

ALBERTA ENERGY AND UTILITIES BOARD

Calgary Alberta

APPLICATION BY SYNCRUDE FOR THE AURORA MINE

**Decision No. 97-13
Application No. 960552**

1 INTRODUCTION

1.1 Application

Syncrude Canada Limited (Syncrude) applied pursuant to section 10 of the Oil Sands Conservation Act for approval to construct, operate, and reclaim an oil sands mine and associated bitumen extraction facilities in the Fort McMurray area, the Aurora Mine. The Aurora Mine would be located east of the Athabasca River, approximately 70 kilometres (km) north of Fort McMurray within the Regional Municipality of Wood Buffalo. The development would include two mining areas: the first located within Township 96, Ranges 9 to 11, West of the 4th Meridian, and the second located within Townships 94 and 95, Ranges 8 and 9, West of the 4th Meridian. The project would be a four-phase development, with the first two phases at the Aurora North Mine and the remaining two at the Aurora South Mine. Each phase would have an initial production capacity of 6 250 000 cubic metres per year (m³/yr) of bitumen. The first train of the Aurora North Mine would start in the year 2001 and production from the extraction plant would be transferred to Syncrude's existing Mildred Lake facility for further processing. Ultimately, production levels from the Aurora Mine would reach approximately 25 000 000 m³/yr of bitumen.

The application covers :

- C two separate truck and shovel oil sands mines,
- C two mining-extraction production systems at each mine,
- C related infrastructure associated with the operation of each mine,
- C utility corridor for pipelines, transmission line, and roads for each mine,
- C water management plans for the proposed development area, and
- C an integrated reclamation plan for the proposed Aurora Mine.

Syncrude later indicated it would be applying separately for the transmission line and froth, recycle water, natural gas and diesel pipelines. Syncrude requested only that the utility corridors be considered with the application. On 18 April 1997, Syncrude filed a submission that altered the original footprint (Figure 1) of the proposed Aurora Mine to remove the surface impact on Lease 13. The Aurora South tailings area was moved to the Aurora South lease. Syncrude also filed on 18 April 1997 to alter the routing of the proposed utility corridor. The 18 April 1997 filing summarizes the applied-for mine and footprint (Figure 2).

Under a coordinated application process adopted by Alberta Environmental Protection (AEP) and the Alberta Energy and Utilities Board (Board), Syncrude has filed a joint Aurora Mine Application/Environmental Impact Assessment report. The application was filed on 24 June 1996 and registered as Application No. 960552. Syncrude filed, under the Alberta Environmental Protection and Enhancement Act (EPEA) and the Water Resources Act, only for the Aurora North Mine, since the Aurora South Mine was not expected to begin operating within the next ten years.

1.2 Background

Syncrude operates the existing Mildred Lake facility 40 km north of Fort McMurray on the west side of the Athabasca River. The Mildred Lake facility, which started production in 1978, is comprised of a surface mine using dragline and bucket-wheel reclaimers, a truck and shovel operation, and bitumen extraction and upgrading plant. The 1995 production of synthetic crude oil (SCO) from this facility was 11.9 million m³/yr. Syncrude has approval to expand the facility to produce 17.6 million m³/yr of SCO. The Aurora Mine, a truck and shovel operation, would provide immediate bitumen requirements to replace depleting supplies from the Mildred Lake west mine, as well as provide for some production increases. Production from the Mildred Lake west mine would be replaced in two stages, by the two trains of Aurora North. The first train would replace production from the north quadrant of the Mildred Lake west mine. The second train would replace production from the south quadrant of the west mine.

1.3 Notices

The Board issued and published the following notices in local and major newspapers.

- C Notice of Filing of the application on 28 June 1996;
- C Notice of Pre-hearing meeting on 6 March 1997;
- C Notice of Hearing on 5 May 1997;

Table 1 lists all interveners and associated abbreviations used in the report. Prior to this filing, other submissions in favour of the application were received. Also received previously were submissions stating concerns with the application; these concerns have since been addressed by Syncrude.

The Board decided on the basis of the information before it that there was no need for a public hearing.

- C Notice of Cancellation of Hearing on 27 June 1997.

The Board received a number of submissions with respect to the Syncrude application and a pre-hearing meeting was held in Fort McMurray, Alberta on 2 April 1997 before Board Members J. P. Prince, Ph.D. (presiding), A. C. Barfett, and Acting Board Member H. O. Lillo,

P.Eng. In the Memorandum of Decision issued 15 April 1997, the Board identified a need for consideration of a regional approach to development of the oil sands. The pre-hearing meeting considered the possibility that Syncrude might reach agreement with interveners so a hearing was scheduled for 15 July 1997, but with the recognition that the hearing might not be necessary. The Board also concluded, after reviewing the interventions, that the interveners did not require a hearing and the scheduled process was cancelled. While a public hearing of the application was not necessary, the Board believes it useful to document its consideration of the submissions in this report and outline the direction proposed by the Board to address the outstanding issues.

2 ISSUES

Upon thorough review of the material filed by Syncrude and the interveners, the Board believes a number of technical and environmental issues related to the application warranted detailed consideration. The following were considered:

- \$ the optimum recovery of the resources in place,
- \$ the Aurora North tailings area,
- \$ ore grade and pit limits,
- \$ extraction,
- \$ tailings,
- \$ environmental issues,
- \$ socio-economic effects,
- \$ communication and public consultation,
- \$ the timing of Aurora South, and
- \$ regional development.

The Board has decided to approve the application, subject to a number of conditions related to various aspects of the proposed development.

3 THE OPTIMUM RECOVERY OF THE RESOURCES IN PLACE

3.1 Syncrude's Views

3.1.1 Lease Boundaries

Syncrude stated that lease boundaries were not consistent with natural economic mine pit limits and, if lease boundary mining was not planned, it could result in a loss of resource value through increased cost or reduced resource recovery. Syncrude stated it was therefore important that operating companies work together to effect economic resource recovery around lease boundaries by:

- \$ coordinated mine development and reclamation planning,
- \$ re-alignment of lease boundaries as may be agreed, such that the re-aligned boundaries were consistent with resource deposits and surface features,
- \$ production/sharing arrangements, and/or
- \$ joint development of the area.

Syncrude recognized that the ore crosses Aurora lease boundaries and it intended to work with the leaseholders as plans were developed to attain economic resource recovery at the lease boundaries. The result could be pit-limit extensions across the boundaries. Syncrude stated that it would resolve the issue with adjacent leaseholders 5 years prior to mining the area. Syncrude noted that if a coordinated plan for mining the boundaries could not be agreed upon by leaseholders, the Board has the authority to adjudicate and request that alternative plans be adopted.

3.1.2 Disposal Sites and Surface Facilities

Syncrude stated that it had identified other areas where there may be a potentially mineable resource such as under disposal sites, surface facilities, and adjacent to rivers. Specifically, these areas were the Fort Hills disposal site, Susan Lake North disposal site, Susan Lake South disposal site, Aurora North and South tailings, Aurora South disposal site and plant site, and the southwest mine area. After reviewing these areas, Syncrude determined that the underlying resource was uneconomic to mine, for one or more of the following reasons: isolation of the resources from other ore, low volume of resource, or the significant depth of overburden. The Aurora North tailings area and Aurora South Mine are discussed in further detail in sections 4 and 12 respectively.

Syncrude stated that it would maintain a self-imposed 1000 metre (m) setback from the Athabasca River on the west pit of Aurora North. Syncrude recognized there was ore closer to the river and adherence to this setback could leave significant volumes of ore not mined. Therefore, it would assess this area when it opened the west pit and would reconsider the potential for ore recovery, attendant environmental impacts, and protection of the river. Syncrude believed that its 1000 m setback allowed for an appropriate level of safety. Syncrude would also maintain a self-imposed setback from Kearn Lake at the Aurora South Mine and it recognized that additional work would be needed in this area to define the pit limits.

Utility corridors and roads were also recognized as areas that could cover a potentially mineable resource. Syncrude has applied for a utility corridor as part of its application. Existing infrastructure, such as the road to Fort Chipewyan on the Aurora lease, could impact the recovery of the resource as well. Syncrude stated it would move the utility corridors and roads to recover the resource if it were economical.

3.2 Views of the Board

One of the Board's principle responsibilities with respect to oil sands is to ensure conservation of the resource is not compromised by ongoing development activity. The Board discharges this responsibility by requiring operations that will optimize recovery as well as the avoidance of

practices which could make future recovery more difficult. Unless such practices can be justified on technical, economic, or environmental grounds. Developers must evaluate and document all alternatives that have been considered prior to sterilizing any portion of the resource.

3.2.1 Lease Boundaries

The recovery of ore at lease boundaries is one of the more difficult issues to resolve when there is more than one company involved. The earlier this problem is engaged the better the chance to avoid later intervention by the Board that could be more costly to the parties involved. While recognizing the initial responsibility to resolve lease boundary problems lies with the leaseholders themselves, the Board's experience is that there are often unique issues that make it difficult for the companies to find solutions. The most acceptable solutions involve the recovery of all the ore at lease boundaries. Only in exceptional circumstances, with adequate justification, would this requirement be relaxed. None of the lease boundary solutions proposed by Syncrude currently meet this requirement. Therefore, the Board will be conditioning its approval to deal with the lease boundary issue.

3.2.2 Disposal Sites and Surface Facilities

Syncrude has identified a number of areas of potentially mineable resource and has met the minimum drill-hole density as required for preliminary planning purposes. However, further drilling on proposed disposal sites should be done to clearly define the economic limit before the specific design is submitted. The Board believes there is ample time to evaluate the Susan Lake disposal sites since they are not scheduled for construction for 15 years. Additional drilling at a later date will determine whether a mineable resource exists, thereby preventing unnecessary sterilization. With regard to the Fort Hills disposal site, the Board has completed its evaluation and agrees that the north end of the site is unlikely to contain recoverable resources, but the possibility of a mineable resource under the south end cannot yet be precluded. Therefore, the Board will ask Syncrude to further drill and evaluate this area. The Board will require Syncrude to submit these further assessments of resource potential in the vicinity of the disposal sites, as well as disposal site designs, one year prior to field preparation.

The Board is satisfied that the preliminary plant site limits for Aurora North do not sterilize potentially mineable oil sands. The exact plant site limits should be part of the mine plan review.

The Board accepts Syncrude's self-imposed setbacks from the Athabasca River and Kearn Lake as preliminary and, therefore, expects that Syncrude will re-evaluate these areas closer to the time of mining.

Proposed corridor routes should not sterilize economic resources. To assess this, an estimate of the value of the ore that could be affected as well as the potential costs to relocate facilities within the corridor is required. The application does not contain this detailed information. Unless a subsequent assessment is provided to justify not recovering the ore in the corridors, full recovery will be required.

4.1 Syncrude's Views

In Syncrude's 18 April 1997 project update, it confirmed that the south limit of the North Mine tailings area would be modified to mitigate resource sterilization. The area would be replaced by extending the north limit of the tailings area. It also stated it was assessing the new tailings area location to confirm whether there were any unacceptable consequences. Syncrude stated that the tailings area was currently sized to minimize out-of-pit disturbance prior to adequate in-pit storage becoming available. The tailings area achieved an appropriate balance of environmental factors, geotechnical conditions, oil sands recovery and economics, although minor changes may occur. Also in the 18 April 1997 submission, Syncrude indicated it was changing the design of the tailings area from a partitioned pond to a contoured basin but did not describe the impact of this change.

On 22 August 1997, Syncrude provided additional information on the economic feasibility of recovering the 250 million barrels of bitumen under the Aurora North tailings area. Syncrude assessed four areas to determine quality and quantity of resource and mining feasibility:

- § the southwest corner of the tailing area just north of Lease 34/Lease 13 boundary,
- § the middle of the tailings area,
- § the northwest end of the tailings area, and
- § the northeast end of the tailings area.

Syncrude believed the southwest oil sands resource was separated from the Aurora North east mine pit by a waste island and that the resource was neither of sufficient grade or size to be mined as a stand-alone pit. Syncrude stated that this resource was connected to a potential resource on Lease 13 but there was a low probability of this area being mined from Lease 13 because of the low grade and high waste-to-ore ratio. Syncrude stated it would continue to work with the Lease 13 holder to evaluate the potential for mining this area, but if the area proved to be uneconomic, Syncrude may propose using this area for tailings or overburden in the future.

Syncrude evaluated the resource in the middle of the tailings area and determined that mining would have to occur early in the Aurora mining sequence because leaving the area available for mining later would eliminate tailings storage space. This area also had low-grade ore with a high waste-to-ore ratio and resulted in negative returns on capital on either a full cycle or an incremental economic basis.

Regarding the two remaining areas, Syncrude stated that there was insufficient geological information available to carry out a complete assessment. Syncrude concluded that the northwest area was fragmented and contained insufficient resources to support a practical mine operation. The northeast area has potential to contain enough resource with sufficient quality to be mineable and could potentially be a stand alone mine. Syncrude committed to a further review of the

geology in the northeast area prior to taking actions that would preclude the area from being mined. Syncrude indicated that waste storage plans would be adjusted to allow sufficient time to evaluate the resource.

4.2 Views of the Board

The Board maintains a drill-hole database and a geological block model of the mineable oil sands area. Using Syncrude's applied-for mining criteria and the Board's geological information, it was determined that there is a significant quantity of potentially mineable resource that could be affected if the tailings area is built as proposed.

The Board has reviewed Syncrude's geological evaluation and agrees that, because the resource in the centre of the tailings area is of lower quality, mining this resource first would alter the economic profile of the project, and make it difficult to start up and optimize a new extraction process. Thus, since the ore in the centre of the tailings area is not economically mineable, the Board will allow a tailings deposit to cover that portion of the resource. Figure 3 shows the reduced tailings area footprint which the Board believes is acceptable together with the three potential mining areas identified.

Regarding the resource in the southwest, the Board's geological interpretation does not show a clear waste channel between it and the Aurora North east mine. Therefore, it should be possible to recover most of the resource from the southeast section of the Aurora North east pit. The Board notes potentially increased efficiency in recovering the ore if Shell Canada Limited (Shell), the Lease 13 holder, and Syncrude can reach agreement to allow mining on both sides of the lease boundary. In any case, the information presently before the Board suggests that the oil sands resource in the southwest can be economically recovered.

The Board also believes there is potential to recover some of the northwest resource by extending the Aurora North east mine pit limits. Syncrude will be asked to reassess the possibility of recovering this resource.

The geological interpretations of both Syncrude and the Board indicate a significant amount of good quality resource in the northeast portion of the tailings area. The Board acknowledges Syncrude's commitment to evaluate this area further and not undertake any activity in this area that would sterilize the resource. However, the Board notes that Syncrude did not address how it would adjust its waste storage plans to allow sufficient time to evaluate this resource.

In summary, the Board believes that the southwest, northwest, and northeast sections of the tailings area contain potentially mineable resource and, therefore, is not prepared to allow the tailings area to extend on to any of these locations at this time. Syncrude should evaluate alternative tailings management plans and compare their costs to the benefits of recovering the resource. The Board is prepared to approve a smaller tailings area in this location, one that does not risk sterilizing the resources in question. If Syncrude wants to have a larger tailings structure in this area, it will have to demonstrate that the resource is uneconomic.

5 ORE GRADE AND PIT LIMITS

5.1 Syncrude's Views

Syncrude stated the criteria for defining ore was site specific and dependent on geological characteristics of the oil sands deposit, economics, and operating constraints. Consideration for mining criteria were: bitumen recovery optimization, material handling costs, extraction recovery, and equipment selection. The mining criteria selected by Syncrude were a cut-off grade of 8 per cent in the first bench and 7 per cent for the rest of the mine with a waste or oil sands zone thickness of greater than or equal to 5 m thickness. Syncrude believed that the optimum balance between project economics and resource recovery was achieved using a ratio of total volume of material removed to net recoverable bitumen (TV/NRB) of 2.2 as an indicator of economic pit limits.

Syncrude has applied for an 8 per cent cutoff in the first bench because of the lower quality ore and the associated processing difficulties. Syncrude stated that it was testing its new Low Energy Extraction Process (LEEP) to determine the recoveries at lower grades, but processing low-grade oil sands would result in lower recoveries, and increased losses to tailings. Syncrude believed there was no benefit to moving toward a 3 m waste or oil sands zone thickness and that a 5 m thickness was optimal for the mining equipment chosen to obtain maximum shovel productivity.

Syncrude stated the pit limits were preliminary and may be extended when the mine plan was finalized. The pit limits were determined using a TV/NRB analysis for Aurora North and total volume of material to bitumen in place (TV/BIP) for Aurora South.

5.2 Views of the Board

The Board recognizes that the minimum mining cut-off grade is influenced by a number of related factors that determine the viability of the operation. These factors include: the extraction recovery, the flexibility of the mine to supply sustained blended qualities of ore to the plant, and project economics. The Board believes that new mine developments should be designed to implement all practical mining and plant improvements to optimize recovery.

The Board acknowledges Syncrude's concern that the first bench is of lower quality ore and accepts the position that an 8 per cent cut-off grade may be appropriate for a time during the start-up of the mine. After some period, when the operation has progressed further into the mine, allowing the material in the first bench to be assessed, there may be an opportunity to reduce the cut-off grade. Therefore, the Board is not prepared to approve the entire first bench with a cut-off grade of 8 per cent at this time. The Board will approve a general cut-off grade of 7 per cent and Syncrude may apply for changes to the cut-off grade in the annual mine plan.

Similarly, the Board is not prepared to approve Syncrude's applied-for thickness criteria of 5 m at this time. A 3 m thickness should result in less waste feed to the extraction process, consequently less fine tails volume. The Board recognizes that shovel productivity may be reduced but the savings in waste processing should more than compensate for any reduction in productivity. Unless Syncrude can provide further information to convince the Board otherwise,

the Board will require a thickness criteria of 3 m.

The Board agrees that the use of the TV/NRB ratio is an improvement over the TV/BIP ratio because it incorporates extraction recovery information. The approximate pit limits defined by the maximum 2.2 TV/NRB ratio are sufficient for preliminary planning purposes. With the exception of the out-of-pit tailings area and the south end of the Fort Hills disposal site, the pit limits shown by Syncrude generally conform to the Board's interpretation and are considered sufficient for preliminary planning purposes. Before opening the mine, Syncrude will be required to conduct an assessment of resource potential and final pit limits and ensure that the pit design will optimize resource recovery. The analysis of pit design will be required annually using updated technical and economic information.

6 EXTRACTION

6.1 Syncrude's Views

Oil sands would be mined by shovel, transported by truck and dumped into crushers. The ore would be mixed with water, chemicals and air in a cyclofeeder, and the conditioned slurry transported by high-density oil sands slurry pipeline (hydrotransport) to the extraction plant. Syncrude stated that one of the benefits of hydrotransport was that it would condition the ore in the pipeline and would eliminate the need for plant feed conveyers, tumbler feed conveyers, and tumblers. It stated that a minimum 5 km pipeline would be required to condition the ore and transport it to the new extraction process plant. With this new technology, the optimum economic configuration would be to have the plant site close to the tailings area rather than the mine.

Syncrude stated that it had developed a new extraction process called LEEP and that this process would use 60 per cent less energy than the present Clark Hot Water Process (CHWE). This reduction in energy consumption would be achieved by lowering the process temperature to 25°C and using hot water from the Mildred Lake facility for make-up. The reduction in energy consumption would allow Syncrude to double production from extraction with no increase in energy use or carbon dioxide (CO₂) emissions. The LEEP process would use kerosene, methyl-isobutyl-carbinol (MIBC) and air as flotation aids, instead of caustic as presently used with the CHWE process at the Mildred Lake facility. The fine tails production would be expected to be the same as or less than the present CHWE process, since the non-caustic LEEP would be expected to have less fines dispersion and a faster initial consolidation rate in the tailings area.

Syncrude noted that a lower bitumen recovery requirement should be considered for LEEP due to the lower energy consumption. The reduced energy requirement would be equivalent to an energy savings of 1.7 per cent bitumen recovery when compared to CHWE. Syncrude believed the bitumen recovery requirement should reflect energy savings equivalent, but did agree to achieve the bitumen recovery requirement of 94 per cent after 3 or 4 years of operation. It noted that LEEP is a new technology that requires time to further develop and fine tune, prior to defining its performance. Syncrude had indicated that additional testing was required to confirm that composite tails (CT) release water would not have an effect on extraction performance.

Further testing was also required on the effect of lower grade, and blended ores on bitumen recovery. Syncrude suggested that the requirement of 94 per cent bitumen recovery may not be the appropriate operating criteria to monitor performance for an extraction process.

Syncrude stated that it had evaluated modifications to the LEEP such as thickeners with immediate water recycle, but was not prepared to increase the complexity of the new process and further increase the risk of implementing new technology. It stated it would continue to evaluate enhancements to the LEEP once commercial operation had been proven.

Syncrude stated that a portion of the process water for the extraction plant would come from the recycle water at the Mildred Lake settling basin. It indicated that basal aquifer water would be used as make-up water along with CT release water. Syncrude noted it was not applying to release CT water into the environment and that if the basal aquifer or CT release water quality was not acceptable, it would install a water treatment facility.

The froth from the Aurora extraction plant would be transported by pipeline, using a natural froth lubricity method, to the Mildred Lake facility for clean up to produce bitumen. Syncrude noted that although the natural froth lubricity method was still under development, it did not envisage a problem with emulsification or froth quality that would require additional treating of this froth. If pipelined froth was detrimental to the froth clean-up process causing excess losses of bitumen and naphtha above the approved levels at the Mildred Lake facility, Syncrude would apply to the Board for alternative froth clean-up facilities. If another method were to be used to transport the froth to the Mildred Lake facility, or if froth clean-up was required on the Aurora site, Syncrude would make the appropriate application.

6.2 Views of the Board

The Board encourages the development of new technology that reduces environmental impacts, improves tailings management, maintains or improves bitumen recovery, and has flexibility to process a wide variety of ores. The time required to test new approaches such as LEEP in a commercial configuration and to fine tune the process is a legitimate part of the investment. Therefore, the Board is prepared to reduce the requirements on bitumen recovery for train one on Aurora North for the first three years of operation.

Syncrude has committed to achieve an extraction recovery of 94 per cent of processed bitumen from the Aurora mine after the first 3 to 4 years of operation. The evidence presently before the Board indicates recovery may be significantly lower with this process. The Board accepts Syncrude's commitment to take necessary steps in the extraction plant to achieve the 94 per cent recovery, even if that requires modifications to the extraction process. Any such change should be reported to the Board and could require further review.

The Board notes that Syncrude anticipates testing to determine what effect using caustic process water from the Mildred Lake facility, water from the basal aquifer, and CT release water will have on the LEEP performance, and what effect processing lower grade and blended ores will have on bitumen recovery and froth quality. As this is new technology, Syncrude's annual report to the Board should contain a summary of testing on LEEP to confirm performance.

Test results on natural froth lubricity should be contained in the annual report to the Board.

The Board recognizes that the use of a low temperature, non-caustic process may have benefits such as faster consolidation of fine tails to mature fine tailings (MFT) and possibly lower production of fine tails. There could also be a benefit to using a thickener to densify fine tails and recycle water in the plant. The Board believes this process has the potential to reduce the volume for thin fine tails storage, reduce energy consumption from immediate water recycling, improve recycle water quality, and reduce the overall volume of water required on site. The Board recognizes Syncrude's reluctance to increase the already significant risks associated with LEEP and accepts Syncrude's commitment to continue evaluating the potential to use a thickener once commercial operation is established and report its findings to the Board.

While acknowledging Syncrude's position that 94 per cent recovery may not be appropriate for a new process, the Board notes that there is an existing initiative regarding the use of operating criteria in the oil sands industry that is expected to assess alternate performance measures. The Board and AEP believe there is a significant opportunity to streamline the regulatory process through this initiative and will be encouraging operators to participate in defining appropriate criteria. Until such time as alternative measures of performance are developed and adopted, the company will be expected to meet the commitments set out in its application.

7 TAILINGS

7.1. Syncrude's Views

Syncrude proposed use of out-of-pit conventional tailings storage management in the initial years of operation to enable opening the east mine pit. The tailings, which consist of sand, process water and fine tailings with small amounts of bitumen, would be placed in an external tailings area. The coarse sand would be used to build dykes, the fine tails would be allowed to consolidate in the tailings area to produce MFT, and the water would be recycled back into the extraction process. As sufficient space became available in the mined-out pit, MFT would be mixed with cyclone underflow tails, gypsum added, and the non-segregating mix which is called CT would be pumped into the mined-out pit. The resulting mixture would consolidate and release water to be recycled in the extraction process. A firm consolidated deposit would be created within 10 to 50 years and allow most of the MFT to be reclaimed to a solid landscape.

Syncrude had assessed a number of alternatives for tailings management of coarse sand and MFT. The alternatives considered were water-capped MFT lakes, spiked tails, composite tails, and solid tails. There were a number of methods to produce solid tailings such as flocculation and filtration, flocculation and thickening, and coagulation and agglomeration of the fine tails (paste technology). Syncrude stated that other solid tailings would be technically feasible but had higher capital cost, due to the high throughput and higher energy inputs, and higher operating costs for chemical and dry material handling. Syncrude indicated that other solid tails management was still in the preliminary stages of development and therefore would create a higher risk for the Aurora project. Syncrude has chosen CT as the preferable option for tailings management, and if CT does not work, Syncrude indicated that water-capping of fine tails would be the alternative.

Syncrude stated that CT was still in the demonstration stage and further testing was required. Syncrude indicated the following as outstanding issues with CT:

- \$ management of the quality and quantity of large volumes of water released,
- \$ development of a reclamation technique to account for ongoing subsidence, and
- \$ the long-term impact of CT tailings on water systems and surface vegetation.

7.2 Views of the Interveners

The Pembina Institute for Appropriate Development (Pembina) stated it was concerned with the long-term stability and suitability of CT reclaimed lands and expected the environmental acceptability of the CT process to be addressed in Alberta Environmental Protection's (AEP) operating conditions for the Aurora mine.

AEP favoured the implementation of CT to address the tailings issues in oil sands operations, however, it noted that there were uncertainties about CT reclamation timing and release water quality. It stated that it would condition its approvals to further demonstrate CT performance, confirm CT reclamation characteristics, and further characterize CT release water. AEP also stated it would require Syncrude to receive AEP approval to discharge any CT release water, to report release water volumes annually, and to apply for an amendment to AEP's approvals if CT did not perform as expected and an alternative tailings management strategy was required.

AEP believed further information on end-pit lake characteristics and associated wildlife and waterfowl habitat was required to demonstrate that the lakes would be a self-sustaining ecosystem. A water resource impact analysis should be carried out based on the scenario that end-pit lakes cannot be filled with water from the Athabasca River but from the surrounding watersheds. Syncrude should also evaluate alternatives to the end-pit lakes and their size in the event water was not available to fill the lakes. AEP believed that Syncrude should evaluate the cumulative effects that may arise from other end-pit lakes that may be created as part of reclamation plans by other oil sands developers in the region.

7.3 Views of the Board

The technology associated with CT is still being developed and full-scale trials are required to refine the technique. While the data presented suggest a dry trafficable landscape may be achievable, various parameters need to be better understood to assess the feasibility of the approach. These include the clay-to-sand ratio, the clay-to-water ratio, and the concentration of gypsum, which affect the consolidation rate and timing of reclamation.

The Board is uncertain that CT is the best tailings management option for a green field site. While other solid tailings techniques are also being assessed, some exhibit significant benefits such as a smaller disturbed area, faster reclamation, reduced energy consumption due to immediate water recycling, reduced water requirements, and little water release that requires management. Moreover, CT requires a large out-of-pit tailings storage area to produce MFT and store sand.

Syncrude has identified back-up approaches to tailings management: conventional tailings storage, and MFT in-pit with water-capped lakes. The Board understands Syncrude's test of a water-capped lake at the Mildred Lake facility is still in the demonstration stage. If Syncrude had to fall back on conventional storage, considerably more area would be required due to the larger footprint, potentially sterilizing additional ore. The Board accepts that CT will be the tailings management strategy for the Aurora Mine but, should changes be required, further review by the Board may be necessary.

Under Informational Letter IL 96-7, the Board shares responsibility with AEP for reclamation planning and final landscape objectives. The Board and AEP will jointly assess CT technology, review CT demonstration and performance, and evaluate reclamation practices.

8 EMISSIONS

8.1 CO₂ Emissions

8.1.1 Syncrude's views

Syncrude indicated it would lower CO₂ emissions by 32 per cent per barrel of SCO through the implementation of the LEEP. The Aurora Mine project would increase total emissions up to 8 per cent due to the increase in the total volumes of bitumen produced.

Syncrude's continued investment in improved technology for increased energy efficiency and decreased emissions would be \$1 billion between 1996 and 2006. Syncrude believed that this level of commitment together with its membership in Canada's Voluntary Challenge and Registry for Industry, aimed at reducing greenhouse gases, demonstrates the company is actively participating in a regional program to limit air emissions.

8.1.2 Views of the Interveners

Pembina was concerned with the Aurora Mine contribution of CO₂ emissions over and above existing approved levels as stated in the 1993 Mildred Lake Application and the inability of Canada to fulfil its international commitment to stabilize and reduce greenhouse gas emissions.

Pembina believed that Syncrude should re-examine best available technologies and best industry practices to ensure these have been evaluated in terms of reducing emissions levels to the lowest economic and technical levels. Pembina also believed that the Board should evaluate the Aurora Mine project in terms of its contribution to the cumulative emissions impact in the region.

Pembina proposed a formal review and negotiation process convened by AEP that would include Syncrude, Board staff, Pembina, and other appropriate affected parties. The focus would be to re-examine and assess all predicted air emissions from the Aurora project; establish acceptable emission levels and limits, and examine the regional airshed loadings and limits (both current and predicted); to determine the level of, and need for, an emission reduction initiative.

Pembina believed that after this formal review process and the determination of appropriate emission levels, these should be incorporated into the EPEA approvals as emission reduction targets for Syncrude. Pembina did not intend to have these conditions apply to any other operator in the Fort McMurray area.

Toxics Watch Society (Toxics Watch) proposed no net increase in greenhouse gas emissions from the Aurora Mine Project. Toxics Watch recognized Syncrude's efforts to reduce CO₂ emissions by improving energy efficiencies but was discouraged by the projected overall increase in CO₂ emissions. Consequently, Toxics Watch believed that support of this project further undermines Canada's commitments to greenhouse gas stabilization and reduction.

Department of the Environment (Environment Canada) recognized that Syncrude would reduce the energy requirement to produce a barrel of SCO. However, total CO₂ emissions were predicted to increase substantially with the Aurora project (by about 55 per cent over 1995 figures for the Aurora Mine with two trains to about 71 per cent for Aurora with four trains operating). This increase was of concern to Environment Canada in light of Canada's international commitments to stabilizing greenhouse gas emissions and, in the near future, to further emissions reductions. In its review, the climate change challenge ultimately requires a reduction in total emissions, not only a reduction on a per unit of output basis. Environment Canada recommended that Syncrude adopt the best available technologies for reducing greenhouse gas emissions.

AEP recognizes that CO₂ emissions that occur due to fuel combustion are of concern in relation to global climate change. However, it noted that Syncrude had undertaken to adopt positive design features to minimize CO₂ emissions from the Aurora project and had filed a Climate Change Voluntary Challenge Program Action Plan with Environment Canada. AEP understood that Syncrude had made technological improvements to decrease CO₂ emissions per unit of production of bitumen between 1990 and 1995 and further decreases were expected by Syncrude over the next five years. AEP realized that total CO₂ emissions would increase due to the Aurora

Mine but Syncrude's efforts to minimize CO₂ emissions was a positive sign.

AEP stated that ongoing policy and scientific initiatives at the provincial, national, and international levels may have relevance in establishing how greenhouse gas emissions would be handled in the future.

8.2 Oxides of Nitrogen (NO_x) Emissions

8.2.1 Syncrude's Views

Syncrude noted that the Aurora Mine project would be a contributor of NO_x emissions to the region and, at some point in the future, loadings could reach potentially acute levels. However, Syncrude would be taking steps to reduce NO_x emissions produced by fixed thermal power generators by installing low NO_x burners. Technological improvements underway at the Mildred Lake facility and the proposed replacement of mining activities there with the Aurora Mine production trains would result in lower than expected NO_x emission rates. However, Syncrude could not provide updated NO_x emission predictions for the Mildred Lake facility at this time.

8.2.2 Views of the Interveners

Pembina stated that NO_x emissions were exceedingly important due to their role in multiple pathways of environmental stressors. Pembina believed that existing levels of NO_x emissions in the Fort McMurray region were too high already and adverse environmental impacts due in part to NO_x have already been detected in the region. Pembina believed that Syncrude should commit the Aurora Mine project to maintain NO_x emissions at or below the total predicted 48.5 tonnes per day (T/d) indicated in the 1993 Mildred Lake Application.

Pembina believed that the Board should require Syncrude to examine and report on options related to minimizing NO_x emissions through the use of best available technology and best industry practices. Pembina also believed that the Board should establish a formal process to determine NO_x emission reduction targets that would be set out in the EPEA approval. Pembina supported Environment Canada's recommendation that all future oil sands developments should be assessed on a regional cumulative effects basis.

Toxics Watch believed that Syncrude should be directed to establish an aggressive NO_x reduction program.

Environment Canada recognized that Syncrude's NO_x emissions were anticipated to increase from 5.6 T/d to 22.8 T/d from stationary and mobile equipment with the four Aurora trains operating. These estimates were recognized as being the best estimates given the state of knowledge about mobile equipment sources at this time. Environment Canada recommended that future monitoring be required by Syncrude and the other oil sands stakeholders to ensure the accuracy of these estimates. Environment Canada also encouraged Syncrude to pursue the opportunities identified in the EIA to significantly reduce NO_x emissions.

AEP noted that the maximum predicted hourly and daily values for NO₂ emissions were below

AEP's Ambient Air Quality Guidelines, however, the maximum annual value was above the ambient NO_x guidelines at the rim of the mine. AEP recommended that Syncrude should join other oil sands developers in the area to share information aimed at reducing emissions from mobile sources and noted that progress reports on this initiative may be required by AEP.

8.3 Total Hydrocarbons (THC) and Volatile Organic Compounds (VOC)

8.3.1 Syncrude's Views

Syncrude stated that THC/VOC emissions would be lower, on a per unit of production basis, than emissions from existing oil sands mining operations based on the use of new technologies, in particular, the LEEP process. Syncrude, however, could not quantify THC/VOC emissions reductions from the new technologies.

8.3.2 Views of the Interveners

Pembina stated that THC/VOC emissions were of concern due to the anticipated increase in levels with operation of the Aurora Mine. Establishing THC/VOC emission levels at the start of mine operations was critical for Syncrude to commit to a THC/VOC emission reduction objective. Pembina supported the establishment of emissions targets in the EPEA approval as a means of monitoring performance and reducing emissions.

Recognizing that VOC emissions are a part of ground-level ozone pre-cursor gases, Environment Canada recommended future monitoring of the ambient environment for VOCs, including the identification of different VOC species.

AEP stated that VOC emissions from the proposed Aurora Mine would occur over a large area. AEP would review Syncrude's monitoring of the cyclofeeder and bitumen extraction process vents to confirm that emission controls on this equipment were not warranted and noted that these readings and information on individual VOC composition and quantity and environmental effects may be a condition to the EPEA approval.

8.4 Ozone

8.4.1 Syncrude's Views

Syncrude stated it was committed to implementing an ozone monitoring program consistent with the design for ambient air quality monitoring adopted by the Southern Wood Buffalo Air Management Zone (SWBZ) of the Clean Air Strategic Alliance (CASA). Syncrude would work to understand the air contaminant chemistry surrounding ground-level ozone precursors that were products of its oil sands mine operations.

8.4.2 Views of the Interveners

Pembina believed that emissions of ground-level ozone precursors (i.e., VOC and NO_x) have increased in the region over time and NO_x was predicted to increase in the future, while future levels of VOC emissions were, at present, uncertain and could result in impacts on human health and vegetation in the region. Pembina supported Syncrude's commitments to ozone monitoring as part of the SWBZ of CASA. Syncrude's commitments to control and reduce both NO_x and VOC emissions and to further refine modelling of the air contaminant chemistry surrounding its operations in the region were also supported by Pembina. Pembina recommended that these commitments form the basis for regulatory review of the Aurora Mine and be reflected in regulatory decisions.

Toxics Watch believed that a regional industry forum should be established under the auspices of AEP to implement an aggressive ground-level ozone compliance program.

Syncrude had indicated that the Aurora Mine operation is predicted to cause exceedences of 9 parts per billion (ppb) above the ground-level ozone National Ambient Air Quality Objective for up to 16 hours per year. Environment Canada recommended that Syncrude undertake monitoring and modelling of ozone and its precursor species to proactively manage for reductions in Canada-wide standards for ground-level ozone.

AEP, as a stakeholder in the Regional Air Quality Coordinating Committee (RAQCC), supports Syncrude's enhanced efforts to measure and monitor ozone levels in the region. AEP believed that additional modelling and monitoring was needed to more precisely and accurately establish the contribution of regional NO_x and VOC emissions to ambient ground-level ozone.

8.5 Acidifying Emissions

8.5.1 Syncrude's Views

Syncrude expected sulphur dioxide (SO₂) emissions from the Aurora Mine would mostly be from the mobile equipment and, with all four trains in production, they would be less than 0.04 per cent of the total regional SO₂ emissions in 2001. It therefore did not consider SO₂ emissions to be significant.

8.5.2 Views of the Interveners

Pembina supported Syncrude's involvement in the CASA endorsed method of estimating sulphate deposition fluxes and critical loads for the SWBZ. Together with Syncrude's commitment to reduction and control of NO_x emissions, these initiatives should form the basis for the regulatory review and regulatory decisions on acidifying emissions from the Aurora Mine.

Environment Canada stated that Syncrude had not determined the contribution of NO_x to the atmospheric acid load in the Local Study Area (LSA). This was an important factor because the potential exists for exceedences of the critical acid load for soils and water in the oil sands region.

Environment Canada recommended that monitoring systems include measures to determine NO_x species as well as SO₂/SO₄ levels. Stakeholders, including Syncrude, should cooperatively develop environmental indicators and define the level of protection desired for this area in order to determine regional emission goals. Environment Canada suggested that the CASA mechanism should be used to achieve this initiative.

AEP stated that it is developing guidelines for critical and target loading for acidifying emissions. Further follow-up with long-term monitoring of sensitive lakes and other environmental receptors through forums such as RAQCC and CASA should be undertaken. The results of such monitoring programs should be used to assess any further mitigation necessary for acidifying emissions.

8.6 Board's Views

The Aurora Mine development will result in an increase in Syncrude's total air emissions. Reduced energy input with the LEEP process will reduce emissions of CO₂ per unit of production. However, increases in the total bitumen produced at Syncrude's Fort McMurray facilities will cause an overall increase in CO₂ emissions. The Board believes that Syncrude's participation in Canada's Climate Change Voluntary Challenge and Registry Program displays a commitment to pursue efforts to adopt the best available technologies for managing and reducing greenhouse gas emissions.

Emissions of SO₂, NO_x, VOCs, and ozone will increase with the Aurora Mine project. However, the Board recognizes that Syncrude must provide necessary emission monitoring and modelling information to satisfy AEP's regulatory requirements. Syncrude's participation in regional programs like CASA's SO₂ Management Team, Environmental Effects Monitoring Program, and ambient air quality monitoring in the SWBZ will promote the discussion of programs to monitor air emission levels and allow stakeholders to exchange information on methods to reduce emissions. The Board supports these regional mechanisms to exchange information, address air issues, and establish air monitoring and air quality objectives.

The Board concludes that although the project will increase air emissions in the region, the level of emissions can be addressed under the regulatory framework of AEP and the regional mechanism operating in the SWBZ. The emissions monitoring and modelling exercises to be undertaken by Syncrude, as appropriate under AEP's legislation, and as a voluntary member of the SWBZ air quality initiatives committees, will identify emission levels and assist in the creation of acceptable air quality objectives for the region. As more data and greater understanding on the cumulative air emission levels for the region materializes, mitigative measures may be required.

9 OTHER ENVIRONMENTAL ISSUES

9.1 Water

9.1.1 Syncrude's Views

Syncrude believed that studies done for the EIA show no future effect of the Aurora Mine process water on vegetation, wildlife, and human health. However, research and monitoring of the results of CT technology will increase its confidence in the use of CT process water in the final reclamation plan.

During the life of the proposed mine operation, Syncrude believed there would be a moderate, long-term, local, and reversible impact on fisheries. At the post-operation phase, Syncrude believed that there would be a high positive impact on fisheries that would be long term for the local area.

9.1.2 Views of the Interveners

Environment Canada recommended that additional data be collected to determine the impact of polycyclic aromatic hydrocarbons on rivers and aquatic life.

Department of Fisheries and Oceans (DFO) was concerned that there was no cumulative effects assessment on the Muskeg and Athabasca River basins with regards to water quality, quantity of water released, and incremental impacts to fish habitat. DFO stated that cumulative impacts to the fisheries resources would not be completely addressed by a cooperative industry development forum, and that the Aurora Mine project, along with all subsequent oil sands developments, should be reviewed in light of this fact.

AEP recommended a monitoring program be developed to verify that fish tainting was not occurring as a result of the Aurora Mine. If tainting was detected, a plan to mitigate or reduce the effects of tainting should be in place. AEP would require Syncrude to provide annual reports on the progress of tainting studies.

AEP stated it may require Syncrude to conduct monitoring during the operating life of the mine to forecast potential adverse impacts as a result of mine de-watering, seepage of water from the various activities of the mine, and to implement mitigative measures as required. AEP stated it may require Syncrude to further document and evaluate the water quality resulting from the de-watering of muskeg.

9.2 Wildlife

9.2.1 Syncrude's Views

Syncrude believed that changes in wildlife populations were reversible in time in the reclaimed landscape. However, it understood that some species would take a very long post-operation period to re-establish.

9.2.2 Views of the Interveners

Environment Canada recognized Syncrude's past attention to reclamation research, development, and implementation as demonstrated by its Bison Management Program. Environment Canada stated that Syncrude's past performance in this area gives Canada confidence that the Aurora Mine sites can be returned to naturally productive and viable ecosystems.

AEP considered moose the most important wildlife species within the LSA from an economic and social viewpoint. The Fort McMurray-Athabasca Oil Sands Subregional Integrated Resource Management Plan (IRP) for the area indicated that, where applicable, the restoration of moose habitat should be the objective of reclaiming mined oil sands areas. AEP did not expect the long-term moose population to return to the predisturbed level after reclamation. However, AEP believed there exists the potential to replace or even increase moose habitat with appropriate reclamation planning by Syncrude.

9.3 Reclamation

9.3.1 Syncrude's Views

Syncrude stated that it adopted a progressive reclamation strategy as part of the mine design criteria to shorten the time span that any particular area was in a disturbed state. Syncrude believed that the final reclaimed landscape would be stabilized and equal in productivity even if it was a different community, emphasizing aquatic habitat and forests, instead of wetlands.

Syncrude stated that 80 per cent of the Aurora Mine would be replaced with similar terrestrial vegetation communities upon completion of reclamation.

9.3.2 Views of the Interveners

Pembina was satisfied with Syncrude's commitment to active participation in the Oil Sands Mining End Land-Use Committee.

Toxics Watch believed that Syncrude should be required to strive for improved reclamation technology during the life of its project to ensure that the final reclaimed land capability was equivalent to the pre-disturbance land use.

AEP believed that Syncrude should provide a reclamation plan indicating that the landscape would be re-established as a forest ecosystem consistent with the Central Mixed Wood Subregion. The reclaimed forest should have a carrying capacity for non-commercial and commercial forests and support wildlife in keeping with historical uses. The established vegetative communities should be monitored for continued biodiversity as part of Syncrude's ongoing reclamation monitoring program.

9.4 Views of the Board on Other Environmental Issues

The Board accepts, with some qualifications, Syncrude's statement that fisheries habitat will be increased after the reclamation of the Aurora Mine is complete. Results from Syncrude's CT technology field development program will show whether the end-pit lake design and water quality will support aquatic habitat and viable fish populations. The Board recognizes Syncrude's endeavours to lessen the impact of mine development on fisheries habitat through a staged process of surface water drainage and diversion. However, alternate reclamation strategies will need to be developed to restore aquatic resources and fisheries if Syncrude's field research proves that initial plans will not achieve reclamation targets. Syncrude would need to develop appropriate mitigative measures to minimize impacts if the results of the CT field program indicate seepage from CT deposits and tailings areas could enter the local surface and groundwater systems.

The Board would expect Syncrude to take the appropriate steps as indicated by water quality monitoring to minimize the impacts on fisheries and aquatic habitat.

A cooperative approach by all stakeholders in the region is required to monitor the losses and changes in wildlife habitat and the subsequent adjustment of wildlife populations to the new environment.

The Board acknowledges Syncrude's role in the Oil Sands Mining End Land-Use Committee. Syncrude's progressive reclamation of the mine site will shorten the time required to re-establish the terrestrial and aquatic habitats disturbed by the mining operations. While recognizing the potential long-term impact on the region, the Board also recognizes Syncrude's commitment to reclaim the landscape to equivalent capability.

10 SOCIO-ECONOMIC EFFECTS

10.1 Syncrude's Views

Syncrude stated that the Aurora Mine project would result in a number of socio-economic changes in the area, but there would be potential to mitigate potential negative effects. Between the years 1998 and 2001, Syncrude would develop one of the four trains at a cost of \$510 million, and subsequent addition of trains would bring cumulative mine development costs to \$1.8 billion. Syncrude stated that the Aurora mine direct income effects of the construction phase (1996- 2001) would be \$263 million to Alberta and \$321 million to Alberta and Canada. Syncrude determined that construction of the first train would require 2.3 million hours of construction labour between 1998 and 2001. The construction workforce would range from an average of about 100 in the early stages to a peak of 500 workers near the end of 2000. Syncrude believed that the construction workers' work camps would reduce the potential impacts on the services and social infrastructure in the region. The Aurora Mine would add no net new long-term operational jobs to the region. Syncrude stated it currently employs 3600 full time and 1000 to 1100 contract workers.

Syncrude completed a socio-economic analysis assuming all the announced projects went

forward in the given timeframe, including Suncor Inc. (Suncor) Steepbank, Solv-Ex Corporation (Solv-Ex), Shell, and Mobil Oil Canada Properties (Mobil). Syncrude believed that the three new projects, Syncrude Aurora, Shell Lease 13, and Mobil Kearl, would sustain the regional construction work force at a higher level and for a longer period of time than originally anticipated in its application. Even though the Aurora project would not be expected to impact the long-term population of Fort McMurray significantly, the combined projects could increase the population of Fort McMurray by 15 to 17 per cent, increasing the demand for community services. Syncrude predicted a long-term stable increase in the demand for housing due to new operational employment that would be created. Given the extended period that the construction workforce would be needed, Syncrude expected more of the people to choose to stay in Fort McMurray rather than spend extended periods of time in construction camps. Syncrude noted that the municipal infrastructure would be capable of handling anticipated increases in demand due to increased population.

Syncrude stated that the Aurora Mine would add some additional demands on urban and regional services and infrastructure but the demands can be readily accommodated without adverse socio-economic impact. The project would extend the longevity and increase the efficiency of Syncrude's oil sands operation which forms a critically large part of the regional economy. Syncrude believed that the Aurora mine would have a positive impact on the fiscal health of the Municipality of Wood Buffalo because it increases the assessment base without adding significant operational costs. Syncrude stated that the project would be desirable to Alberta and Canada in economic terms.

10.2 Views of the Board

Some social impact is an inevitable consequence of further development. While acknowledging that fact, the Board believes the impacts can be managed within acceptable levels. Moreover, there are significant economic benefits to the region and province associated with continued development of the existing operation and the logical extension of that operation to the Aurora Mine. The Municipality of Wood Buffalo supported the project and the Board is satisfied that there is, or can be, sufficient infrastructure provided in the region to handle the development.

11 COMMUNICATION AND PUBLIC CONSULTATION

11.1 Syncrude's Views

Syncrude stated that it had conducted extensive public consultation since the formal announcement of the Aurora mine on 12 June 1995. It indicated that it was available to discuss the project with any interested party. Syncrude stated that it proactively interacted with interested parties in the Regional Municipality of Wood Buffalo area, provided an extra level of consultation with Fort McKay in recognition of its proximity to both existing and future facilities, and maintained open communication with other native communities in the Wood Buffalo Region. It stated that it ensured that regional stakeholders were well informed. After the filing of the application, Syncrude stated it maintained its consultation processes with the general public in the Wood Buffalo Region, the Regional Municipality of Wood Buffalo, the

Fort McKay First Nation, and Fort Chipewyan. Once interventions were filed, Syncrude tried to resolve the issues identified, through a consultative process.

11.2 Views of the Interveners

Initially, a number of interveners had concerns about Syncrude's consultation process. They indicated that the consultation process was ineffective or that Syncrude had not consulted with them prior to the filing of the application and that they had a number of concerns regarding the application. As of 23 June 1997, Syncrude had addressed most of the interveners' concerns. Shell requested that the Syncrude approval be conditioned to ensure the impacts of the Aurora project on Lease 13 were minimized. Pembina submitted a joint submission with Syncrude identifying areas of agreement and outstanding concerns and indicating conditions that could be attached to the AEP or EUB approval to address these issues. A number of interveners had concerns related to the regional development, which they believed the Board could address.

11.3 Views of the Board

The Board acknowledges that Syncrude engaged in comprehensive consultation, prior to filing the application, with the general public in the Wood Buffalo Region, the Regional Municipality of Wood Buffalo, and the Fort McKay and Fort Chipewyan First Nations and Metis Settlements. This consultative process appears to have been very effective. However, Syncrude was not as timely or thorough in consulting with other industrial interests in the region. That led to numerous objections to the Aurora project in the initial stages of the Board's process. It was only then that the applicant embarked on consultation and negotiation with these other industrial interests. Syncrude was successful in reaching agreements with everyone; however, the agreements resulted in a series of amendments to the application, the most significant being relocation of all Syncrude facilities off Lease 13. If Syncrude had begun this consultation with other firms earlier, fewer amendments to the application would have been required, and the time to process the application would have been significantly reduced.

12 THE TIMING OF AURORA SOUTH

12.1 Syncrude's Views

Syncrude stated that the Aurora South Mine was an integral component of Syncrude's strategy for future development. It was of fundamental importance to Syncrude to secure approval for both Aurora North and South, so long-term planning and investment discussions could proceed with confidence and necessary financial and human resources commitments could be made. Syncrude stated that it originally planned to have the Aurora South Mine operating by 2008, but that this schedule may be accelerated. Therefore, approval of Aurora South was critical considering that the regulatory process takes 3 years and 3 additional years are required for detailed design and construction.

Syncrude stated that it would use the same mining and economic criteria for Aurora South as for Aurora North. Since the mines were geologically similar, extraction and mining methods would be identical and there would be no fundamental change in material handling costs between the

areas. Syncrude stated that less detail on environmental issues was included in the Aurora South portion of the application because it was outside the 10-year EPEA approval period. Syncrude believed the most important environmental consideration in approval of mine disturbance was the quality of post reclamation and closure landscape. This area was emphasized with respect to the Aurora South Mine and covered in similar depth for all Aurora mine areas.

In Syncrude's 18 April 1997 submission, it applied to change the location of the Aurora South tailings area, plant site, and utility corridor. Syncrude moved the tailings area and plant site from Lease 13 to the Aurora South lease. Syncrude stated there were no significant differences between the two tailing areas. However, it also said there could be 69 million barrels of recoverable bitumen under the proposed Aurora South tailings area, whereas, the original tailings area location had no significant resource underlying it. Also, the area footprint of the new tailings location was significantly larger than that of the original proposal.

Syncrude recognized there may be four areas on the Aurora South lease where resource sterilization could occur. It investigated the resource under the tailings area, plant site, southwest mine area, and south disposal area. Of the four areas, only the southwest mine area was thought to have a potentially mineable resource. Syncrude stated that the southwest mine area would not be affected by the present mine area and that it would evaluate the resource potential in the detailed planning stage.

Syncrude originally placed the south overburden disposal site at the north end of the new tailings area. It stated that a detailed design would be required for this disposal site because the disposal site was underlain by Clearwater clay and required extensive investigation to ensure a stable design. In moving the tailings area onto this area, Syncrude stated that the experience gained from the Mildred Lake facility provided sufficient confidence for construction on the Clearwater formation for the tailings area. Syncrude noted its experience with the Mildred Lake settling basin and southwest storage site.

Syncrude stated that coordination of development with Shell has been focusing on Aurora North and the west portion of Lease 13 because commencement of its project would start at the Aurora North mine. Syncrude suggested that the Board condition its approval so that development activity on Aurora South does not begin until such time as the application of Shell and Mobil have been filed and considered by the Board. If it appeared that modifications to the Aurora South component of Syncrude's approval were required, the Board would be free to adjudicate on them. Any conditions would also have to contain a sunset clause so that, in the event that either the Shell or Mobil projects did not proceed, Syncrude would be in a position to proceed with the development of the Aurora South Mine on a timely basis.

12.2 Views of the Intervener

Toxics Watch believed that the Board should require a separate application for consideration of the Aurora South Mine. Toxics Watch believed there was a lack of detailed information on Aurora South in the application and was concerned about the total land area under disturbance at any one time and the lack of analysis of the cumulative impacts from a number of developments proposed for the region.

12.3 Views of the Board

The Board accepts that Aurora North and South have similar macro geological features and that it may be satisfactory to use the same preliminary mining criteria at this stage in the project. The Board is satisfied with the preliminary pit limits proposed by Syncrude. However, the technology, operating costs, and revenue streams may differ for Aurora South if start-up is not for 10 years. LEEP, natural froth lubricity and the proposed tailings management, CT, are new technologies and further development to demonstrate commercial feasibility is required. The Board will request confirmation from Syncrude, closer to the time of implementation, that its technology is still appropriate.

With respect to the movement of the tailings area from its original location on Lease 13 to an area on the Aurora South lease that is sited on Clearwater clay, the Board notes that Syncrude has had to redesign some of the structure at the Mildred Lake facility due to geotechnical concerns related to the Clearwater formation. Syncrude's comparison of the southwest sand storage area to the Aurora South tailings area is not necessarily appropriate since the southwest sand storage area is not a fluid retaining structure, whereas the Aurora South tailings area may contain fluid. Therefore, the designs may vary. Should the disposal area design change, as often occurs when using the observational approach to design, the result could be a significantly larger footprint. The Board believes the initial location of the tailings area had a better foundation and smaller footprint, with no significant resource sterilization. The new location requires a much larger footprint, creates geotechnical concerns, and could sterilize a significant potentially mineable resource. Therefore, the Board is not prepared to approve the location of the Aurora South tailings area at this time.

The Board notes that plant site location is very dependent on tailings area location and that the utility corridor is dependent on plant location. Since the Board cannot accept the Aurora South tailings location without further evaluation of this proposed site and alternatives, including off-lease alternatives, it is unable to accept the plant site or utility corridor at this time. The Board believes there is significant opportunity for cooperative development, with respect to tailings areas, disposal sites, and infrastructure to minimize resource sterilization between the Aurora South and adjacent leaseholders.

The Board notes Syncrude's belief that an approval for Aurora South will facilitate long-term planning, and secure investment commitments, to allow for orderly development of the resource. It also notes that the interveners did not raise any specific concerns in relation to Aurora South. The Board is satisfied that the Aurora South lease contains a significant amount of ore and notes

that any concerns with the Aurora South application can be addressed through conditions in the Board's approval. If the project changes significantly the Board will assess the changes and determine whether a formal review is necessary.

13 REGIONAL DEVELOPMENT

13.1 Syncrude's Views

Syncrude submitted a regional development position paper on 28 May 1997 to assist the Board in its efforts to understand the approach that Syncrude was taking with respect to coordinating activities with adjacent leaseholders to ensure that conservation and environmental performance opportunities were considered, coordinated, and incorporated in their respective development plans. Syncrude stated that it has already entered into a cooperation agreement with Shell, Lease 13 holder, to enhance economic return and to mitigate any potentially adverse environmental, social, and cultural impacts of separate projects. Syncrude has provided additional environmental information on developments proposed by Syncrude, Shell, and Mobil.

Syncrude and Birch Mountain Resources Ltd. (Birch Mountain) have committed to a program of coordination of oil sands mining and metallic resource and exploration activities. Syncrude stated it has reinforced the role of existing consultative vehicles such as the RAQCC and the Oil Sands Mining End Land-Use Planning Committee.

Syncrude stated its intent to work with other developers, the Board, and AEP to ensure that coordination takes place in the region and to promote the public interest. The goal of cooperation between developers is commercially sensible development in the interest of sustaining Alberta's natural resources in an environmentally-acceptable way. Syncrude recognized that cooperative development could lead to efficient development of a large resource area, avoid unnecessary duplication of facilities, reduce environmental effects, and reduce total capital expenditures. Syncrude stressed that the oil sands industry needed competition to stimulate continuous improvement and that neither a monopoly nor a large number of small developments would be appropriate development.

Syncrude suggested areas to consider for cooperative development opportunities are:

- \$** lease boundaries,
- \$** interference of utility corridors with surface mining areas,
- \$** overburden and tailings areas,
- \$** utilities and infrastructure,
- \$** environmental management, and
- \$** forestry and surface mining.

Syncrude indicated that the industry was already working at the following areas of opportunity:

- \$ coordination of environmental assessment, monitoring, and planning,
- \$ promotion of oil sands research and technology development,
- \$ dissemination of oil sands technology and experience through commercial arrangements,
- \$ sharing of utilities and infrastructure,
- \$ coordination of project management,
- \$ sharing of mine plans and joint mine planning where mining or reclamation should be harmonized to ensure resource recovery and reclamation, and
- \$ consultation and cooperation in communicating with members of the public.

Syncrude believed that projects that were ready to proceed should be approved, but in the context of others' plans to the extent that they are known. Industry can work together but where situations arise where parties cannot resolve issues within the Board's mandate, the Board would be the arbiter of any dispute. One of the Board's roles is to ensure consistent regulatory treatment for all developers. This is particularly important in respect of conditions affecting project economics such as resource conservation criteria, rather than intervening in project-by-project economics. The Board should encourage proactive consultation with all stakeholders as part of the application process.

Syncrude believed that the Aurora Mine Project could proceed on a timely basis in a way that would maintain the investment momentum and also be compatible with orderly development in the region. Syncrude stated it requires approval of all the Aurora project so that it can justify its investment decision to expand its operations relying on all of the reserves that are covered by this application. Syncrude believed its project can be adjusted or modified to take into account the plans of other operators' projects as the details of the projects become available. Syncrude expected that its approval would be conditioned in such a way that its approval can be modified to take into account the future plans of other leaseholders in the area.

13.2 Views of the Interveners

Environment Canada recommended that the stakeholders in the oil sands region consider opportunities for collaborative or cooperative actions that might lead to further efficiencies and emission reductions. Environment Canada also recommended that all stakeholders within the mineable oil sands region should collectively identify suitable performance indicators and feedback mechanisms which would monitor progress on emission reductions, and observe changes in the ecosystem.

DFO had concerns over the overall impacts on fisheries resources in the Muskeg and Athabasca River basins as a result of the disclosure of other oil sands projects in the area. DFO recognized Syncrude's attempt to address the cooperative approach to oil sands development in the region in its 28 May 1997 submission. DFO encouraged and would participate in a regional forum of industry stakeholders to ensure that site-specific plans for the protection and mitigation of fish and fish habitat of individual tributaries were adequate.

AEP believed that oil sands mining activity was consistent with the IRP. The IRP provides

resource management policies for regional development of the oil sands through formal and informal public review and regulatory standards for performance, compliance, and enforcement.

Two regional committees, the Oil Sands Mining End Land-Use Committee and the RAQCC, provide opportunities to analyze regional effects of development. AEP believed that potential effects of NO_x emissions were being addressed in the regional context by the SWBZ monitoring program. This system includes ambient air quality, human health-related, and environmental monitoring components. Monitoring would include the analysis of soil, vegetation, and water to determine any effects of acid deposition. Ground-level ozone would be monitored at human health monitoring sites and ozone would be monitored at environmental sites in the future. The focus of this regional committee is to allow detection of changes in the surrounding environment resulting from regional industrial activities. This would include any direct effects of NO_x on vegetation, even though this issue is not well understood at present.

AEP stated that all environmental requirements would be addressed through EPEA approvals. A certain measure of uncertainty regarding potential impacts was acceptable with the nature and scale of this project. These uncertainties would be addressed under EPEA approval conditions through on and off-site monitoring requirements, detailed licenses, and reporting. Some conditions may be recommended to the Director of Land Reclamation for consideration.

13.3 Views of the Board

The Board acknowledges Syncrude's submission of 28 May 1997 on regional development. That submission identifies many issues that need to be addressed and suggests numerous benefits from enhanced cooperation in oil sands development. The Board is in broad agreement with the views expressed by Syncrude in that document. A major characteristic of the oil sands is that the mineable ore extends across lease boundaries and under rivers and lakes. On some leases, such as Syncrude's Aurora North, there is little space to place disposal sites, tailings areas, plants, and other facilities without sterilizing, or preventing economic recovery of mineable reserves. From the Board's viewpoint, the goal of regional development should be to look at the ore body as a whole and determine the best possible mine plan to ensure optimal recovery and protection of the environment.

There are numerous benefits to ensuring orderly development through a regional approach, as noted by Syncrude in its submission. The Board places considerable emphasis on the following benefits in concluding that a regional approach should be pursued:

- C such an approach could result in the recovery of over a billion barrels of oil, which is equivalent to Syncrude's production over the last 20 years, that might otherwise be lost,
- C an effective and efficient approach to environmental protection can be achieved at the least possible overall cost through a cooperative approach to defining and addressing issues,

- C additional profits to the companies and royalties to the Province could be realized through potential reductions in development costs, and
- C the efficiency of the application process for individual developments could be greatly enhanced by the adoption of a regional development approach that had the support of the various corporate interests in the region and other stakeholders.

The Board has a particular interest in the final benefit listed above, enhancing the efficiency of individual application reviews. The process of reviewing individual applications would be accelerated if there was more information on how cooperative effort might reduce resource losses, enhance environmental protection, and reduce costs. Lack of detail in this area hinders progress in assessing individual applications and has the potential to stall or unfairly delay one of the oil sands projects to deal with issues that could have been more efficiently addressed through a regional initiative. At the very least, application processing time is likely to be extended and uncertainties created for operators because of the need to include in approvals conditions to be met at some future time. A broadly accepted regional plan would provide a baseline on which individual applications could build, focusing on important site-specific issues. The Board believes that everyone will benefit from addressing regional issues in a regional context and leaving issues related to specific projects to be dealt with through applications.

The Board is confident that industry will work cooperatively in areas where there is an economic incentive. The potential enhancement of profit is a legitimate and easily identified reason for cooperation, but conservation and protection of the environment are also important, although the benefits may be less easily identified from a corporate viewpoint. Moreover, the Board has some concern that conflicting business interests and perceived competitive advantage may hinder cooperation in important areas. The Board believes that the companies should study the Muskeg River drainage basin to identify a mine plan for the entire ore body, ignoring lease boundaries. This approach could optimize resource recovery, minimize surface disturbance, and reduce overall environmental impacts. However, the Muskeg River drainage basin is not a large enough area within which to assess emissions. That assessment should include Syncrude's existing operations at the Mildred Lake facility, as well as Suncor's existing site and proposed expansions, and other contributors in the area.

Although the Board agrees with the general approach Syncrude outlined in its document, which envisions the review being undertaken by the companies, the most effective way to ensure the review is complete and the results are broadly acceptable is through early involvement of stakeholders. Broad consultation before the objectives and approach to the review are defined will enhance the ultimate credibility of the work and acceptability of the results. The Board will initiate discussion of this approach following the issuance of this decision.

14 OVERVIEW AND SUMMARY

Following the pre-hearing meeting held in April of 1997, Syncrude developed and submitted a discussion paper entitled "Aurora Mine, Regional Development Update". That document presented Syncrude's position on the importance of and potential approach to a regional review

of oil sands development. The Board is in broad agreement with Syncrude's position:

"... it is important that development proceeds in a manner consistent with the public interest" . "The goal is commercially sensible development in the interest of sustaining this most important of Alberta's natural resources in an environmentally-acceptable way." *Syncrude, Aurora Mine, Regional Development Update, May 28, 1997.*

Alberta's oil sands deposits represent an energy resource comparable to any in the world in scope and magnitude. The oil sands will contribute significantly to the economy of Alberta and Canada for many decades, if not centuries. Unlike many other resource deposits, however, the oil from the sands is difficult and costly to recover; and its recovery has important implications for the environment.

Syncrude and its owners have an established and extensive role in the development of Alberta's oil sands. They and Suncor have been the primary corporate sponsors of development in the Fort McMurray region for many years. Suncor recently moved forward with its expansion strategy. Shell and Mobil have announced their intentions to develop their leases as well. Shell is currently preparing an application for its project. Syncrude's current proposal, in part, replaces some of the bitumen production from the Mildred Lake Mine.

A number of factors prompt close scrutiny of Syncrude's proposal: it relates to one of the world's most significant resource deposits; has economic implications for Alberta and Canada that will span several generations; involves extensive environmental effects; and is one of several planned developments that, combined, could represent one of the most intensive and valuable resource projects in history. These factors combine to make this a critical application, setting the stage for a large expansion of oil sands recovery activity over the next decade or so. That prospect has added complexity to the decision, and prompted the Board's determination to be as clear and complete as possible in laying out the considerations surrounding its approval, and its basis for the conditions attached to that approval.

"For the Aurora mine, for example, conditions can be attached to Syncrude's requested approval so that the desired level of compatibility between Aurora and other projects can be attained as the other projects come forward." *Syncrude, Aurora Mine, Regional Development Update, May 28, 1997.*

The discussion in the body of this report has identified, for each of the technical elements of the project, the need for conditions associated with the approval. The discussion here focuses on the broad interacting elements of the approval that have added to the complexity of the decision. These stem primarily from the Board's mandate under relevant legislation, and relate primarily to the Aurora South portion of the application as well as the need for a regional approach to developing the resource.

14.1 The Mandate of the EUB under the Oil Sands Conservation Act

The Act sets out two requirements that bear directly on the issues discussed here:

- (a) to effect conservation and prevent waste of the oil sands of Alberta and,
- (b) to ensure orderly, efficient, and economical development in the public interest of the oil sands resources of Alberta.

From a broad perspective, the Board sees these legislated purposes as constituting a direction to consider the overall public interest in making decisions about how the resource will be developed. These purposes take on special importance in oil sands development because it is somewhat different from other oil and gas development in the province. The salient differences, for purposes of this discussion, include the fact that the existence and location of the resource is known, though not precisely defined, and that the mineable ore body is extensive, crossing the boundaries of leases held by different corporate interests. This means that the inherent competition associated with finding conventional oil and gas is reduced and different in nature for oil sands. Competition to discover the resource and acquire the mineral rights no longer exists (although there may be continuing competition to acquire existing rights). The competition that does exist relates more to finding efficient ways to extract and process the resource, attract the necessary labor and capital, and market the product. It is not clear that all aspects of such competition are a zero sum game. One company's gains in improving recovery and processing need not imply a loss to other companies. Inadequate cooperation, on the other hand, could prove detrimental to ultimate recovery, the environment, and the treasury of the Province. This has been recognized, even at the corporate level, through agreements to share information and through initiatives such as the Canadian Oil Sands Network for Research and Development (CONRAD).

"Cooperative action will also be required in a number of development areas for the industry to grow as efficiently as possible and in a manner consistent with the public interest. In this document, Syncrude identifies those key areas where cooperative actions by developers can improve the performance of environmental protection while increasing the value of oil sands development for the private and public sectors that share the economic rent created." *Syncrude, Aurora Mine, Regional Development Update May 28, 1997.*

Another difference from conventional resource development relates to the sheer size of the ore body. The large quantity of economically attractive high-grade deposits may tempt some operators to focus effort exclusively on this highly profitable ore, even if that puts at some risk the eventual development of the lesser, though clearly economical mining areas. Many years may have elapsed before the impact of that approach in reducing the ultimate recovery from the ore body as a whole would be apparent. Given the shorter time horizon of corporate interests as compared to society as a whole, there is a need to ensure that development of the resource meets the needs of the public interest, including those of future generations, by recovering all of the ore that is economic, using criteria acceptable to society as a whole. In common parlance, this discussion relates to what is sometimes referred to as highgrading, although the pejorative

connotation of that term is not always appropriate. There can be legitimate differences in how different segments of society view the value of development with government normally having a longer-term view than corporate enterprise. In any case, this difference in views can be challenging to deal with: first, what constitutes highgrading is not always clear; second, highgrading itself is not always visible; and finally, excessive concern with it could impose unwarranted costs on the developer. It is a question of judgement. The Board has always tried to be vigilant in applying critical yet reasonable judgement to this issue and is confident the conditions in its approvals adequately address this possibility as well as the possibility that conflicts with other developers could lead to a loss of resource.

This issue has a strong and clear parallel in conventional oil development. In the early stages of the province's conventional development, conservation was neglected, in part because of limited knowledge, and in part because the size of the resource seemed of such magnitude that wastefulness did not matter. That view changed over time as the Board and the industry recognized the importance of conservation, which is now embedded in the legislation. The proactive approach to this issue is to ensure a reasonable degree of conservation of the resource as development proceeds. That requires careful assessment of both the technical and economic aspects of proposed developments. Ensuring the best available technology is continually applied to oil sands development has always been important to the Board in discharging its responsibilities under the Act.

14.2 Importance of A Regional Approach to Development of the Oil Sands

The need for a comprehensive review of potential activity in the oil sands region of northern Alberta relates to both the environment and conservation of energy resources. Because the ore body is large and extends over lease boundaries and confluent waterways, cooperative development is imperative. In conventional oil and gas development, a similar requirement exists when a particular pool is tapped by competing interests. There, the industry has accepted, even promoted, the need for a stringent regulatory approach to ensure that competition will not result in a large portion of the resource being unrecoverable. In the case of oil sands, cooperation is also needed to ensure that the optimum amount of ore will be recovered. This can be achieved through minimizing sterilization of ore located around lease boundaries and under facilities and disposal sites. Optimal development may require cooperation to ensure tailings areas are properly located, even if that means they must be off-lease, or perhaps on another leaseholder's land. Lease boundary issues are best considered at an early stage of development, involving the participation of all the companies in the region. The Board has identified a possibility that over a billion barrels of oil could be lost if appropriate cooperation does not occur.

Regional development is indicated, not only on conservation grounds but also because of the environmental implications of extensive development of oil sands in a concentrated area. Cooperation could result in substantial improvement to the post-mining landscape. For example, tailings areas could require a smaller total area if they are optimally coordinated among the various projects. Roads and utility corridors for one project could not only sterilize ore in another project but could also cause unnecessary environmental damage. The overall effect on the regional ecology may also lessen through appropriate coordination and planning.

14.3 Aurora South Application

"In relation to the Aurora South Mine component of its applied-for approval, Syncrude suggests that the Board condition its approval so that development activity on Aurora South does not begin until such time as the applications of Shell and Mobil have been filed with and are considered by the Board."

Syncrude, Aurora Mine, Regional Development Update, May 28, 1997.

The factors noted above prompted the Board to consider the Aurora South portion of the application in relation to potential regional development. The application contained much less information regarding Aurora South than was provided for Aurora North. This resulted in considerably more uncertainty surrounding critical aspects of the application, such as the location of the tailings areas, and even the location of the plant. The applicant did not file for environmental approvals with respect to the Aurora South portion of the application since the project was not slated to begin for 10 years or more. Syncrude justified submitting the application at this time by noting the potential advantages of an approval to facilitate long-term planning and obtaining commitments to finance the project. The Board was unsure of the real value of those supposed benefits and, in addition, believed that it could be unfair to other companies to provide an approval for a project in the distant future when it was looking to achieve some greater level of regional assessment than had been suggested by the companies to date.

One concern was that the Board wanted to send the right signal to other applicants regarding the need for relatively complete information, sufficient to allow the Board to determine that the objectives of the act would not be compromised. As well, an approval in hand could provide Syncrude with some degree of leverage in negotiations over regional development, thereby either preventing eventual agreement or biasing a regional development plan away from a level playing field and optimal recovery. In resolving this dilemma, the Board considered several options, including denying the application without prejudice. The decision to approve was taken because the Board did not want arbitrarily to deprive the applicant of any potential planning and financing benefits that might be associated with an approval, given that the Board's objectives can be achieved through appropriate conditions on the approval relating to Aurora South, thus ensuring a level playing field with respect to regional development.

"Where there are large differences in timing of adjacent developments, the Board's criteria of avoidance of resource loss will override the value assessment."

Syncrude, Aurora Mine, Regional Development Update, May 28, 1997.

14.4 Conclusions

The Board recognizes the contribution Syncrude has made and will continue to make to the development of the oil sands. Syncrude has demonstrated a commitment to ongoing research and development of the technologies to continually improve the efficiency of resource extraction and to minimize impacts on the environment. The Board also acknowledges Syncrude's discussion of the need for some form of cooperation in developing the oil sands resource, as has been noted throughout this overview, and agrees with many of the points made in that discussion. The following quotation represents one of the few areas the Board believes requires

further discussion with Syncrude and other companies.

"Each of the companies supports the orderly, efficient, and economical development of Alberta's oil sands resources. This is best accomplished by oil sands developers voluntarily exploring opportunities for cooperation which enhance economic return and mitigate any potentially adverse environmental, socio-economic and cultural impacts." *Syncrude, Aurora Mine, Regional Development Update, May 28, 1997.*

While generally concurring with this sentiment, the Board is not sure the best approach is for the companies to negotiate solutions and then submit them for approval. Significant impediments stand in the way of an agreement being structured solely among the companies involved. These include liability issues, surface rights issues, reduced flexibility, and higher initial costs. These impediments may preclude eventual agreement among corporate interests alone, or make such agreement inadequate to protect the public interest. The agreement between Syncrude and Shell that resulted in an amendment to the application, moving the planned tailings area off Shell's Lease 13, is an example of the settlement of a private difference that has raised questions for the Board. There are strong indications from the information available that the potential loss of resource and incremental environmental impact attributable to that decision could be very significant. A properly focussed regional initiative will revisit that decision and provide a process to address the other potentially difficult problems such as issues of liability.

Syncrude's application did, of course, provide some opportunity for the Board to discuss its approach to regional development. A public hearing could have been convened and that subject could have been a designated element of such a hearing. However, it would have been unfair to the applicant to put the burden of addressing over-all planning for the region on its individual application. And yet it would also be inefficient and unfair to future applicants as well as the Board to adopt a process that tries to deal with the inevitable regional issues and conflicts as each application comes forward over the upcoming months and years.

The Board is convinced that the difficult issues associated with developing one of the most significant resources in the world are best resolved through a process that looks at the total regional picture, as far in advance as is reasonable and possible. The companies that will develop the resource should lead the process. Government agencies representing the interests of the public should have a smaller yet influential role in ensuring those interests are protected in any eventual agreement. That responsibility is best discharged through an early involvement with the review process rather than by having a complete plan handed over at the end of a process that involved only a few players. Past experience has confirmed the difficulties, for example, of realizing acceptable approaches to ensuring the complete recovery of the resource at lease boundaries, even when only two companies are involved. With several companies involved, competing interests will make agreement even more challenging. While the Board understands the desire of the companies to work out agreements without the participation of other interests, such as those that would be represented by the Board and Government departments, the importance of the resource to both present and future generations may require the broader ongoing participation of governments in the discussions that lead up to any recommendations. Nonetheless, the Board's vision of regional development is one that gives the companies a major role in planning and resolving issues to their own satisfaction, while also

allowing participation of relevant government agencies. The difference in views is not major; the Board thinks some process to allow the participation of government agencies and the public at an early, defining stage of the regional discussions would be beneficial to all concerned. This would allow appropriate input from those groups in defining the objectives and priorities of the review, enabling them to have greater confidence that the eventual recommendations will have been developed within an acceptable context. The companies could then proceed with commercial negotiations and negotiations in other areas with participation of others as appropriate, and come up with an overview that would have a greater likelihood of broad acceptability. The Board believes the companies involved will recognize the need for, and benefits of, a coordinated approach to regional development and will be discussing the options with the industry in the near future. The eventual approach to regional development should neither benefit nor disadvantage Syncrude with respect to its current application, nor other applicants with respect to any future applications.

The Board believes Syncrude's Aurora project would be valuable to Alberta and Canada, can be carried out with acceptable implications for the environment, and is in the public interest. The application will be conditionally approved as discussed in the various sections of this report.

15 DECISION

The Board has carefully considered all evidence pertaining to this application, having regard for its responsibilities under the statutes. Accordingly, the Board is prepared, with the approval of the Lieutenant Governor in Council, to approve the Aurora application with conditions and requirements as referenced in this report, that will be specified in the approval.

DATED at Calgary, Alberta on 24 October 1997.

(Original signed by)

J. P. Prince, Ph.D.
Presiding Member

(Original signed by)

A. C. Barfett
Board Member

(Original signed by)

H. O. Lillo, P.Eng.
Acting Board Member

Attachments

TABLE 1
INTERVENERS AND ASSOCIATED ABBREVIATIONS
USED IN THE REPORT

Alberta Environmental Protection, Alberta Health, and Alberta Community Development (AEP)

Mr. Victor M. Anez (Mr. Anez)

Birch Mountain Resources Ltd. (Birch Mountain)

Confederation of Regions Political Party (CORE)

Department of Fisheries and Oceans Habitat Management Division (DFO)

Department of the Environment (Environment Canada)

Mobil Oil Canada Properties (Mobil)

Northland Forest Products Ltd. (Northland)

Shell Canada Limited (Shell)

Solv-Ex Corporation (Solv-Ex)

Joint submission:

\$ Syncrude Canada Limited (Syncrude)

\$ Pembina Institute for Appropriate Development (Pembina)

Toxics Watch Society (Toxics Watch)

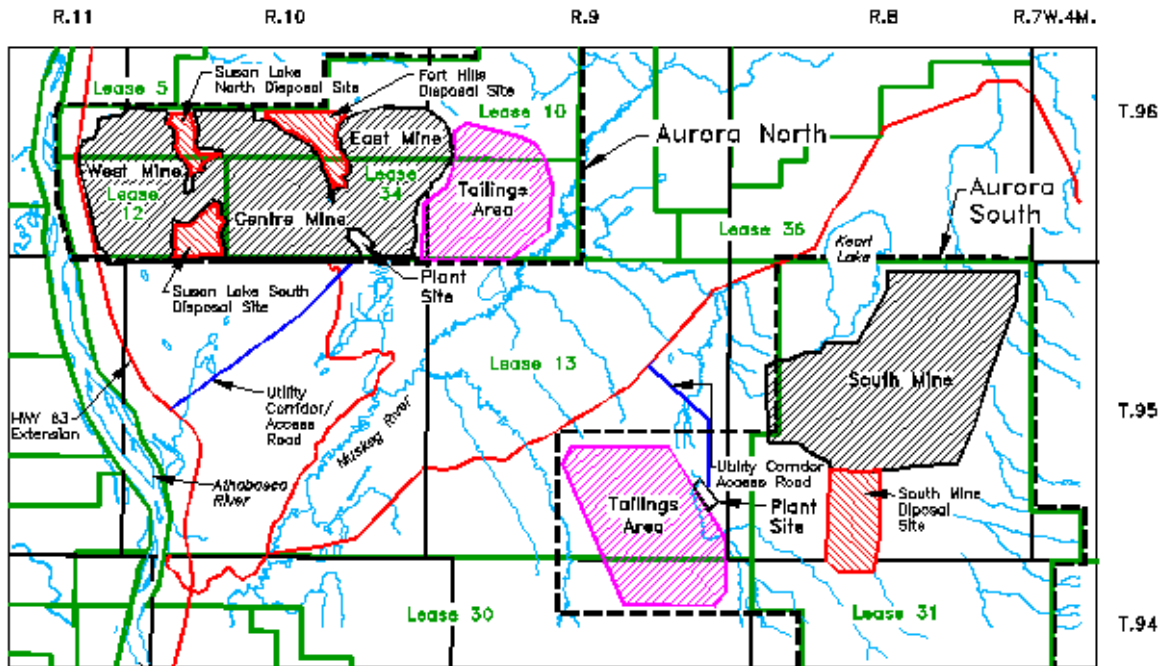


FIGURE 1
 AURORA MINE PROJECT
 Originally Applied for Application No. 960552
 Syncrude Canada Limited

Decision 97-13

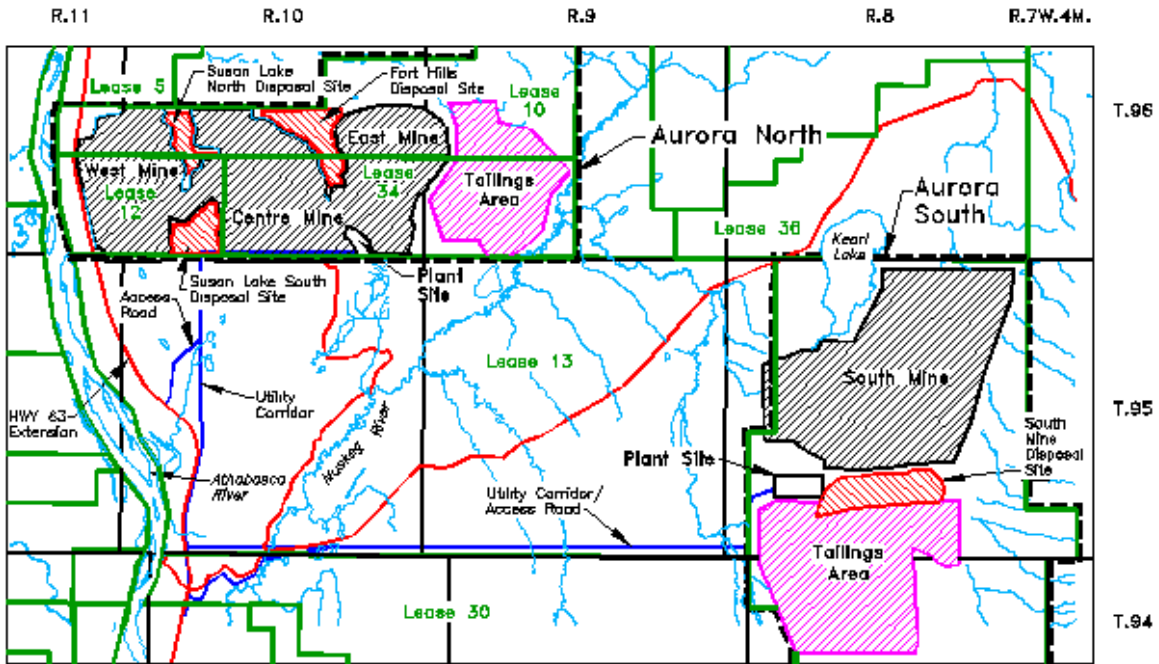


FIGURE 2
 AURORA MINE PROJECT
 Revised Application No. 960552
 Syncrude Canada Limited

Decision 97-13

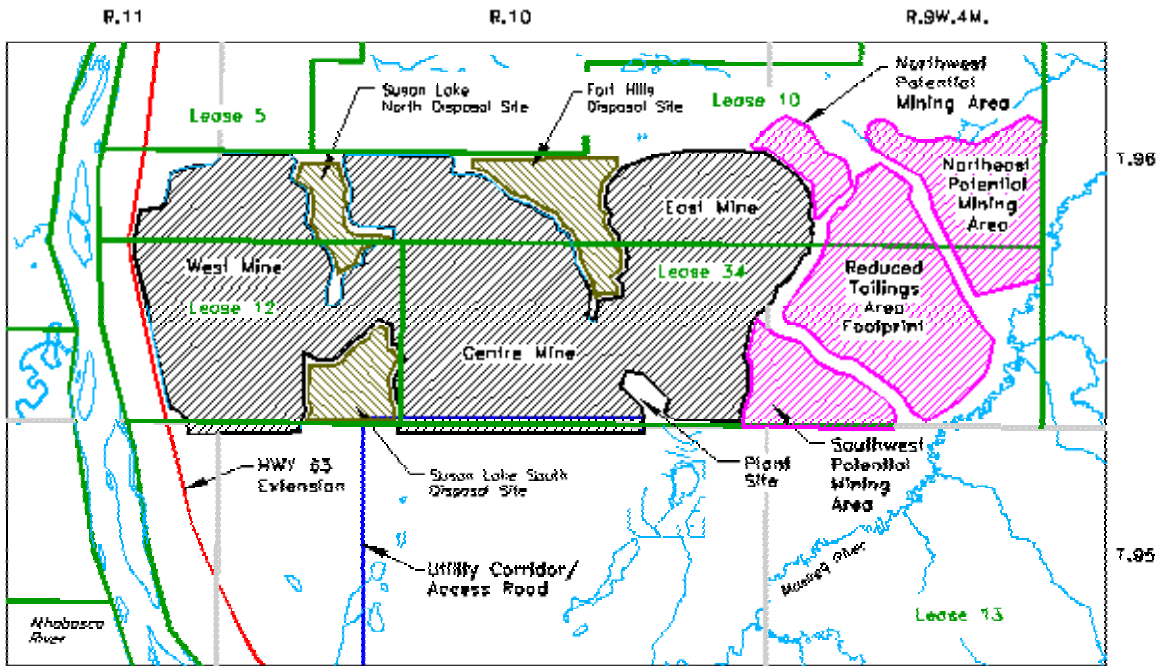



FIGURE 3
AURORA NORTH MINE PROJECT
 Revised Tailings Area Footprint and Potential Mining Areas
 Application No. 960552
 Syncrude Canada Limited

Decision 97-13
