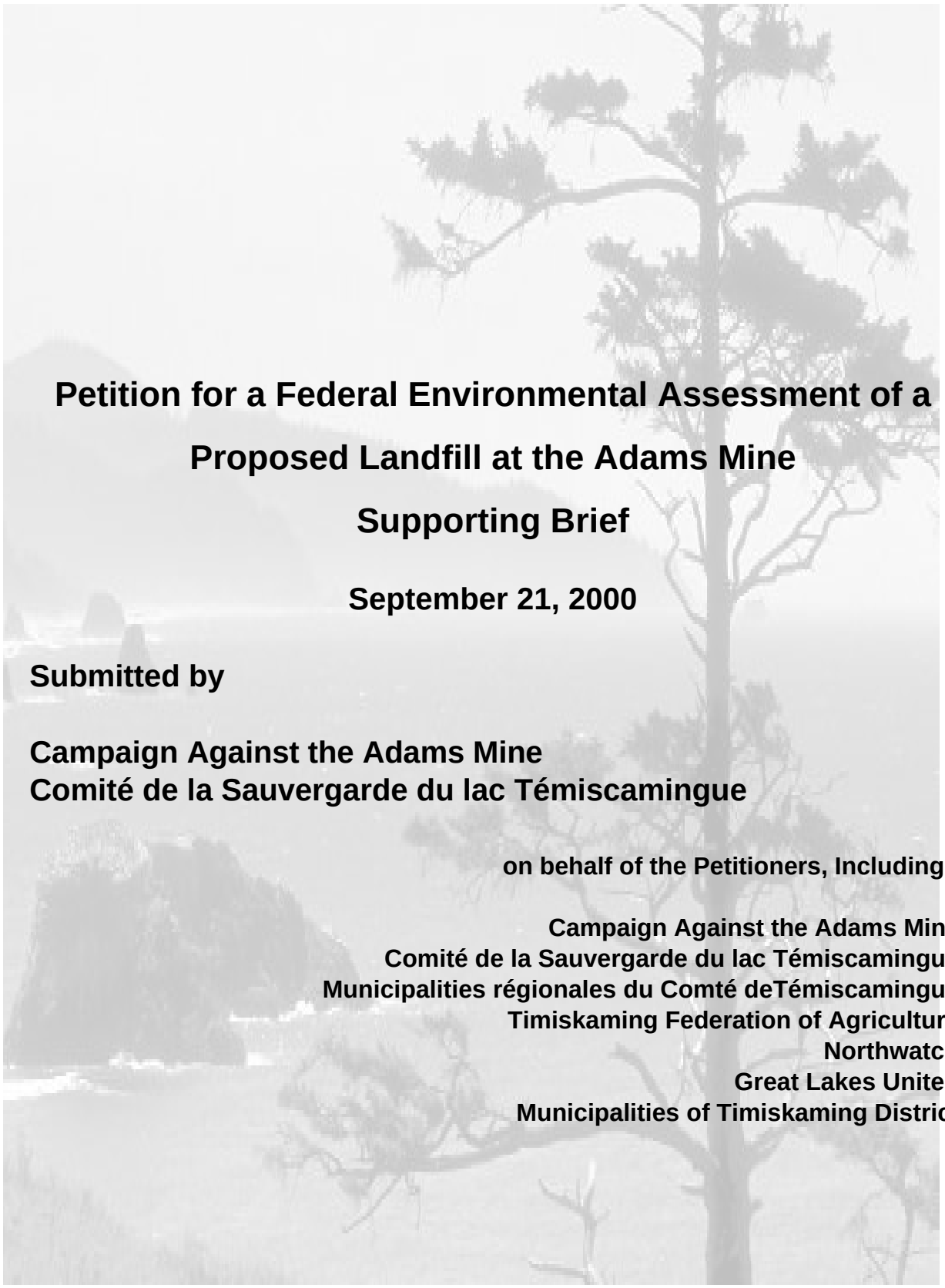

Petition for a Federal Environmental Assessment of a Proposed Landfill at the Adams Mine

Supporting Brief

September 21, 2000

Submitted by

Campaign Against the Adams Mine
Comité de la Sauvergarde du lac Témiscamingue

on behalf of the Petitioners, Including:

Campaign Against the Adams Mine
Comité de la Sauvergarde du lac Témiscamingue
Municipalities régionales du Comté deTémiscamingue
Timiskaming Federation of Agriculture
Northwatch
Great Lakes United
Municipalities of Timiskaming District

1.0 Background

1.1 Project Description

The 'Adams Mine' project is a landfill proposal for the disposal of municipal solid waste. The operation of this landfill is a private sector venture that will utilize a tipping fee from waste disposal contracts to provide operating capital and a profit margin.

The 'Adams Mine' is an abandoned open pit iron-ore mine that was operated by Dofasco Inc. until 1989. The site consists of five individual pits, three of which are deemed by the proponent to be suitable for the landfilling of municipal solid waste. At present, only one pit has received a Certificate of Approval from the Ministry of the Environment for the province of Ontario.

The mine pit approved for waste filling is termed the 'South Pit' and it will have an ultimate disposal capacity of twenty (20) million tonnes of solid waste. In order to justify the significant capital expenditure required to alter the abandoned mine pit into a waste receptacle and construct associated landfill infrastructure, a contract with a large volume waste source is required. For this reason, the landfill proponent has been negotiating with the City of Toronto for a waste handling contract that is to have a twenty (20) year minimum duration.

Under this contract, the landfill proponent Rail Cyle North (a business consortium of Notre Development, the property owner and project initiator, major partner Canadian Waste Services, and proposed waste haulers Canadian National Railway, Ontario Northland Transportation Commission, and Miller Waste) will not only be responsible for disposing of Toronto's municipal solid waste, but will also be responsible for the transportation of this waste from the City's transfer station facilities to the Adams Mine site, a distance of approximately six-hundred (600) kilometres. Rail haulage has been identified in the project proposal as the intended mode of transportation.

After the South Pit has been filled to capacity, the landfill operator will be responsible for the post closure care and maintenance of the waste receptacle and supporting infrastructure. This period will be separated into two phases – active treatment (100 years) and gravity drainage (900 years). The proponent shall utilize a portion of the waste tipping fee to provide sufficient funding for this post closure care period.

1.2 Project Design

The Adams Mine landfill design will rely on the hydraulic containment principle for the control of leachate generated within the waste receptacle (mine pit). This method of conducting the undertaking was not compared to any other alternative methods in the Environmental Assessment process and thus, has not been established as the most 'environmentally friendly' approach to achieving the desired outcome. Nor were alternate sites considered, or alternative means of managing solid waste, such as through increased diversion.

The pits at the Adams Mine are described by the proponent as having been identified through field studies carried out by Golder Associates Inc., as being suitable for establishing hydraulic

containment as high ground water pressure gradients were measured across the mine pit walls. Less than ideal conditions however, have been measured across the pit floor. In the 1998 EA hearing, this condition was discussed and it was agreed upon by the EA hearing panel that the data presented by the project proponent was insufficient to guaranty containment of the leachate within the waste receptacle. The proponent was instructed, as a condition of approval, to further pursue the drilling of monitoring wells for the purpose of determining the magnitude of the upward ground water pressure gradient across the pit floor.

This aspect of the Adams Mine project design is extremely important to the proper functioning of hydraulic containment during the 900 gravity drainage phase, wherein active dewatering of the pit ceases and the leachate/ground water level within the waste receptacle is allowed to rise to just below the static water table elevation.

As part of the design, a porous surround is to be constructed in the mine pit in conjunction with waste placement. On the pit floor, a network of pipes will be imbedded in the porous surround base to direct the leachate to a central drainage adit from where both leachate and ground water are to be pumped to a surface collection pond. This porous surround is to consist of two layers. A coarse material (3" lump) layer will be covered by a fine material (1/2" lump) filter layer. This fine filter layer is to be used to inhibit the migration of fine grained material into the coarse layer, thus postponing the effects of clogging in the porous surround.

Once the leachate/ground water mixture is deposited into the surface collection pond by the pit pumps, it is fed into the waste water treatment plant. This facility will utilize an activated carbon process (PACT) as the main component in the treatment process. The effluent from this process will target Ontario's Provincial Water Quality Objectives (PWQO) as the discharge criteria. Phosphoric acid will be added to the effluent as it exits this treatment facility for the accelerated decomposition of organic loading (BOD).

A passive wetland will be constructed as a final effluent polishing zone, with its primary purpose being the arrest of effluent which is non-compliant with PWQO, prior to the effluent entering the cold water fisheries of the receiving water courses.

1.3 Regional Description

The Adams Mine landfill proposal is to occur in the district of Timiskaming. This district is located in the northeast corner of the province of Ontario and borders the province of Quebec. It is comprised of twenty-six (26) organized municipalities and many townships without municipal government, and has a combined total population of approximately forty-thousand (40,000) people. The Adams Mine is located just south of Kirkland Lake, Ontario, in Boston Township. Boston Township and those townships immediately adjacent to Boston Township are "unorganized" townships, meaning that they are without municipal government. The mine site is just south of the height of land which divides the Arctic and Great Lakes watersheds, and is at the headwaters for the Lake Temiscaming-Ottawa River watershed. The site is approximately 600 kilometres north of Toronto, and just 20 kilometres from the Ontario-Quebec border.

The economic activity in the northern section of this district is primarily driven by the mining and

forestry industries. Tourism is a minor third component to the economy of this part of the region. The southern section of Timiskaming is quite different. A micro-climate established by Lake Temiscaming permits successful agriculture to occur. This feature, coupled with thick fertile soil, has placed agriculture as the primary economic engine for the southern section of Timiskaming District. A rapidly growing tourism industry is also occurring, which has resulted in substantial growth in the communities of south Timiskaming. The tourism potential throughout Timiskaming is substantial and, if developed properly, could replace the primary resource extraction economy.

The natural environment in the district of Timiskaming is that of a transition zone. The Great Lakes-St. Lawrence forest region merges into the Boreal forest region throughout the district. High elevation areas display the ecology of the Great Lakes-St. Lawrence forest region, while low elevation areas are true Boreal forest. A rather impressive level of bio-diversity results from the merge of these two forest regions in the District of Timiskaming.

The land mass in the northern section of Timiskaming is at a higher surface elevation than southern Timiskaming (average is approximately 600 foot variance). This landmass is characterized as typical Canadian Shield topography. Abrupt changes in surface relief due to bedrock outcropping, large areas of poorly drained, swampy conditions and substantial accumulations of glacial-fluvial deposits (ie. eskers, moraines, etc.) all characterize north Timiskaming. Watershed drainage from this region is north to south. Surface water in this region occurs predominately in lakes, with a minor percentage found in rivers. Ground water is available throughout the region, with the most substantial aquifers found in the glacial-fluvial deposits of sand and gravel.

The land mass of southern Timiskaming is again quite different from the northern region. The primary shaping factors that cause this difference is massive bedrock faulting and the accumulation of a huge glacial lake at the end of the last ice-age. The Ottawa River Rift Valley fault is responsible for preserving a thick limestone layer over the volcanic ‘basement’ geology. This limestone layer dates to the Silurian / Ordovician geological eras. Above this limestone layer and as a direct result of the depression created by the faulting. Lake Ojibway-Barlow was formed at the end of the last ice age. The bottom of this lake is now called the ‘Little Claybelt’ and is host to a thriving agricultural industry. Extremely thick (300 to 400 ft) deposits of lacustrine material overlie the limestone layer. Surface water in this region occurs predominately in rivers that drain the northern section of the watershed into Lake Temiscaming. This lake is the remnant of Lake Ojibway-Barlow, and is the ultimate receptor of all surface and ground water in the district of Timiskaming.

The ‘Little Claybelt’ agricultural area relies almost entirely on ground water for useable water supplies and this ground water is found in great abundance and of high quality in the limestone layer underlying the region. The recharge of this limestone aquifer occurs predominately through seepage along the western and northern edges of the ‘Little Claybelt’ basin. Vertical infiltration through the thick lacustrine deposit offers little recharge to the limestone aquifer. Contributions of ground water through perimeter seepage is most significant from the north/south trending glacial-fluvial esker deposits that remain from the glacial rivers feeding Lake Ojibway-Barlow. The most impressive of these esker deposits is the Munro Esker which extends for over fifty (50) kilometres north of the ‘Little Claybelt’ and reaches widths of over seven (7) kilometres and deposit thicknesses in excess of two-hundred (200) metres.

The ‘Adams Mine’ pits are located at the northern edge of the ‘Little Claybelt’ area in a land mass with a surface elevation greater than six-hundered (600) feet above much of the ‘Little Claybelt’ surface. The Munro Esker flanks the eastern boundary of the Adams Mine site. The potential for this location to influence the water quality in the ‘Little Claybelt’ aquifer is extremely significant.

1.4 Community Response to Project

In 1990, Metropolitan Toronto signed a "willing host agreement" with the municipalities of Kirkland Lake, Larder Lake and Englehart. The agreement set out the financial benefits for those three municipalities, ie. the payments from Metro to the municipalities in exchange for their "willingness" to provide political support for the project. But, in addition to the deal being based on the use of a faulty site, it was also built on a false partnership. The three signing municipalities are all at various distances from Boston Township (where the Adams Mine site is located); Boston Township is outside their boundaries, and outside their jurisdiction.

Boston Township is an unorganized township in Timiskaming District. Not only is it outside of Kirkland Lake's boundaries (the closest of the three signing municipalities) but Boston Township and Kirkland Lake don't even share a boundary. Boston Township is an "unorganized" township, which means it does not have an elected municipal council.

Since 1990, residents throughout the district have been calling for a referendum on the project, wishing to have a democratic voice in a project that will affect the region for generations to come. To date, this request has always been refused. In 1993, the Town of Kirkland Lake did include a project related question on the municpal ballot, asking if voters supported there being a full environmental assessment (EA) on the Adams Mine project. Despite earlier promises that a full EA would be done prior to the project proceeding, and despite 69% support on the municipal ballot for the EA (some did not vote for the EA because they wished to oppose the project even if there was an EA), a full environmental assessment hearing has never been held.

In August 1995, 60% of the residents of Boston Township turned out to register their vote in a poll set up at the Round Lake Fire Hall; 95% of the ballots cast were against the project to convert the abandoned mine in their township into a mega-landfill. In September of the same year, a poll of residents of Larder Lake, one of the so-called "willing hosts", showed 74% opposed. In Chamberlain Township, a nearby municipality who had rejected the offer to share revenue in exchange for political support, the result was 92% opposed. Other municipalities in the area also held polls of various sorts. When elected councillors for the Township of Dack went door-to-door, they found that 94% of the citizens were opposed.

In February, 2000 Timiskaming MPP David Ramsay released the results of a professional poll conducted by Oracle Research of attitudes in Timiskaming District towards the Adams Mine proposal. The results: 85% are concerned about harm to surface and groundwater, and two-thirds are opposed to the project. In September, 2000, the results of a professional poll done by Oracle Research were released, showing 76% throughout the district in opposition, with opposition at 86% among residents downstream of the project.

Opposition is strong and growing through the Districts of Timiskaming and Témiscamingue-Abitibi. On July 30 of this year, 2,800 people participated in a rally in the small town of Earlton which had been organized on less than a week’s notice. Five demonstrations have been held in the district over the last three months, including 4 which have blocked highways or railways or both, and one protest rally of aboriginal communties, hosted by Temagami First Nation and supported by the Chiefs of Ontario, and communities from Treaty 9, the Robinson-Huron Treaty area, and the Algonquins. Two rallies have been held in Témiscamingue, the region on the Quebec side of the

watershed, both protesting the project. The federal member of parliament for Témiscamingue-Abitibi reports that he has received letters from 800 of the 15,000 residents in his riding, and petitions signed by one-third of the poplulation, as of September 12th, 2000. The regional council of municipalities in Témiscamingue has passed a resolution opposing the project, due to anticipated impacts on Lake Temiscaming, and a citizens coalition has been formed to mobilize the opposition to the project from Quebec.

1.5 History of Review and Approvals

1.5.1 Policy Review by Province of Ontario, 1990- 1992

In 1989, an abandoned mine in Boston Township appeared on a list of 83 private sector proposals for the "disposal" of solid waste from Metropolitan Toronto. Some proposals suggested incineration, others proposed dropping baled garbage from airplanes onto crown land in northern Ontario, and several offered landfill sites across or beyond Ontario. In 1990, the proposal to use the abandoned mine was confirmed as Metro's "favourite" when Metropolitan Toronto signed a "willing host agreement" with the municipalities of Kirkland Lake, Larder Lake and Englehart, setting out the financial benefits they would receive in exchange for their "willingness". However, at that same time, the Province of Ontario responded to pressure from residents in Timiskaming District and other rural residents across Ontario to develop waste management policies which would protect communities from being targeted as waste disposal sites by distant urban centres.

A series of policy statements were issued by the Minister of the Environment between 1990 and 1992, and in 1992, Bill 143 was introduced in the provincial legislature. This new “Waste Management Act” enshrined community responsibility for managing their own waste streams, and imposed requirements on the Greater Toronto Area to identify and develop landfills for the disposal of solid waste volumes which were residual to an improved waste diversion program. Further, the legislation established an “Interim Waste Authority” to manage the landfill siting process, and clarified that waste disposal sites outside of the GTA (ie in northern Ontario) could not be presented as an alternative to the GTA sites during the Environmental Assessment Process.

1.5.2 Metropolitan Toronto Adams Mine Site Assessment Process, 1995

Anticipating a change in provincial government and a repeal of the legislation which compelled Metropolitan Toronto and the Greater Toronto Area municipalities to site landfills within the Greater Toronto Area, in May 1995 Metro Toronto began eight months of "public consultation" on using the Adams Mine as a Toronto landfill.

A Public Liaison Committee was established with representation from local communities and organizations, and a strenuous meeting schedule was adhered to, with hundreds of local residents attending many of the sessions. Peer reviewers provided the PLC with some expert advice, which, in combination with local input, led to a majority report from the Public Liaison Committee which strongly recommended that the project not proceed.

On December 20, 1995, the council for Metropolitan Toronto voted against proceeding with the development of the Adams Mine as a waste disposal site, for financial and environmental reasons.

1.5.3 Ontario Environmental Assessment Scoped EA, 1998

In December 1996, Notre Development Corporation submitted an environmental assessment document to the Ontario Ministry of the Environment and asked for approval to use the Adams Mine as a "private sector proposal", meaning the proponent will operate the landfill, and provide disposal of solid waste on a contract basis for municipalities or private sector customers.

In 1998 the provincial Minister of the Environment ordered that an environmental assessment hearing be held, but that it be restricted to one technical question, as set out in the letter of referral from the Minister of the Environment to the Environmental Assessment Board:

> *Pursuant to subsection 9.2 (1) of the Act, the undersigned hereby refers to the Board for a hearing and decision, only the matters set out in the following questions relating to the application submitted by the proponent:*
>
> *Questions:*
>
> 1. *Is the proposed "hydraulic containment" design an effective solution for the containment and collection of leachate that will be generated at the proposed site?*
> 2. *If the answer to Question 1 is "No", is there an alternative method that would be an effective solution for the containment and collection of leachate that will be generated at the proposed site?*
> 3. *If the answer to Question 1 or 2 is "Yes", are the attached draft Conditions of Approval set out in Schedule A-1 appropriate?*
> 4. *If the answer to Question 3 is "No", in whole or in part, what changes to the draft Conditions in Schedule A-1, or additional Conditions, would you impose?*

In plainer terms, the referral meant that the review could look only at the engineering design and whether it would work to keep leachate from escaping out the pit walls. All other environmental and social issues were ruled "out of order", including any discussion about the treatment and release of the 83 billion litres of leachate (the contaminated water produced by directing water to move through garbage in the landfill) which would be generated, the need or alternatives to the project, the transportation impacts related to long distance waste haulage, or any other social or environmental concerns.

The partial EA hearing was the first to be conducted under the revised provincial Environmental Assessment Act, which had been the subject of severe revisions in 1996. In the words of the hearing panel, as written in their decision of 19 June 1998, the changes to the Act had a significant effect on the review:

> *This referral by the Minister of the Environment was a "first" in the sense that (i) the Board was required to consider, under the Environmental Assessment Act, a hearing in which the terms of reference were defined to include only a part of the undertaking and only part of the scope of the environmental assessment*

(excluding, for example, "alternatives to the undertaking") as defined by section 6.1 (2) of the Act; (ii) the Minister has indicated his intention to approve the other aspects of the undertaking: "those matters not referred to the Board" and (iii) the Minister established a deadline for delivery of the Board's decision.

The Minister's "deadline" required that the hearing be completed in just 15 days.

The hearing concluded with a split decision from the 3 person panel; one member concluded that the project was not safe, while the other 2 members concluded that they did not have enough information to determine whether it was safe or not. This June 1998 decision issued by the Environmental Assessment Board issued was called a "conditional approval", with 26 conditions which had to be met before any approval could be granted

Two aspects of the conditions were considered key. Condition 10 ordered that two more test drills be conducted, and that the Director (who would issue the final aproval from the Ministry of the Environment) must conclude, without reservation, that the tests supported the proponent's theory that hydraulic containment would be maintained during the pumping (120 years) and gravity drainage (900 years) phases of the project.

The required two borehole tests were conducted, and results were reviewed by Mr. Paul Bowen, P.Eng, on behalf of the community organizations in the affected area. In Mr. Bowen's professional opinion, the results supported earlier information that indicated the engineered design could not be relied upon to contain the leachate. The Ministry of the Environment was provided with Mr. Bowen's review of the test results, but has at no point responded to this submission.

Despite this new information, in April 1999 the Ministry of the Environment issued the Provisional Certificate of Approval for a Waste Disposal Site in April 1999, with 66 conditions.

1.5.4 Outstanding Provincial Permits and Approvals

While a provisional Certificate of Approval has been issued to operate a waste disposal site at the Adams Mine, there are separate permits required for several of the operating components of the project, under either the Ontario Water Resources Act or the Environmental Protection Act. They include:

Dewatering the South Pit

On August 15, the Ministry of the Environment released a draft of a "Permit to Take Water" to the Adams Mine Community Liaison Committee, giving them 15 days to comment on the permit. The CLC is an advisory committee established by Notre Development under an order by the Environmental Assessment Board. The Ministry of the Environment (MOE) refused to provide copies of the draft to anyone who is not on the CLC. Ordinarily, notice of draft permits are posted on the Internet for public comment, and copies provided on request. The permit, if issued, will allow Notre Development to drain the water from the South Pit at a rate of 25 million litres per day. A total of 4 billion litres of water will be released into the Misema River, via the tailings area. Key issues includes the potential for the disolution of contaminants contained within the tailings when this water is released via the tailing area, the potential for suspended solids loading

to the Misema River to increase during the dewatering, and potential for the tailings dam structures to be weakened by sudden and increased load.

August 31 was the deadline for commenting on the draft permit; the draft indicated pumping is to start on September 1, but Notre Development has advised the CLC that they are seeking a November 1 start date. The permit would be issued under Section 34 of the Ontario Water Resources Act (OWRA). Due to the magnitude of the undertaking, this permit should be subject to a hearing under the Ontario Water Resources Act prior to approval, but there has been no indication that a hearing will be granted.

Leachate Treatment Plant and Constructed Wetlands

The design and effectiveness of the leachate treatment plant and the effect of releasing the 83 billion litres of contaminated water into an artificial wetland constructed on a tailings management area (which was designed for a limited life span) were excluded from the 15 day EA hearing held in 1998. A Certificate of Approval under Section 53 of the Ontario Water Resources Act will be required for the on-site leachate treatment plant and the constructed wetlands. A general application was made to the Ministry of the Environment in 1996 at the same time as the EA application, but the specifics of the design and operation of the facility and constructed wetlands had not been completed at the time of the EA hearing. This approval is a major item and, again, should be subject to a hearing under the OWRA.

Stormwater Management

A Certificate of Approval under Section 53 of the OWRA is needed for the stormwater management facilities proposed for the mine site and associated facilities. This was not a matter considered during the 15 day EA hearing

Landfill Gas Control Plant and Flares

A Certificate of Approval Under Section 9, EPA for the landfill gas control plant and flares (this is for the capture and use or faring of methane gas which will be produced by the landfill). This was not a matter considered during the 15 day EA hearing.

2.0 Basis for a Federal Environmental Assessment

2.1 Aboriginal Interests

On September 1, 2000, the Timiskaming First Nation submitted a petition to the federal Minister of the Environment, requesting a federal environmental assessment of the Rail Cycle North proposal to develop the Adams Mine as landfill. That petition was supported by a summary of evidence and appropriate documentation, including:

- an identification of transboundary impacts resulting from the proposed undertaking
- an assertion of Aboriginal interest in the lands to be affected
- an identification of other federal lands in addition to the Indian Act reserve lands which will be affected

The Timiskaming First Nation, in their petition, set out the facts with respect to federal lands and the Aboriginal Interest in those lands, in accordance with Section 48(1) of the Canadian Environmental Assessment Act, which states:

> *48. (1) Where no power, duty or function referred to in section 5 or conferred by or under any other Act of Parliament or regulation is to be exercised or performed by a federal authority in relation to a project that is to be carried out in Canada and the Minister is of the opinion that the project may cause significant adverse environmental effects on*
> *(a) lands in a reserve that is set apart for the use and benefit of a band and that is subject to the Indian Act,*
> *(b) federal lands other than those mentioned in paragraph (a),*
>
> *(c) lands that are described in a land claims agreement referred to in section 35 of the Constitution Act, 1982 and that are prescribed,*
>
> *(d) lands that have been set aside for the use and benefit of Indians pursuant to legislation that relates to the self-government of Indians and that are prescribed, or*
>
> *(e) lands in respect of which Indians have interests,the Minister may refer the project to a mediator or a review panel in accordance with section 29 for an assessment of the environmental effects of the project on those lands.*

The signatories to this petition wish to adopt the submission of the Timiskaming First Nation as a statement of fact with respect to the Aboriginal interest, and request that the Minister refer the project for a panel review on the basis of the petition of the Timiskaming First Nation, further to Section 48(1) of the Canadian Environmental Assessment Act.

2.2 Transboundary Impacts

As set out in other sections of this brief (namely Sections 3 and 4, which describe the surface water impacts to the receiving environment and the implications for groundwater and surface water related to a failure of the hydraulic containment), there will be sigificant and adverse effects

on the transboundary watershed of the Blanch River, Lake Timiskmaing and the Ottawa River, which is shared by Ontario and Quebec.

The impact of the proposed Adams Mine landfill on surface water and fisheries resources will be both long term and far ranging. The design proposes to pour a steady stream of diluted leachate into a trans-provincial water system for over 1000 years. There is a lack of hard data to demonstrate the characteristics of the untreated leachate and the effectiveness of the proposed treatment. Long term and short term performance of the proposed constructed wetland is unknown. Potential impacts of a number of parameters, chemicals and metals have been understated in the proponent's studies due to inappropriate methods or out of date criteria.

The Canadian Environmental Assessment Act bestows on the Minister of the Environment the power to refer to panel review or mediation any project which may cause adverse environmental effects on a province other than the province in which the project is taking place, as set out in Section 46(1) of the Act:

> *46. (1) Where no power, duty or function referred to in section 5 or conferred by or under any other Act of Parliament or regulation is to be exercised or performed by a federal authority in relation to a project that is to be carried out in a province and the Minister is of the opinion that the project may cause significant adverse environmental effects in another province, the Minister may refer the project to a mediator or a review panel in accordance with section 29 for an assessment of the environmental effects of the project in that other province.*

The signatories to this petition request that the Minister refer the proposed undertaking for an environmental assessment review by a review panel, based on the duties set out in Section 46(1), the potential for significant adverse environmental effects described in this submission, and any other additional adverse environmental affects which may be brought to the Minister's attention.

2.3 Impacts on Fish and Fish Habitat

On May 26, 1997, the Department of Fisheries and Oceans (DFO) provided comments to the Ontario Ministry of the Environment and Energy Environmental Assessment Branch with respect to the proposed waste disposal facility at the Adams Mine. Mr. Ed DuBruyn, Fish Habitat Biologist with the Department of Fisheries and Oceans wrote:

> *For the Fisheries Act to apply to a proposal, the fish habitat in question must support either directly or indirectly, or have the potential to support, a commercial, recreational or subsistence fishery... The tailings lake upstream of Dam #6 (Moosehead Lake) has a resident fish community directly linked to Moosehead Creek and Misema River which are known fishery areas. Therefore the Fisheries Act does apply to Moosehead Lake.*

As outlined in Sections 3 and 4 of this submission, there will be a massive release of landfill leachate into Moosehead Creek, which DFO has acknowledged as a known fisheries area. The leachate includes a broad array of contaminants, several which are in exceedence of provincial and/or federal water quality standards. These releases meet the Fisheries Act definition of a deleterious substance.

Section 34(1) of the federal Fisheries Act sets out what constitutes a deleterious substance:

> *34. (1) For the purposes of sections 35 to 43,"deleterious substance" means*
>
> *(a) any substance that, if added to any water, would degrade or alter or form part of a process of degradation or alteration of the quality of that water so that it is rendered or is likely to be rendered deleterious to fish or fish habitat or to the use by man of fish that frequent that water, or*
>
> *(b) any water that contains a substance in such quantity or concentration, or that has been so treated, processed or changed, by heat or other means, from a natural state that it would, if added to any other water, degrade or alter or form part of a process of degradation or alteration of the quality of that water so that it is rendered or is likely to be rendered deleterious to fish or fish habitat or to the use by man of fish that frequent that water, and without limiting the generality of the foregoing includes*
>
> *(c)any substance or class of substances prescribed pursuant to paragraph(2)(a),*
>
> *(d) any water that contains any substance or class of substances in a quantity or concentration that is equal to or in excess of a quantity or concentration prescribed in respect of that substance or class of substances pursuant to paragraph (2)(b), and*
>
> *(e) any water that has been subjected to a treatment, process or change prescribed pursuant to paragraph (2)(c);*
> *"deposit" means any discharging, spraying, releasing, spilling, leaking, seeping, pouring, emitting, emptying, throwing, dumping or placing;*
> *"fish habitat" means spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes;*
> *"water frequented by fish" means Canadian fisheries waters. Regulations for purpose of definition "deleterious substance"*

Further, Section 36(3) and 36(4) of the Fisheries Act sets out that no person shall deposit a deleterious substance into waters frequented by fish, with the exception of any deposits of such deleterious substances as authorized by regulation:

36 (3) Subject to subsection (4), no person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water.

36 (4) No person contravenes subsection (3) by depositing or permitting the deposit in any water or place of (a) waste or pollutant of a type, in a quantity and under conditions authorized by regulations applicable to that water or place made by the Governor in Council under any Act other than this Act; or(b) a deleterious substance of a class, in a quantity or concentration and under conditions authorized by or pursuant to regulations applicable to that water or place or to any work or undertaking or class thereof, made by the Governor in Council under subsection (5).

It is the view of these petitioners, and supported in fact and statements of evidence included in and attached to this brief, that the proposed undertaking will result in a large deposit of deleterious substances into waters frequented by fish.

Given that this deposit is going to take place, and given that the deposit of the deleterious substances can only be done with authorization (permit) from the Department of Fisheries and Oceans, a permit must be required of that Department. Further, given that the Fisheries Act is included on the Law List for the Canadian Environmental Assessment Act, an environmental assessment becomes mandatory under CEAA. However, the Department of Fisheries and Oceans have, to date, failed to properly exercise their duties as a Responsible Authority. The basis for this inaction may relate to a statement included in Mr. DeBruyn's letter of May 1997, already referenced, in which he states:

Based on the information provided us, the proposal does not state that an activity will be undertaken in this area which will result in a harmful alteration, disruption or destruction of fish and fish habitat. Therefore, no Fisheries Act authorization pursuant to Section 35(2) of the Fisheries Act will be required. As the (sic) is no regulatory for trigger for DFO, we will not be initiating a Canadian Environmental Assessment Act review nor will we be a Responsible Authority for a Canadian Environmental Assessment Act review should another federal department be required to initiated (sic) such a review."

Clearly, the Department has failed to date in its duty to protect fish and fish habitat. It would seem, based on the only written comment DFO appears to have provided on the Adams Mine project, that the Department's views on the project was formed solely by a site visit and the review of material provided the proponent. DFO has erroneously concluded, based on their limited observations, that, since the proposal does not state that an activity will be undertaken in this area which will result in a harmful alteration, disruption or destruction of fish and fish habitat (emphasis added), then such an alteration, disruption or destruction will not take place. This conclusion is unsupported by

DFO, and is erroneous.

The project will release an estimated 312 million litres of contaminated leachate each year directly into waters frequented by fish. Such a deposit is prohibited under the federal Fisheries Act, with the exception of those instances when authorized under the Act. In such cases, a permit would be required, making the project subject to a mandatory federal environmental assessment.

2.4 Jurisdiction under the Canadian Constitution

While the Canadian Environmental Assessment Act provides the Minister with a discretionary power to refer a project or activity to a panel review or mediation if there are transboundary effects, the Canadian constitution additionally rests authority over interprovincial matters with the federal government.

The constitution sets out a division of powers between the federal government and the provinces. Under this division of powers, the federal government is given exclusive jurisdiction over inter-provincial matters. In effect, the provinces do not have the power to do things which may substantially affect other provinces; only the federal government has the power to do such things. The Adams Mine landfill proposal poses a significant threat to the Lake Temiscaming and the Ottawa River watershed, which is an interprovincial watershed, shared by Ontario and Quebec. The project is an inter-provincial matter, which is outside the constitutional power of the Province of Ontario to approve. Rather, the jurisdiction lies with the federal government.

2.5 North American Free Trade Agreement

In August 2000, an independent tribunal under the North American free-trade agreement ruled that Mexico must pay California-based Metalclad Corp. a total of $16.7-million (U.S.) as compensation for a Mexican municipality's refusal to allow the company to run a hazardous waste dump. The decision demonstrates that, under NAFTA, local governments will have difficulty regulating foreign corporations, such as the U.S. based Waste Management Inc, which is full owner of Canadian Waste Services. Canadian Waste Services is poised to purchase Notre Development, and become full owners of the Rail Cycle North Consortium, which is proponent for the Adams Mine landfill proposal. Should the Adams Mine proposal move forward with foreign-owned Canadian Waste Services as owner, domestic governments will have difficulty limiting the use of the landfill, even after environmental harm is demonstrated (ie. in the course of the landfill's proposed operating period).

The August 2000 NAFTA ruling also demonstrates that it is the federal government which will be found financially responsible for "damages" in the case of any trade dispute under the trade agreement. In the case of the Metalclad Corp., the Mexican government was ordered to pay $16.7 million (U.S.) as compensation for investment made in the property; the company had also argued for compensation for lost business opportunities. In the case of the Adams Mine, the 1995 estimate of capital cost investment, with the Municipality of Metropolitan Toronto as proponent, was approximately $450 million (CDN); the estimate provided to the City of Toronto in 2000 was substantially lower at an estimated $125 million (CDN). While no explanation of the gap between

figures has been made available, suffice to say that a figure anywhere within that range would be a significant penalty to be paid by Canadian taxpayers. Yet, such would be the outcome of a quite predictable scenario: the landfill proceeds to development under U.S. ownership, deleterious impacts result, use of the landfill is suspended, and Waste Management Inc. seeks damages under NAFTA, in a manner similar to that just exercised by Metalclad Corp.

3.0 Surface Water Impacts

The impact of the proposed Adams Mine Landfill on surface water and fisheries resources will be both long term and far ranging. The design proposes to pour a steady stream of diluted leachate into a trans-provincial water system for over 1000 years. The flow will continue until all of the toxins, chemicals and metals have been leached from the 20 million tonnes of waste and have been absorbed into the receiving water system .

The proponent's hypothetical non-hydraulic containment scenario identifies surface water features as the receptor for 100% of the untreated leachate in the event of a loss of hydraulic containment.

Despite these facts, surface water impacts were not dealt with during the scoped environmental assessment hearing.

3.1 Leachate and Effluent

In order to accurately characterize treated landfill effluent it is necessary to know:
a) The chemistry of the untreated leachate because, as Alan Winter, P.Eng., indicates:

> *All of the modeling and analysis that has been undertaken to assess potential surface water impacts relies on the accurate characterization of leachate*.; and

(b)What the proposed treatment is capable of removing.

3.2 Leachate Characterization

Notre's summaries of leachate quality in 3 Toronto area landfills show large variances in key parameters between each site. For instance, cadmium levels, range from .004 to .036 mg/L, lead levels range from .1 to .57 mg/L, chromium levels range from .11 to .22 mg/L and chloride levels range from 1,034 to 3,572 mg/l. Rather than indicate what is likely to be in the leachate generated by the proposed Adams Mine Landfill, these studies only serve to illustrate that leachate quality is highly variable between landfills.

Notre's consultants chose to estimate the untreated leachate chemistry based on modelling for only 17 selected contaminants. The remaining 61 contaminant concentrations, including phosphorus, cyanide, aluminum, arsenic cadmium, nickel, chromium, mercury, and most all of the organic concentrations, were "estimated as a percentage of the Keele Valley (landfill) measured values, based approximately on the ratio of modelled to measured values for the flagged (selected) contaminants" as stated in Appendix B of the Notre Adams Mine Environmental Assessment.

The reliability of this method of estimating concentrations in the untreated leachate is questionable. As Alan Winter, P. Eng. comments:

> *A sensitivity analysis of the leachate characterization was not performed. It is likely that waste disposed at the GTA landfill sites does not specifically represent the types of waste proposed to be landfilled at this site.*

Dr. Fred Lee states that the estimated concentrations of constituents in the untreated leachate could be in significant error due to the modeling approaches used. Additionally, Dr. Lee notes that the modeling was remiss in not addressing the issue of potentially hazardous unregulated chemicals:

> *This modeling effort ignores the fact that there are over 60,000 -100,000 chemicals in commercial use today, and the municipal solid waste stream typically contains many thousands of chemicals that are unregulated and for which there are no standards. To assume, as Notre/SENES have done, that only a few regulated chemicals of the type that they considered would be key constituents in the leachate is at best naive and certainly inappropriate.*

> *One of the parameters that should have been included in the modeling effort is a surrogate for the potentially hazardous unregulated organics present in municipal solid waste leachate. Over 95% of the organics in municipal solid waste leachate are uncharacterized. There is no question that these organics contain hazardous chemicals that in the future will be identified as parameters that will have to be controlled. As more is learned about leachate, more information is being developed on the significance of the unregulated organics. A surrogate compound which is assumed to represent the potential hazard and worst-case behaviour of these organics could and should have been used in the modeling effort to evaluate their behaviour with respect to influencing the contaminating lifespan.*

M. Story, P. Eng, questions the fact that many conventional contaminants were emitted from the modeling exercise and not even considered as part of the provincial EA. Ms. Story is concerned that the following contaminants were emitted entirely from the EA study:

Parameter	
Fluoride	(Maximum Allowable Concentration in drinking water (MAC) = 1.5 mg/L)
Nitrite	(MAC = 1.0 mg/L)
Uranium	(MAC = 0.1 mg/L and Interim Provincial Water Quality Objective (PWQO)= 5 µg/L)
Unionized Ammonia	(PWQO = 20 µg/L)
Boron	(Interim MAC = 5.0 mg/L and Interim PWQO = 200 µg/L)
Zirconium	(Interim PWQO = 4 µg/L)
Antimony	(Interim PWQO = 20 µg/L)

Also, M. Story, P. Eng., points out that:

> *The EA was remiss in not addressing radiological isotopes of which 78 have MACs and 5 (Cesium 137, Iodine 131, Radium 226, Strontium 90, and tritium) have Provincial Water Quality Objectives, and more importantly, it was also remiss in not addressing microbiological parameters such as Escherichia coli, (PWQO = 100 per 100 mL and MAC = 0 per 100 mL) and fecal coliforms.*

Finally, Ms Story, P. Eng., points out that:

> *Notre's EA did not address the more toxic form of ammonia, unionized ammonia. When ammonia is present in water it is present in two forms: ionized ammonia (NH_4+) and unionized ammonia (NH_3). The ratio of ammonia to unionized ammonia is pH and temperature dependent. The higher the temperature and the pH the more unionized ammonia will be present. Therefore at a ammonia concentration of 1 mg/L, an ambient temperature of 20 degrees Celsius, and a pH of 6.9 (conditions presented in Notre's EA), the unionized ammonia concentration will be 3 ug/L. However, if this pH is allowed to increase to 7.7 at a temperature of 20 degrees Celsius, the unionized ammonia concentration increases to 20 ug/L. What does Notre plan to do to ensure that the unionized ammonia concentration always remains below the PWQO. What are the human and environmental effects of discharging an effluent into the Misema which contains unionized ammonia*.

3.3 Leachate Treatment

Similarly, there is a lack of actual operating data to demonstrate the effectiveness of the proposed leachate treatment. Tables showing the performance of the powdered activated charcoal treatment (PACT) system in operation leave out key parameters of concern. For example, there is no information to show how much, if any, mercury is removed by the PACT system. Yet, somehow, Notre's consultants are able to estimate that the mercury concentration in the leachate will be reduced from 0.0004 mg/L (a concentration twice the PWQP) to < 0.00002 mg/L as the leachate passes through the PACT system. They provide, however, no basis for such an assertion.

Considering the facts as presented above, it can only be concluded that the stated concentrations of many of the substances within the leachate both before and after the PACT treatment are speculative at best.

Furthermore Notre's EA study was remiss in not modelling or considering the possible human health and environmental effects of many contaminants such as fluoride, nitrite, uranium, unionized ammonia, boron, zirconium, antimony, radiological isotopes and microbiological parameters.

3.4 Constructed Wetland

There are many unanswered questions about the effectiveness of the proposed constructed wetland. It is unclear over the long term whether it will be a benefit or ultimately a massive liability.

In reference to the tailings pond, which is going to be used as the base of the wetlands, Alan Winter, P. Eng. notes that:

> *…no information is provided that quantifies the integrity or remaining life expectancy of this facility. Could this facility be subject to failure and if so, under what mechanisms could this facility fail. What would be the consequences of its failure? Would contaminated sediments that have been collected in the tailings pond be*

released to the environment?

The tailings dams, which are integral to the integrity of the wetland system, were not designed to contain saturated wastes for over 1000 years, whereas the estimated contaminating life span of the Adams Mine Landfill. Studies need to be conducted to determine the realistic service life of these structures and the implications of their maintenance on the long term capital and operating costs associated with this project.

The failure of tailings containment structures is not uncommon in northern Ontario, even within the design life of the system. In April 1991, for example, a two year old tailings dam washed out at the St. Andrew Goldfields Stock Township Mine west of the town of Matheson spilling cyanide-laced water into a river system. That dam, incidentally, was designed and its construction supervised by Golder Associates (lead consultant for the Adams Mine landfill proposal).

The contaminant removal efficiency of wetlands is not consistent and varies from one wetland to the next depending on a number of factors including maturity of the wetland cell, the type of wetland (i.e. surface flow or sub-surface flow), the substrate material, the vegetation species within the wetland, the biological life in the wetland, the detention time within the wetland, the loadings to the wetland, the control and maintenance of water levels within the wetland, the season and ambient temperature and the rate of flow.

As Alan Winter, P. Eng. notes:

> *Artificial wetlands take considerable time (several years) to become established and to become effective as a treatment process. The time period is highly variable and the effectiveness usually increases over time. The removal rates that have been used in the analysis by the proponent would be representative of a well established wetland complex.*

Notre's consultants refer to their proposed constructed wetland as a "passive system". According to Maria Story, P. Eng.:

> *Effective wetlands are not passive systems. Wetland systems have to be managed, monitored, and the water levels in them have to be controlled, especially in cold northern climates such as the one in the Adams Mine area.*

In a book entitled "Treatment Wetlands" (1996), by Robert H. Kadlec and Rober L. Knight's, both world renowned wetland experts, this is further emphasized in the following statement:

> *'Operating a wetland treatment system is similar to guiding an ocean liner in a confined space with a tugboat. Changing the direction of the ocean liner takes considerable time and energy. Once a new course is established, it takes a large amount of time and energy to return to the original course or to an alternate course. Incorrect operational control decisions and design errors can cause prolonged periods of poor operational performance in constructed wetlands and significant*

ecological changes in a natural wetland. Early detection of subtle changes in a treatment wetlands water quality and biological resources requires adequate data collection and frequent data analysis".

In his comments on the proposed wetland system Dr. Fred Lee noted that:

… the approach used by Notre in making predictions for the characteristics of the wetlands effluent ignored hydrologic factors where, at times, a wetlands effluent is of poorer quality than the influent. While wetlands can be effective in removing constituents during active growing periods, they release constituents at a high rate during non-growing periods, especially during high flows.

Additional questions including the removal of ammonia during winter months and long term effectiveness (over 1000 years) of the wetlands need to be addressed. Also, the effects that constructing the wetland in the tailings area would have on the integrity of the tailing containment structures, and whether contaminants from within the tailings are transferred to the leachate as it traverses the tailings/wetland, have not been adequately investigated. Furthermore, detailed studies are necessary to accurately assess both the short and long term effects of the tailings/wetland on the quality of the effluent discharged to surface water and the surface water receptors.

3.5 Acute Toxicity and Bioaccumulation

Potential impacts of a number of parameters, chemicals and metals of concern are understated due to inappropriate methods or out of date criteria. Mercury is one example.

Dr. Fred Lee comments:

The mercury risk assessment approach does not adequately consider the levels of mercury that are known to be of significance today compared to the values that were selected for assessing the hazard by the proponent.

Additionally, in reference to fish samples tested by the proponent, he notes that:

…the analytical methods used for mercury do not have sufficient sensitivity to measure it at concentrations that can bioaccumulate to excessive levels in fish, rendering them dangerous to people who use them as food.

Maria Story, P. Eng. questions:

How will the production of methyl mercury (many times more toxic than mercury) as a result of residual levels of mercury in the treated leachate/groundwater/rainwater mixture, be prevented in the wetland?

The book “Treated Wetlands” by Robert H. Kadlec and Robert L. Knight, 1996 outlines this

problem:

> *Under anaerobic sediment conditions, mercuric ions are biomethylated by microorganisms, resulting in trace concentrations of mono- and dimethyl mercury, which are more toxic than the more abundant mercuric forms. Methylated mercury is a serious problem in aquatic ecosystems because it is readily bioconcentrated in the food chain. Total mercury concentrations are significantly higher in animals than in plants because of the selective storage of methylated mercury compounds in fats and because of low depuration rates.*

Another example is chromium. Chromium PWQO used by the proponent (100 µg/L) is out of date with what is currently understood about this metal in an aquatic environment. The Canadian Water Quality Guidelines set the limits for chromium at 2 µg/L to protect aquatic life. The proponent's predicted discharge of chromium from the PACT treatment is <.05mg/L (i.e., <50 µg/L). There is no data offered to demonstrate that the wetlands will reduce chromium levels in the effluent. Assuming no removal in the wetlands and a conservative concentration of .04mg/L (i.e., 40 µg/L), the discharge into the receiving body would be 20 times the Canadian Water Quality Guideline. Even with a reduction of 50%, the chromium levels would be 10 times over the guideline.

Cadmium is yet another example. Maria Story, P. Eng. has the following comments on cadmium:

> *Cadmium which is predicted to be above its respective PWQO, even subsequent to engineered water treatment, is on the Primary List of Candidate Substance for Bans, Phase-Outs or Reductions. According to the MOEE's Candidate Substances for Bans, Phase-Outs or Reductions-Multimedia Revision dated October 1993. Cadmium is expected to bioconcentrate in the food chain and bioconcentration factors in freshwater fish have been reported as high as 30,000 times. In short and long term tests, cadmium has been found to be highly toxic to freshwater fish and invertebrates. It is also moderately toxic to aquatic vegetation. Notre Development should not be allowed to discharge this contaminant into the environment, not even into their wetland, at any concentration.*

In commenting on the proponent's Hazard Assessment Aquatic Toxicity study, Dr. Fred Lee states:

> *A review of the material presented in this section shows that the authors have chosen to use LC20 values. This approach is not protective. LC values can be and often are higher than the values that are needed to protect the aquatic life from chronic toxicity effects.*

Additionally Dr. Lee is critical of the proponent's assumption that a median value should be considered representative of the true typical conditions of a waterbody:

> *Chemicals do not affect organisms based on their average concentrations. The*

"concentration- duration" of exposure relationship must be considered in evaluating potential harm.

Further, as Maria Story, P. Eng. notes:

PWQOs are not set for the protection of humans, but the protection of aquatic life. Two separate analyses should be done: the toxicological impacts of this landfill proposal and its associated waste streams on human health and the toxicological impacts of the landfill proposal and its associated waste streams on the receiving environment.

3.6 Discharge into Watercourses and Fisheries

Some work has been done with respect to the assimilative capacity of the Misema River as the receptor of the effluent from the landfill. More information is necessary to assess the impacts of the proposed discharge of contaminated effluent into this watercourse.

Alan Winter, P. Eng., questions what the water quality conditions of the receiving streams will be under spring time runoff and summer time rainfall events. He also notes:

The predicted concentrations for the Misema River mean flow are based on a mean annual flowrate of 7,200 L/s. We question the validity of using mean annual flow rate when assessing net effects.

Dr. Fred Lee agrees:

The use of the mean – median value can skew the values in favor of allowing greater discharges of pollutants to the Misema River. Such an approach can readily result in harm to the river through inadequate treatment of the leachate.

The proponent also proposes to use Moosehead Creek, a watercourse defined as a fishery area, to carry the effluent approximately 1 km to the Misema River. In the proponent's Addendum G2, Surface Water, there are sections devoted to the Tailings Pond Discharge Quality (5.4.3) and Misema River Water Quality (5.4.4) but no attention is given to the effects on Moosehead Creek.

Maria Story, P. Eng. has expressed concerns about this lack of information:

The Moosehead Creek has a very low to almost non-existent flow, at certain times throughout the year, and contains very high quality water. What will be the impact of discharging this wastewater stream into the Moosehead Creek? Does the Moosehead Creek have the assimilative capacity required for this discharge? Notre's EA talks about the Misema River having a great enough dilution ratio to accommodate the discharge, but does not make any mention of the environmental impact on the

Moosehead Creek and its associated wetlands as a result of it being used as the method to convey the discharge to the Misema River. ……. Has the use of a mixing zone in the Moosehead Creek been evaluated opposite the mixing zone limitations as imposed by the PWQOs?

Little attention is given by the proponent to waters beyond the Misema River. A section titled "Blanche River Water Quality" (5.4.5 Addendum G2-Surface Water Quality) simply compares the drainage area of the Blanche to that of the Misema and, by a simple calculation, attempts to demonstrate that the projected phosphorous loading from the landfill effluent should represent less than 0.2% of the total phosphorous load in the river.

Notwithstanding the fact that the proponent's figures for phosphorous are highly questionable (i.e., there is no basis provided for their estimated concentrations and they indicate that phosphoric acid will be required in the treatment process to adjust pH), this study is completely inadequate compared to what is needed to assure the rights, health and safety of downstream users of the water and the aquatic life in the Blanche River, Lake Temiscaming, the Ottawa River, and all other waters connected to this large system.

The proponent's studies, for the most part, look at concentrations of contaminants within the discharge effluent. This does not give an accurate picture of the net results of this undertaking.

The proposed landfill is designed in such a way that, eventually, all the contaminants/pollutants in the waste will be flushed out by a combination of groundwater, rain and surface runoff. Over the short term, some of the contaminants will be captured in a sludge during the treatment process. But, since the sludge will be returned to the pit, over the long term these contaminants will be flushed out too. The end receiver of all the contaminants/pollutants is the surface water. An accurate environmental and human health assessment of this undertaking must include studies which will show what the net loading will be, over the long term, to downstream receptors.

3.6 Monitoring of Impacts

The proponent, while claiming that the studies are both accurate and conservative, assures us that any miscalculations will show up in the monitoring program and that the necessary steps will be taken to assure environmental protection. This is no assurance at all. The company or companies that run the site will be doing so with a large profit in mind. It is unreasonable to think that such a company would undertake a large and expensive monitoring/remedial operation if they could avoid it. To assume that the Ontario Ministry of the Environment will police and enforce the monitoring is completely unrealistic in Ontario today. When the Ministry of the Environment is incapable of monitoring and ensuring safe drinking waster in southern Ontario, it is unlikely that a dump site in northern Ontario will get the attention or protection that it requires. This attention and protection is especially important when you consider the magnitude of this project and its potential to cause extremely adverse affects.

4.0 Hydraulic Containment Failure

4.1 Waste Placement

The waste receptacle at the 'Adams Mine' will utilize two distinct areas for the depositing of waste. The imaginary line separating these two areas is the surface elevation of the static water table (*340m – see Figure 3 titled 'Diagrammatic Cross-Section'*). Waste stored below this line will be heavily saturated with ground water and when the pit is maintained in a dewatered state, the movement of ground water / leachate will be governed by the hydraulic containment principle. The leachate generated in this section of the waste mound will be maintained within the pit by the inward ground water pressure gradient.

Waste mounded above the static water table elevation will not be subjected to the forces of hydraulic containment. Leachate generated within this waste mound may surpass the leachate volume expected in the lower section of the waste receptacle. This assumption is based on the expected damage of the final cover over the waste receptacle due to waste settlement. During this waste settlement period, the landfill operator is expected to ensure the final cover slopes are maintained and shall provide regular monitoring of the final cover to minimize the potential of surface water ponding in depressions on the waste mound.

Even with diligent inspection of the final cover, the damaged drainage layer will not efficiently permit surface water from precipitation to enter the porous drainage surround and percolate to the pit sump. This 'trapped' water will ultimately saturate the waste mound above the static water table and form large amounts of leachate. The movement of leachate in this area of the waste receptacle will not be governed by the inward pressure gradients of hydraulic containment.

Based on findings from the environmental assessment of Cogema's JEB tailings management facility at its McClean Lake site in northern Saskatchewan, it is the petitioners view that the storing of waste above the static water table elevation is dangerous and should be viewed as a

Figure 3 titled ‘Diagrammatic Cross-Section

design flaw in the Adams Mine landfill proposal. Briefly, in the assessment evaluation for Cogema's JEB facility, Environment Canada was concerned about waste placement above the sandstone–overburden contact zone in the upper section of the pit, due to the potential for a contaminated plume to travel horizontally away from the pit along fractures in the sandstone formation. The Adams Mine landfill proposal will mound waste to a height of fifty-five (55) metres above the static water table elevation, relying solely on a thin drainage layer to prevent the outward migration of a contaminant plume into a highly fractured / weathered bedrock layer.

4.2 Contingency Measures

Should leachate escape from the waste receptacle, the ultimate receptor will be the Misema River. This assertion is based on work done by Golder Associates, which established this river as the potentiometric 'low' in the immediate area's water table. Thus, all ground and sub-surface water movement is assumed to 'upgrade' into this river.

Once a leachate plume enters this river through either sub-surface or ground water movement, one can expect an adverse impact to occur in the cold water fishery of this river. The extent and severity of this impact will be directly proportional to the volume of leachate in the plume. Migration of a leachate plume downstream of the Misema River into the Blanche River and ultimately into Lake Temiscaming, will occur and the only level of contingency available will be the dilution capacity of these water courses / bodies.

Relying on the high inward pressure gradient measured across the pit walls, the project proponent has basically ignored the development of a contingency measure to address the escape of a leachate plume from deep within the waste receptacle. Escape of a leachate plume into the upper ten (10) metre layer of highly fractured / weathered bedrock is to be mitigated by the excavation of an 'interceptor' trench and the use of blasting to enhance the hydraulic conductivity of the bedrock layer.

This concept has never been proven in actual field testing and, to quote Environment Canada in its assessment of Cogema's JEB tailings facility:

> "*The effectiveness of the method to enhance permeability in the bedrock is questionable. The various possible interactions with ground water flows in existing fracture patterns as well as difficulties with how to assess the effectiveness of the 'hydraulic cage' in resolving the problem, further add to the uncertainties".*

The last point made in the above quote is of significant importance to the Adams Mine proposal since the use of standard monitoring wells for the evaluation of ground water quality is intended. The view of the petitioners is one which is highly critical toward the use of monitoring wells in a fractured bedrock environment. This view is supported by the response of Golder Associates hydrogeologist, Sean McFarland, when presented with the following question during the provincial EA hearing. This question was posed with respect to the interval spacing of the proposed monitoring well network around the South Pit. EA panel member, Don Smith, asked Mr. McFarland:

"*If there's a leachate pathway, fractures, whatever, either in the upper 30 metre zone or in the upper 100 metre zone – if these monitoring wells are not hydraulically connected to the pathways, is it possible that the leachate could slip through in this interval distance?"*

Mr. McFarland's response to this question was:
"That's correct."

It is the petitioners view that the level of monitoring and contingency planning is inadequate to protect the aquatic habitats of the Misema and Blanche Rivers, should a leachate plume migrate through the sub-surface bedrock layers. The long term escape of leachate into these water courses would eventually display severe adverse changes in the aquatic environment of Lake Temiscaming.

4.3 New Borehole Evidence

During the provincial EA hearing for this proposal, hydrogeologist Paul Bowen, P.Eng identified an error in the computer modeling effort carried out by Golder Associates for the 'gravity drainage' phase of the Adams Mine landfill. This error involved conflicting measurements for the allowable leachate level in the waste receptacle (mine pit) during this phase.

Basically, the leachate will rise to an elevation of 325 metres above sea level (masl) during the gravity drainage phase. Mr. Bowen noted that at one test location in the only borehole drilled under the pit floor, the equivalent 'head' reading was less than the allowable leachate elevation during the gravity drainage phase. This location produced a 'head' reading of 306 masl which indicated that, should leachate be allowed to rise to the 325 metre level in the waste receptacle, reverse circulation would occur and the leachate would flow out through the pit floor and into the surrounding water table along the feature outlined by this low 'head' value. The result of this observation was an order by the EA hearing panel that the proponent further investigate the magnitude of the upward pressure gradients through the pit floor by drilling two more test wells.

The order was carried out during the summer season of 1998. The results of the first test well was such that out of fourteen (14) test intervals, none of the equivalent 'head' measurements were greater than 325 masl. In fact, the highest value obtained was 316 masl while the lowest value was 260 masl. The second test well produced marginally better results with eight (8) out of thirteen (13) test intervals exceeding the minimum allowable 'head' measurement of 325 masl.

Upon review of these test results, Paul Bowen, P.Eng, a hydrogeologist and principal of Terraprobe Ltd., stated in a sworn affidavit dated March 19, 1999, that :

Having regard for the results of the two new boreholes, I cannot conclude without reservation, that the recorded ground water levels will sustain hydraulic containment in the South Pit such that the environment will be protected during both the pumping and gravity

drainage phases. To the contrary, it is my opinion that the new borehole results confirm the presence of conductive bedrock structures which would cause or permit the escape of leachate from the South Pit during the gravity drainage phase.

4.4 Biological Clogging (Incrustation)

The Adams Mine proposal utilizes a highly engineered system for the control of leachate volume and movement within the waste receptacle. This 'engineered' system consists primarily of a granular drainage surround in the mine pit, a basal collection pipe network (perforated) and a pumping system. Of these three primary system components, only the pumping system will be serviceable.

In order for this system to function properly, the drainage surround must offer the lowest hydraulic conductivity when compared to the host rock and the waste within the pit. The theoretical value for the freshly installed granular material is 0.01 cm/sec. This value is approximately 10 times more conductive than the highly fractured surface bedrock layer which extends ten (10) metres below the pit rim.

The granular drainage surround is to be constructed in two layers. The layer contacting the host rock is to be constructed from coarse granular material (3" lump), while the layer contacting the waste is to be constructed from fine granular material (1/2" lump).

In October 1991, a research paper titled 'Incrustation Processes in Drainage Systems of Sanitary Landfills' was presented at the 3rd International Landfill Symposium in Cagliari, Italy.

This paper was the culmination of data from thirty-one (31) landfill sites in western Europe concerning the incrustation of drainage systems. This study observed that

"the incrustation process occurred at most landfill sites and that, together with insufficient drainage of the landfill body, is the biggest problem for the long term efficiency of the drainage system."

The incrustation process is one that involves both the abiotic and the biotic components of the landfill environment. Landfills displaying the highest degree of incrustation have a correspondingly high concentration of organic content in the leachate, coupled with high concentrations of inorganic substances such as iron and calcium. Temperature is also an important factor, with higher temperatures displaying a corresponding increase in incrustation deposits. Temperature within the waste mound is depth dependent. The least incrustation depositing was noted in landfills which partially decomposed their waste in aerobic environments prior to landfilling. The subsequent decreased organic content in the landfill leachate was key in reducing the incrustation rate.

The proposed Adams Mine landfill is extremely susceptible to this incrustation process for a number of factors, namely:

- the landfilling process will be rapid – a minimum tonnage value of 1.3 million tonnes annually over a 27 hectare site.

- no attempt will be made to pre-compost the waste. A high organic content in the leachate is expected. In fact, the effluent treatment process will add phosphoric acid to the treated leachate in order to accelerate the organic decomposition prior to release into the Misema River.
- the waste mound will achieve an unprecedented depth – 200 + metres. High temperature can be expected throughout the waste mound and because the waste receptacle is surrounded by bedrock, the waste / drainage surround will be protected from the ambient environment and maintained at a consistently warm temperature.
- the natural ground water is high in both calcium and iron content.
- the fine particle size of the drainage surround's filter layer is of the same size noted for susceptibility to extreme incrustation formation in the research paper referenced previously.

The incrustation deposits drastically influence the hydraulic conductivity of the drainage material. Several orders of magnitude are not uncommon for heavily incrusted areas. In one example sited in the previously referenced report, the hydraulic conductivity of the granular drainage material was reduced to 0.00001 cm/sec by incrustation deposits. When compared to the theoretical value expected to be maintained at the Adams Mine landfill, this would represent a 1000 fold decrease in hydraulic conductivity. Should this same degree of incrustation develop in the Adams Mine drainage surround, the highly fractured bedrock layer in the upper pit zone would now be 100 times more conductive than the drainage surround and would easily represent the path of least resistance to leachate migration. It is important to note that not only is the incrustation process found in granular drainage material and drain pipes, it also occurs in the waste material and drastically influences the hydraulic conductivity of the compacted waste. This occurrence in the Adams Mine waste receptacle would present serious problems as the potential for leachate mounding within the waste would be very great. This mounded leachate would be prone to developing a pressure 'head' which could overcome the inward pressure gradient offered by hydraulic containment.

Paul Bowen, P.Eng, of Terraprobe Ltd., states:

> *"I think it's a very real risk. Its one that has not been addressed sufficiently and the most important issue arising out of that risk is that there's absolute necessity to clearly identify the costs and feasibility of contingency works as an upfront issue with respect to landfill design. You can make assumptions, you can look at what has happened at other sites and you can come up with some very, very approximate timeframes, but what it ultimately leads me to conclude is that there will be clogging of the system."*

5.0 Geological Conditions

5.1 Rock Fracturing

The walls of the pits, in particular, the South Pit are highly fractured. The fractures had high water pressures, which required draining when the pit was in operation to stabilize the walls. Many problems with wall rock failure were encountered during the pit's operation. Details of some of these problems are contained in private company reports by P.N.Calder, Ph.D., P.Eng. to Cliffs of Canada, Adams Mine.

The walls of the pit remain unstable (photographs from these reports are included in Attachment 1: titled "The Adams South Pit"). In the report of Golder Associates, Appendix F, subsurface hydrogeological concepts are applied on the assumption that the bedrock is of homogenous composition with a specific porosity and with no rock fractures between ground surface and 200 meters below sea level. The 2-dimensional models ignore the regional water flow direction below the local water table and lack predictability of water conductivity through the fractured bedrock below the elevations of nearby drainage to lakes and streams.

5.2 Continental Water Table

The South Pit (as well, the Central Pit) extends very deep into the continental water table, well below the near surface water table drain by local lakes and rivers. The continental water flow is 155 to 170 degrees (SSE) toward Lake Timiskaming. It is the main source of water for deep-water wells in the farmland and commercial centers of Ontario and Quebec that include New Liskeard, Earlton, Englehart, Thornloe and Notre Dame-du Nord.

5.3 Pit Inflow Rates Based On Observed Water Chemistry

At present, based on 1996 and 1998 data, ground (continental) water is seeping through the lower portions of south pit to maintain the present water chemistry within the pit. The rate of exchange required is a minimum of 265,000 liters/hr to 388,000 liters/hr. to a maximum of 2.65 million to 3.88 million liters/hr. This would be 10 to 100 times the design value for the effluent treatment plant of 47,500 liters/hr.

5.4 Potential Pit Drainage Pattern

Data also shows that when the South Pit is drained, and only rainwater is considered to enter the pit, 167,000 cu.m. to 267,000 cu.m. escape from the South Pit per year (30,379 liters/hr). In other words, 83% to 89% of the rainwater was exiting the pit, near and at its base, when flooding was first initiated. This figure does not include additional, lower continental ground water that would be entering and leaving the pit which may have been orders of magnitude higher in volume.

5.5 Flow Net Analysis

In figures F8.2 to F8.7 from the proponent's Technical Appendix F (Geology/Hydrology, 1995), the computer generated equipotential contours and ground water divides have no meaning below the elevations at which the ground water table intersects the land surface (surface elevation of lakes and streams). Instead, ground water below streams will flow in the general direction of the stream and not perpendicular to it. Thus, for example, in the west-east profile in Figure F8.2, below the stream and river beds in the vicinity of the Adams Mine property, the continental ground water flows toward the viewer at a slight downward slope in the direction of Lake Temiscaming.

Figures F8.2 through F8.7 are drawn based on the assumption that the bedrock is of homogenous composition with a specific porosity and no fractures between the ground surface elevation and 200 meters below sea level. These diagrams mainly apply to subsurface hydrogeological concepts where the near surface ground water gravitates to the nearest lake or stream, mainly through porous mediums such as soil, clay and gravel. Lakes and streams represent the intersection of the water table with the land surface. Contrary to what is shown in the diagrams, ground water below a streambed does not rise (flow up hill) to any great extent to fill the stream. Ground water below a stream, river or hole in the ground continues to drain downward, which in general is the slope of the continent. Water does not, and will not, rise from depth to replenish lakes and streams.

In the case of the Adams Mine, the ground water below the nearby streams at approximately 300 masl flows south-southeast at 155 to 165 degrees toward Lake Temiscaming which has a surface elevation of 151 masl. Ground water below 300 masl remains in the bedrock flowing SSE along fractures and joint planes until it reaches a deep body of water such as Lake Temiscaming.

Figures F8.2

Figures F8.3

Figures F8.4

Figures F8.5

Figures F8.6

Figures F8.7

6.0 Sustainable Development Impacts

6.1 Mineral Development Potential

The area immediately surrounding the Adams Mine site is commonly referred to as the 'Greenstone Belt' which is part of the 'Larder Lake – Cadillac' fault system. This fault system has spawned in excess of twenty producing gold mines, with several still in operation. The iron ore deposit that was excavated at the Adams Mine is not an uncommon feature in this region's geology, and several smaller deposits exist in the surrounding region. Due to the abundance of gold deposits in this area, base metal deposits have been largely ignored, but their occurrence is documented, with several economically viable deposits identified. The region immediately north of the Adams Mine site also has significant potential for the presence of diamonds.

The most visible characteristic pertaining to the economically viable mineral deposits in this region is their size. Most deposits identified are rich, based on percentage of ore per ton of rock. However, their overall tonnage is small. A condition such as this lends itself to satellite mining operations that feed a central ore processing facility. This type of mineral extraction infrastructure has been proven economically viable for operating companies such as Cambior Inc., Lac Minerals Ltd. and Homestake Mining Company.

Of most concern to the petitioners is that any mining operation will ultimately influence the static water table and cause change in the ground water flow patterns. The Adams Mine landfill will be extremely sensitive to this type of influence, and so may severely limit the level of development in the immediate vicinity of the landfill. Boston, Skead and McElroy townships are all in this vicinity and all hold excellent potential for the development of either precious or base metal deposits using the 'satellite mining' approach. The removal of one or two small deposits from consideration due to the landfill's presence could jeopardize the economic viability of a rather large mining development.

6.2 Agricultural Impacts

Timiskaming's 500 farm families contribute over 30 million dollars annually to the region's economy. The largest sector is dairy production which grosses over $20 million annually. Dairy production is highly dependent on a quality water supply. Timiskaming's 85 dairy operations utilise over 160 million litres of water annually to produce 40 million litres of milk, which is sold throughout Ontario.

The Timiskaming Federation of Agriculture (TFA) represents area farmers in dealings with all levels of government as well as other industries. The TFA has been involved with the Adams Mine Landfill proposal since 1995. During this time, the TFA has attempted to work with the proponent's consultants to ensure that the agricultural sectors concerns (ground and surface water impacts) were adequately addressed. However, within the farm community, the level of anxiety regarding the possible failure of the project has actually increased rather than decreased over time.

One example of the TFA's concerns in the project review has been that the project is almost completely based on computer modelling. In 1995, the TFA , as a member of Public Liaison Committee (established by then-proponent Metro Toronto), asked that a thorium tracer test be carried out to confirm the water modelling results. That request was refused by the proponent. A similar request was refused again in August 2000 by Toronto City Council, in their capacity as potential user of the Adams Mine as a landfill.

During their tenure on the PLC, the TFA learned that in some instances the same consultants were completing the proponent's studies and later peer reviewing their own work. At that point, the membership of the TFA lost confidence in the impartiality of the peer review process and the process itself. Members clearly state that they have seen no evidence to date which would change this assessment.

As the various review processes continued, it became obvious that surface water, namely the Blanche River system, was at great risk from the project. Since the Blanche runs through the heart of the Timiskaming farming area and TFA members have spent considerable time and money to eliminate agricultural impact on the river, the farming community is very concerned that effluent from the landfill will not only negate improvements that have been made, but it could eventually destroy the entire system.

Farmers know that all projects, large or small have positive and negative impacts, yet according to proponents and their peer review, this huge landfill with an experimental leachate contol system will have absolutely no negative impact and it will function perfectly for at least 1000 years. It is obvious that a "true " enviromental assessment has never been done since there are no "cons" to measure against the "pros".

TFA members have no confidence that this project will perform as predicted by the proponent. This crisis of confidence has already had a marked impact on the agricultural industry and it is reasonable to expect that this impact will escalate if the project goes ahead without a "true" environmental assessment.

Uncertainty over the project has caused new investment in dairy infrastructure to slow down and it could eventually disappear. Like any other business, dairy farmers have to constantly upgrade their operations to remain competitive. Many farmers will choose to leave the industry or the area if the return on that investment seems uncertain because of possible or probable impact from the landfill project. Consumer perception of the area has a large impact on the marketability of Timiskaming products. Local producers question whether that perception would remain positive if the largest landfill in the country went into operation, and even moreso once the waste site becomes problematic.

The most likely scenario will be that the value of farmland will drop due to decreased demand from the dairy sector. Course grain production will replace dairy as the main agricultural income source. At present grain prices, gross agricultural income for the district will fall by 50%. There will be a collapse in the local agricultural service industry. The farm economy in Timiskaming will resemble many areas in western Canada that depend on grain cash crop production and are

now under severe economic stress.

6.3 Commercial Fishery Concern

There is presently a commercial fishery operating on Lake Temiscaming which would be put at risk by the Adams Mine landfill project proceeding. Fisheries impact could result from the release of large amounts of leachate into the Lake Temiscaming watershed, as detailed in earlier sections of this brief. Further, the landfill poses a risk to the marketability of the commercial fisheries' products, given the negative market perception that can be expected to develop.

6.4 Tourism

A rapidly growing tourism industry is also occurring which has resulted in substantial growth in the communities of south Timiskaming. The tourism potential throughout Timiskaming is considerable and, if developed properly, could replace the primary resource extraction economy.

Timiskaming District's tourism infrastructure includes drive-in facilities, such as hotels and motels, destination attactions, and remote and semi-remote resource based tourism opportunitites. 1996 census data shows 3,400 "remote visitors" to the district, with expenditures of $2,179,400. Total remote based tourism expenditures are estimated by Stats Canada to be $5,865,500 annually. Remote based tourism is the fastest growing sector of the tourism industry, which in turn has been identified as fastest growing sector in the broader economy.

The Adams Mine landfill proposal has a very high profile, and the project going forward can be expected to have an immediate and negative effect on the "public image" of northern Ontario. Currently, the area is regarded as a tourism destination. Timiskaming District is home to many tourist camps flying in thousands of fishers and hunters annually. Waterfront resorts, such as in New Liskeard and Haileybury, Notre Dame du Nord and Fort Timiskaming depend on summer visitors to survive. The Adams Mine proposals threatens the reputation of the area for clean air and water that draws people to the region from southern Ontario and beyond to boat, sail, hike, canoe, fish and hunt.

6.4 Social Impacts and Self Identity

The conversion of Timiskaming District into a large scale waste disposal "host" is already having an effect within the region, at a social level. Social conflict has increased, and there are deep divisions now forged between "dump" opponents and supporters in several communities. There is evidence of depression, and increased anxiety, stress and fear. Very large amounts of personal and community energy, which would otherwise have been devoted to created and social enterprises, are instead being expended in the broad community-level struggle to oppose the Adams Mine landfill.

Recent professionally done polls demonstrate that the local population is not only unsupportive of the project, but are firmly in opposition. A February 2000 poll by Oracle Research showed

that 85% of the area residents fear harm to water resources. A September 2000 poll showed that among residents in the southern end of region, downstream of the project, opposition to the project waste at 86%. The poll also revealed that 79% of respondents indicated they were concerned the landfill will have to be maintained by future generations.

7.0 Conclusions

A federal environmental assessment is required to assess the impacts of the project on transboundary watershed of Lake Temiscaming and the Ottawa River, and on the aboriginal interests and federal lands.

This brief to the federal Minister of the Environment set out the basis for such a review under Sections 46 and 48 of the Canadian Environmental Assessment Act, and identified that an environmental assessment of the project is mandatory, given the anticipated impacts on fish and fish habitat.

The federal government is urged to act in a timely manner, given the immediacy of the threat to the water resource shared by northeastern Ontario and northwestern Quebec.