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**ALBERTA ENERGY AND UTILITIES BOARD**

Calgary Alberta

**APPLICATION BY SUNCOR INC. OIL SANDS GROUP  
FOR AMENDMENT OF APPROVAL NO. 7632 FOR  
PROPOSED STEEPBANK MINE DEVELOPMENT****Decision No. 97-1  
Application No. 960439****1 INTRODUCTION**

Suncor Inc. Oil Sands Group (Suncor) applied pursuant to section 14 of the Oil Sands Conservation Act to amend its existing Approval No. 7632 for the development of the proposed Steepbank Mine. Suncor applied for approval:

- to construct and operate the proposed Steepbank Mine and for related modifications to the existing approved scheme in access, ore transport, extraction, and tailings handling to sustain an increase in production to 6 209 000 cubic metres per year (m<sup>3</sup>/y) of synthetic crude oil (SCO) and other oil sands products,
- to operate the proposed Steepbank Mine based on a 20-year mine plan, and
- of the integrated conceptual reclamation plan for Lease 86/17 within the area of the existing approved scheme and the proposed Steepbank Mine.

Under a coordinated application process adopted by Alberta Environmental Protection (AEP) and the Alberta Energy and Utilities Board (EUB), Suncor has filed a joint Steepbank Mine Application/Environmental Impact Assessment report. The application was filed on 30 April 1996 and registered as EUB Application No. 960439.

Suncor has developed a long-term growth strategy for the development of its mineable oil sands holdings in the Fort McMurray area. The first part of this strategy has been accomplished through applications in 1994 and 1995 for plant debottlenecking. Modifications to the fixed plant were considered and approved by the Board on 20 December 1996 (EUB Application No. 960369).

The development of the Steepbank Mine project is a related step in the strategy. A 20-year plan has been prepared to develop the ore body east of the Athabasca River, and south of the Steepbank River on leases 97, 25, and 19 (Appendix A). In advance of the opening of the mine in the year 2000, Suncor would build a bridge over the Athabasca River, clear trees from the lease, salvage the topsoil, and remove the overburden. The bridge application has been approved by AEP and the federal Department of Fisheries and Oceans, and is under construction.

The Steepbank Mine will deliver conditioned oil sands ore to the existing Suncor plant using hydrotransport technology in which the oil sands is crushed, mixed with hot water and caustic at the mine, and then transported via slurry pipeline to the existing extraction plant. Minor

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modifications, beyond the existing fixed plant expansion approvals, will be required for bitumen production facilities at the existing Suncor plant as production increases to 14 000 m<sup>3</sup>/d and 17 000 m<sup>3</sup>/d of SCO.

The application described the mining of ore until the year 2020 leaving landforms that are in various stages of reclamation. The final reclamation plan will be considered and approved by AEP. Suncor stated that there is sufficient ore in proximity to the existing plant to allow economical mining to continue for thirty years or more.

The Board issued a Notice of Filing of the application on 7 May 1996 and published it in local and major newspapers on 13 and 20 May 1996. Upon completion of the application, the Board issued a Notice of the application on 5 September 1996 and published it in newspapers throughout the province on 12 and 19 September 1996.

As a result of the Notice, submissions were received from:

- Oil Sands Environmental Coalition (OSEC),
- Athabasca Fort Chipewyan First Nation (the Band), and
- Confederation of Regions Political Party (CORE).

Letters of support for the project were received from:

- David Chatters, M.P. Athabasca,
- Adam Germain, M.L.A. Fort McMurray,
- Fort McMurray Chamber of Commerce,
- Alberta Chamber of Resources,
- Communications, Energy and Paper Workers of Canada Local 707, and
- Fort McMurray Construction Association.

OSEC's submission was the only submission that contained detailed information. It stated that the existing coke pile presents an unacceptable level of environmental risk and that the naphtha recovery unit should be twinned to maintain naphtha losses to the tailings ponds at current levels.

Suncor and OSEC jointly filed a Memorandum of Understanding (MOU) with the Board and AEP that summarized their consensus and differences on fifteen issues. The MOU clarified where the parties have agreed to work together to prioritize tasks which they have agreed to share and to develop a plan for addressing these tasks.

The Board is satisfied that the issues of concern raised in the MOU can be addressed through discussion between Suncor and OSEC. The Board also noted that the measures taken by Suncor and OSEC have reduced other public concerns and allowed for a cooperative approach for the review of the application.

While the Athabasca Fort Chipewyan First Nation submission was not specific, the concern by the Band centred on social impacts. Suncor stated that it is interested in continued consultation with the Band to fully understand its needs. It encouraged the Band to retain independent expertise to review the application and offered to fund the review. Suncor provided details of its communication with the Band regarding the application and stated that it has endeavoured to address the concerns raised by the proposal. The Band requested a ruling by the Board on its status as a local intervener. To qualify as a local intervener for purposes of recovering costs, an applicant must meet the requirements outlined in section 31 of the Energy Resources Conservation Act. The Board does not believe the Band meets the requirement in the Act to be eligible for cost recovery as a local intervener. Notwithstanding that position, the Board noted the willingness of Suncor to voluntarily assist the Band to review the application and to work with it on resolving its issues of concern.

Suncor took the position that CORE is not directly affected by the application and has not initiated communication with CORE. The Board believes that the submission by CORE is of little merit and dismisses it pursuant to section 17 (b) in the Rules of Practice.

AEP provided information to the Board to maintain a consistent approach in conditioning the respective regulatory approvals. AEP stated that it would consider the Board's decision report in conditioning approvals under the Water Resources Act, the Public Lands Act, and the Environmental Protection and Enhancement Act.

While a public hearing of the application was not required, the Board believes it would be useful to document its consideration of the submissions in this report and outline the direction proposed by the Board in order to address the outstanding issues.

## **2 APPLICATION REVIEW AND COMMENTS**

Upon thorough review of the material filed, the Board believes a number of technical, environmental, and socio-economic issues related to the proposal warrant special consideration. The Board believes that, in order for the Steepbank Mine development to be done in an orderly fashion, there are a number of concerns that need to be resolved over the life of the operation. The concerns fall into two broad categories, project development and environmental concerns.

## 2.1 Project Development

The Board accepts that, as the ore body is depleted from Lease 86/17, the Suncor leases on the east side of the Athabasca River will provide Suncor with a source of oil sands ore well into the next century. The Board believes that it is in the broad public interest to extend the life of the existing Suncor processing facilities, and that the Steepbank Mine will contribute to the orderly development of the oil sands, subject to satisfactory resolution of the concerns to follow.

### Ore Recovery Criteria

The application is restricted to the development of Pit 1 in the centre ore body on leases 97 and 25, and Pit 2 of the south ore body on leases 19 and 25. Continued development of the south ore body on leases 19 and 25, beyond Pit 2, are not part of this application (Appendix A).

Suncor applied to use an 8.0 weight per cent minimum bitumen saturation ore grade and a 3-m minimum mining thickness. Ore with a grade less than 8.0 weight per cent bitumen saturation would be considered as waste material. The minimum grade selected by Suncor would influence the average grade of ore processed by the plant. Plant recovery efficiencies influence the minimum grade and average grade of ore sent to the plant. In general, improvements in plant recovery capability would allow a lower minimum grade and an increase in the volume of oil sands available to be processed.

Suncor acknowledged that the Steepbank Mine contains a significant quantity of oil sands having an average grade between 6.0 and 8.0 weight per cent bitumen. Most of the oil sands are found near the top of the ore body. Suncor has stated that processing this low-grade oil sands will result in poor recoveries, increased losses to tailings, and require more energy and cost to process. The application indicated a seven-item task plan to be studied by Suncor regarding low grade ore processability.

Suncor has committed to conditioning oil sands by hydrotransport, improving bitumen recovery efficiency from 91.0 to 92.5 per cent, improving overall naphtha recovery from 99.1 to 99.3 per cent, and improving plant measurement and control.

The Board recognizes that the minimum mining cutoff grade is influenced by a number of related factors that determine the viability of the operation. The most important of these factors are: the extraction recovery, oil prices and fiscal regimes, mining costs, and the ability of the mine to supply sustained blended ore qualities to the plant. Given that many of these are influenced by the original design, the Board believes that milestones such as major plant expansions or new mine developments are opportune times for implementing plant recovery efficiency improvements.

Given the uncertainty over the long term with respect to factors bearing on the cutoff grade, the Board does not believe it is appropriate to commit the operation to a minimum cutoff grade. The

Board believes a cutoff grade target of less than 8.0 weight per cent bitumen saturation may be appropriate, bearing in mind Suncor's operating experience, processing improvements, and reduced operating costs. Accordingly, the Board will require Suncor to conduct additional studies to determine an appropriate cutoff grade during the mine operation. The Board intends to address this matter through discussions with Suncor. The Board also expects Suncor to incorporate provisions in its plant design at the outset to handle ore of lower than 8.0 weight per cent bitumen saturation cutoff should it become desirable to process such ore in the future.

### **Pond 1 Abandonment**

In the past, Suncor had committed to abandon the Tar Island Pond (Pond 1) by 2002 by filling it with dry material. The application stated that management of tailings through the use of consolidated tailings (CT) technology would result in a shortage of tailings sand for Pond 1 abandonment and proposed to delay the remediation of Pond 1 by approximately 10 years.

Suncor estimated that, although approximately 1600 m<sup>3</sup>/d of fluid seeps from Pond 1 into the Athabasca River, its studies have shown that there is no measurable impact to the river from this seepage. Suncor stated that Pond 1 fine tails would be removed for use in CT by 2006 and that the pond will be infilled by 2009. Suncor indicated a trafficable surface should be formed by 2012.

The Board continues to believe the earliest practical remediation of Pond 1 is in the public interest. On the basis of the information submitted, the Board is not satisfied that the timing of Pond 1 remediation needs to be delayed as proposed by Suncor. The Board believes that there may be options available to Suncor that would allow it to proceed with production of CT and remediate Pond 1 sooner than proposed by the application. Accordingly, Suncor is required to re-evaluate materials handling and present a plan to the Board and AEP by 30 June 1998. The submission should include a full description of the existing and proposed plans, showing the volumes of materials handled and the process of disposal.

### **Pit Limits**

Suncor provided an outline of approximate pit limits using a net cost per barrel of bitumen. The pits limits shown by Suncor generally conform to the Board's interpretation and are considered sufficient for preliminary planning purposes. Before opening the mine, the Board will require Suncor to conduct an assessment of resource potential and final pit limits and satisfy the Board, on an annual basis, that the appropriate pit design is utilized to optimize resource recovery. The review must include consideration of increased drilling density and quality, mining and extraction parameters and measurements, and recent project cost information.

## **Discard Locations**

Suncor applied to construct four external discard sites to store excess overburden and interburden over the 20-year planning period as follows:

- North discard site - north of Pit 1 between the lower reaches of the Steepbank River and the Athabasca River,
- East discard site - east of Pit 1 and adjacent to the south escarpment of the Steepbank River,
- West discard site - west of the Athabasca River escarpment near the area of the Shipyard Lake wetlands, and
- South discard site - south of Pit 2.

The design details and final footprint of each site are to be based upon geotechnical investigations and analysis completed in advance of site preparation.

On the basis of an examination of the geological information submitted, the Board believes that the north, east, and west discard sites will not sterilize recoverable reserves. The Board, however, believes that continued drilling and evaluation is required to identify any recoverable reserves in the south discard site before it can be accepted. Furthermore, the Board believes that future drilling and refinements to pit boundaries may dictate that discard sites can be reduced in size. The Board will require Suncor to submit detailed dump designs and assessments of resource potential in the area influenced by the dumps 6 months prior to field preparation to satisfy the Board such sites and pit boundaries are appropriate.

## **Tailings Management (Dikes)**

Suncor proposed a series of in-pit tailings dikes to contain the consolidated tailings and release water deposited during the 20-year period. The dikes would form Ponds 7 and 8 within the mined-out pit of the Steepbank Mine. The dikes would be constructed of overburden, interburden, tailings sand, or a combination of materials. The final dike elevations proposed for Pond 7 are 330 m above mean sea level while the Pond 8 dikes would reach an elevation of 310 m above mean sea level and contain a potential 5 to 6 years of additional storage space for continued mining operations.

The Board believes that in-pit dike construction is an integral part of the overall tailings management program. The Board accepts the concept of using in-pit dike construction to allow staged in-pit tailings disposal while mining operations progress. The Board also accepts that tailings management plans are subject to change. Accordingly, the Board will require Suncor to

submit tailings management plans, including construction schedules, with the annual mine plan or as otherwise determined by the Board. The Board notes that geotechnical designs of dikes must be submitted to the Dam Safety Branch of AEP as outlined in Informational Letter IL 94-19.

## **2.2 Environmental Concerns**

The Board notes the detailed environmental information filed as part of the application. While the Board finds most of the environmental impacts from the proposed development acceptable, the following specifies a number of elements requiring further attention by Suncor.

### **Tailings Management (Consolidated Tails - CT)**

Suncor proposed to reclaim tailings generated through the processing of oil sands from the Steepbank Mine using CT technology. CT would be produced by mixing mature fine tails with sand and gypsum. The mixture is expected to consolidate to produce a material that enables a dry landscape in 10 to 50 years. Sand that is currently used to construct dikes would be used in the formation of CT. On the basis of pilot scale testing, Suncor expected the CT mixture to capture 90 per cent of the fine tails. A commercial scale trial from November 1995 through May 1996 captured approximately 60 per cent of fine tails. Suncor stated that it is confident that, with modifications, a 90 per cent capture rate is achievable.

In its application, Suncor requested a one-year delay to acquire operating experience prior to meeting any conditions relating to fines capture using CT technology. Suncor noted that the fines capture is dependent on:

- CT placement method,
- the clay-to-sand ratio,
- clay-to-water ratio in the mature fine tails, and
- the concentration of gypsum.

AEP favoured the use of CT to address the tailings issues in oil sands operations, however it noted that there are 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 Suncor 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 does not perform as expected and alternative tailings management proposals are required.

The Board recognizes the advantage of a dry tailings option and will endorse its use. While the Board is satisfied that it shows promise, it notes that tailings management by CT technology is still under development. The data presented by Suncor, from the limited testing that has been done, indicated that the tailings consolidation to form a dry trafficable landscape is achievable with modifications and further development. The Board accepts that full scale trials of CT are required to further understand this process. The Board expects that Suncor will continue to work on dry tailings management options, and if CT does not perform as expected, Suncor will reapply to the Board with other tailings management options.

Under Informational Letter IL 96-7, the reclamation planning and final landscape objectives are a shared responsibility between AEP and the Board. The Board will assist in the assessment of CT technology through consultation with AEP, reviewing CT demonstration and performance, and evaluating reclamation practices.

### **Naphtha Recovery**

Suncor stated it is committed to maintaining absolute naphtha volume losses to the ponds at current levels through continuous improvement in its process and the installation of additional equipment as production increases to 14 000 m<sup>3</sup>/d and 17 000 m<sup>3</sup>/d of SCO.

OSEC expressed a concern regarding Suncor's ability to hold naphtha losses to current rates without the addition of an additional Naphtha Recovery Unit (NRU). It believed that Suncor should be required to achieve naphtha recoveries equivalent to twinning the NRU. OSEC stated that Suncor should commit to specific technology and operating practices along with a time line for increasing the overall naphtha recovery.

The Board believes that maintaining current absolute volume losses of naphtha would reduce operating flexibility and hamper any future oil sands development by Suncor. It believes that improvement in recovery efficiency is a more appropriate measure to control resource losses to the pond. The existing approval addresses losses to the ponds by stipulating an overall naphtha recovery of 99.1 per cent. Under the Board's approval of Application No. 960369, Suncor will be required to improve overall naphtha recovery to 99.3 per cent.

### **Coke Utilization**

Suncor stated that, although its primary objective in long term disposal of the coke is to develop an economical use for coke, a market has not developed, therefore excess coke generated through the production of the SCO is currently stockpiled. There are approximately 4.5 million tonnes (10<sup>6</sup> t) of coke in the stockpile and Suncor expects the site will reach capacity of some 6 x 10<sup>6</sup> t by August 1999. Suncor applied to slurry excess produced coke and combine it with CT once the stockpile reaches capacity. If a market should develop that would reduce the stockpile and allow for additional storage capacity, Suncor would again stockpile coke. Suncor estimated that approximately 15 x 10<sup>6</sup> t of coke would be produced over the 20-year operating life of the Steepbank Mine.



Suncor projected handling costs of approximately \$85 million for the  $15 \times 10^6$  t of coke produced over the life of the project. Suncor also noted that, although there are currently no viable markets for the coke, there are ongoing discussions with prospective customers for its use.

In ERCB Decision Report 77-24, the Board authorized the stockpiling of coke based on a reasonable probability that a use for coke would emerge in the near future, particularly with respect to gasification and as a fuel in the cement manufacturing industry. The Board continues to encourage the conservation of resources where there is a reasonable prospect that the resource has value. The Board will require Suncor to review the advantages and disadvantages of feasible alternative uses of coke and report to the Board by 1 August 1998. This should include a comparison of the costs and benefits of on-site versus off-site uses for the approximately  $15 \times 10^6$  t of coke that will be produced from the Steepbank Mine. The Board notes that there has been no experimental data developed to directly address the impact of the addition of coke on the CT process. The Board will expect Suncor to address the physical, chemical, and environmental effects of the addition of coke to CT. In the interim, presuming that there is a reasonable long term potential for a market for the coke to develop, the Board believes that it is necessary to preserve the coke.

### **Coke Storage**

Suncor acknowledged that the coke stockpile does not meet the Board's Interim Directive ID 95-03 and Guide 55 *Storage Requirements for the Upstream Petroleum Industry*. It stated that a plan demonstrating that the stockpile could meet the intent of Guide 55 would be completed by the end of 1998, and that final reclamation of the stockpile will be addressed in conjunction with abandonment of the Suncor plant site.

AEP has stated that it would condition its approvals under the Water Resources Act, the Public Lands Act, and the Environmental Protection and Enhancement Act to, among other things, regulate the disposal of coke, gypsum, and other process wastes to the reclaimed landscape. The Board understands that AEP will also condition its approval to require Suncor to provide, by 1 August 1998, a plan for removal of the stockpile, to commence by 31 January 1999 and to be completed by 24 June 2006. OSEC indicated that coke is a hazardous waste and the stockpile presents an unacceptable level of environmental liability and risk. It is OSEC's firm position that Suncor must commit to a process of relocating the stockpile away from the Athabasca River, by June 1997, to an acceptable permanent disposal site such as burial below ground or integration into the tailings sludge for disposal. OSEC said that the stockpile was intended to provide a buffer for surplus coke that was generated from time to time at the Suncor facility, and not intended to be a permanent massive stockpile. OSEC also stated that leaving the coke stockpile in the present location until final site reclamation would not be acceptable and that any additional combustion of coke in the Fort McMurray area region would impose such a large increase in emissions per unit of energy, that it would render the operation totally unacceptable from an overall environmental impact perspective.

Given the evidence, the Board is not persuaded that the current stockpile represents an immediate environmental risk. Notwithstanding, Suncor is to provide the Board with a plan, by 1 August 1998, to manage the existing surplus coke that addresses matters relating to coke recovery, dusting, and fires, and identifies means for preventing soil and groundwater contamination while it operates the existing facilities. It must also present, at that time, a plan to manage the final reclamation of the coke that addresses conservation, land reclamation planning, and the final landscape objectives. In the interim, Suncor will be allowed to utilize the existing stockpile until it reaches maximum capacity of  $6 \times 10^6$  t or 31 January 1999 (whichever comes first).

### **2.3 Socio-Economic Effects**

Suncor stated that the Steepbank Mine project will result in a number of socio-economic changes in the area. Coordination of its development activities with Syncrude, Solv-Ex, and the Municipality of Wood Buffalo Standing Committee on Oil Sands Development would mitigate potential negative effects. There would, however, be an increased demand for temporary services.

The Steepbank Mine project will provide 1040 person-years of employment between 1996 and 2000. During the operational phase, project employment and direct suppliers would support an average of 2650 jobs/y, and the additional activity in the area would result in 635 indirect jobs/y and 1475 induced jobs/y.

Steepbank Mine construction would require direct expenditures of \$336 million from 1997 to 2001 with \$200 million expected to be spent in Alberta. Operating expenditures are expected to be \$6.4 billion (1995\$) from 1996 to 2020.

Suncor stated that, at the height of construction (1999), the population of Fort McMurray would be expected to increase by 711 in a community of 34 700; however, most of the construction workers will be housed at a construction camp. The operation of the Steepbank Mine would result in a permanent population increase of 350 starting in 2007.

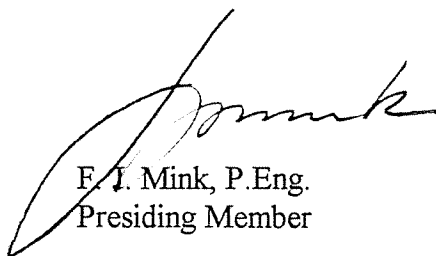
The Board notes that, while support of the project in the Wood Buffalo region is not unanimous, the people of the region, and public officials are generally in favour of the development. The Board accepts that there are significant economic benefits to the region and province through sustained development of the existing operation and that the Steepbank Mine is a logical extension of the current development. The Board also accepts that some social impact is an inevitable consequence of further development but that it can be managed within acceptable levels. The Board is satisfied that there is, or can be, sufficient infrastructure provided in the region to handle the development.

### 3 DECISION

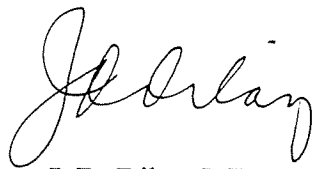
The Board has carefully considered all evidence pertaining to this application, having regard for its responsibilities under the statutes. While the Board notes that some environmental concerns regarding specific aspects of the application remain to be resolved, it believes that adverse impacts can be avoided or mitigated. The Board also believes socio-economic issues related to native communities can be addressed through dialogue and normal channels and that the issues of naphtha recovery and the coke pile can be addressed through appropriate conditioning of the approval. The Board notes that there is widespread support for the project and believes the development to be in the broad public interest of the province.

Accordingly, the Board is prepared, with the approval of the Lieutenant Governor in Council, to approve Suncor's application.

DATED at Calgary, Alberta on 22 January 1997.



F. J. Mink, P.Eng.  
Presiding Member



J. D. Dilay, P.Eng.  
Member

N. W. MacDonald, P.Eng.\*  
Member

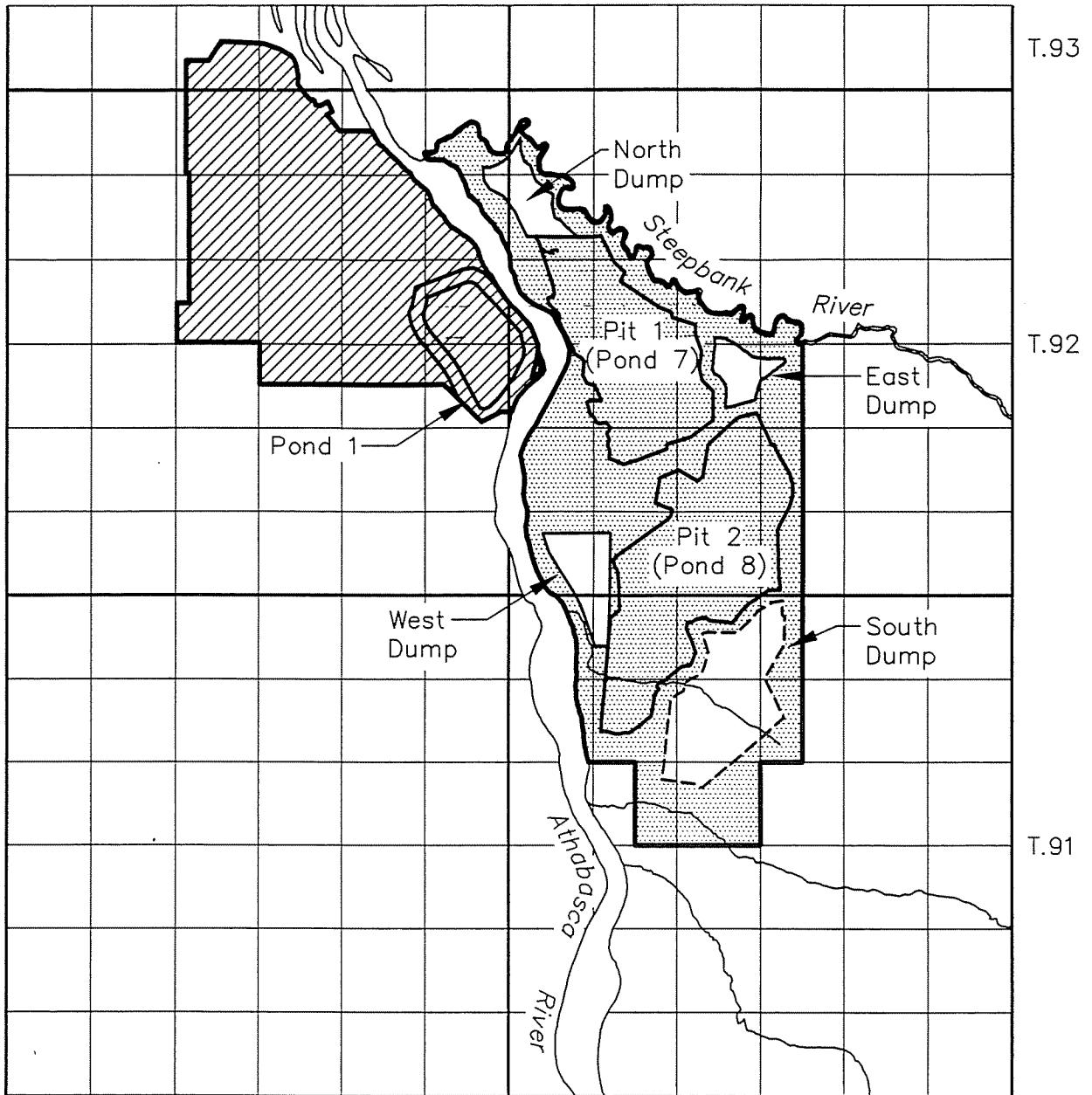
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\* Mr. MacDonald was unavailable for signature but concurred with the decision.



R.11

R.10 W.4M.








**SUNCOR OIL SANDS PROJECT  
MILDRED LAKE AREA**



APPENDIX A TO DECISION No. 97-1  
PREVIOUS TO APPROVAL No. 7632

**LEGEND**

-  EXISTING MILDRED LAKE PROJECT AREA
-  PROPOSED STEEPBANK MINE EXPANSION AREA
-  APPROXIMATE AREAS OF MINES
-  APPROVED DISCARD SITE AREA
-  PROPOSED DISCARD SITE