

# **ALBERTA ENERGY AND UTILITIES BOARD**

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**Calgary Alberta**

## **APPLICATION BY SYNCRUDE CANADA LTD. FOR AMENDMENT OF APPROVAL NO. 7550 PROPOSED MILDRED LAKE UPGRADER EXPANSION**

**Decision 99-25  
Application No. 980381**

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### **1 INTRODUCTION**

#### **1.1 Application**

Syncrude Canada Ltd. (Syncrude) applied, pursuant to Section 14 of the Oil Sands Conservation Act, to amend Approval No. 7550 to allow for the expansion of its Mildred Lake upgrading complex (see attached figure). The proposed expansion would increase Syncrude's production of marketable hydrocarbons through the addition of a new fluid coker, a flue gas desulphurization (FGD) unit, new froth treatment facilities, additional hydrotreating and sulphur recovery capabilities, and associated ancillary units. Syncrude sought approval for

- a production scheme for the expanded facilities that would increase annual production volume to 27.5 from 15.3 million cubic metres per year of marketable hydrocarbons
- removal of the annual production volume and term limits for the upgrading complex

Under a coordinated application process adopted by Alberta Environment (AENV) and the Alberta Energy and Utilities Board (the Board/EUB), Syncrude filed a joint application and environmental impact assessment (EIA). Syncrude also filed for an amendment to its Approval No. 26-01-00 issued under the Alberta Environmental Protection and Enhancement Act (AEPEA).

#### **1.2 Hearing**

A public hearing of the application was held in Fort McMurray, Alberta, on 27-30 July 1999 before Board Members J. D. Dilay, P.Eng. (Presiding Member), T. McGee (Board Member), and C. A. Langlo, P.Geol. (Acting Board Member).

The table below lists the participants at the hearing and corresponding abbreviations used in the report.

## THOSE WHO APPEARED AT THE HEARING

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### Principals and Representatives (Abbreviations Used in Report)

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#### Syncrude Canada Ltd. (Syncrude)

R. A. Neufeld  
B. J. Roth

#### Mobil Oil Canada (Mobil)

T. Shopik

#### Shell Canada Limited (Shell)

J. Jamieson

#### Suncor

S. Lowell, P.Eng.

#### Oil Sands Environmental Coalition (OSEC)

K. E. Buss

#### Anzac Metis Local #334 and Wood Buffalo First Nation (WBFN)

A. C. Rice

#### Alberta Government (Alberta Environment and Alberta Health and Wellness)

G. D. Sprague  
H. Veale

#### Alberta Energy and Utilities Board staff

W. Y. Kennedy, Board Counsel  
M. Dmytriw, RET  
R. Germain, P.Eng.  
K. Eastlick, P.Eng.

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### Witnesses

D. Thompson

G. Pool

B. Friesen, P.Eng.

B. Davies

G. Brown, P.Biol.

L. Visser (Conor Pacific Environmental  
Technologies Inc.)

D. Smith

M. Kitagawa

A. Dort-McLean

J. Malcolm

E. Herman

K. Vivier

E. Cree

J. Flobert

G. Cooper

The Fort McKay First Nation and Fort McKay Metis Local 122, as represented by the Fort McKay Industrial Relations Corporation, advised, in a letter dated 9 July 1999, that its concerns had been resolved and that it would not be intervening at the hearing.

The Fort McMurray First Nation advised, in a letter dated 16 July 1999, that its concerns had been resolved and that it would not be intervening at the hearing.

The Government of Saskatchewan submitted a letter of interest in the project dated 13 June 1999 advising that its concerns could be addressed through ongoing dialogue with Syncrude and the regulatory agencies and through participation in the various committees examining environmental issues.

At the end of the hearing, the Athabasca Chipewyan First Nation (ACFN) requested that it be allowed to submit an environmental agreement it had recently concluded with Syncrude. Ms. L. Hoffman, a member of ACFN, objected to the agreement being submitted on the grounds that she had not had the opportunity to review the material. The Board declined to accept the agreement on the grounds that it was not filed in accordance with the EUB's Rules of Practice. Subsequent to the hearing, Ms. Hoffman filed a request under Section 42 of the Energy Resources Conservation Act for her book *Inkonze: The Stones of Traditional Knowledge* to be considered by the Board as new evidence in the Syncrude hearing. The Board denied Ms. Hoffman's request.

## 1      2      ISSUES

The Board believes the issues to be considered with respect to the application are:

- Technology
  - Diluent recovery
  - Bitumen conversion technology selection
  - Removal of production and term limits
- Environment
  - Sulphur dioxide (SO<sub>2</sub>) emissions from the base plant
  - Sulphur recovery from acid gas
  - Greenhouse gases (GHG)
  - Oxides of nitrogen (NO<sub>x</sub>)
  - Particulates (PM)
  - Ozone
  - Water management
- Cumulative effects
- Human health effects
- Socioeconomic impacts

### **3 TECHNOLOGY**

#### **3.1 Diluent Recovery**

##### **3.1.1 Views of the Applicant**

Syncrude stated that its existing and new naphtha recovery units (NRU) were designed to recover 76 and 84 per cent respectively of the naphtha present in its froth treatment tailings stream and that any naphtha not recovered would be discharged to the tailings pond.

Syncrude stated that there would be some changes retrofitted into the existing unit whether the expansion goes ahead or not. However, even if the expansion did proceed the existing NRU could not be retrofitted to achieve the same performance as the proposed new NRU.

Syncrude confirmed that its total naphtha losses were expected to be 300 cubic metres (m<sup>3</sup>) (1900 barrels) per calendar day on an annual average basis. Based on its strategy for a normal, planned shutdown, Syncrude expected naphtha losses from its existing and proposed new NRUs to be maximums of approximately 430 m<sup>3</sup> (2700 barrels) per day and 320 m<sup>3</sup> (2000 barrels) per day respectively.

Syncrude stated that once it had implemented the first elements of its expansion, it would be committed to target losses at all stages of the upgrader expansion project of not more than 3.6 volumes of naphtha per thousand volumes of bitumen production. However, Syncrude stated that other operators had been approved at 4.0-4.5 volumes per thousand volumes of bitumen production. Syncrude requested the same requirement as its reward for developing and improving the technology.

Syncrude stated that its proposed target naphtha loss was lower than either Suncor or Shell. It did not believe that a requirement by either the EUB or AENV to have redundant naphtha recovery capacity in its operating licence would be appropriate. Syncrude claimed that efforts to improve operating time and efficiency would have a much greater impact on reducing naphtha losses than the installation of additional units to sit on hot standby. Syncrude stated that a normal, planned shutdown of its NRU would coincide with its fluid coker shutdowns to minimize the overall impact on plant production.

Syncrude stated that in the past there were concerns with odours coming from the tailings pond that resulted from the presence of small concentrations of mercaptans in the naphtha. However, since Syncrude began to use a partially hydrotreated naphtha in the late 1980s, odour incidences have been relatively infrequent. When the NRU is not operating, some untreated tailings are discharged to the tailings pond. However, Syncrude stated that based on its investigations it had been unable to find any direct correlation between any odour incident and those particular occurrences. Furthermore, Syncrude noted that its unplanned outages were typically of a short duration. As a result, Syncrude did not believe that the additional requirement imposed on the other operators to have “essentially no untreated tailings discharged to the tailings pond” would be appropriate. Syncrude believed that some of the options to achieve this objective would actually be counterproductive and would probably have negative impacts on both bitumen recovery and naphtha losses.

Syncrude stated that its EIA and health impact assessment indicated that the impact of its project was not significant with respect to the increased volume of naphtha discharged to the tailings pond. Syncrude noted that assigning an impact as “significant” or “not significant” was based on professional judgement of the ecological, human health, social, and economic importance of the potential effect. Syncrude stated that in judging the importance of a potential effect, it considered the areal extent, duration, frequency, and magnitude of the predicted impact.

Syncrude stated that the largest source of volatile organic compounds (VOC) emissions was its froth treatment tailings discharge point. Other sources included the settling pond surface and fugitive emissions from its plant. Syncrude estimated that the proposed project would add approximately 1 tonne/day of VOC emissions and that total VOC emissions following the expansion were expected to be approximately 5.3 tonnes/day.

### **3.1.2 Views of the Interveners**

The interveners did not provide specific comments regarding diluent recovery. However, they expressed concerns over the increase in VOC emissions in the region on both a project-specific and cumulative basis and the impact this would have on human health and as precursors to ozone formation.

### **3.1.3 Views of the Board**

The Board acknowledges Syncrude’s efforts to improve naphtha recovery from its froth treatment tailings stream through improvements to its existing NRU and through further improvements that would be incorporated in its new NRU. The Board accepts Syncrude’s commitment to limit total naphtha losses to not more than an annual average of 300 m<sup>3</sup> per day and will otherwise limit naphtha losses to not more than 4.3 volumes per thousand volumes of bitumen production. The Board also accepts Syncrude’s commitment to work toward a target naphtha loss of not more than 3.6 volumes per thousand volumes of bitumen production on an annual average basis.

The Board believes that naphtha losses to tailings ponds are a major contributor of anthropogenic VOCs, either through their direct release to the atmosphere or as the primary feedstock for the biogenic release of methane. As a result, the Board believes that naphtha losses should be minimized and that industry should continue to develop technology to reduce naphtha losses to tailings ponds. The Board will require Syncrude to report annually on the steps it has taken to reduce its losses of naphtha to the target level of 3.6 volumes of naphtha per thousand volumes of bitumen production from its approved level of 4.3.

The Board believes that a long-term objective of the oil sands industry should be to have no untreated tailings discharged to the tailings pond. At the present time the Board will not impose this requirement on Syncrude because

- it has committed to a maximum loss of 300 m<sup>3</sup> per day of naphtha on an annual average basis
- it has committed work toward a target loss of 3.6 volumes of naphtha per thousand volumes of bitumen production, which is lower than other operators’ losses
- it uses a hydrotreated naphtha, with potentially fewer offsite impacts
- unplanned outages are typically of short duration

In the event that on- or off-site impacts are observed, the Board may re-evaluate this decision.

## **3.2 Bitumen Conversion Technology Selection**

### **3.2.1 Views of the Applicant**

Syncrude stated that its choice of bitumen conversion technology was based on an assessment of a number of alternatives initially screened for more detailed review using the following criteria:

- highest net present value
- lowest risk of major fire and/or explosion
- lowest risk of production outages
- least risk of personnel injuries
- greatest potential to further lower SO<sub>2</sub> emissions
- lower carbon dioxide (CO<sub>2</sub>) emissions per cubic metre of hydrocarbon product
- lowest fugitive emissions

Syncrude stated that its initial screening yielded the following four technologies for further consideration:

- delayed coking
- fluid coking
- flexi-coking
- bitumen hydrocracking

On the basis of an economic and technical assessment, Syncrude concluded that flexi-coking and bitumen hydrocracking were not viable alternatives and that fluid coking and delayed coking appeared to be equally attractive. However, in the absence of any significant drivers, Syncrude elected to continue with fluid coking technology, given

- the experience of Syncrude's workforce with fluid coking technology
- Syncrude's belief that fluid coking offered it the safest and most reliable technology
- Syncrude's belief that fluid coking technology offered a major economic upside potential, particularly in light of Syncrude's current commitment to the technology in terms of its research and development efforts and installed capacity at its existing facilities

Syncrude further noted that its choice of technology offered a number of synergies with its existing facilities, including

- integration between the new and existing fluid cokers
- availability of a trained workforce for both operations and major maintenance activities
- a cost-effective means of stockpiling product coke
- an available application for the use of low and medium levels of recovered heat

It also noted that

- fine solids in the feedstock are not detrimental to process operation and
- transportation limits on the size and weight of the shop-fabricated equipment that can be transported to the Mildred Lake site constrain reactor sizes and, hence, increase the capital costs for hydrogen addition processes relative to a central Alberta location.

### 3.2.2 Views of the Interveners

The interveners did not provide comments regarding technology selection.

### 3.2.3 Views of the Board

The Board accepts Syncrude's choice of fluid coking for its bitumen upgrading technology based on the factors considered. The Board notes that, although fluid coking has a number of advantages, it also has a number of drawbacks. The technology produces large volumes of SO<sub>2</sub>, CO<sub>2</sub>, and particulates, and liquid yields are less than those achievable with hydrocracking technology. However, the Board acknowledges Syncrude's design efforts and the fact that it has incorporated into its expansion plans a number of technologies that help mitigate these drawbacks. The Board also notes that the synergies with Syncrude's existing facilities may provide the opportunity for further improvements to those facilities in the future.

The Board notes that fluid coking produces a large excess of coke, which has neither an on-site use nor an off-site market. The Board considers coke to be an energy resource and expects Syncrude to continue to examine the economic and technical feasibility of utilizing its net coke production.

## 3.3 Removal of Production and Term Limits

### 3.3.1 Views of the Applicant

Syncrude argued that there was no need to fix either a production limit or a term limit to regulate the conservation or environmental performance of its facility. Syncrude made the following points:

- Clause 1 of Approval No. 7550<sup>1</sup> would preclude any change to its production scheme that would negatively impact the performance of its operation.
- Both the Board and AENV have the authority to reopen and change the terms and conditions of their respective approvals.
- The Board is increasingly moving towards the use of operating criteria that would prescribe expected operator performance at all production levels.
- Syncrude's nearest competitor has no production limit in its approval.

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<sup>1</sup> Approval No. 7550, Clause 1

- (1) The scheme (i.e. Syncrude)... is approved subject to the Oil Sands Conservation Regulation and the terms and conditions herein contained.
- (2) Subclause (1) does not preclude alterations in design or equipment provided the Board is satisfied the alterations are compatible with the outline of the scheme and made for the better operation of the scheme.

- Removing the production limits would allow Syncrude to avoid the situation that arose in 1992 and again in 1993 where its production exceeded its annual synthetic crude production limits and it was required to obtain Board approval to continue to operate.
- Refineries and gas plants do not have term limits.
- Syncrude currently operates under a number of mass emission rate limits. An additional production limit would not be necessary.
- Term limits unnecessarily complicate the valuation of reserves and setting the value of the operation. This influences the raising of capital that Syncrude requires to finance its operation. Therefore, term limits are not in the public interest.
- Term limits are imposed under Syncrude's environmental approvals. There is a statutory maximum ten-year approval period under AEPEA, which allows AENV to review every ten years the environmental performance and the continuing justification for emissions from any facility under its control.

### **3.3.2 Views of the Interveners**

OSEC did not disagree in principle with the concept of removing Syncrude's approved production limit. However, OSEC stated that if the production limit were removed, Syncrude's approval should be conditioned to limit the absolute amount of emissions from its operation, rather than limits based on per-unit emissions.

OSEC stated that it was not in favour of eliminating the expiry date from Syncrude's approval. OSEC believed that the expiry clause provides an opportunity for members of the public to examine, review, and provide comment to the Board on the project, the overall facility, and the associated technologies. OSEC noted that environmental approvals issued by AENV do not necessarily provide the public with the same opportunity to review the project.

### **3.3.3 Views of the Board**

The Board believes that there would be no need for production or term limits in approvals if there were equivalent mechanisms in place to allow for adequate regulation. In the Board's view, operating criteria could provide an equivalent mechanisms. Operating criteria have been developed for mining and extraction resource conservation. However, they have not yet been developed for upgrading. Accordingly, the Board is not prepared to eliminate production and term limits from Syncrude's approval, should one be issued. The Board notes that production and term limits were not included in other recent approvals, based on the expectation that operating criteria for upgrading would be in place soon. However, since that did not occur, the Board believes it may be necessary to review those approvals to include such limits. The Board is prepared to deal with requests for minor production increases on a routine basis, provided that such requests are forwarded in a timely manner for the Board's consideration.



## **4 ENVIRONMENT**

### **4.1 SO<sub>2</sub> Emissions from the Base Plant**

#### **4.1.1 Views of the Applicant**

Syncrude stated that it had examined the possibility of retrofitting FGD onto its existing plant. It re-examined a 1991 study and concluded that it was difficult to do and was expensive and that the environmental benefits did not outweigh the cost and the impact on its existing operation.

Syncrude stated that the most economic solution was the installation of an FGD unit between each existing carbon monoxide (CO) boiler and the main stack. However, Syncrude rejected this option based on safety considerations. It rejected a second option of replacing the existing CO boilers because it would require either a shutdown of three to four months for each boiler replacement or operating through the diverter stack for a similar period of time.

Syncrude argued that the substantial sums of money that could be invested in reducing emissions from its main stack could be more effectively used elsewhere. Considering the environmental impact of a change, as opposed to the numerical change in absolute emissions and the region that the change would impact, Syncrude concluded that focusing efforts on reducing low-level acidifying emissions, such as those from the mobile fleet and process furnaces, was a more attractive option.

Syncrude stated that it believed further substantial reductions in sulphur emission were achievable over the next five years and, although it did not quantify the possible reductions, committed to strive for this outcome. Syncrude noted that under Clause 8.2 of Approval No. 7550, it was required to file with the Board each year a summary of its efforts to minimize atmospheric emissions, in particular, SO<sub>2</sub> emissions. Syncrude committed to clarify the possible substantial reductions in base plant SO<sub>2</sub> emissions in its next report to the Board on 28 February 2000. Syncrude also noted that Clause 4.4.2 of its approval under AEPEA requires that prior to 15 March 2001, it report on options to reduce SO<sub>2</sub> emissions. Syncrude stated that if it were to install FGD on one of its existing cokers, it could reduce sulphur emissions by approximately 37.5 tonnes per stream day.

Syncrude stated that it was committed to a long-term average of 185 tonnes per day of SO<sub>2</sub> from its site. However, it stated that it required a 90-day rolling average emission limit of 250 tonnes per day to allow for operational flexibility. Syncrude committed to not exceed the 250 tonnes per day emissions limit and committed to adjust production accordingly if required.

Syncrude confirmed that it had designed the project in accordance with Clause 4 of Approval No. 7550, which states that Syncrude shall construct and design any new facilities so as to not make more difficult the possible future installation of facilities for the removal of contaminants from stack gases.

#### **4.1.2 Views of the Interveners**

OSEC noted that Syncrude accounts for 77 to 78 per cent of the region's SO<sub>2</sub> emissions and that Syncrude's projections indicate that it would be the largest contributor to SO<sub>2</sub> emissions in the region for a long time. OSEC noted that Syncrude's EIA stated that the observed SO<sub>2</sub> concentrations in the area have exceeded Alberta ambient air quality guidelines and that the cumulative impact assessment predicts that SO<sub>2</sub> guidelines would continue to be exceeded for both baseline and application cases. OSEC also expressed concern over the long-range transport of Syncrude's SO<sub>2</sub> emissions into Saskatchewan and the impact this would have on the ecosystems in that province.

OSEC requested the Board to recommend that Syncrude examine and move toward additional SO<sub>2</sub> emission reductions and that it take actions to make a substantive reduction in its SO<sub>2</sub> emissions from its existing facility.

#### **4.1.3 Views of the Board**

The Board acknowledges the SO<sub>2</sub> emission reductions that Syncrude would achieve through the installation of FGD as part of its expansion plans. However, the Board also notes that, following expansion, Syncrude would emit an estimated 185 tonnes per day of SO<sub>2</sub>, primarily from its base plant, and that this would account for a significant portion of total SO<sub>2</sub> emissions in the region.

The Board believes that a long-term objective of the oil sands industry should be to limit emissions of all pollutants, including SO<sub>2</sub>. The Board expects that Syncrude will continue to reduce SO<sub>2</sub> emissions from its operations and the Board will require Syncrude to report every three years on its efforts to make substantial SO<sub>2</sub> emission reductions. In this regard, the Board notes Syncrude's belief that further substantial reductions in sulphur emissions are achievable over the next five years and that Syncrude has committed to report to the Board on reductions it believes are possible in its next report by 28 February 2000. The Board expects Syncrude in its report to provide a comprehensive and detailed review of options to reduce SO<sub>2</sub> emissions from its base plant, including the submission of engineering studies in support of its conclusions. The Board notes that while Syncrude has committed to report to it by 28 February 2000, the Board will accept 15 March 2001 as the submission date to harmonize with the requirements of AENV.

The Board also notes that there are a number of multistakeholder initiatives that will examine the impacts of SO<sub>2</sub> emissions in the region, such as the NO<sub>x</sub>/SO<sub>2</sub> Initiative and the recently announced Regional Sustainable Development Strategy (RSDS). The Board notes that the outcomes from these initiatives may require Syncrude to implement additional SO<sub>2</sub> abatement measures on its base plant.

### **4.2 Sulphur Recovery from Acid Gas**

#### **4.2.1 Views of the Applicant**

Syncrude stated that, following its upgrader expansion, sulphur recovery from its acid gas would be accomplished with the use of the following process units:

- four sulphur plants to treat the raw acid gas

- a single Sulphreen unit treating the tail gas from each of the four sulphur plants
- a single FGD unit treating the tail gas from the Sulphreen unit

The sulphur plants would have a sulphur recovery of between 95 and 96 per cent; the Sulphreen unit would recover approximately 75 per cent of the sulphur in the tail gas from the four sulphur plants; and the FGD unit would recover approximately 90 per cent of the sulphur in the tail gas from the Sulphreen unit. Collectively and under normal operating conditions, these units would recover approximately 99.8 per cent of the sulphur in the acid gas.

Syncrude stated that, coincident with the planned regular maintenance schedule of its new coker, the FGD unit would also undergo maintenance. It expected that this maintenance period would last 25-40 days every two years. It expected that during this period sulphur recovery would decrease to approximately 99 per cent. Syncrude stated that a similar impact would arise when the Sulphreen unit was taken out for normal maintenance. This would occur when one of the existing cokers was down and it would be separate from the time period that the FGD unit was down. Syncrude stated that there were also some other minor activities that could reduce sulphur recovery, but the downtime of the FGD and Sulphreen units would have the most major impact.

Syncrude stated that outside of the two shutdown periods it would meet 99.8 per cent recovery of the sulphur in the acid gas feed to the sulphur plants. However, to allow for normal maintenance activities, Syncrude believed that appropriate sulphur recovery levels would be 98.5 per cent quarterly and 98.8 per cent annually.

#### **4.2.2 Views of the Interveners**

The interveners did not provide specific comments regarding sulphur recovery from acid gas but did express concerns over the total quantity of sulphur emissions arising from Syncrude's operations.

#### **4.2.3 Views of the Board**

The Board believes that the *IL 88-13*<sup>2</sup> guidelines represent reasonable pollution prevention standards for sulphur recovery from acid gas produced in oil sands operations. It is the Board's view that these guidelines are appropriate for Syncrude. Therefore, consistent with the guidelines and approvals for other operators, the Board will require Syncrude to recover not less than 99.5 per cent of the sulphur contained in the acid gas produced on a quarterly basis with the start-up of the new coker. However, the Board expects Syncrude to steward its operations to achieve an annual target recovery of not less than 99.8 per cent of the sulphur contained in the acid gas produced and will require Syncrude to report annually on its efforts to achieve 99.8 per cent sulphur recovery.

The Board notes that Syncrude's current sulphur recovery requirement is 98 per cent. The requirement will remain in effect, subject to any new directives issued by the Board and provided that Syncrude's production remains at or below its currently approved limit of

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<sup>2</sup> *Informational Letter (IL 88-13): Sulphur Recovery Guidelines — Gas Processing Operations*

15.3 million cubic metres per year of marketable hydrocarbons. For production increases above the approved limit, Syncrude will be expected to conform to the sulphur recovery requirements of *IL 88-13*.

### **4.3 Greenhouse Gases**

#### **4.3.1 Views of the Applicant**

Syncrude stated that its GHG emission reduction target was a 45 per cent reduction in per-unit CO<sub>2</sub> emissions in the period 1998-2008, as outlined in its 1998 filing to the Voluntary Challenge and Registry<sup>3</sup> (VCR). Syncrude stated that its total CO<sub>2</sub> equivalent emissions in 2008 would be 13.5 million tonnes, compared to 8.5 million tonnes in 1997. Syncrude confirmed that it would comply with any framework that Canada developed for dealing with CO<sub>2</sub> and other GHGs.

Syncrude stated that although CO<sub>2</sub> emissions from its operations would increase by about 60 per cent, globally there would be no net increase in CO<sub>2</sub> emissions as a result of its expansion. It further stated that, assuming there were a market demand for its product, its CO<sub>2</sub> emissions would, at worst, be equal to those associated with the production of a comparable product from any other similar resource.

#### **4.3.2 Views of the Interveners**

OSEC acknowledged that Syncrude's per-unit emissions would decrease following its expansion but argued that the issue was the significant increase in the absolute amount of emissions.

OSEC stated that Canada was a carbon-emission-limited country. Canada's commitment under the Kyoto protocol would effectively put a cap on Canada's emissions of GHGs. By limiting the amount of emissions that would be allowed, such a cap would make the right to produce GHGs valuable. OSEC argued that when a regulatory agency such as the Board considers applications like the one put forward by Syncrude, it was essentially deciding on whether to grant a portion of Canada's allocation of GHG emissions to this particular applicant. By granting one project or activity the right to a portion of Canada's limited GHG emissions, the Board would be preventing other projects and activities from producing that quantity of emissions.

OSEC stated that in the absence of an overall policy framework in Canada, all companies and sectors should strive for a 6 per cent reduction in GHG emissions.

OSEC noted that it has consistently argued that new energy development projects should be governed by a policy of no net increase in GHG emissions. OSEC was of the view that the Board should not approve the Mildred Lake upgrader expansion unless Syncrude committed to no net increase in GHG emissions associated with its project. OSEC believed that Syncrude should also commit to developing a comprehensive GHG management plan to document the

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<sup>3</sup> In 1995, Canada's federal and provincial governments prepared a National Action Program on Climate Change (NAPCC). NAPCC provided a framework for developing actions to reduce greenhouse gas emissions by establishing strategic directions and objectives for Canada's climate change policy. The major policy initiative contained in NAPCC was the VCR program. The program was designed to encourage governments, communities, and corporations to reduce their greenhouse gas emissions on a voluntary basis. These organizations were encouraged to assess their current emissions, design plans to reduce them, and report back on their progress.

range of measures that it intended to use to achieve no net increase. Such a plan would likely consist of an energy efficiency target for the project, continuous improvement mechanisms, internal offsets within Syncrude's overall operations, domestic offsets within other Canadian companies, and limited international offsets.

OSEC noted that both Shell and Suncor have recognized the need to seriously evaluate GHG offsets and develop an offset strategy to account for the net increase in emissions that would be associated with their oil sands projects. OSEC stated that Syncrude was the largest emitter of GHGs; yet it had not committed to holding the line on GHG emissions, nor had it committed to any offsets to achieve this end. OSEC believed that this remains a fundamental deficiency in the project.

OSEC rejected Syncrude's claim that globally there would be no net increase in GHG emissions as a result of its project. OSEC tabled an oil and natural gas industries foundation paper that compared the life cycle emissions of CO<sub>2</sub> equivalents for seven different feedstock sources and their GHG emission intensity. OSEC claimed that Syncrude's position was true only by comparing Syncrude's 2005 synthetic crude oil to a specific type of partly upgraded crude oil from another source. OSEC pointed out that using crude sources, such as Canadian domestic, North Sea, and Saudi-like crude oil, would result in a net decrease in CO<sub>2</sub> emissions.

### **4.3.3 Views of the Board**

The Board acknowledges Syncrude's participation in the VCR and its efforts to continuously seek opportunities to reduce GHGs from its operations. The Board believes that the issue of GHGs is best dealt with through initiatives and policies developed at the federal and provincial levels. The Board will not unilaterally impose conditions on oil sands operators in the absence of these policies and initiatives.

## **4.4 NO<sub>x</sub> Emissions**

### **4.4.1 Views of the Applicant**

Syncrude stated that there would be an increase of 12.7 tonnes per day of NO<sub>x</sub> emissions associated with its project. It confirmed that its NO<sub>x</sub> emissions would contribute to acid deposition in the region and to the overall ozone formation chemistry in the region. Syncrude also confirmed that its cumulative-effects assessment concluded that there would be a possibly significant effect from acid deposition and contribution to overall ozone formation chemistry. However, Syncrude stated that its EIA predictions were significantly overstated and that this was confirmed by its experts. In the case of NO<sub>x</sub>, Syncrude stated that the predictions were in the order of three times greater than levels measured in the area.

Syncrude confirmed its commitment to participate in the NO<sub>x</sub>/SO<sub>2</sub> Initiative by way of a memorandum of understanding (MOU) dated 7 December 1998, which contains specific provisions binding the parties to abide by outcomes of the initiative. Syncrude stated to OSEC in writing that, should the MOU process dissolve or fail for some reason, Syncrude would proceed through the steps required by the MOU, including preparing and presenting to the regulatory agencies and other interested parties an NO<sub>x</sub> management system. Syncrude noted that the

wording of the MOU did not specifically state that an emission allocation system would be developed as part of an overall NO<sub>x</sub> management system.

Syncrude committed to work toward further reducing NO<sub>x</sub> emissions on a continuous improvement basis, to abide by the outcomes of the NO<sub>x</sub>/SO<sub>2</sub> Initiative, and to prepare a comprehensive sitewide NO<sub>x</sub> emission management plan, as required by its approval under AEPEA. Syncrude stated that OSEC was attempting to prejudge the outcome of the NO<sub>x</sub>/SO<sub>2</sub> Initiative based on its request for a regulatory backstop.

Syncrude said that

- it had used the lowest NO<sub>x</sub> technology in its design wherever possible;
- once the detailed design commenced, it would revisit each opportunity for emission control and apply the best available technology in each instance; and
- it would upgrade to low NO<sub>x</sub> emission technologies when component replacement or modifications were required.

#### **4.4.2 Views of the Interveners**

OSEC stated that NO<sub>x</sub> plays a role in acid deposition as a precursor for the formation of ozone and that above-guideline levels may be a concern for human health. OSEC claimed that NO<sub>x</sub> emissions have produced an accumulated regional loading of acid deposition in the ecosystem and that the region was moving closer to critical limits.

OSEC asked the Board to backstop Syncrude's involvement, participation, and abiding by outcomes of the NO<sub>x</sub> /SO<sub>2</sub> Initiative through conditions in its approval to Syncrude. OSEC rejected Syncrude's claim that its request for the Board to backstop the initiative pre-empted its outcome. Rather, OSEC claimed that a regulatory requirement would help ensure success of the initiative.

OSEC pointed out that, notwithstanding that it had signed the NO<sub>x</sub>/SO<sub>2</sub> Initiative MOU, one of its objectives was the development of an equitable emission allocation system for existing and future industries as part of a regional NO<sub>x</sub>/SO<sub>2</sub> management system.

OSEC also requested the Board to require NO<sub>x</sub> emissions reductions from Syncrude's mobile fleet.

#### **4.4.3 Views of the Board**

The Board recognizes the concerns surrounding the volume of NO<sub>x</sub> emissions that would result from the project and the potential direct and indirect impacts these emissions would have on the environment on a project-specific and cumulative basis. However, in mitigation of these concerns, the Board notes

- Syncrude's efforts to minimize emissions of NO<sub>x</sub> from its proposed expansion
- Syncrude's commitment to strive to further reduce NO<sub>x</sub> emissions on a continuous improvement basis
- uncertainties regarding the observed and predicted impacts of NO<sub>x</sub> emissions
- Syncrude's commitment to participate in and abide by the outcomes of the NO<sub>x</sub>/SO<sub>2</sub> Initiative

The Board is satisfied that if the NO<sub>x</sub>/SO<sub>2</sub> Initiative identifies that current NO<sub>x</sub> emissions are a concern that must be addressed, appropriate measures will be implemented, either through the NO<sub>x</sub>/SO<sub>2</sub> Initiative or under the regulatory authority of the Board or AENV.

## **4.5 Particulates**

### **4.5.1 Views of the Applicant**

Syncrude stated that it had taken all reasonable steps toward the objective of no increase in PM emissions and that it had a realistic expectation of achieving this objective as a result of the Mildred Lake upgrader expansion project. However, Syncrude indicated that it was not in a position to make this commitment to stakeholders or the Board at this time. It stated that its EIA conservatively assumed base-case particulate emission rates for its new FGD stack. In the absence of any operating experience, Syncrude could not otherwise quantify what the expected emissions would be. Syncrude also assumed that, as part of its process redesign, ammonia would be removed from the main stack, which would reduce PM emissions and secondary formation of PMs outside of the stack.

Syncrude noted that monitoring has indicated that the current levels of PM in the communities adjacent to its operation are within the most stringent guidelines that have been proposed or considered. Syncrude stated that emissions of PM<sub>10</sub> (ten micron and smaller sized particles) measured in Fort McMurray were in the range of 7 micrograms (µg) per cubic metre, whereas in Edmonton in 1995 the annual mean concentration was 20 µg/m<sup>3</sup>. In the Fort Saskatchewan area, monthly ranges were between 12 and 36 µg/m<sup>3</sup>.

### **4.5.2 Views of the Interveners**

OSEC stated that PM emissions were a serious health issue because of their inhalable and respirable properties, but most serious were the fine and ultra fine particles, which can be inhaled deeply into the lungs. OSEC stated that epidemiological research indicated that there was a robust and statistically significant correlation between human health impacts and mortality effects from exposure to these pollutants. These epidemiological findings concluded that there was a linear relationship between increasing concentrations of PM and human health impacts.

These findings also concluded that there appears to be no level at which no adverse effects would be expected to occur: that is, there was no bottom threshold below which PM could be considered safe.

OSEC noted that in its review of Syncrude's Aurora project, Environment Canada recommended to Syncrude that the potential impact of secondary PM should have been considered in its EIA. OSEC noted that Environment Canada again pointed out to Syncrude that particulate matter was a concern and that if secondary PM had not been considered in its EIA for the Mildred Lake upgrader expansion application, it should be, and the potential impact on health should be reassessed. OSEC noted that Syncrude admitted in its reply to Environment Canada that secondary PM formation was not included in its EIA and that it was a deficiency. OSEC rejected Syncrude's claim that it was not an important deficiency.

OSEC argued that there should be no increase in ambient concentrations of PM, based on

- the epidemiological evidence correlating exposure and health impacts
- the lack of understanding about the mechanism of the secondary formation of PM
- the increased ambient concentrations of PM that would arise from the effect of increasing NO<sub>x</sub> concentrations
- the uncertainty with respect to predicting the amount emitted and the dispersion of the PM
- the fact that Syncrude has predicted as much as a 15 per cent increase in direct PM emissions from its proposed expansion

OSEC requested that the Board condition Syncrude's approval such that Syncrude would be required to monitor and report on its PM emissions and the status of ambient PM concentrations in the communities of Fort McKay and Fort McMurray. OSEC also requested that, should Syncrude fail to hit its target of no increases in PM concentrations, Syncrude should then be required to undertake initiatives to offset those increases.

WBFN expressed concern over the lack of information on the metals content of the PM, the areal extent of PM dispersion, and the potential health impacts of PMs.

#### **4.5.3 Views of the Board**

The Board acknowledges the concerns expressed over the potential increase in PM emissions from Syncrude's proposed upgrader expansion. However, the Board also notes

- Syncrude's efforts to minimize PM emissions from its proposed project
- Syncrude's expectation that actual emissions will be less than stated in its application
- the lack of health impact data at the PM levels currently observed in the region or at the level expected as a result of Syncrude's expansion
- emission guidelines are currently being negotiated under the Canadian Council of Ministers of the Environment Harmonization Accord

The Board will require Syncrude to

- continue to identify opportunities to further reduce PM emissions
- ensure through its participation in the Wood Buffalo Environmental Association (WBEA) that appropriate monitoring programs are established and maintained
- abide by the guidelines developed under the Canadian Council of Ministers of the Environment Harmonization Accord

## **4.6 Ozone**

### **4.6.1 Views of the Applicant**

Syncrude confirmed that NO<sub>x</sub> emissions would contribute to the ozone formation chemistry in the region. It also confirmed that its EIA concluded a possibly significant contribution to the ozone formation chemistry from the cumulative effects of current and planned developments in the region. However, Syncrude pointed out that NO<sub>x</sub> emissions have steadily increased from 1990 to 1995, whereas ozone levels have not.



Syncrude understood that exposure of vegetation to the levels allowed by the existing guideline could cause stress and therefore believed it likely that Canada, through a national process, would adopt a guideline more stringent than the current guidelines.

Syncrude stated that the current WBEA monitoring programs were designed to monitor and detect effects on vegetation due to air emissions, with the emphasis on the effects of SO<sub>2</sub>. Syncrude confirmed that the detection of effects from ozone was a lesser priority and the monitoring program under WBEA could be enhanced to detect the effects of ozone.

Syncrude stated that elevated concentrations relative to the 24-hour guideline were common in Alberta. Syncrude pointed out that AENV stated at the EUB hearing of the Suncor Millennium application that the 24-hour guideline for ozone is exceeded frequently in both rural and other areas of the province, possibly due to natural effects. Syncrude also noted that OSEC did not have any evidence to refute AENV's claim.

Syncrude stated that it would address ozone concerns through the NO<sub>x</sub>/SO<sub>2</sub> Initiative.

#### **4.6.2 Views of the Interveners**

OSEC claimed that Syncrude did not adequately assess the effects of its project on ozone formation and the impact this would have on ground-level ozone concentrations, vegetation, and on human health. OSEC claimed that the threshold concentration at which vegetation was impacted was much lower than originally understood several years ago.

OSEC stated that the 24-hour guideline was being exceeded about a third of the time and that most of the exceedances occurred during the late spring and summer period, when vegetation was most sensitive.

OSEC stated that both the baseline and application cases in Syncrude's EIA predict that there would be exceedances of the one-hour ozone guideline and that the 24-hour ambient air quality objective has been and would continue to be exceeded. OSEC rejected Syncrude's claim that exceedances are a naturally occurring phenomena throughout the province and not associated with oil sands developments. OSEC stated that there were only small bits of data collected from a few monitoring sites from around Edmonton, Calgary, and Fort McMurray, and very little else. OSEC concluded that this was not enough data on which to base a generalization.

OSEC noted that Environment Canada's supplemental information request to Syncrude specifically requested that Syncrude should identify what steps it would take to meet ozone guideline levels if they were exceeded.

OSEC pointed out that Syncrude has acknowledged that existing monitoring for effects on environmental receptors needs to be improved because the existing monitoring program may not detect adverse effects from ozone. Therefore, Syncrude cannot conclude that effects from ozone are not already occurring.

### **4.6.3 Views of the Board**

The Board acknowledges the concerns expressed by OSEC and Environment Canada. However, the Board also notes the uncertainty regarding the potential increase in ground-level ozone concentrations and the impacts this will have on human health and vegetation. The Board believes that the best way to develop a better understanding of the issue and to reduce uncertainty is through the ozone working group under WBEA. The Board notes Syncrude's participation in the working group and expects Syncrude to continue to support its activities. The Board notes that ozone issues will also be addressed through the NO<sub>x</sub>/SO<sub>2</sub> Initiative and that Syncrude has committed to participate in the initiative and to abide by its outcomes. In the interim, the Board expects Syncrude to ensure that appropriate monitoring protocols are implemented to better detect the impacts of ozone.

## **4.7 Water Management**

### **4.7.1 Views of the Applicant**

Syncrude stated that it would withdraw an additional 27.3 million m<sup>3</sup> of water from the Athabasca River as a result of the project, approximately 88 per cent above its current withdrawal. Syncrude stated that based on its ability to manage water, its current licence limit would be sufficient to accommodate any future production plans.

Syncrude stated that, while there were numerous issues with respect to water management on its site, there was none that it could not successfully manage in a manner acceptable to the public and to the regulators. Syncrude stated that if it was necessary to clean up and discharge its process-affected water at some point in the future, there would be a number of suitable industrial processes in use by refineries that could be applicable to its operation.

Syncrude stated that groundwater seepage from its coke storage area was within the present mine site. Any runoff would be collected and recycled as part of its water management system, and there would be no external runoff.

### **4.7.2 Views of the Interveners**

The interveners expressed concerns over the impact that project emissions would have on water quality in the region, the impact that increased water withdrawals would have on the Athabasca River, especially at low flows, and the potential for groundwater contamination.

### **4.7.3 Views of the Board**

The Board is concerned with the large increase in fresh water intake, the large inventory of process-affected waters on site as a result of the tailings management technology currently in use, and the impact this may have on Syncrude's ability to manage its water inventory in the future.

The Board believes that the long-term storage of large volumes of process-affected water as a water management strategy should be reviewed. The Board encourages Syncrude and other operators to place a priority on developing strategies and technologies to minimize water

withdrawal, maximize water reuse, and decrease on-site water inventories. The Board will require Syncrude to report every year on its efforts in this regard. The Board also expects Syncrude to actively participate in addressing the water management issues raised under RSDS.

## **5 CUMULATIVE EFFECTS**

### **5.1 Views of the Applicant**

Syncrude stated that the Board has dealt with the issue of cumulative effects and cumulative impact assessments on a number of previous occasions, as evidenced in the decisions in respect of the Shell Muskeg River project (Decision 99-2) and the Suncor Millennium project (Decision 99-7). Syncrude noted that the Board stated that it believed that both RSDS and the Cumulative Environmental Effects Management Initiative (CEEMI) were acceptable and effective processes through which regional cumulative effects issues could be addressed.

Syncrude stated that its cumulative effects assessment showed that there could be potentially significant impacts associated with acidification. However, Syncrude noted that the conclusions were based on an extremely conservative set of assumptions as to individual components of the ecosystem and even more conservative scenarios for the projects that would be proceeding within the time frame assessed. Syncrude concluded that the environmental impact predictions were significantly overstated and that there were a suite of measures and programs that could be undertaken to manage these risks. Syncrude claimed that cumulative effects was not an imminent issue.

### **5.2 Views of the Interveners**

OSEC pointed out that there was considerable uncertainty, especially with respect to cumulative effects that could result from this project. OSEC noted that NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, polycyclic aromatic hydrocarbons (PAH), metals, (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>, VOC, and reduced sulphur compounds (RSC) would increase substantially as a result of this project combined with the other projects planned for the region. With respect to human health, this project would add to the increasing health risks from industrial emissions in the area.

OSEC also noted that the cumulative effects of development on surface water quality, aquatic resources, soil quality, vegetation, wildlife, lake fisheries, forestry, and traditional land use were all described as possibly significant and that most were a result of acidifying emissions.

OSEC noted that Syncrude's cumulative effects assessment was deficient because it did not quantify the effects of long-range transport of acid-producing chemicals and did not take into consideration the historic accumulation and residual impacts that have taken place from developments in the region over the last 30 years.

OSEC rejected Syncrude's reliance on managing the potentially significant effects and claimed the issue should be whether the cumulative effects could be prevented in the first place rather than managed after they occur.

### **5.3 Views of the Board**

The Board recognizes the potentially significant impacts predicted to occur as a result of current and proposed industrial development in the Fort McMurray region. However, the Board also recognizes the high degree of uncertainty surrounding the science of predicting cumulative effects. The Board believes that, in light of the potential effects and the uncertainty of their occurrence, a precautionary pollution prevention approach should be taken. In this regard, the Board acknowledges the efforts of Syncrude to minimize the impact of its project, which in some instances has resulted in a net decrease in environmental emissions from its total operations. In addition to the specific mitigation measures proposed by Syncrude, the Board notes that environmental management initiatives such as RSDS and CEEMI, as well as those under the general framework of WBEA, may require that further steps be taken. The Board expects that Syncrude will participate fully in the regional environmental management initiatives and that it will abide by their outcomes.

## **6 HUMAN HEALTH EFFECTS**

### **6.1 Views of the Applicant**

Syncrude stated that minimal risks to human health were predicted for acute short-term exposures to air emissions resulting from normal plant operating conditions. Syncrude noted that slightly elevated potential health risks were predicted during infrequent abnormal emission conditions, but it concluded that the predicted increase in health risk during infrequent abnormal emission conditions was not considered significant relative to the baseline case. Syncrude stated that chronic long-term exposures to normal air emission conditions through all exposure pathways were predicted to have a minor potential human health risk, but that the magnitude of the predicted increase in health risk from chronic exposures relative to the baseline case was expected to be minimal.

Syncrude stated that its human health assessment followed a three-step process to establish health risks consistent with its standard practice. Step one was to establish the exposure limits and the rationale for those limits for each substance of concern. Step two was to calculate exposure ratios for specific receptors for each substance using a suite of very conservative (protective) assumptions at each stage of the evaluation. In all cases in which exposure ratios of less than one were calculated in step two, the analysis was deemed complete and that substance was determined to have no significant effect. For those cases with exposure ratios above one, a third step was required: the analysis was revisited to assess the degree of conservatism built into the analysis and, through the subsequent application of professional judgement, a final determination was made and the assessment was completed.

Syncrude confirmed that in its assessment of the risks for cancer, background levels of carcinogens were assumed to be safe and were not taken into consideration.

Syncrude confirmed that at the present time there was a debate as to whether cancer risks calculated for individual chemicals should be reported as incremental risks or whether the incremental risks should be added together for all carcinogenic chemicals. Syncrude stated that, for the purpose of its application, it would be reasonable to add incremental cancer risks, though it had not done this as part of the application.

## 6.2 Views of the Interveners

OSEC pointed out several deficiencies in Syncrude's human health assessment:

- Pollutant interactions where pollutants and other stresses interact with each other were not accounted for.
- The impact of ozone concentrations on human health were not considered.
- The effect of background levels were not included and cannot assumed to be safe.
- The additive effects of individual carcinogens were not taken into consideration.
- Professional judgement, rather than objective standards, were used in evaluating the results of risk calculations.
- Syncrude's modelling techniques underpredict exposures that were assumed to be conservative in the first place.

OSEC requested that the Board require Syncrude to re-examine its health assessment to take into account background levels and sum the effects of individual exposures.

## 6.3 Views of the Board

The Board notes Syncrude's findings and OSEC's concerns about Syncrude's human health assessment. The Board notes, however, that the Alberta Oil Sands Community Exposure and Health Effects Assessment Program (AOSCEHEAP) is nearing completion. AOSCEHEAP, and any follow-up studies, may provide data for future evidence-based decisions on the impact of oil sands development on human health. The Board expects Syncrude to continue to participate in AOSCEHEAP and to respond to its findings.

# 7 SOCIOECONOMIC IMPACTS

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## 3 7.1 Views of the Applicant

Syncrude stated that its \$3 billion expansion would result in substantial socioeconomic benefits for the Wood Buffalo region, Alberta, and Canada. Syncrude stated that the socioeconomic benefits would include

- 1000 person-years of engineering employment, 8000 person-years of direct construction employment, and 20 000 direct, indirect, and induced person-years of employment over the construction period
- 200-250 highly skilled permanent operating jobs and approximately 500 ongoing indirect jobs
- 70 per cent of the estimated \$3 billion capital cost of the project being spent in Alberta
- continuation of the historic spending of 90 per cent of the ongoing purchases of goods and services within Alberta

- a significant increase in the royalties to the provincial government and taxes to municipal, provincial, and federal treasuries
- a net social benefit in the order of \$27 billion

Syncrude acknowledged that there were a number of concerns in the region regarding the cumulative effects of the project, its environmental impact, and socioeconomic issues. However, Syncrude noted that it had undertaken extensive consultations with all stakeholders in response to these concerns to resolve issues relating, not only to the project, but also to its entire operation. In addition, Syncrude noted that it was a participant in a number of proactive, regional, multiparty, consensus-based, adaptive management processes examining all aspects of current and proposed oil sands development in the region. Syncrude also stated that it has initiated substantial business development and aboriginal development programs and supports activities in arts, recreation, culture, environment, education, health and safety, and countless other community activities.

#### **4      7.2      Views of the Interveners**

OSEC stated that projects such as Syncrude's expansion tend to result in an influx into the region of people who are not qualified for the positions being offered. This results in a strain on social services, housing, and employment opportunities. OSEC indicated that there was a shortage of affordable housing for low- to middle-income families in Fort McMurray. OSEC also indicated that the income earned by persons involved in the oil sands operations was growing at such a rate that it was having an adverse impact on the cost of living for other persons in the region.

WBFN raised a number of socioeconomic concerns it had with respect to regional industrial development. Issues included, but were not limited to, unemployment, lack of adequate educational and training opportunities, poor housing, rising living costs, insufficient medical services, and social family problems among its membership.

WBFN also expressed concerns it had with respect to the impact oil sands development had on its members' traditional land use. WBFN believed that increased industrial activities in the region were responsible for the decline in the wildlife populations and, in turn, have adversely affected its members' trapping and hunting yields.

WBFN stated that it believed the Board had the power to direct Syncrude to treat WBFN consistently with treatment of other native groups in the Wood Buffalo region in terms of the development benefits that have accrued to them from Syncrude over the years.

#### **5      7.3      Views of the Board**

The Board recognizes that developments such as that proposed by Syncrude can have major socioeconomic implications for the people of the region and that these may not always be positive. While the Board does not have the mandate to resolve these issues specifically, it believes that the participation of Syncrude and other stakeholders in such groups as the Athabasca Oil Sands Development Facilitation Committee (AOSDFC), the Regional Infrastructure Working Group (RIWG), and the Cumulative Effects Assessment Working Group (CEAWG) is the most effective mechanism for addressing local socioeconomic concerns. The

Board acknowledges Syncrude's participation in these groups and notes its efforts to address the socioeconomic concerns of aboriginal groups by creating employment and business development opportunities and providing assistance in gaining access to educational opportunities.

The Board recognizes the concerns of WBFN with respect to its socioeconomic issues but believes that direct discussions and negotiations between WBFN and Syncrude are the most effective means of resolving them. The Board believes that any outstanding concerns should be directed to provincial agencies charged with addressing socioeconomic issues. In this regard, the Board will direct the comments and concerns raised at the hearing to RIWG and the appropriate provincial ministries, which are in a position to assist in these matters.

## **8 CONCLUSIONS**

### **1. Diluent Recovery**

- a) Naphtha losses will not exceed 4.3 volumes per thousand volumes of bitumen production to a maximum of 300 m<sup>3</sup> per day on an annual average basis.
- b) Syncrude will steward its operations to reduce naphtha losses to a target level of 3.6 volumes per thousand volumes of bitumen production on an annual average basis and will report on its efforts to achieve the target level.

### **2. Bitumen Conversion Technology**

- a) The Board accepts Syncrude's choice of fluid coking for its upgrading technology.
- b) The Board considers coke to be an energy resource and expects Syncrude to continue to examine the economic and technical feasibility of utilizing its net coke production.

### **3. Removal of Production and Term Limits**

- a) The Board is not prepared to remove production and term limits from Syncrude's approval pending development of operating criteria for upgrading.
- b) The Board is prepared to deal with requests for minor production increases on a routine basis, provided that such requests are forwarded in a timely manner for the Board's consideration.

4. SO<sub>2</sub> Emissions from the Base Plant

- a) The Board believes that a long-term objective of the oil sands industry should be to limit emissions of all pollutants, including SO<sub>2</sub>.
- b) The Board expects Syncrude to continue to reduce SO<sub>2</sub> emissions from its operations and will require Syncrude to report every three years on its efforts to make substantial SO<sub>2</sub> emission reductions.
- c) Syncrude has committed to report to the Board on reductions it believes are possible in its next report on 28 February 2000. The Board expects Syncrude to provide in its report a comprehensive and detailed review of options to reduce SO<sub>2</sub> emissions from its base plant, including the submission of engineering studies in support of its conclusions.
- d) Syncrude committed to a long-term average emissions limit of 185 tonnes per day of SO<sub>2</sub> from its site.
- e) Syncrude committed to not exceed a 90-day rolling average SO<sub>2</sub> emissions limit of 250 tonnes per day and committed to adjust production accordingly if required.

## 5. Sulphur Recovery from Acid Gas

- a) The Board believes that the *IL 88-13* guidelines represent reasonable pollution-prevention standards for sulphur recovery from acid gas produced in oil sands operations and that these guidelines are appropriate for Syncrude.
- b) The Board will require Syncrude to recover not less than 99.5 per cent of the sulphur contained in the acid gas produced on a quarterly basis with the start-up of its new coker.
- c) The Board expects Syncrude to steward its operations to achieve an annual target recovery of not less than 99.8 per cent of the sulphur contained in the acid gas produced and to report annually on its efforts to achieve 99.8 per cent sulphur recovery.
- d) Syncrude's current sulphur recovery requirement of 98 per cent will remain in effect, subject to any new directives issued by the Board, provided that its production remains at or below its currently approved limit of 15.3 million m<sup>3</sup> per year of marketable hydrocarbons. For production increases above the approved limit, Syncrude will be expected to conform to the sulphur recovery requirements of *IL 88-13*.



## 6. Greenhouse Gas

The Board believes the issue of GHGs is best dealt with through initiatives and policies developed at the federal and provincial levels. The Board will not unilaterally impose conditions on oil sands operators in the absence of these policies and initiatives.

## 7. NO<sub>x</sub> Emissions

The Board is satisfied that if the NO<sub>x</sub>/SO<sub>2</sub> Initiative identifies that current NO<sub>x</sub> emissions are a concern that must be addressed, appropriate measures will be implemented, either through the NO<sub>x</sub>/SO<sub>2</sub> Initiative or under the regulatory authority of the Board or AENV.

## 8. Particulates

- a) The Board expects Syncrude to continue to identify opportunities to further reduce PM emissions and to ensure that, through its participation in WBEA, appropriate monitoring programs are established and maintained.
- b) The Board expects Syncrude to abide by the PM guidelines developed under the Canadian Council of Ministers of the Environment Harmonization Accord.

## 9. Ozone

- a) The Board believes that the best way to develop a better understanding of ozone issues and to reduce uncertainty is through the ozone working group under WBEA. The Board expects Syncrude to continue to support the activities of this group.
- b) Ozone issues will be addressed through the NO<sub>x</sub>/SO<sub>2</sub> Initiative, and Syncrude has committed to participate in the initiative and to abide by its outcomes.
- c) In addition to requiring its participation in the various environmental management initiatives, the Board expects Syncrude to ensure that appropriate monitoring protocols are implemented to better detect the impacts of ozone.

## 10. Water Management

- a) The Board believes that the long-term storage of large volumes of process-affected water as a water management strategy should be reviewed.
- b) The Board encourages Syncrude and other operators to place a priority on developing strategies and technologies to minimize water withdrawal, maximize water reuse, and decrease on-site water inventories. The Board will require Syncrude to report every year on its efforts in this regard.
- c) The Board expects Syncrude to actively participate in addressing the water management issues raised under RSDS.

11. Cumulative Effects

The Board expects Syncrude to participate fully in regional environmental management initiatives such as RSDS and CEEMI, as well as those under the general framework of WBEA, to address concerns relating to cumulative effects and to abide by the outcomes of these initiatives.

12. Human Health Effects

The Board expects Syncrude to support AOSCEHEAP and to respond to its findings.

13. Socioeconomic Impacts

- a) The Board believes that the participation of Syncrude and other stakeholders in such groups as AOSDFC, RIWG, and CEAWG is the most effective mechanism for addressing local socioeconomic concerns.
- b) The Board will direct the comments and concerns raised at the hearing to RIWG and the appropriate provincial ministries in a position to assist in these matters.

**9 DECISION**

The Board has carefully considered all of the evidence pertaining to this application. Accordingly, the Board is prepared, with the approval of the Lieutenant Governor in Council, to approve Syncrude's Application No. 980381 with conditions and requirements as referenced in this report that will be specified in the approval.

DATED at Calgary, Alberta, on 14 October 1999.

**ALBERTA ENERGY AND UTILITIES BOARD**

*[Original signed by]*

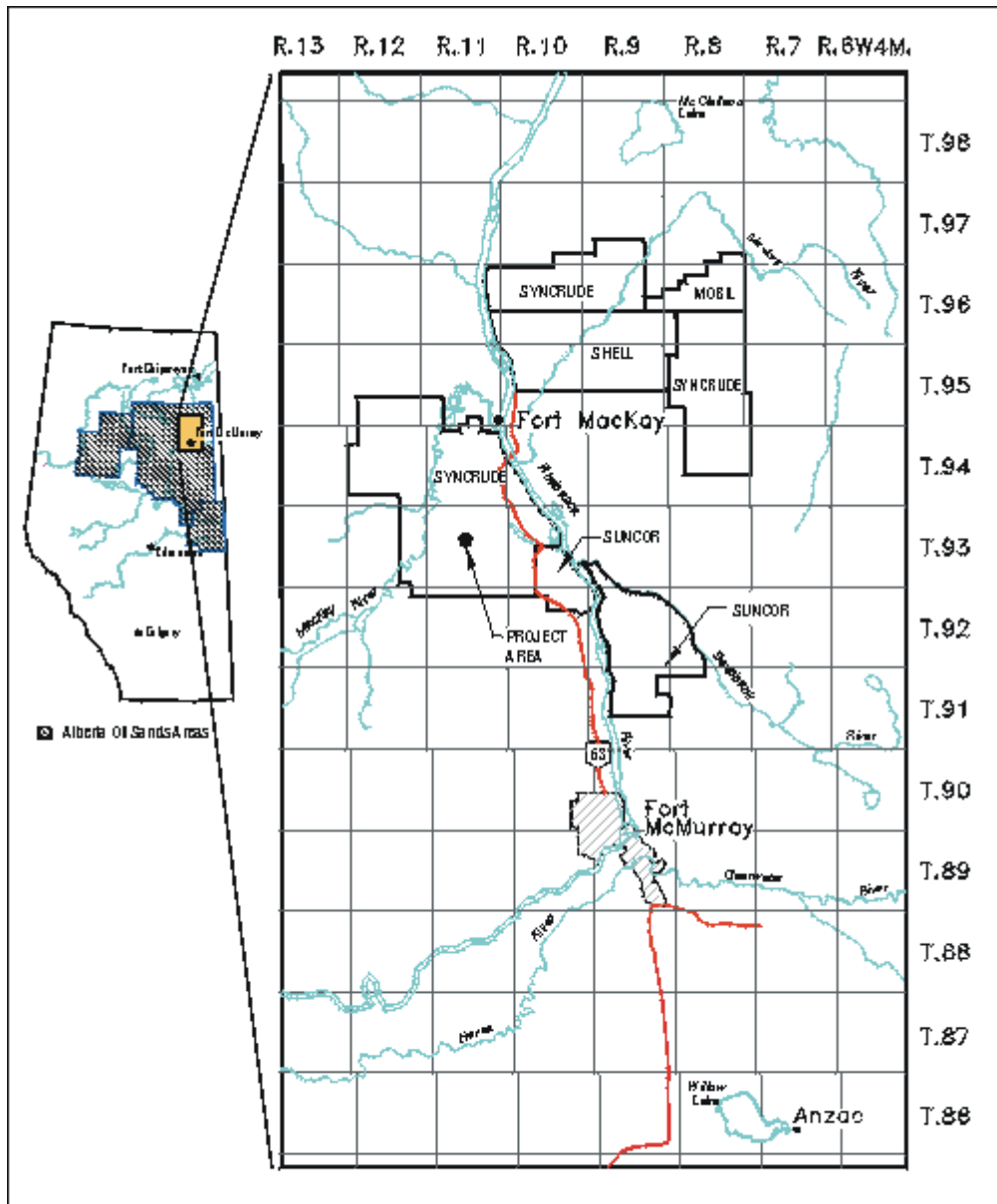
J. D. Dilay, P.Eng.  
Presiding Member

*[Original signed by]*

T. McGee  
Board Member

*[Original signed by]*

C. A. Langlo, P.Geol.  
Acting Board Member



Mildred Lake Upgrader Expansion  
 Application No. 980381  
 Syncrude Canada Ltd.

Decision 99-25