, E	
	Utilities and Transportation		
3.3	Description and location of Project utilities	B4, C4	
	Amount and source of energy for mine and plant facilities	C4, D	
	Options for supply of thermal energy and electric power with their environmental implications	C4	
	Road access to and within Project area; need to upgrade or construct new roads; access management	B5, C5	

TOR Section	Environmental Assessment Topic or Issue (Abridged)	Volume 1 Project Description	Volume 2 EIA
	Analysis of impact on Highway 63 during construction and operation; mitigation options; cooperative infrastructure development	A4	F2
	Methodology determining projected traffic volume, mitigation options		F2
	Cooperative infrastructure development with other oil sands and industry operators	A3	
	Sources of road construction and restoration materials; volumes required; local availability	C2.4.1	
	River and stream crossings by utility lines, roads and pipelines; design features to prevent spills, contingencies for spill response; environmental risks associated with spills	C2.6	C2.2
Air Emissions Management			
3.4	Emissions profile (normal and upset conditions)	F3	B2
	Emission control technologies in context of available technologies	C2.5, C3, C4	B2
	Incremental greenhouse gas emission in context with total provincial and national emissions; management plan	F3	B3
Water and Wastewater Management			
3.5	Water management plan for Project including: site runoff and containment, groundwater protection, muskeg and mine pit dewatering, and discharge of aqueous contaminants beyond lease boundaries	C2.4.3	C2, C3
	Permanent and temporary alterations to natural watercourses and their effects	C2.4.3	C2, C3, C4
	New water intake structures and design to address fish entrainment issues and navigational concerns	Not Applicable	
	Wastewater management plan: expected volumes and quality of wastewater; treatment technology proposed in context of available technologies	C3	
	Effluent and reclamation discharges: volumes; quality; location; duration; load estimates for significant contaminants	C2.4.3	C2, C3
	Alternatives to reduce freshwater consumption	C2.5, C3, C4	
	Findings of the Northern River Basin Study (NRBS) in relation to the Project		C3, C4
	Total water balance during approval under WRA	C2.4.4	

TOR Section	Environmental Assessment Topic or Issue (Abridged)	Volume 1 Project Description	Volume 2 EIA
	Discharges to surrounding watershed and Athabasca River from reclaimed sites, including tailings ponds; management strategy for handling releases	C2.4.3	C2, C3
	Potable water and sewage treatment systems to be installed	F6, F3.2.5	
Hydrocarbon, Chemical and Waste Management			
3.6	Hydrocarbon storage: location; nature; amount; containment and environment protection	B3, C3	
	Chemical product consumption: listing and identification versus specified lists of toxic substances	F2	
	Chemical storage and management	F2	
	Waste stream generation: characterization, volumes and management	F2	
	Tailings, overburden, other mining wastes, coke, sulphur and gypsum: management plans; evaluations to minimize fine tailings considering mining methods and minimum ore grade selected	F2, B2.3	
	On-site waste versus off-site waste disposal strategy; location of on-site waste disposal locations	F2	
	Incorporation of pollution prevention and waste minimization principles into project design	F2	
Environmental Management Systems			
3.7	Existing environmental management systems and their incorporation into the Project	B6.1	A1
	Monitoring air and water emissions and waste: independent and collaborative programs; new initiatives required as a result of the Project	F3	B, C
	Contingency plans that consider environmental effects of serious malfunctions and emergency response system	B6.2.2 Suncor 1996a	C2
	Contingency plans to respond to unpredicted negative impacts during and after Project development	B6.2.2 Suncor 1996a	
Assessment Requirements			
4.1	Environmental resources and resource uses: prediction of impacts; mitigation of negative impacts; impact significance; biodiversity considerations		D, F3, G

TOR Section	Environmental Assessment Topic or Issue (Abridged)	Volume 1 Project Description	Volume 2 EIA
4.1	Sources of information: summary of previous assessments; information limitations		A1
	Key ecosystem components: selection rationale; consultative process		A2, C, D
	For each environmental parameter: description of existing conditions; nature and significance of environmental effects and impacts; plans to minimize, mitigate or eliminate negative effects and impacts; residual impacts and significance; plan to identify possible effects and impacts; plan to address adverse impacts when joint resolution is required		B, C, D F
Cumulative Environmental Effects			
4.1.1	Likely cumulative environmental effects of the Project: assessment; study area and time boundaries; rationale to define boundaries for each environmental component		B5, C5, D6, F1.4, F2.4, F3.8, F4.4
	Likely cumulative environmental effects of the Project in combination with existing and proposed projects and forseeable activities: assessment		B5, C5, D6, F1.4, F2.4, F3.8, F4.4
	Previous data: appropriateness; limitations		A1
	Cumulative assessment methods: cooperative initiatives; assumptions; confidence in data and analysis		A2
EIA Study Area			
4.2	Description of Local and Regional Study Areas		A2
	Consultation process; rationale and assumptions used in establishing Study Area boundaries	A3	A2
Cooperative Opportunities			
4.3	Cooperative ventures initiated and developed to minimize environmental impact		B, C, D
Climate, Air Quality and Noise			
4.4	Baseline climatic and air quality conditions		B2
	Effect of Project components on air quality, locally and regionally		B3
	Ground-level concentrations of air quality parameters. Changes to particulate or acid deposition patterns. Selection and limitations of models used.		B2, B3

TOR Section	Environmental Assessment Topic or Issue (Abridged)	Volume 1 Project Description	Volume 2 EIA
	Potential for decreased air quality: implications, interactive effects		B3
	Air quality impact mitigation		B3, B5
	Ambient air quality monitoring		B2
	Project components with potential for increased noise levels, implications and mitigation		B3
	Aquatics		
Fisheries and Fish habitat			
4.5.1	Existing fish resource: description; use		C4.1
	Fish habitat: description and map; critical habitat areas; seasonal habitat use; information base; information deficiencies; proposed studies; key indicator species and selection		C4.1
	Fish and fish habitat: potential impacts of Project		C4.2
	Design, construction and operational factors incorporated into Project to protect fish resources		C4.2
	Fish and fish habitat: residual impact and significance; plans to offset any loss in productivity of fish habitats; "No Net Loss" plan; cooperative mitigation strategies		C4.2
	Potential for increased fishing pressures in Study Area and implications		F3
	Monitoring programs to assess impacts and effectiveness of mitigation strategies		C4.2
Water Quality			
4.5.2	Water quality before and after project development and operation		C3.1, C3.2
	Natural seasonal variations in water quality		C3.1
	Components of Project which influence surface and groundwater quality		C2, C3
	Comparison of predicted and existing water quality; implications of any predicted non-compliance with quality guidelines; impacts on sediments.		C3.2
	Water courses sensitive to acidic deposition and potential project impacts		C3.2
	Relevant issues identified by NRBS program		C3.1, C3.2

TOR Section	Environmental Assessment Topic or Issue (Abridged)	Volume 1 Project Description	Volume 2 EIA
	Post-reclamation water quality; impact of CT water discharges on land, soil, vegetation and receiving watercourses		C3.2
	Impact of CT waters on Shipyard Lake; management of water quality of Shipyard Lake and feed streams		C3.2
	Aquatic quality monitoring programs		C3.1, C3.2
Surface Water Hydrology and Hydrogeology			
4.5.3	Pre- and post-Project surface hydrology		C2.1, C2.2
	Pre- and post-disturbance watercourse configuration	C2.4.3	C2.1, C2.2
	Effects on surface water quantity caused by the Project		C2.2
	Temporary and permanent alterations, diversions, withdrawals and disturbances: resultant impacts under a variety of operating conditions (including emergency conditions) on hydrology		C2.2
	Permanent alterations, diversions, withdrawals and disturbances: use of, to enhance fish habitat and recreational potential		C2.2, C4.2
	Potential flooding and its effects		C2.2
	Project activities affecting stream bed and shores, and mitigation measures	C2.4.3	C2.2, C4.2
	Surface water runoff monitoring program		C2.2
	Groundwater regime	C2.4.3	C2.1
	Project effects on groundwater and options to manage and protect groundwater systems		C2.2
	Interrelationship of groundwater to surface water; potential impacts to streams, Shipyard Lake and the Athabasca River		C2.1, C2.2
	Potential effects of alterations to groundwater regime on terrestrial and riparian vegetation and surface water		C2.2, D3.2
	Implications of development on surface and groundwater flows to associated wetlands		C2.2, D3.2
	Impacts of withdrawing water from the Athabasca River or other water sources on water users, including wildlife and fisheries; impact on downstream watercourses		C3.2, C4.2

TOR Section	Environmental Assessment Topic or Issue (Abridged)	Volume 1 Project Description	Volume 2 EIA
	Terrestrial		
Land Use			
4.6.1	Athabasca Oil Sands Integrated Resource Plan (IRP): consistency with guidelines and objectives; mitigation and research requirements to satisfy guidelines		F3.6
	Proposed setbacks from Athabasca and Steepbank Rivers, compliance with IRP	C2.4	F3.6
	Unique sites and special features in the study area: Project impact; Special Places candidate sites (if present)		F3.5
	Existing land uses: Project impact; mitigation strategies		F3
	Recreation and public access: Project impact and implications		F3
	Replacement of existing land use by reclamation	E	D, E
Geology, Terrain and Soils			
4.6.2	Map of bedrock, surficial geology and topography of Study Area	C2.2, C2.4	
	Aggregate resources: management plan	C2.4.1	
	Sequential maps and assessment of anticipated changes to topography, elevation and drainage patterns	C2.4.1, E5.1	
	Map of soil types and distribution in Project area	E3	D2.1
	Map and assessment of pre- and post-disturbance land capability	E3	D2.1, D2.2
	Availability and suitability of soils for reclamation	E2.5	D2.1, D2.2
	Criteria to be used in salvaging soils for reclamation	E2.5	
	Areas where soils will be stockpiled and salvaged; estimate of volume salvaged and required for reclamation	C2.4	
	Soil-related constraints affecting reclamation; constraints on revegetation; soil erosion; soil contamination		D2.2
	Regional soil sensitivity to acid deposition: studies and planned work		D2.2
	Ecological Land Classification (ELC) for Project area	E1.4, E2.5	D4.1

TOR Section	Environmental Assessment Topic or Issue (Abridged)	Volume 1 Project Description	Volume 2 EIA
	Impact on each ELC unit from disturbance based on key soil characteristics		D4.2
	Vegetation and Forest Resources		
4.6.3	Map and description of vegetation communities affected by the project using Alberta Vegetation Inventory Standards Manual Version 2.2	E2.5	D3.2
	Description of plant communities for each ecosite phase: species important to wildlife; indicator species; rare species	E2.5	D3.1, D5.1
	ELC map of pre- and post-disturbed landscapes and assessment of land uses		D4.1, D4.2 F3
	Rare, vulnerable or endangered species: opportunities to mitigate impacts to species, if present		D3.2, D5.2
	Commercial and non-commercial forest: classification; comparison pre- with post-disturbance; impact on present and future needs	E2.5, E3.4	D3.2, F3.6
	Vegetation disturbance: amount; temporary and permanent changes; significance of the effects; implications for other environmental resources		D3.1, D3.2
	Strategy to minimize impact of the project on vegetation		D3.2
	Plan for mitigating the adverse effects of site clearing	E	D3.2
	Inventory of peatlands and wetlands	E2.5	D3.1
	Predicted effect of Project on peatlands and wetlands; plans to minimize the impact		D3.2
	Wildlife		
4.7	Use and potential use of Study Area by wildlife		D5.1
	Rare, threatened and endangered species and their habitat needs		D5.1
	Potential adverse impacts on wildlife during each phase of Project		D5.2
	Significant local habitat for indicator wildlife species		D5.1
	Potential to return area to pre-disturbed wildlife habitat conditions		D5.2
	Mitigation plan and schedule for wildlife habitats		D5.2

TOR Section	Environmental Assessment Topic or Issue (Abridged)	Volume 1 Project Description	Volume 2 EIA
	Monitoring programs to assess wildlife impacts and effectiveness of mitigation strategies		D5.1, D5.2
	Current bird deterrent system: expansion to incorporate the Project; system limitations, effectiveness and potential improvements; impact on adjacent reclaimed land		D5.1, D5.2
	Reclamation and Mine Closure		
5	Mine closure plan; reclamation concepts and objectives; proposed end use objectives and other factors necessary to implement the plan	E	E
	Reclamation timeframe and release of lands back to the Crown	E	E
	Incorporation of final landform into mine planning and development	E	E
	Return of land to pre-disturbed equivalent capability, with regard for end-use preferences	E	E
	Incorporation of IRP identified values into reclamation plan	E	E
	Promotion of biodiversity	E	D, E
	Aquatic components of post-reclamation landscape: issues, hydrological analysis, comparison to pre-disturbance	E	C, E
	Wetlands; how the reclamation plan incorporates diversity, size and extent into the final design	E	D, E
	ELC map for post-reclamation landscape considering potential land uses		D
	Species for permanent revegetation; selection rationale		D3.2, E
	Parameters used to monitor and evaluate reclaimed ecosystems: key milestone dates, measurement of progress to achieve targets		C, D, E
	Plans to demonstrate reclamation success to stakeholders	E	E
	Reclamation constraints	E	E
	Need for further reclamation research and development programs	E	E
	Public Health and Safety Issues		
6	Implications for public health or regional health service delivery		F2.5, F3

TOR Section	Environmental Assessment Topic or Issue (Abridged)	Volume 1 Project Description	Volume 2 EIA
	Potential to increase human exposure to contaminants		F3.3
	Workforce and public safety: emergency response and mitigation plans	B6.2, Suncor 1996a	F2.5
	Potential health and safety impacts due to higher traffic volume and increased risk of accidental spills		F1.3
	Documentation of health and safety concerns from stakeholders during consultation	A3	
Historical Resources / Traditional Land Use			
7	Historic Resources Impact Assessment (HRIA) and consultation		F4.2
	Overview and summary of previous heritage resource studies		F4.2
	Results of consultation with aboriginal stakeholders; aboriginal land uses; project impact and mitigation strategies	A3	F4.2, F4.3 F4.4
	Stakeholder concerns with respect to historical significance or current traditional land use		F4.2, F4.3
Socio-Economic Assessment			
8	Socio-economic impacts of the Project on the communities of the region and on Alberta	A4.11	F2.4, F2.5
	Suncor policies regarding use of regional and Alberta goods and services	A4.11, C6	
	Summary of industrial benefits; description of engineering and contracting plan	A4.11, C6	
	Workforce requirements for construction and operation; local employment and business opportunities	A4.11, C6	F2.4
	Plan to work with aboriginal and other local residents and businesses with regard to employment and business opportunities	A3.4	F2.2, F2.4
	Impact on local services and infrastructure; cumulative effects; options to mitigate impacts	A4.11	F2.5
	Cooperative strategies to mitigate socio-economic concerns and continuing consultation plans	A3	F2.5
Public Consultation			
9	Public consultation program	A3	
	Consultation process and influence on the project	A3	
	Communication program and continued public consultation	A3	

LIST OF ABBREVIATIONS

"	Inch
$k	Thousand dollars
%	Percent
<	Less than
>	More than
°C	Temperature in degrees Celsius
°F	Temperature in degrees Fahrenheit
7Q10	Lowest 7-day consecutive flow that occurs, on average, once every 10 years
AAC	Annual Allowable Cut
AEOSRD	Alberta Energy Oil Sands and Research Division
AEP	Alberta Environmental Protection
AEP-LFS	Alberta Environmental Protection - Lands and Forest Service
AEPEA	Alberta Environmental Protection and Enhancement Act
AEUB	Alberta Energy and Utilities Board (also EUB)
Al-Pac	Alberta Pacific Forest Industries Inc.
AMD	Air Monitoring Directive
ANC	Acid Neutralizing Capacity
AOSERP	Alberta Oil Sands Environmental Research Program
API	American Petroleum Institute
ARC	Alberta Research Council
asl or ASL	Above sea level
ATP	AOSTRA Taciuk Process
avg.	Average
AVI	Alberta Vegetation Inventory
bbl	Barrel, petroleum (42 U.S. gallons)
bbl/cd	Barrels per calendar day
BCM	Bank cubic metres
BCY	Bank cubic yards
BOD	Biological oxygen demand
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
C	Carbon
C&R	Conservation and Reclamation
Ca^{2+}	Calcium base cation (particle)
$CaCO_3$	Calcium carbonate
CANMET	Canada Centre for Mineral and Energy Technology
CASA	Clean Air Strategic Alliance
$CaSO_4$	Calcium sulphate
CCME	Canadian Council of Ministers of the Environment
cd	Calendar day
CEA	Cumulative Effects Assessment
CEAA	Canadian Environmental Assessment Association
CEC	Cation exchange capacity
CEPA	Canadian Environmental Protection Act
ch	Calendar hour
CHWE	Clark Hot Water Extraction

CLI	Canadian Land Inventory
cm	Centimetre
cm/s	Centimetres per second
cm^2	Square centimetre
CO	Carbon monoxide
CO_2	Carbon dioxide
COD	Chemical oxygen demand
COH	Co-efficient of haze
CONRAD	Canadian Oil Sands Network for Research and Development
Consortium	Fine Tailings Fundamentals Consortium
CPUE	Cateh per unit of effort
CSEM	Continuous Stack Emissions Monitor
CT	Consolidated Tailings
CWQG	Canadian Water Quality Guidelines
d	Day
DBH	Diameter at breast height
DCU	Delayed Coking Unit
DEA	Diethanolamine
DEM	Digital Elevation Model
DIAND	Department of Indian Affairs and Northern Development
DL	Detection Limit
DO	Dissolved oxygen
DRU	Diluent Recovery Unit
e.g.	For example
EA	Effective Acidity
EC	Effective Concentration
EIA	Environmental Impact Assessment
ELC	Ecological Land Classification
elev	Elevation
EPL	End Pit Lake
ER	Exposure Ratio
ESPs	Electrostatic Precipitators
FEM	Finite Element Modelling
FGD	Flue Gas Desulphurization
FMA	Forest Management Agreement
ft	Feet
ft^3	Cubic feet
FTPH	Final Tailings Pump House
g	Grams
g/cc	Grams per cubic centimetre
g/s	Grams per second
GC/FID	Gas Chromatography/Flare Ionization Detection
GC/MS	Gas Chromatography/Mass Spectrometry
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIS	Geographic Information System
GJ	Giga-joules (10^9 joules)
GLC	Ground Level Concentration
Golder	Golder Associates Ltd.
GTG	Gas Turbine Generator

h	Hour
H_2S	Hydrogen sulphide
ha	Hectares
HNO_3	Nitric Acid (gas)
HQ	Hazard Quotient
HRSG	Heat Recovery Steam Generator
HSI	Habitat Suitability Indicies
HU	Habitat Unit
i.e.	That is
ibid.	In the same place
IC	Inhibiting Concentration
ICP	Inductively Coupled Argon Plasma Atomic Emission Spectrometric Analysis
IR	Infrared Spectrophotometric Analysis
IRIS	Integrated Risk Information System
IRP	Integrated Resource Plan
k	Thousand
K^+	Potassium Base Cation (particle)
kg	Kilogram
kg/d	Kilograms per day
kg/ha	Kilograms per hectare
kg/hr	Kilograms per hour
KIRs	Key Indicator Resources
km	Kilometre
km^2	Square kilometre
kmol.	kilo mole
kV	Kilovolt
kW	Kilowatt
L or l	Litre
lb/hr	Pounds per hour
LC	Lethal Concentration
LC/MS	Liquid Chromatography/Mass Spectrometry
LGHR	Low-Grade Heat Recovery
LHV	Lower Heating Value
LOAEL	Lowest Observed Adverse Effect Level
LOEC	Lowest Observed Effect Concentration
LOEL	Lowest Observed Effect Level
m	Metre
M	Mega (SI prefix)
m/s	Metres per second
m^2	Square metres
m^3	Cubic metres
m^3/cd	Cubic metres per calendar day
m^3/d	Cubic metres per day
m^3/ha	Cubic metres per hectare
m^3/hr	Cubic metres per hour
m^3/s	Cubic metres per second
masl	metres above sea level
MDEA	Methyl-diethanolamine
meq	Milli-equivalents

MFT	Mature Fine Tails
mg	Milligrams
MOU	Memorandum of Understanding
MSL	Mineral Surface Lease
µg	Microgram
µg/g	Micrograms per gram
µg/kg/d	Micrograms per kilogram body weight per day
mg/kg/d	Milligrams per kilograms body weight per day
µg/L	Micrograms per litre
mg/L	Milligrams per litre
$\mu g/m^3$	Micrograms per cubic metre
Mg^{2+}	Magnesium base cation (particle)
MJ	Megajoule (10^6 joules)
MM	Million
mm	Millimetre
MM.BTU	Million British Thermal Units
Mm^3	Mega metres (Million cubic metres)
Mobil	Mobil Oil Canada
mS/cm	milli-siemens per centimetre
MVA	Mega volt-amperes
MW	Megawatt
N	Nitrogen
ND	Not detected
N.D.	No data
N/A and n/a	Not applicable
NAP	Net Acidifying Potential
NAQUADAT	Alberta Environmental Historical Water Database
NH_4	Ammonia (particle)
NO	Nitric Oxide (gas)
No.	Number
NO_2	Nitrogen Dioxide (gas)
NO_3	Nitrate (particle)
NOAEL	No Observed Adverse Effect Level
NOEC	No Observed Effect Concentration
NOEL	No Observed Effect Level
NO_x	Oxides of nitrogen (NO, NO_2) (gas)
NO_y	All nitrogen species, $NO_x + N_2O + N_3O +$ .....(gas)
NPRI	National Pollutant Release Inventory
NRBS	Northern River Basin Study
NRU	Naphtha Recovery Unit
O & G	Oil and Grease
OB	Overburden
OSEC	Oil Sands Environmental Coalition
OSLO	Other Six Lease Owners
OSRPAP	Oil Sands Reclamation Performance Assessment Protocol
OSWRTWG	Oil Sands Water Release Technical Working Group
P	Phosphorus
PAH	Polycyclic aromatic hydrocarbons
PAI	Potential Acid Input

PANH	Polycyclic aromatic nitrogen heterocycle
PASH	Polycyclic aromatic sulphur heterocycles
PM_{10}	Particulate matter with mean aerodynamic diameter $\leq$ 10 microns
$PM_{2.5}$	Particulate matter with mean aerodynamic diameter $\leq$ 2.5 microns
PMF	Probable maximum flood
ppb	Parts per billion
ppm	Parts per million
psi	Pounds per square inch
Q	Quarter (i.e., three months of a year)
QA/QC	Quality Assurance/Quality Control
RA	Reclamation Area
RAMP	Regional Aquatic Monitoring Program
RAQCC	Regional Air Quality Coordinating Committee
RfD	Reference Dose
RIWG	Regional Infrastructure Working Group
RMWB	Regional Municipality of Wood Buffalo
RRTAC	Reclamation Research Technical Advisory Committee
RSA	Regional Study Area
RsD	Risk Specific Dose
s	Second
S	Sulphur
SAR	Sodium absorption ratio
scf/d	Standard cubic feet per day
SCO	Synthetic crude oil
sd	Stream day
sep cell	Separation cell
SFR	Sand to fines ratio
Shell	Shell Canada Limited
SLC	Screening Level Criteria
SO_2	Sulphur dioxide
SO_4^{2-}	Sulphate (particle)
SO_x	Sulphur oxides
spp	Species
Suncor	Suncor Energy Inc., Oil Sands
Syncrude	Syncrude Canada Ltd.
t	Tonne
t/cd	Tonnes per calendar day
t/d	Tonnes per day
t/h	Tonnes per hour
t/hr	Tonnes per hour
t/sd	tonnes per stream day
TDS	Total dissolved solids
TEH	Total extractable hydrocarbons
THC	Total hydrocarbons
TID	Tar Island Dyke
TIE	Toxicity Identification Evaluation
TKN	Total Kjeldahl Nitrogen
TOC	Total organic carbon
Ton	2 000 pounds
Tonne	2 205 pounds (1000 kg)

TRV	Toxicity Reference Value
TSS	Total suspended solids
TV/BIP	Ratio of total volume removed to total volume of bitumen in place
TV/NRB	Ratio of total volume removed to net recovered bitumen (in barrels)
Twp.	Township
U.S. EPA	United States Environmental Protection Agency
USgpm	U.S. gallons per minutes
VOC	Volatile organic compound
Vol.	Volume
VRU	Vapour Recovery Unit
vs.	Versus
WA	Waste Area