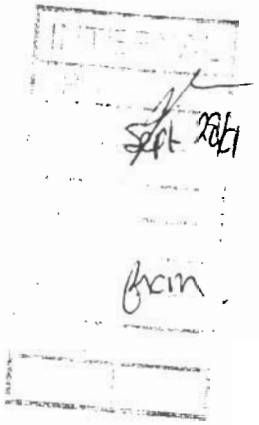
Part 2 of 2

Paul Crowley
P.O. Box 1226
Iqaluit, Nunavut
X0A 0H0
Tel.: (867) 979-3396
Fax: (867) 979-2100
Email: pcrowley@nunanet.com



August 17, 2001

Philippe dePizzo, Executive Director
Nunavut Water Board
4616 Cool Draw
Yellowknife, NT
X1A 2K4

Dear Philippe:

Re: *Paul Crowley* v. *Municipality of Iqaluit*, Nunavut Court of Justice file #01 00 241 cv

Please signify your acceptance of service of the following documents filed with the Nunavut Court of Justice in the above-noted action by returning a signed copy to me for filing with the Nunavut Court of Justice:

- Originating Notice;
- Notice of Motion;
- Affidavit of Paul Crowley;
- Pre-Hearing Brief of the Applicant;
- Draft Order.

Please further note that the Application set forth in the above Notice of Motion has been adjourned by Order of the Nunavut Court of Justice to September 11, 2001.

Philippe diPizzo
Name (please print)

Nunavut Water Board
Organization

P. diPizzo
Signature

21/VIII/2001
Date

Yours truly,

Paul Crowley
Paul Crowley

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Special Editions

Iqaluit councillor dumps on Nunavut Water Board

Iqaluit town councillor Matthew Spence says the Nunavut Water Board's strict new water licence for Iqaluit represents an attack on Iqaluit town council's decision-making powers.

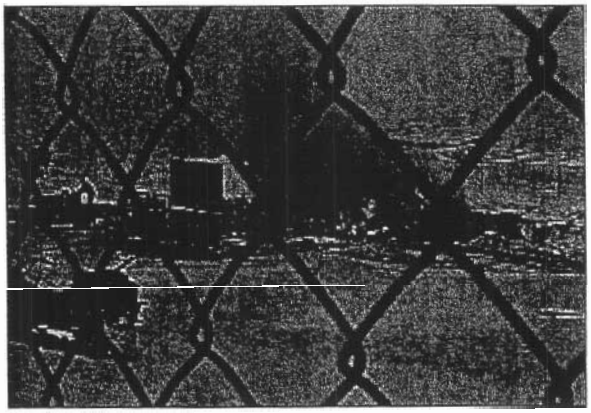
MICHAELA RODRIGUE
Nunatsiaq News

IQALUIT — An Iqaluit town councillor says that the Nunavut Water Board (NWB) has "hijacked" Iqaluit town council's right to decide where to spend its money.

At two separate Iqaluit town council committee meetings this week, Coun. Matthew Spence lashed out at a recent water board decision to grant the municipality of Iqaluit a stiff one-year licence to distribute water and dispose of sewage.

The Town of Iqaluit's administration had applied for a six-year licence with terms similar to previous water licences issued by the old Northwest Territories Water Board.

Instead, the licence that the Nunavut Water Board



The Nunavut Water Board wants Iqaluit's municipal government to conduct a study to find out if the open burning of garbage at Iqaluit's notorious dump is producing toxins that are poisoning Iqaluit's water. But Iqaluit town councillor Matthew Spence says the NWB is interfering with the Town of Iqaluit's right to decide where to spend its money.

PHOTO BY SEAN MCKIBBON

April 1, 1999

Discussions

Nunatsiaq News Talk Back
Nunanet Political Forum

Contact Information:

Box 8 Iqaluit NT
X0A 0H0 Canada
Tel: (867) 979-5357
Fax: (867) 979-4763
nunat@nunanet.com

imposed on Iqaluit is replete with new conditions and requirements aimed at meeting environmental concerns expressed by various government agencies and private citizens at the water board's public hearings last year.

Nevertheless, the licence still surprised many Iqaluit councillors with its severity. Few councillors, if any, however, appear to have read the Nunavut Water Board's decision and licence, both of which were released to the public just before Christmas.

Draining capital dollars

Spence says the new conditions imposed by the water board are sure to take money away from other long-awaited Iqaluit projects such as road paving and a new recreational facility.

"I'm not sure the water board got it right," Spence said at a meeting of the Town's executive committee this week.

"They have highjacked our capital planning," he said.

"If we're going to have decision-making process taken out of our hands... what's the point of having council?" Spence asked. Spence said roads and recreational facilities are more important to Iqaluit residents than a new garbage disposal system.

The new conditions imposed by the water board on the Town of Iqaluit include:

- completion and submission of a new solid waste management plan by May 1, 2000;
- holding of a public meeting on the new plan this fall;
- testing of the integrity of the dykes around the existing sewage lagoon should it be used as an emergency back-up facility;
- completion of a test on the effect of airborne emissions from the open burning of garbage at the Iqaluit dump on water quality in Lake Geraldine.

The board also criticized the Town of Iqaluit for going ahead with a new sewage treatment system before it had received water board approval for the plan.

However, the board stopped short of banning the open burning of garbage at Iqaluit's dump, as various delegations had lobbied for.

And the municipality had already begun to meet some of the requirements outlined in the water' boards new licence, including a new waste management plan, were already underway.

Who will pay?

But Spence said it appears as if the water board will force the Town to abandon open burning and spend millions of dollars on a new dump when the licence comes up for renewal again next year.

If that happens, Spence said, there won't be any money left over for the capital projects that Iqaluit town council has decided are most important.

"We need roads repaired. We need recreational facilities. Where are we going to find the money?" Spence said.

Much of the money will likely come from the Nunavut government. The Nunavut government expects to pay the lion's share of the cost said, Mike Ferris, Nunavut's deputy minister of community government, when contacted by Nunatsiaq News.

Typically, the territorial government also helps the Town pay for other capital projects. Ferris said balancing regulatory requirements with other "nice-to-have" items, such as roads, would be a challenge.

But Coun. Lynda Gunn said that she's happy that the water board's decision will likely force the Town to find a new way to get rid of its garbage.

But she too is concerned that the cost of waste management will gobble up all of the territory's capital money for Iqaluit. And she asked the town administration to look for federal money to pay for a new garbage disposal system.

"Maybe funds can be found for this from other sources," Gunn said.

Administration didn't tell council

Gunn also admonished administration for not keeping council informed about the Town's water licence application.

Gunn said council never saw the licence application before it went to the water board. And as of this week, councillors still hadn't seen the water board's final decision.

"I would like from now on for this committee to be kept apprised. It should be on an ongoing basis until we receive a permanent licence," Gunn said at a development, works and public safety (DWPS) committee meeting this week.

The water board's demand that the town conduct a study showing a link between open burning of garbage and the quality of water in Lake Geraldine is the most contentious condition by far.

Speaking before the executive committee, this week, town engineer Denis Bedard said the municipality would not comply with the new licence unless they received financial help.

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This is Exhibit " E " referred to in the Affidavit of

PAUL CROWLEY

Sworn before me this 11TH day of AUGUST A.D., 19 2001

A COMMISSIONER FOR OATHS IN AND FOR NUNAVUT TERRITORY

Nunavut Water Board File No. NWB3IQA0103

NUNAVUT WATER BOARD

REASONS FOR DECISION

January 26, 2001

Date of Hearing: ***November 22, 23 and 24, 2000***

Date of Decision: ***January 1, 2001***

IN THE MATTER OF Article 13 of the *Nunavut Land Claims Agreement*,

- and -

IN THE MATTER OF the renewal of the Town of Iqaluit's municipal licence.

Cite as: re: Iqaluit Licence Renewal 2000

TABLE OF CONTENTS

APPEARANCES

TOWN OF IQALUIT	Matthew Hough John Matthews John Tidball
DEPARTMENT OF COMMUNITY GOVERNMENT AND TRANSPORTATION NUNAVUT (CGT)	Douglas Sitland
DEPARTMENT OF SUSTAINABLE DEVELOPMENT - ENVIRONMENT PROTECTION NUNAVUT (EP)	Robert Eno
DEPARTMENT OF HEALTH AND SOCIAL SERVICES NUNAVUT (HEALTH)	Bonnie Segal
DEPARTMENT OF JUSTICE NUNAVUT (JUSTICE NUNAVUT)	Susan Hardy
DEPARTMENT OF FISHERIES AND OCEANS CANADA (DFO)	Jordan DeGroot
ENVIRONMENT CANADA (EC)	Anne Wilson
DEPARTMENT OF INDIAN AND NORTHERN AFFAIRS (DIAND)	Paul Smith
DEPARTMENT OF JUSTICE CANADA (JUSTICE CANADA)	Lee F. Webber
CITIZENS	Marcel Mason Bill Mackenzie

SUMMARY

On September 15, 2000, the Nunavut Water Board received from the Town of Iqaluit an application for the renewal of licence NWB3IQA9900, due to expire December 31, 2000. The Board conducted a pre-hearing meeting in Iqaluit on September 25, 2000 to discuss procedural and other issues relating to the hearing. At the pre-hearing, the Board identified, with the help of all parties, a number of agreed-upon issues to be dealt with at the hearing. A hearing was then held on November 22, 23 and 24, 2000 to hear the submissions of the applicant and interested parties.

After hearing evidence from the Town of Iqaluit, the Government of Nunavut (Department of Sustainable Development, Department of Health and Social Services, Department of Community Government and Transportation) and the Government of Canada (joint submission from Fisheries and Oceans Canada, Environment Canada and Indian and Northern Affairs Canada), as well as Mr. Marcel Mason and Mr. Bill Mackenzie, both residents of Iqaluit, the Board decided to renew the Town's water licence for a term of three years effective January 1, 2001.

The three-year licence issued by the Board on January 1, 2001 contains several general and specific conditions, such as: a maximum use of 1.1 million cubic metres of freshwater for municipal purposes from Lake Geraldine; the submission of a report on the long-term assessment of the Town's fresh water needs; the authorization for the continued use of the current solid waste management with restrictions on open burning; the abandonment and restoration of abandoned solid waste facilities; the operation of a new sewage treatment plant and the short and long-term disposal of sludge removed from the plant; and the abandonment and restoration of the current sewage lagoon and its possible use as a back-up facility. The reasons for the decision were issued on January 26, 2001 in a separate document.

I. Procedural History, Background and Jurisdiction

Procedural History

This matter involves the renewal of the water licence of the Town of Iqaluit, in Nunavut. The Town is located on Commissioner's Land, and a water licence regulates water use and waste disposal activities for municipal purposes. The previous licence was issued by the Nunavut Water Board (the "Board") on December 31, 1999 for a term of one year, and authorized the Town of Iqaluit to use water and dispose of waste in conjunction with municipal services.

On September 15, 2000, the Town of Iqaluit filed an application for licence renewal. Initially, the Board decided to hold a public hearing on November 7th and 8th, 2000. Notice of the hearing was given in Nunatsiaq News and at local establishments within Iqaluit, and was also sent directly to interested parties. A pre-hearing meeting with the applicant and interested parties was held on September 25, 2000 to discuss procedural issues and to identify the matters to be dealt with at the hearing. Upon a motion made by the Government of Nunavut at the pre-hearing meeting, the Board decided to hold the hearing on November 22, 23, and 24, 2000. At the pre-hearing, the applicant also agreed to file its statement of evidence and an Inuktitut summary of its Solid Waste Management Planning Study no later that October 20, 2000. In accordance with the Board's Rules of Practice and Procedure for Public Hearing, the deadline for interventions was set for November 7, 2000. Revised notices of the hearing were posted locally and in Nunatsiaq News, a Nunavut-wide weekly newspaper.

By November 7, 2000, formal written intervention statements were received from the Department of Indian and Northern Affairs Canada (DIAND), Environment Canada (EC) and Fisheries and Oceans Canada (DFO), Nunavut's Departments of Health and Social Services (Health), Community Government and Transportation (CGT), and Sustainable Development (DSD), as well as from Mr. Marcel Mason, a resident of Iqaluit.

A public hearing was held on November 22, 23, and 24, 2000 in Iqaluit, and a site visit of the Town's municipal infrastructures was also held in conjunction with the hearing.

Background

Iqaluit, known as Frobisher Bay until January 1, 1987 when the community reverted to its original Inuktitut name, is located near the site of a traditional Inuit fishing camp, at 2,261 air kilometres east of Yellowknife, and 2,060 air kilometres north of Montréal. It is located on rocky, irregular coastline in a rocky lowland area, flanked by mountains on the northeast and southwest. The vegetation is typical of the sub-arctic tundra bio-region. Average annual precipitation is 19.2 centimetres of rainfall and 25.5 centimetres of snowfall, for a total of 44.7 centimetres precipitation. July mean high temperature is 11.4 degrees Celsius, and low is 3.7 degrees Celsius. January's mean high is -21.5 degrees Celsius, and low is -29.7 degrees Celsius. Winds are NW in the fall and SE in summer, at an annual average speed of 16.7 km/h. Iqaluit is located in the continuous permafrost area.

The site of Iqaluit remained relatively undisturbed since the first recorded contact with Europeans in 1576. Most of the development of Iqaluit occurred because of the United States Air Force's construction of the largest airbase in the North on the site in 1942-43. The USAF was active until 1963 with a variety of projects: construction of a radar station, expansion of in-flight refueling capabilities, sending men and supplies to the eastern part of the Distance Early Warning (DEW) line then under construction. Iqaluit is also the site of a Forward Operating Location (FOL) built at the beginning of the 1990s.

The Town of Iqaluit obtained Town status on October 1, 1980. Over the years, the community became the major administrative and political centre for the Baffin region; it is now the capital of the new territory of Nunavut, formally proclaimed on April 1, 1999.

Access to Iqaluit is by air. Access by sea is possible during the ice-free season, generally from July to October. Heavy machinery, vehicles, dry goods, construction material and supplies, and fuel and lubricants, are transported by ship from Southern Canada.

Jurisdiction

The Nunavut Water Board has jurisdiction to consider this application pursuant to the Nunavut Land Claims Agreement (NLCA), Article 13. Under Article 13.7.1, "no person may use water or dispose of waste into water without the approval of the NWB." By requiring permission from the Board before the use of water or the deposit of wastes into water, the NLCA gives the Board an obligation to protect the quantity and quality of the water within the Nunavut Settlement Area as much as possible.

We believe this duty is significant and far reaching because fresh water is such a fragile resource and the direct and indirect deposit of waste of any kind or form into it should be avoided as much as possible. The *Yukon Waters Act*,[1] the *Northwest Territories Waters Act*[2] and the *Mackenzie Valley Resource Management Act*[3] define waste to include:

> (a) any substance that, if added to water, would degrade or alter or form part of a process of degradation or alteration of the quality of the water to an extent that is detrimental to its use by people or by any animal, fish or plant, or
>
> (b) water that contains a substance in such a quantity or concentration, or that has been so treated, processed or changed, by heat or other means, 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 to the extent described in paragraph (a),
>
> and, without limiting the generality of the foregoing, includes:
>
> (c) any substance or water that, for the purposes of the *Canada Water Act*,[4] is

---

[1] S.C. 1992, c. 40.
[2] S.C. 1992, c. 39.
[3] S.C. 1998, c.25.
[4] R.S.C. 1985, c. C-11.

> Waste is defined as: (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 to an extent that is detrimental to their use by man or by any animal, fish or plant that is useful to man, and
> (b) any water that contains a substance in such a 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 to the extent described in paragraph (a);
> ...
> Prescribed substances and certain water deemed waste
> (2) Without limiting the generality of the definition "waste" in this Act,
> (a) any substance or any substance that is part of a class of substances prescribed pursuant to subparagraph 18(1) (a)(i),

deemed to be waste,

(d) any substance or class of substances prescribed by regulations made under subparagraph 33(1)(b)(i),

(e) water that contains any substance or class of substances in a quantity or concentration that is equal to or greater than a quantity or concentration prescribed in respect of that substance or class of substances by regulations made under subparagraph 33(1)(b)(ii), and

(f) water that has been subjected to a treatment, process or change prescribed by regulations made under subparagraph 33(1)(b)(iii);

A similar definition is found in the *Arctic Waters Pollution Prevention Act*:[5]

The word "deposit" has been defined broadly. In the *Fisheries Act*[6] for example, deposit means:

s. 34(1) ". . . any discharging, spraying, releasing, spilling, leaking, seeping, pouring, emitting, emptying, throwing, dumping or placing;

s. 40 (5) For the purpose of any proceedings for an offence under subsection (2) or (3),

(a) a "deposit" as defined in subsection 34(1) takes place whether or not any act or omission resulting in the deposit is intentional; and

(b) no water is "water frequented by fish", as defined in subsection 34(1), where proof is made that at all times material to the proceedings the water is not, has not been and is not likely to be

---

(b) any water that contains any substance or any substance that is part of a 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 subparagraph 18(1)(a)(ii), and
(c) any water that has been subjected to a treatment, process or change prescribed pursuant to subparagraph 18(1)(a)(iii),
shall, for the purposes of this Act, be deemed to be waste.

[5] R.S.C. 1985, c. A-12.
s. 2 "waste" 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 to an extent that is detrimental to their use by man or by any animal, fish or plant that is useful to man, and
(b) any water that contains a substance in such a 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 to the extent described in paragraph (a),
and without limiting the generality of the foregoing, includes anything that, for the purposes of the Canada Water Act, is deemed to be waste.

[6] *R.S.C. 1985, c. F-14.*

frequented in fact by fish

When considering a water application, the Board may request a broad range of information from the applicant as listed in Article 13.8.1[7], including any steps taken to mitigate adverse impacts and "any other matters that the NWB considers relevant."

The Board therefore has broad jurisdiction to include terms and conditions it considers necessary to ensure protection of the waters in the Nunavut Settlement Area including jurisdiction with respect to freshwater, both surface and subsurface; for the purposes of the NLCA, water is defined as "waters in any river, stream, lake or other body of inland waters on the surface or under ground in the Nunavut Settlement Area, and includes ice and all inland ground waters, but does not include water or ice in marine areas."[8]

[7] Article 13.8.1 states: Consistent with subsection 13(2) of the *Northern Inland Waters Act*, RSC 1985, c. N-25, the NWB, when considering a water application, may issue guidelines to the applicant for provision of information with respect to the following:

a. project description;
b. any qualitative and quantitative effects of the proposed water use on the management area, including anticipated impacts on other water users of that area;
c. steps which the proponent proposes to take to avoid and mitigate adverse impacts;
d. steps which the proponent proposes to take to compensate interests adversely affected by water use;
e. the program the proponent proposes to establish for monitoring impacts of the water use;
f. interests in the lands and waters which the proponent has secured or seeks to secure;
g. options for implementing the project; and
h. any other matters that the NWB considers relevant.

[8] Article 1.1.1

II. Issues

Several issues were identified at the September 25, 2000 pre-hearing and the Board decided that the following would be the subject of the subsequent hearing, keeping in mind that this list was not exhaustive and that the Board would accept evidence on any matter relating to its jurisdiction with respect to the use of water and the disposal of waste into water pursuant to Section 13.7.1 of the Nunavut Land Claims Agreement:

A. The use of water for municipal purposes, and in particular the Town's long term water supply and the integrity and stability of Lake Geraldine's dam;

B. The status of the new sewage treatment plant;

C. The disposal of sludge that will be produced by the new sewage treatment plant;

D. The status of the current sewage lagoon, including the stability of its dykes and its decommissioning;

E. The current and proposed methods for solid waste disposal, including the operation of the current solid waste disposal facility and appropriate contingency during the transition period from the current method to the proposed system; and

F. The abandonment and restoration of the current and other solid waste disposal sites in Iqaluit.

III. Summary of Evidence and Analysis

A. The use of water for municipal purposes, and in particular the Town's long term water supply and the integrity and stability of Lake Geraldine's dam;

i. Long Term Supply of Water for the Town of Iqaluit

The Town's application states that in 2000 water use is averaging 1.1 million litres per day in Iqaluit. In its application, the Town asked the Board to maintain its maximum water use at 1.1 million cubic metres per year. The Town told the Board that as its population grows, its water requirements are expected to grow proportionately. The Town recognized that, while it may be possible to draw more water from Lake Geraldine for several more years, it has a finite capacity, and the Town is expecting that new long-term sources of water will be needed in about five years.

In their joint submission to the Board, DFO, DIAND and EC indicated that the Town of Iqaluit's water consumption for 1996, 1997, and 1998 was 471,627 m^3, 438,778 m^3, and 391,555 m^3 respectively, and that with population growth, water consumption rates would steadily rise over the course of the next five years and during the proposed 20-year design life of the water treatment plant upgrade (i.e. 2017). The Town of Iqaluit has requested the approval for the use of 1.2 million L/day of raw water from Lake Geraldine, which amounts to about 438,000 m^3/year. DFO, DIAND and EC noted that this amount did not allow any contingency for growth or for emergency needs of the town of Iqaluit, and recommends that the Board maintains licensed water use at 1.1 million m^3/year, as in the previous licence**. The Board agrees with DFO, DIAND and EC's recommendation and approves the use of freshwater to a maximum of 1.1 million cubic metres annually.**

The December 31, 1999 license issued by the Board required the applicant to submit a detailed hydrological assessment on the Lake Geraldine watershed. **The licensee failed to meet this requirement.** At the hearing, the Town of Iqaluit told the

Board that it was planning to retain a consultant in March 2001 to assess the ability of Lake Geraldine to meet Iqaluit's needs, to identify alternative water sources and, if Lake Geraldine's capacity was adequate, to plan for additional storage facility at the current water treatment plant. At the hearing, the Town said that it was prepared to submit such report to the Board, by no later than December 31, 2001.

In their joint submission, DFO, DIAND and EC again recommended the inclusion of this study as a water licence condition, and recommended that it include the hydrological assessment of Lake Geraldine and realistic predictions of future growth and water use as well as an assessment of the potential effects of water drawdown on fish populations in Lake Geraldine. Health noted that at this time the source and quality of the water was acceptable, but it also supported DFO, DIAND and EC's recommendation.

On the other hand, CGT noted that in May 1998, Reid Crowther & Partners Limited (RCPL) was retained to undertake a Water Treatment Plant Design Brief. CGT told the Board that the Design Brief concluded that the water quality was generally good and that, as a result of height increases to the Lake Geraldine Dam, provided the level of Lake Geraldine remained high, there was sufficient capacity to meet Iqaluit's water demand. In light of these conclusions, CGT questioned why attention was being placed on the long-term viability of Lake Geraldine as the municipal water source.

However, the Board agrees that an assessment of Iqaluit's freshwater needs is essential and instruct the Town to submit to the Board for approval at least six months before the expiry of the licence a report on the long-term water supply options for the Town of Iqaluit.

ii. Integrity of the Lake Geraldine Dam

In its 1999 decision, the Board had instructed the Town to confirm the stability and integrity of the Lake Geraldine Dam. In the 1999 Licence, Lake Geraldine Reservoir Dam had to be inspected within six months of the licence issuance during open and high water conditions, by a qualified geotechnical engineer in accordance with the *Canadian Dam*

Association's 1995 Edition of the *Dam Safety Guidelines*. **The Town failed to meet this licence requirement**, and furthermore told the Board at the hearing that it did not believe that the Lake Geraldine dam presented any concern. The Town told the Board that the level of Lake Geraldine Dam was raised and that improvements to the concrete dam and the earthen berms had been made in 1997; it indicated that since that time, the work was inspected several times by the consulting engineers for this project, and that final inspections were completed in July 2000. No problems with the alterations to the dam, or the dam itself, were noted, and superficial cracks on the surface of the concrete would be grouted later.

At the hearing, the Town also told the Board that a risk assessment has been commissioned by the Government of Nunavut to evaluate the risk involved in building a hospital at the bottom of the hill beneath the dam. According to the Town, the objective of the study was to prove whether or not a new hospital would be damaged if the Lake Geraldine dam failed. The overall condition of the dam is supposedly being considered as part of this study.

In light of the work that has recently taken place on the dam, and the risk assessment study currently underway, the Town requested the deletion of any requirement for geotechnical inspection of the Lake Geraldine dam from its new license. At the hearing, CGT supported the Town's position.

In reply to the Town, DFO, DIAND and EC said that without access to the inspection reports prepared either by or for the Town, it is not clear that concerns regarding dam stability have been adequately addressed. DFO, DIAND and EC furthermore agreed that if any of the consultant's report retained by the Town to monitor or repair the dam were incorporated in a summary report that would meet the Water Board requirements, then the Town could submit this inspection report to the NWB for approval *in lieu* of conducting a new assessment.

In contrast, DFO, DIAND and EC recommended to the Nunavut Water Board

that the Lake Geraldine Reservoir Dam be inspected once during the term of the licence, during open and high water conditions by a qualified geotechnical engineer following the *Canadian Dam Association's 1999 Dam Safety Guidelines*, and that the engineer's report should be submitted to the Board within 60 days of the inspection with a covering letter from the Licensee outlining an implementation plan to respond to the engineer's recommendations.

The Board is of the opinion that **regular inspection of dams and dykes is a sound engineering practice and relies on the recommendations of the Canadian Dam Association regarding the type and frequency of dam inspection**, and furthermore agrees with DFO, DIAND and EC that **the Lake Geraldine Dam should be inspected at least once during the term of the licence, in accordance with the Canadian Dam Association's January 1999 Edition of the *Dam Safety Guidelines***. The Board also agrees that if the Town can provide a detailed summary of the inspection work already conducted by their engineering consultants, and provided that the report meets the requirements of the Dam Safety Guidelines, then this report could be deemed satisfactory for the purpose of this licence.

B. The status of the new sewage treatment plant;

At the hearing, the Town told the Board that the construction of the Iqaluit Sewage Treatment Plant (STP) was almost completed in February 2000. However, during the hydrostatic test, leaks were noticed in the tank walls. Work was stopped on the project and a structural investigation revealed significant structural flaws in the walls of the tanks. The Town is currently working to repair the tanks before completing construction of the plant and expects that the repairs will be completed by the end of December 2000. If no further delay occurs, the plant is expected to be operational in the spring of 2001.

In the 1999 Licence, the Board ordered that all sewage be directed to the new plant no later than February 15, 2000 on the assurance by the Town's Principal Engineer that the STP would be operational long before that date. At the 2000 hearing, the Town told the

Board that it wished to see the STP in operation as soon as possible, but that imposing an artificial deadline would be counterproductive.

At the hearing, Health told the Board that the lagoon dykes breached in the past, and that a new STP should be in place to improve the situation.

Similarly, in their 1999 intervention, EP supported the Town of Iqaluit's plan to construct a modern STP. At the November 2000 hearing, EP said that they were still supporting this project, but that they were concerned about the delays and the difficulties that the Town of Iqaluit was experiencing with the contractor and with the project in general. However, EP recommended that the new water licence include a condition that requires the Town to submit a status report to the Board prior to the commissioning of the STP that would summarize the reasons for modifications and repairs made to the system, a discussion of how these would affect the efficiency of the system, effluent quality, and the life expectancy of the STP. However, EP agreed with the Town that if a deadline was imposed by the Board for the commissioning of the new STP, it should be realistic and flexible.

DFO, DIAND and EC also recommended to the Board that the licence require full transition to the new system as soon as possible, with a target date of no later than September 1, 2001, in order to improve the quality of effluent entering Frobisher Bay. If the plant is not operational by the deadline, DFO, DIAND and EC recommended that the Board require the Town to submit a detailed progress report beginning in September and monthly thereafter, describing activities undertaken and progress made during the reporting period towards the commissioning of the new system, and outlining any remaining work.

Mr. Marcel Mason, a resident of Iqaluit, told the Board that in the period of time since the Nunavut Water Board issued the Town's last water licence, the Town began looking at the various solid waste management and sewage disposal issues facing the community. Mr. Mason acknowledged that the progress made in these areas should be

recognized; however, he noted that the STP that was supposed to be operational almost a year ago is still not finished and that a growing population still depended on a sewage lagoon not designed for a community this size. Mr. Mason recognized that the problems with this project were the legacy of a previous Council and administration, but that the fact remained that these problems were the result of poor planning and monitoring by the Town of Iqaluit, and quite possibly the Government of Nunavut, and should have been avoided with appropriate monitoring and enforcement of licence conditions.

The Board agrees with DFO, DIAND and EC that the new STP should be operational as soon as possible but that some flexibility in the date of its commissioning is appropriate. Consequently, **the Board instructs the Town to direct all sewage to the STP as soon as the plant is operational but in any event no later than August 1, 2001.** The Board recognizes however that unexpected or uncontrolled events may prevent the Town from meeting that deadline, and consequently gives the Town the possibility of applying for a change of date should the STP not be operational by the August 1, 2001 deadline. The Board also decided to ask the Town to submit to the Board regular reports on the status of the completion of the Sewage Treatment Plant until the Sewage Treatment Plant is commissioned. **Until the STP is operational, the Board authorizes the disposal of all sewage in the current lagoon. Furthermore, as conditions have not changed since the issuance of the 1999 licence, the Board maintains in this licence the same effluent quality limits as in its 1999 licence for both the new STP and the sewage lagoon.**

Finally, in their written submission to the Board, CGT said that the effluent from the STP and the existing lagoon was released into Koojesse Inlet, and therefore that the Water Board may not have the jurisdiction to regulate these effluent discharges. On this question of jurisdiction, the Board notes that in *Canada (Environment Canada)* v. *Canada (Northwest Territories (Commissioner))*,[9] the trial judge and the appeal judge referred to the Iqaluit situation. In both cases, there was no issue of the NWT Water Board's jurisdiction with

[9] (1994), 15 C.E.L.R. (N.S.) 114 at 127.

respect to establishing standards for the quality of the discharge from the sewage lagoon. As the Nunavut Water Board has acquired the equivalent powers and responsibilities currently held by the Northwest Territories Water Board under the *Northern Inland Waters Act*,[10] this Board continues with at least the same authority–and responsibility–to include terms and conditions regarding the sewage lagoon system.[11]

C. The disposal of sludge that will be produced by the STP

In its 1999 licence, the Board instructed the Town to submit a plan for the interim treatment and disposal of sludge generated by the new STP. **This licence requirement was not met**. In response, the Town told the Board that the disposal of the plant's sludge was not an issue for the Town yet as the plant is not yet operational.

At the hearing, the Town told the Board that the current plan is to take the sludge from the STP to the current dump, to place them on a HDPE liner, then to cover and compost them. The Town proposes to take regular tests to ensure that the material is not dangerous to workers or to the environment. Once the material is in a suitable form, the Town would use the material as cover at the landfill, as greening material, or on the tundra, and as a long-term measure, the Town hopes that its proposed solid waste incinerator will be able to incinerate the sludge. In any case, the Town said that it was committed to preparing a more detailed plan for the disposal of sludge both in the short and long term, and agreed to submit such report prior to the commissioning of the STP.

At the hearing, Health told the Board that it was concerned about whether or not the proposed composting of sewage sludge will work. Health noted that composting requires proper aeration and specific temperatures, and that in the absence of these conditions, the process would be slower, create anaerobic conditions and odor, and that pathogenic organisms may not be completely destroyed due to lower temperatures.

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[10] R.S.C. 1985, c. N-25.
[11] NLCA, Article 13.2.1.

On the issue of sludge disposal, EP advocated that the Town should plan their treatment and disposal before the commissioning of the STP. Additionally, EP felt that the Town of Iqaluit's proposal to compost the sludge in the current landfill site had not been tested under arctic conditions, and recommended that the Town conduct a pilot project to confirm the feasibility of this option. EP further proposed that the sludge be characterized to determine if composting would be an appropriate means of treatment, and finally suggested that the Town should investigate other treatment and disposal options in the event that composting proved to be inappropriate or unsuccessful. EP recommended that the Board require the Town to prepare short-term and long term sludge management plans and that these plans be submitted to the Board for review and approval.

DFO, DIAND and EC also remarked that the Town is planning to compost the sludge at the current dump in a HDPE-lined containment structure and told the Board that they needed additional information on the different options for the disposal of the STP sludge; for example, on their composition, the suitability of different storage techniques, the length of time required to compost, and the possibility of sludge incineration or alternatively their use as greening material; and would also like to see options for sludge management identified and presented to the Board for approval prior to implementation.

The Board agrees with the interveners that the Town must have in place a plan for the treatment and disposal of sludge before the sludge is produced by the new sewage treatment plant. Accordingly, the Board instructs the Town to prepare and submit to the Board for approval, plans for the disposal of sludge removed from the sewage treatment plant. **The Town shall submit to the Board for approval, at least two months before the planned commissioning of the STP, a plan for the interim disposal of sludge removed from the Plant. The Town is also required to submit to the Board for approval, by no later than December 31, 2001, a long-term plan for the disposal of sludge removed from the STP.** The long-term plan shall include, among other matters, the characterization and quantification of the sludge, their treatment and disposal alternatives - including composting, the details of the preferred option, the proposed monitoring program, and finally, an implementation schedule.

D. The status of the current sewage lagoon, including the stability of its dykes and its decommissioning

i. Integrity of Lagoon Dykes

The 1999 municipal licence issued by the Board required the Town to have the sewage lagoon dykes inspected by an engineer in accordance with the Canadian Dam Association guidelines for dam inspection. **The Board notes that the Town has not met this licence condition**.

In its submission, the Town indicated that the dyke at the west end of the lagoon facility failed in 1993, and that following this event, the dykes were re-engineered and rebuilt. The Town told the Board that the dykes are now approximately twice the size of the dykes that failed and that a spillway was constructed to ensure that the risk of a catastrophic failure was greatly reduced. The Town said that they are not aware of any signs of problems with the dykes at the sewage lagoon, and confirmed that the freeboard limits are verified by staff through inspections on a daily basis. The Town acknowledged that once last year, the lagoon came close to breaching the spillway, but that the level of the dam was quickly lowered by opening the runoff valve. The Town furthermore told the Board that the lagoon will be closed soon after the STP is commissioned, and that it would be a better use of time and money to prepare its closure plan rather than to investigate the integrity of its dykes.

On the other hand, EP thought that, until such time as the current sewage lagoon is decommissioned, dykes should be inspected by a qualified engineer for structural integrity because of increasing population and the pressure this exerts on the existing system, which already has a history of failures. EP maintained that, unless the Town of Iqaluit was able to provide compelling evidence confirming that an inspection was not necessary, this requirement should stay in the licence.

In their joint submission to the Board, DFO, DIAND and EC noted that until the

new STP is commissioned, the existing lagoon system will continue to be used, and that the existing effluent discharge limits for Total Suspended Solids, BOD_5, and Fecal Coliforms should be maintained. DFO, DIAND and EC also recommended that leakage from the lagoon's west dyke should be monitored and minimized, and overall dyke integrity evaluated. The Federal Departments consequently urged the Board to require that a geotechnical inspection of the existing sewage lagoon dykes be done annually while the lagoon is in use, starting with the next open water season, and that necessary remedial measures be identified and implemented.

On a related issue, DFO, DIAND and EC noted that the Town is required to submit to the Board plans for the Operation and Maintenance of Sewage and Solid Waste Disposal Facilities prior to the commissioning of such facilities, and that the Licensee is also required to review the approved plan on an annual basis and revise them as required. The Federal Departments confirmed that the Northwest Territories Water Board last approved the Town's Operation and Maintenance Plan in 1995, and that many changes have taken place in Iqaluit's municipal facilities since this plan was approved, and recommended that all operations and maintenance plans be updated to reflect current waste disposal facilities and practices. They recommended that the Board require these plans to be revised and resubmitted prior to the commissioning of any new or modified waste disposal facility.

The Board is aware that there have been serious problems with this lagoon and dyke in the past. In 1991, the party ultimately responsible for the maintenance of the lagoon, the Commissioner of the Northwest Territories, was convicted under section 36 of the *Fisheries Act*[12] of unlawfully depositing or permitting to be deposited a deleterious substance into water frequented by fish.[13] Bourassa Terr. Ct. J. found the effluent that was released from the lagoon when the dyke failed was a deleterious substance and did enter the waters of Koojesse Inlet. The Court also noted that the dyke had failed previously at least two times, and the defendant was aware of the requirements for the proper

[12] R.S.C. 1985, c. F-14.
[13] *Canada (Environment Canada)* v. *Canada (Northwest Territories (Commissioner))* (1993), 12 C.E.L.R.

construction, operation and maintenance of the lagoon.

The Court found the Defendant did not act with due diligence as it failed to maintain and monitor the lagoon even when it knew of the recommended procedures. Bourassa Terr. Ct. J. quoted Dickson J. in *R.* v. *Sault Ste. Marie (City)*, [1978] 2 S.C.R. 1299 with respect to due diligence:

> Has the defendant "exercised all reasonable care by establishing a proper system to prevent commission of the offence and by taking reasonable steps to ensure the effective operation of the system"?

The Court found the Defendant had the ability to prevent spillage from the lagoon. It did not take the required steps to prevent the spillage. The appeal judge agreed with the trial judge and added that a lack of action on the part of the Defendant to prevent the spill, which was foreseeable and could have been prevented through due diligence, violated section 36(3) of the *Fisheries Act*.[14]

In sentencing the defendant, Bourassa Terr. Ct. J. stated that the "courts are the protectors of the public welfare of the environment."[15] The Court believed that government defendants should not receive preferential treatment, as the government must act with the public interest in mind. The Court considered government conduct that results in a conviction as potentially a breach of trust, as the public relies on the government to protect the public interest. Citing Ayotte Terr. Ct. J. in *R.* v. *Echo Bay Mines Ltd.*, 3 F.P.R. 47 [AT P. 51] the Court emphasized that:

> The legislation is not intended to encourage compliance after an environmental mishap but rather to demand compliance before those mishaps occur so as to prevent them.

With these principles in mind, this Board strongly believes that not only the lagoon but also all aspects of the treatment of wastes must be considered and dealt with in the

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(N.S.) 37.

[14] *Canada (Environment Canada)* v. *Canada (Northwest Territories (Commissioner))* (1994), 15 C.E.L.R. (N.S.) 85.

[15] *Canada (Environment Canada)* v. *Canada (Northwest Territories (Commissioner))* (1993), 12 C.E.L.R. (N.S.) 55 at 60.

licence. The intent of the terms and conditions in the current licence is to prevent wastes from entering the surface or ground freshwater in and around Iqaluit.

The Board therefore agrees with DFO, DIAND and EC that as long as the sewage lagoon will be in use, the integrity and stability of its dyke must be assessed, and the Board decides to rely on the Canadian Dam Association guidelines regarding the type and frequency for the inspection of dykes and dams. **Accordingly, the Board instructs the Town to have the sewage lagoon dykes inspected by an engineer by no later than August 31, 2001. The Engineer's report shall meet the requirements of the Canadian Dam Association's January 1999 Edition of the *Dam Safety Guidelines*.**

ii. Closure, Abandonment and Restoration of the Sewage Lagoon

The Town's application for a licence states that the planned closure, abandonment and restoration of the sewage lagoon are scheduled to take place after the commissioning of the STP. The application also states that the preliminary plan for the closure of the sewage lagoon is to direct the sewage through the STP for treatment. The plan would be to allow the sludge in the lagoon to dry, then to remove it for disposal, and to leave the lagoon empty so that it could be used as a back up system in case of failure of the STP.

In its submission, the Town agreed to submit to the Board, within six months of the commissioning of the new STP, a formal abandonment and restoration plan prepared and submitted in accordance with the same requirements as those of the 1999 licence.

In its submission, Health told the Board that it was important that the licence contains provisions for ensuring the old lagoon is maintained in a condition that will allow it to act as an emergency repository should the STP fail. EP also told the Board that they were in favour of keeping the sewage lagoon in operation as a backup facility, but that

doing so would reinforce the need to ensure that the lagoon, and in particular its dykes, were maintained in an appropriate manner.

In their submission to the Board, DFO, DIAND and EC asked that the Board require the Town of Iqaluit to submit to the Board for approval a closure plan and implementation schedule for the existing sewage lagoon within six months of commissioning of the new STP. They also recommended that the plan include an assessment of supernatant treatment, runoff quality, sludge volume and composition, and sludge disposal options, and that a comprehensive plan be prepared by the Town that would deal with dyke stability and timing of dyke inspections, and the final configuration of the facility should the Board decide to approve the Town's proposal.

The Board agrees with DFO, DIAND and EC, and EP and Health, and instructs the Town to submit to the Board, within six months of the new STP becoming operational, a plan for the abandonment and restoration of the sewage lagoon and/or its conversion to a contingency back-up facility for short-term storage and treatment of sewage.

E. The current and proposed methods for solid waste disposal, including the operation of the current solid waste disposal facility and appropriate contingency during the transition period from the current method to the proposed system

i. Status of the New Solid Waste Disposal Facilities

The Town submitted its Solid Waste Management Planning Study[16] (SWMPS) to the Board on September 25, 2000. In their report, the authors recommended to the Town, the construction of an incinerator and a small landfill for ash and metal waste. At the hearing, the Town told the Board that the Town Council approved the recommendations of the SWMPS, that it was in the process of identifying and assessing potential sites, and that the

[16] "Solid Waste Management Planning Study. Town of Iqaluit". Golder Associates Ltd. And J. L. Richards

design of the selected facilities would be done early next year in time for completion by the end of the summer of 2001.

At the hearing, Health told the Board that the current solid waste disposal system was unacceptable, and that the SWMPS was too preliminary to comment upon. Indeed, Health would like the Board to give them and other intervenors the opportunity to review the details of the proposed option, including the location for new site(s), the type of system(s) selected, and operations and maintenance manual. At the hearing, CGT also told the Board that it should require the Town to submit its proposal to the Board and receive approval prior to constructing any new solid waste disposal facility.

In support of Health, EP also recommended that the water licence include a condition that requires the Town to submit their long-term solid waste management plan, once it is finalized, for review and approval, within four months of the issuance of the water licence or by no later than May 1st 2001. Additionally, EP would like the Town to be required to provide regular updates to the Board on the progress of its long-term solid waste plan.

At the hearing, DFO, DIAND and EC told the Board that they had an opportunity to conduct a cursory review of the SWMPS, and although a complete review of this report had not been completed, the Federal Government Departments told the Board that the report appeared to be comprehensive and that it identified available options for solid waste management. The Federal Departments confirmed that they will provide detailed comments to the Board when the Town submits its proposal for a new facility to the Board for approval. The joint submission noted that the current solid waste facility had less than a year's capacity remaining and was expected to be full by October 2001, and it agreed with the Town's proposal that a contingency plan be in place as soon as possible.

In their joint submission, DFO, DIAND and EC concluded their

& Associates Ltd. September 5, 2000.

recommendations by saying that the Town should be required to submit its final proposal for a new waste management facility to the Board, for approval, within three months of licence issuance.

The Board concludes that there is no question as to its jurisdiction over solid waste management, and that any proposal by the Town to build a new facility for the disposal of solid waste must be formally approved by the Board, and furthermore that all interested parties will have the opportunity to take part in that process. **Any proposal by the Town to construct a new facility, including a facility for the disposal of solid waste, shall meet the requirements of Part G of the licence.**

ii. Contingency Plan

At the hearing, the Town confirmed that the current dump is expected to be full by October 2001, but that the new incinerator facility may not be ready in time to service the town. The Town told the Board that it is currently preparing a contingency plan as a last resort, and that the contingency plan would likely involve earthwork at the current dumpsite, and a possible expansion of the site towards the old metal dump at the East end of the facility as well as the construction of berms to increase the height of the dump.

In their submission to the Board, EP agreed with the Town's intentions and recommended that the water licence include a requirement for the Town of Iqaluit to provide the NWB with a detailed contingency plan six months prior to the current site reaching capacity if it becomes apparent that the new solid waste management facility will not be ready on time. The contingency plan should be subject to review and approval by the appropriate regulatory agencies. Similarly, DFO, DIAND and EC recommended to the Board that the Town be also required to submit, within six months of licence issuance, a Contingency Plan for any interim period between facilities and an Abandonment and Reclamation plan for the existing dump, prior to closure. Health agreed with EP that such a plan was necessary. **Consequently, the Board decides that if a new solid waste disposal facility will not be operational before August 31,**

2001, the Licensee shall submit to the Board for approval, as soon as possible before that date, a contingency plan for the interim period.

iii. Operations of the Current Solid Waste Disposal Facilities

The Town's application stated that the current method of solid waste disposal in Iqaluit has been used on a continuous basis since the military presence of the late 1940's, and that this year the Town, through the preparation of a SWMP, has taken its first step toward adopting a new disposal method.

At the hearing, Town representatives told the Board that the Town Council has made it a priority to consider all issues involved in instituting a new waste disposal process, but that the cessation of burning was not possible. The Town said that a volume reduction of 85% was achieved through burning and that without burning, the current dump would be full very quickly. The Town said that they were burning garbage at the dump only from Tuesday to Friday, that no material was added to the burn after 3:30 p.m. and that wind direction was always taken into consideration before burning garbage. Additionally, the Town told the Board that without burning, the accumulation of garbage would be a danger to the planes at the nearby airport due to the congregation of birds at the site, and that it would cause additional pollution through increased leachate.

On the other hand, EP told the Board that the practice of open garbage fires has caused a lot of public concerns in Iqaluit. EP told the Board that this past summer it received numerous complaints from the public about garbage fire smoke drifting into the town, and that it issued a written warning to the Town in response to these public complaints. However, EP conceded that the Town had no choice but to burn garbage until a new facility is in place.

Nevertheless, EP recommended that the Board order the Town to take appropriate measures before setting garbage on fire.

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Nevertheless, EP recommended that the Board order the Town to take appropriate measures before setting garbage on fire.

As for the construction of a new facility, EP supported the Town's approach, but recommended that the Board impose stringent timelines in the water licence, together with realistic delivery dates for completion of the new facility.

In their joint intervention, the Federal Government Departments noted that the Town should be required to submit to the Board plans for the Operation and Maintenance of Sewage and Solid Waste Disposal Facilities prior to their commissioning, and that the Licensee was also required to review the approved plans on an annual basis and revise them as required. The Federal Departments remarked that the Northwest Territories Water Board last approved the Town's Operation and Maintenance Plan in March 1995, and that many changes have taken place in Iqaluit's municipal facilities since this plan was approved.

Again, the Departments recommended that the licence require the Town of Iqaluit to submit a revised Operation and Maintenance Plan to the Nunavut Water Board that reflects the current solid waste disposal facilities and practices. This Plan should be revised and resubmitted prior to the commissioning of any new or amended waste disposal facility. **The Board agrees with this recommendation and instructs the Town to review, and amend, as needed, the Operation and Maintenance Plan for all solid waste disposal facilities on an annual basis and to revise them prior to the operation of any new solid waste disposal facilities.**

At the hearing, Mr. Marcel Mason told the Board that the Town had contaminated the environment because of its open burning practices at the dump. Mr. Mason told the Board that despite what the Town told the Board at the November 1999 hearing –that it would restrict the hours of burning and segregate waste prior to burning, nothing appeared to have changed in the way the Town was operating its solid waste disposal facility. Mr. Mason also told the Board that the nature of the waste being disposed of by burning (plastics, plastic compounds, and chemicals such as found in household cleaners, detergents, drain openers, etc.) resulted in the creation of dioxins and furans which are hazardous to human and animal life and the environment. Mr. Mason told the

Board that on many occasions, wind has blown smoke from the landfill directly into the community, creating a health hazard for residents.

To address this problem, Mr. Mason urged the Board to impose further restrictions on open burning at the dump. For example, he suggested that no burning should occur during any time of the year when the wind direction could cause smoke from the landfill to move into the community, and between the 15th of April and the 1st of October when the wind direction could cause smoke from the landfill to move over the causeway area, the North 40 recreational area, or the Sylvia Grinnell Park area.

From our public hearings in Iqaluit in 1999 and 2000, garbage was a big issue. We would therefore like to clarify the Board's jurisdiction over activities such as the burning of wastes at the landfill sites in Iqaluit. From our perspective, the interconnectedness between the land and the water is clear, and even though there is no clear statute dealing comprehensively with Iqaluit's situation,[17] the link between land and water is recognized in several federal legal definitions of "environment." For example, the *Canadian Environmental Assessment Act*[18] provides this definition of the environment:

> "environment" means the components of the Earth, and includes,
>
> land, water and air, including all layers of the atmosphere,
> all organic and inorganic matter and living organisms, and
> the **interacting natural systems** that include components referred to in paragraphs (a) and (b). (emphasis added)

The *Canadian Environmental Protection Act*[19] defines environment as:

> "environment" means the components of the Earth, and includes,
>
> I. air, land, and water,
> II. all layers of the atmosphere,
> III. all organic and inorganic matter and living organisms and

[17] Many of the presenters acknowledged that there is no specific waste management legislation for Nunavut. See John Tidball, Tape 2, Side A, p. 7 and at Tape 3, Side B, p. 12; Lee Webber, Tape 3, Side B, p. 14; Marcel Mason, Tape 6, Side A, p. 9; and William Mackenzie, Tape 6, Side B, p. 14.
[18] S.C. 1992, c. 37, s. 2 as amended.
[19] R.S.C. 1985, c. 16 (4th Supp.), s. 3 as amended.

IV. the **interacting natural systems** that include components referred to in paragraphs (a) to (c). (emphasis added)

The *Northwest Territories Environmental Protection Act*[20] and *Environmental Rights Act*[21] both have broad definitions of environment. These definitions concur with the traditional belief of the Inuit regarding the land, or *nuna* in Inuktitut, which includes all of nature: the earth itself as well as the water, the ice, the wind, the sky, and the plants and animals. Water interacts with all other biophysical elements. This interaction requires that activities on land do not affect the water, both surface and underground sources, within the watershed. The courts have also recognized the interconnectedness within the environment. In *Canada* v. *Canada* cited above, de Weerdt, J. stated that "the environment is a seamless web of which no part is disconnected from the rest." This is consistent with the NLCA, which gives the Board the ability to consider the effect of any activity on the entire drainage basin.[22]

The connection of water to the environment has received a broad and liberal interpretation in the Federal Court and Supreme Court of Canada.[23] In *Qikiqtani Inuit Assn.* v. *Canada (Attorney General)*,[24] the Federal Court of Canada reviewed the Nunavut Water Board's decision with respect to the Nanisivik Mine in the Northwest Territories (Nunavut). The Trial Division Judge carefully scrutinized the Board's assessment of water-related

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[20] "environment" means the components of the Earth, and includes,
a. air, land and water,
b. all layers of the atmosphere,
c. all organic and inorganic matter and living organisms and
d. the *interacting natural systems* that include components referred to in paragraph (a) to (c).
(R.S.N.W.T. 1988, c. 75 (Supp.), s. 2(c)), (emphasis added).

[21] "environment" means the components of the Earth within the Territories and includes
a. all air, land, and water, snow, and ice,
b. all layers of the atmosphere,
c. all organic and inorganic matter and living organisms and
d. the *interacting natural systems* that include components referred to in paragraphs (a) to (c).
(emphasis added).

[22] Article 13.10.2: In the event that it is determined that the approval of a water application in the Nunavut Settlement Area would have significant bearing upon water use outside the Nunavut Settlement Area, the NWB may collaborate with the competent water authority in the review, if appropriate, of that water application.

[23] *Qikiqtani Inuit Assn.* v. *Canada (Attorney General)* (1998), 155 F.T.R. (Fed. T.D.); *Friends of the Oldman River Society* v. *Canada (Minister of Transport)*, [1992] 1 S.C.R. 3; *Quebec (Attorney General)* v. *Canada (National Energy Board)*, [1994] 1 S.C.R. 159.

[24] *Ibid.*

impacts as well as matters including air quality, wildlife and public health, and did not question the Board's authority to consider these factors.

In this application, the Board must balance the needs of the residents of Iqaluit with the many activities in the environment that affect fresh water. The Board must decide if the proposed project will provide a continued source of water for the community, and adequately protect all water sources by providing a water treatment facility and an environmentally acceptable solid waste management system for the Town of Iqaluit. Even though the sorting and management of town wastes is something that should ultimately be left with the Town,[25] all residents of Iqaluit are left with potential freshwater pollution concerns because of Iqaluit's *ad hoc* (and now *post hoc*) approach to waste management. Among other things, we know from the evidence that there are significant quantities of waste going into the landfill without being subjected to a proper recycling or environmental sorting program.

Wastes include, by their nature, explosive or reactive metals, acids and salts, hydrocarbons, flammable and organic wastes, toxic and heavy metals and so on. Without the proper waste management practice--which does not exist--the necessity of exercising the jurisdiction of the Board and its licensing authority is overwhelming. Indeed, different presenters agreed the Board should include terms in the water licence with respect to the landfill.[26] This is because polluted leachate from landfills is a significant threat to Nunavut fresh waters. In Iqaluit, we heard evidence that historically there was never a sorting program.[27]

Even today there is evidence that dry cleaning and photo-processing chemical wastes are ending up in the landfill and sewage lagoon.[28]

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[25] The presenters discussed the matter of jurisdiction regarding waste management. John Tidball (Tape 2, Side A, p. 7) noted that the Board does not have jurisdiction to regulate waste management. See also Lee Webber, Tape 3, Side B, p. 15

[26] See Anne Wilson, Tape 2, Side B, p.14 and Tape 4, Side A, p.2; Robert Eno, Tape A, Side B, p. 17, and Tape 7, Side B, p. 4; and Susan Hardy, Tape 6, Side A, p. 4.

[27] William Mackenzie, Tape 6, Side B, p. 15 and Tape 7, Side A, p. 2

[28] These concerns were mentioned by Marcel Mason, Tape 3, Side A, p. 1 and Matthew Hough, Tape 3, Side A, p. 3.

In understanding the pollution cycle of landfills, common sense dictates that rain and snow percolates through the waste, forming new waste constituents in the landfill until a contaminated soup exists. This toxic "soup" can enter groundwater aquifers and flow to other aquifers and/or to freshwater of marine ecosystems. The waste can potentially harm wildlife and/or humans who drink the water.

Another issue is whether the Board can regulate burning at the landfill site. In the licence issued in 1999, the Board stated how it has jurisdiction over air emissions at the landfill on the premise that all aspects of the environment are interconnected and that any emissions into the air *may* affect water.[29] Also, the Board believed then and believes now that airborne emissions, e.g. from the Town's dump, can be carried and deposited into water or onto snow that melts or runs into fresh water. The argument is strengthened knowing that emissions are defined as "waste." For example, the definition of waste in the *Northwest Territories Waters Act* and the *Yukon Waters Act* includes "any substance that, if added to water, would degrade or alter ... the quality of the water...." "Any substance" would include airborne emissions that can degrade or alter the quality of water. At the hearing, Mr. Mason[30] told the Board that some "contaminants generated by the municipal open burn are toxic, specifically, plastics when burnt in low temperature create some very toxic materials ... specifically ... the dioxins and furans[31] ... created during open burning."

Therefore, as the material at the landfill site is burned, particles from this process can enter the water cycle, thus becoming a waste as it can degrade the quality of the water. As no person is allowed to "dispose of waste into water without approval of the NWB," the Board can make conditions with respect to activities that can create air emissions that can ultimately affect fresh waters. In the previous licence, the Board ordered that appropriate studies be performed to determine the link that may exist between emissions from burning

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[29] re: Iqaluit Licence Renewal 1999.
[30] Marcel Mason, Tape 6, Side A, p. 10
[31] According to the *Dictionary of Environmental Science and Technology* (A. Porteous. John Wiley & Sons Ltd. Third Edition. 2000.) these highly toxic organic compounds are created when compounds containing chlorine such as plastics and PVC are burnt in low temperature in improperly operated and designed domestic refuse incinerators. For example, a 20-kg piece of chipboard impregnated with Chlorophenol (a glue) creates as much dioxin when it burns as an entire incineration plant in a whole month (*Warmer Bulletin*, No. 9, March 1986).

waste at the landfill and deposits in fresh waters. **The Town did not complete these studies.** Until it can be conclusively established that there is no link, the Board will continue to make conditions to protect the environment and the waters within its jurisdiction. We know that the study to establish the link–or disprove it–costs money, and CGT reminded us of this.[32] However, we feel strongly about protecting the quality of the fresh waters of Nunavut, especially for humans, and we believe Nunavut's waters should be protected almost *regardless* of cost.[33] Though this statement seems extreme, we are not prepared to accept the alternative possibility, which is that humans become sick or in extreme cases die if pathogens or other toxic matters enter the public's water supply.

The Board has the authority to regulate solid or hazardous wastes in landfills due to the link with wastes and water. When it seems likely that a discharge into water may occur from a landfill site or garbage dump, the Board will request site-specific studies be completed by the applicant. This is consistent with guidelines established for treating municipal wastewater in the Northwest Territories.[34] The construction of the landfill site must also take into consideration the potential of contaminants entering water sources due to runoff from the landfill site. Using the definitions from the *Northwest Territories Waters Act* and the *Yukon Waters Act*, runoff from the landfill can be considered waste.[35] Material in the runoff can degrade or alter the freshwater it enters.

The Board, when determining the conditions and terms of the licence, realizes that the operation of the solid waste disposal site is a critical and costly issue. Although it may appear that the Board is being overly cautious in some of its licence conditions, it does not want to see problems arising as it has in the past. One of the problems from the current landfill – and to a large extent from the sewage lagoon - is *birds*. There are dozens if not hundreds of birds which surely pose an extreme public safety hazard; the bird strike

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[32] Doug Sitland, Tape 5, Side A, p. 11 and Side B, p. 14.

[33] The study required under the previous licence to establish a link between air borne emissions and the effect on fresh waters has not been completed. In his closing remarks, J. Tidball stated that he did not feel it was practical to expend resources on the study at this time as the site is to be closed within the next year. (Tape 8, Side B, p. 17).

[34] Northwest Territories Water Board, "Guidelines for the Discharge of Treated Municipal Wastewater in the Northwest Territories" (1992: NWT Water Board).

[35] *Supra* note 11.

potential from ravens, seagulls and other birds must be high because of the proximity of the dump: it sits immediately south of Iqaluit's major runway. We also know that the landfill is not far from the flight path. During our site visits, both sites attracted flocks of birds concurrently with aircraft using the runway. We clearly do not have the authority over aviation matters but we are sending a copy of this decision to Transport Canada so that they may be aware of the situation. Again, for this and other reasons, we are *pleased* that the Town will be closing the current dump and replace it with a more acceptable alternative for the environment, the health or residents, and public safety.

However, the Board decides that it would be in the public interest that the Town not only improve its current practices of open burning at the solid waste disposal site but also adheres to its own Operation and Maintenance Manual for this site. With this in mind, **the Board authorizes the Town to continue open burning practices at the current solid waste disposal facilities under the following conditions: a 5-m buffer zone is maintained around the combustion area; the wind is from the north or the south and the air temperature is below 15 degrees Celsius; if the wind is not blowing towards the Town. If wind shifts during burnings, attempts to reduce the size of burn shall be made; if the wind does not blow from the northwest between May 1st and September 30th; burning is prohibited during periods of higher risk for the fuel tank farm (i.e., tank filling, venting of tank during high wind, or site spill at the tank farm). In addition, effective June 1, 2001, the Licensee shall limit open burning at the Solid Waste Disposal Facilities to food waste, paper products, paperboard packaging and untreated wood**, subject to the conditions listed above in this paragraph.

iv. <u>The abandonment and restoration of the current and other solid waste disposal sites in Iqaluit</u>

The Town's Statement of Evidence indicated that the Town was responsible for the closure of three waste sites in the community: the Apex dump and the two metal waste sites situated east of the current dump, which have been identified for closure. The Town told the Board that the metal dump in the West 40 area is the responsibility of Transport

Canada and is slated for clean up in the summer of 2001. The Town also told the Board that the metal dump located in the North 40 area is the responsibility of the Federal Government, and that it planned to lobby the government to close that site.

In its submission, the Town told the Board that its preliminary plans for the closure of the municipal sites include the removal of all above ground waste from the area and the use of earthworks to berm and cover the remaining site, and that scheduling for clean up will depend upon available funds.

In their intervention, CGT confirmed that there are numerous waste (sewage and solid waste) sites within the Town that have not been properly closed. As their individual impact on fresh water is unclear, CGT suggested that the NWB may wish to establish some guidelines on the abandonment and restoration of these sites, including the possible use of the existing lagoon as a back up facility for the sewage treatment plant (including repairs to the lagoon dykes). CGT further suggested that runoff from these sites may not impact on fresh waters and as such, the NWB may not have the authority to govern their closure. Regarding the existing solid waste disposal facility, CGT noted that it has the potential of runoff entering drainage channels, and although the existing facility is likely to be abandoned in the very near future, CGT recommended that the NWB should give consideration to requiring the Town to submit Abandonment and Restoration plans to ensure that no deleterious substances are leached from the site.

Similarly, EP agreed that abandoned solid waste sites in Iqaluit must be decommissioned and remediated, but would like to reserve their comments until such time as the Town of Iqaluit submits detailed plans for review. EP noted that any acceptance of such plans should be subject to regulatory approval by applicable agencies.

For their part, DFO, DIAND and EC confirmed that in August 1997, the Town submitted to the Nunavut Water Board abandonment and restoration (A&R) Plans for

the Iqaluit and Apex Landfill Sites. After the Board requested revisions, new documents were submitted (Drainage Plans for West 40 - Site #4 and the Apex Dump Site, October 1997), along with a Remediation Plan for the two sites (December 1997). The Board advised the Town the above-noted documents were not sufficient to meet the licence requirement and could not be approved. The Board provided comprehensive and detailed comments to the Licensee but did not request the revised plans be resubmitted to the Board's office by a specific date. Consequently, the Departments asked the Board to require from the Town the submission of appropriate A&R plans for the Apex and West 40 - Site #4 by specific dates within the licence period, and that these plans should include a schedule for implementation.

At the hearing, Mr. Mason told the Board that the North 40 landfill commonly referred to as "the old metal dump" was a mess of old vehicles and machinery. Mr. Mason noted that the Town believed this landfill was the responsibility of the Government of Canada but he remarked that the site had been used as a municipal landfill. Mr. Mackenzie, a long time resident of Iqaluit, confirmed Mr. Mason's statement.

Mr. Mason observed that the landfill previously used by the Town is located on the side of a bank directly across the inlet from the community, and that some attempts at covering material were previously made although remains visible on the side of the hill during the summer months and spring and rain runoff goes directly through this area into the waters of the inlet. He also pointed out that the old Apex landfill is located on the side of a steep hill leading directly into the ocean and that to date, restoration of this site has consisted of burying material on the top of the hill with rock and gravel fill and heavier material remains at the base of the hill directly in the inlet during periods of high tide. Mr. Mason told the Board that to the best of his knowledge, no studies were ever commissioned regarding either the effects these landfill sites are having on the environment or the ultimate restoration or remediation of any of the sites.

The Board agrees that all known solid waste sites within the municipal boundaries should be the object of proper abandonment and restoration and

acknowledges that, subject to further confirmation, some sites may be not the responsibility of the Town. **Consequently, the Board instructs the Town to submit to the Board, by no later than December 31, 2002, Abandonment and Restoration Plans for the current Solid Waste Disposal Facilities, the Apex dump, the two waste sites situated east of the current dump and, unless the Licensee disproves the ownership of the site, the North 40 dump.**

IV. Conclusion

In conclusion, the Board, when issuing this water licence, has added specific conditions with respect to steps the Town must take to protect water and to reduce potential risks. As the Board is concerned with any factor that may affect the quantity or quality of the water, it must consider activities that can indirectly affect the water as well as those that directly affect water. And since the potential for waste to enter freshwater exists from the polluted leachate and/or runoff from the landfill as well as air borne waste from the burning of debris at the landfill, the Board can include conditions with respect to these activities in the application made by the Municipality of Iqaluit.

For the reasons listed above and pursuant to Article 13 of the NLCA, the Board approves the application for the Town of Iqaluit to renew its water licence for a **three-year term effective January 1, 2001**, subject to the additional details and general and specific conditions of licence NWB3IQA0103 issued by the Board on January 1, 2001.

Dated January 26, 2001 at Baker Lake, Nunavut.

ORIGINAL SIGNED BY

Thomas Kudloo, Chairperson

APPENDIX A - LIST OF SUBMISSIONS AND CORRESPONDENCE

Application for water licence for the Municipality of Iqaluit received on:

- September 15, 2000: application form.
- September 22, 2000: supplementary questionnaire and English Executive Summary.
- September 25, 2000: Inuktitut Executive Summary and *Solid Waste Management Planning Study (SWMP),* September 5, 2000.
- October 2, 2000: application fee.
- October 20,2000: Statement of Evidence in English and Inuktitut; Inuktitut summary of SWMP Study.

Related Letters/ Intervention Statements/Reports:

Letter dated August 1, 2000 from Thomas Kudloo, Chairperson, Nunavut Water Board, Gjoa Haven.

Letter dated August 3, 2000. "Proposed Hearing," from Rick Butler, Chief Administrative Officer, Municipality of Iqaluit, Iqaluit.

Fax dated August 3, 2000 from Philippe di Pizzo, Executive Director, Nunavut Water Board, Gjoa Haven.

Fax dated August 8, 2000 from Philippe di Pizzo, Executive Director, Nunavut Water Board, Gjoa Haven.

Letter dated August 28, 2000 from Philippe di Pizzo, Executive Director, Nunavut Water Board, Gjoa Haven. (English and Inuktitut).

Letter dated August 29, 2000. "Municipality of Iqaluit," from John Tidball, Counsel to the Applicant Municipality of Iqaluit, Miller Thomson Barristers & Solicitors, Markham, Ontario. (English and Inuktitut).

Letter dated September 6, 2000 from Philippe di Pizzo, Executive Director, Nunavut Water Board, Gjoa Haven. (English and Inuktitut).

Letter dated September 7, 2000 from Lee Webber, Legal Counsel to the Intervener DIAND, Department of Justice Canada, Yellowknife.

Letter dated September 8, 2000 from John Tidball, Counsel to the Applicant Municipality of Iqaluit, Miller Thomson Barristers & Solicitors, Markham, Ontario.

Letter dated September 12, 2000 from Philippe di Pizzo, Executive Director, Nunavut Water Board, Gjoa Haven.

Electronic message dated September 12, 2000. "Iqaluit Water Licence Intervention," from Robert Eno, Hazardous Substances Specialist, Department of Sustainable Development, Government of Nunavut, Iqaluit.

Electronic message dated September 13, 2000. "Re: Iqaluit – Request for Extension, from Marcel Mason, Iqaluit.

Electronic message dated September 14, 2000. "Re: Iqaluit – Request for Extension," from Chris Nichols, Department of Sustainable Development, Government of Nunavut, Iqaluit.

Electronic message dated September 14, 2000. "Re: Iqaluit – Request for Extension," from John Tidball, Counsel to the Municipality of Iqaluit. Miller Thomas LLP, Markham, Ontario.

Letter dated September 15, 2000. "Municipality of Iqaluit water licence – Request by Nunavut Department of Sustainable Development for extension of deadline for submitting intervention," from Lee Webber, Legal Counsel to the Intervener DIAND, Yellowknife.

Electronic message dated September 18, 2000. "Intervention Deadline," from Anne Wilson, Water Pollution Specialist. Environment Canada, Yellowknife.

Letter dated September 27, 2000. "Application for the Renewal of the Town of Iqaluit's Municipal Licence," from Philippe di Pizzo, Executive Director, Nunavut Water Board, Gjoa Haven.

Intervention Statement dated October 5, 2000. "Application for Renewal, Municipality of Iqaluit." Marcel Mason, Iqaluit, Nunavut.

Intervention Statement dated November 2, 2000. "Iqaluit Water Licence," from Robert Eno, Hazardous Substances Specialist, Environmental Protection Service, Department of Sustainable Development, Government of Nunavut. Iqaluit, Nunavut. (English and Inuktitut).

Intervention Statement dated November 6, 2000. "Municipality of Iqaluit Water Licence Renewal – 2000," from Douglas Sitland, P. Eng., Manager, Capital Programs, Community Development Division, Department of Community Government and Transportation, Government of Nunavut. Iqaluit, Nunavut. (English and Inuktitut)

Intervention Statement dated November 7, 2000. "Renewal of Iqaluit Water Licence No. NWB3IQA9900," from Bonnie Segal, Environmental Health Officer, Department of Health & Social Services: Baffin. Iqaluit, Nunavut. (English and Inuktitut)

Intervention Statement dated November 7, 2000. "Town of Iqaluit – Water Licence Renewal," from David Livingstone, Director, Renewable Resources and Environment, Department of Indian & Northern Development; Burt Hunt, Director, Eastern Arctic Area, Fisheries and Oceans Canada; and Laura Johnston, Manager, Northern Division,

Environmental Protection Branch, Environment Canada. (English and Inuktitut).

Report dated November 7, 2000. "2000 Compliance Report," from Philippe Lavallée, Inspector, Indian and Northern Affairs, Nunavut District, Iqaluit, Nunavut. (English and Inuktitut).

APPENDIX B – LIST OF EXHIBITS FILED AT NOVEMBER 22-24, 2000 PUBLIC HEARING.

1. Letter dated September 14, 2000 with Renewal Application Form for NWB3IQA9900. "Water License Renewal Application." Matthew Hough, Ed. T., Director, Engineering and Public Works, Municipality of Iqaluit.

2. Water Licence Application Supplementary Questionnaire for Municipalities received September 22, 2000 from the Municipality of Iqaluit.

3. Submission received October 20, 2000. "Written Evidence of the Municipality of Iqaluit." Municipality of Iqaluit.

4. Study dated September 5, 2000. "Solid Waste Management Planning Study, Municipality of Iqaluit." Golder Associates Ltd. and J.L. Richards & Associates Limited. Kingston.

5. Slide Show presented November 23, 2000. "Municipality of Iqaluit – Iqaluit Water Licence Public Hearing, November 22-24, 2000." Municipality of Iqaluit.

6. Submission presented November 23, 2000. "New Conditions Proposed by the Municipality of Iqaluit." Municipality of Iqaluit.

7. Intervention Statement dated November 7, 2000. "Town of Iqaluit – Water Licence Renewal." David Livingstone, Director, Renewable Resources and Environment, Department of Indian & Northern Development; Burt Hunt, Director, Eastern Arctic Area, Fisheries and Oceans Canada; and Laura Johnston, Manager, Northern Division, Environmental Protection Branch, Environment Canada. (English and Inuktitut).

8. Dam Safety Guidelines. Canadian Dam Association. Edmonton, January 1999.

9. Slide Presentation presented November 23, 2000. "Intervention of the Iqaluit Municipal Water Licence Renewal Application." Department of Indian Affairs & Northern Development, Fisheries and Ocean Canada, and Environment Canada.

10. Intervention Statement dated November 6, 2000. "Municipality of Iqaluit Water Licence Renewal – 2000." Douglas Sitland, P. Eng., Manager, Capital Programs, Community Development Division, Department of Community Government and Transportation, Government of Nunavut. Iqaluit, Nunavut. (English and Inuktitut)

11. Intervention Statement dated November 2, 2000. "Iqaluit Water Licence." Robert Eno, Hazardous Substances Specialist, Environmental Protection Service, Department of Sustainable Development, Government of Nunavut. Iqaluit, Nunavut. (English and Inuktitut).

12. Intervention Statement dated November 7, 2000. "Renewal of Iqaluit Water Licence

No. NWB3IQA9900." Bonnie Segal, Environmental Health Officer, Department of Health & Social Services: Baffin. Iqaluit, Nunavut. (English and Inuktitut).

13. Intervention Statement dated October 5, 2000. "Application for Renewal, Municipality of Iqaluit." Marcel Mason, Iqaluit, Nunavut.

14. Slide Show presented November 23, 2000. www.nunanet.com/~mmason.

15. By-Law No.200. Town of Iqaluit.

16. Public Registry, Town of Iqaluit. Nunavut Water Board, Gjoa Haven, Nunavut.

LICENCE NWB3IQA0103

Pursuant to the *Nunavut Land Claims Agreement* the Nunavut Water Board, hereinafter referred to as the Board, hereby grants to

Municipality of Iqaluit

(Licensee)

P.O. Box 460, Iqaluit, Nunavut, X0A 0H0

(Mailing Address)

hereinafter called the Licensee, the right to alter, divert or otherwise use water or dispose of waste into water subject to and in accordance with the conditions specified in this Licence.

LICENCE NUMBER	**NWB3IQA0103**
WATER MANAGEMENT AREA	**05**
LOCATION	**Iqaluit, Nunavut**
PURPOSE	**Water Use and Waste Disposal**
DESCRIPTION	**Municipal Undertaking**
QUANTITY OF WATER NOT TO BE EXCEEDED	**1,100,000 cubic meters annually**
EFFECTIVE DATE OF LICENCE	**January 1, 2001**
EXPIRY DATE OF LICENCE	**December 31, 2003**

This Licence issued and recorded at Baker Lake, Nunavut, includes and is subject to the conditions herein.

Signed this 31st day of December, 2000

ORIGINAL SIGNED BY

Thomas Kudloo
Chairman

This is Exhibit "F" referred to in the Affidavit of
PAUL CROWLEY
Sworn before me this 11TH day of AUGUST A.D. 19 2001
A COMMISSIONER FOR OATHS IN AND FOR NUNAVUT TERRITORY

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PART A: SCOPE, JURISDICTION, ENFORCEMENT AND DEFINITIONS

1. Scope

This License allows for the use of water and the disposal of waste into water for municipal undertakings at the Municipality of Iqaluit, Nunavut (Latitude 63°44'N and Longitude 68°31'W).

2. Jurisdiction

This Licence is issued pursuant to the Board's authority under the *Nunavut Land Claims Agreement*.

3. Enforcement

a. Subject to Part A, Item 3 (d), failure to comply with the licence will be a violation of the *Northwest Territories Waters Act*, exposing the licensee to the enforcement measures and the penalties provided for in the Act.

b. Subject to Part A, Item 3 (d), all inspection and enforcement services regarding this licence will be provided by inspectors appointed under the *Northwest Territories Waters Act*.

c. Subject to Part A, Item 3 (d), inspectors appointed under the *Northwest Territories Waters Act* enjoy-with respect to this licence, and for the purpose of enforcing this licence, and with respect to the use of water and deposit or discharge of waste by the licensee-all powers and privileges and protections that are conferred upon them by the *Northwest Territories Waters Act* or by other applicable law.

d. To the extent that the *Northwest Territories Waters Act* is, subsequent to the issuance of this licence, replaced with respect to water management in Nunavut by other federal legislation (including, without limitation, a regulation or order referred to in Section 10.10.2 of the *Nunavut Land Claims Agreement*), and to the extent that the other federal legislation is consistent with the *Nunavut Land Claims Agreement*, the other federal legislation shall apply with respect to this licence and the *Northwest Territories Waters Act* shall cease to apply with respect to this licence.

4. Definitions

In this licence: NWB3IQA0103

"Act" means the *Northwest Territories Waters Act;*

"Amendment" means a change to original terms and conditions of this licence requiring correction, addition or deletion of specific terms and conditions of the

licence; modifications inconsistent with the terms of the set terms and conditions of the Licence;

"Average Concentration" means the arithmetic means of any four consecutive analytical results submitted to the Board in accordance with the sampling and analysis requirements specified in the "Surveillance Network Program";

"Average Concentration for Faecal Coliform" means the running geometric mean of any four consecutive analytical results submitted to the Board in accordance with the sampling and analysis requirements specified in the "Surveillance Network Program";

"Board" means the Nunavut Water Board established under the *Nunavut Land Claims Agreement*;

"Commercial and Industrial Waste" means any waste generated by the operation of a commercial or industrial enterprise, but does not include Sewage;

"Chief Administrative Officer" means the Executive Director of the Nunavut Water Board;

"Freeboard" means the vertical distance between the water line and the crest on a dam or dyke's upstream slope;

"Grab Sample" means a single water or wastewater sample taken at a time and place representative of the total discharge;

"Greywater" means all liquid wastes from showers, baths, sinks, kitchens and domestic washing facilities, but does not include toilet wastes;

"Geotechnical Engineer" or "Engineer" means a professional engineer registered with the Association of Professional Engineers, Geologists and Geophysicists of the Northwest Territories/Nunavut whose principle field of specialization is the design and construction of earthworks in a permafrost environment;

"Hazardous Waste" means any waste that could be flammable, toxic, corrosive, explosive or otherwise that has the potential for endangering municipal operations, the community or the surrounding environment;

"Inspector" means an Inspector designated by the Minister under Section 35(1) of the *Northwest Territories Waters Act*;

"Licensee" means the holder of this Licence;

"Minister" means the Minister of Indian and Northern Affairs Canada;

licence; modifications inconsistent with the terms of the set terms and conditions of the Licence;

"Average Concentration" means the arithmetic means of any four consecutive analytical results submitted to the Board in accordance with the sampling and analysis requirements specified in the "Surveillance Network Program";

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"Hazardous Waste" means any waste that could be flammable, toxic, corrosive, explosive or otherwise that has the potential for endangering municipal operations, the community or the surrounding environment;

"Inspector" means an Inspector designated by the Minister under Section 35(1) of the *Northwest Territories Waters Act*;

"Licensee" means the holder of this Licence;

"Minister" means the Minister of Indian and Northern Affairs Canada;

"Modification" means an alteration to a physical work that introduces new structure or eliminates an existing structure and does not alter the purpose or function of the work, but does not include an expansion, and changes to the operating system that are consistent with the terms of this Licence and do not require amendment;

"Nunavut Land Claims Agreement" (NLCA) means the "Agreement Between the Inuit of the Nunavut Settlement area and Her Majesty the Queen in right of Canada," including its preamble and schedules, and any amendments to that agreement made pursuant to it;

"Sewage" means all toilet wastes and greywater, excluding Commercial and Industrial Waste and Hazardous Waste;

"Sewage Disposal Facilities" comprises the area and engineered structures designed to contain and treat Sewage (i.e., sewage lagoon and sewage treatment facilities);

"Sewage Lagoon" comprises the area and engineered structures designed to contain and treat sewage as described in UMA Engineering Ltd. drawings CD-00-47-A1 (set of 4);

"Sewage Treatment Plant" comprises the area and engineered structures designed to treat sewage using the ZenoGem technology as described in Hill Murray & Associates Inc. drawings D-0199-G001 to D-0199-G007, D-0199-C001 to D-001-C010, D-0199-M001to D-0199-M013, D-0199-M030 to D-0199-M060, D-0199-E001 to D-0199-E060, D-0199-A001to D-0199-A009, D-0199-S001 to D-0199-S037 received by the Nunavut Water Board September 8, 1999;

"Sludge" means the accumulated and concentrated solids removed from the sewage lagoon and sewage treatment plant;

"Solid Waste" means garbage, refuse, or other discarded material resulting from community activities excluding sewage sludge, commercial, industrial or hazardous waste;

"Solid Waste Disposal Facilities" means the area and associated structures designed to contain solid waste as described in drawing number 100, titled "Town of Iqaluit New Landfill Site", dated January 12, 1995;

"Toilet Waste" means all human excreta and associated products, but does not include greywater;

"Waste" means any substance that, by itself or in combination with other substances found in water, would have the effect of altering the quality of any water to which the substance is added to an extent that is detrimental to its use by people or by any animal, fish or plant, or any water that would have that effect

because of the quantity or concentration of the substance contained in it or because it ahs been treated or changed, by heat or other means;

"Waste Disposal Facilities" means all facilities designated for the disposal of Waste, and includes the Sewage Disposal Facilities and Solid Waste Disposal Facilities; and

"Water Supply Facilities" means the area and associated water intake infrastructure at the Lake Geraldine Reservoir.

PART B: GENERAL CONDITIONS

1. The Licensee shall submit an Annual Report to the Board no later than March 31st of the year following the calendar year reported which shall contain the following information:

    a. the monthly and annual quantities in cubic metres of all freshwater obtained from all sources;

    b. the monthly and annual quantities in cubic metres of Waste discharged to the Sewage Lagoon and/or the Sewage Treatment Plant;

    c. the monthly and annual quantities in cubic metres of Sludge removed from the Sewage Lagoon and/or Sewage Treatment Plant;

    d. tabular summaries of all data generated under the "Surveillance Network Program";

    e. a summary of modification and/or major maintenance work carried out on the Water Supply and the Waste Disposal Facilities, including all associated structures, and an outline of any work anticipated for the next year;

    f. a list of unauthorized discharges and follow-up action taken;

    g. updates or revisions to the approved Operation and Maintenance Manuals, Abandonment and Restoration Plans, and/or Spill Contingency Plan;

    h. a summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for the next year;

i. a summary of any specific studies or reports requested by the Board, and a brief description of any future studies planned or proposed;

j. an executive summary of all plans, reports, and studies in English and Inuktitut;

k. an overview of the capital project projections related to the use of water and the disposal of Waste into water, with proposed implementation schedules; and

l. any other details on water use or Waste disposal requested by the Board by November 1st of the year being reported.

2. The Licensee shall comply with the "Surveillance Network Program" annexed to this Licence, and any amendments to the said "Surveillance Network Program" as may be made from time to time, pursuant to the conditions of this Licence.

3. The "Surveillance Network Program" and compliance dates specified in the Licence may be modified at the discretion of the Chief Administrative Officer.

4. The Licensee shall maintain meters, devices or other such methods used for measuring the volumes of water or waste to the satisfaction of an Inspector.

5. The Licensee shall maintain the necessary signs to identify the stations of the "Surveillance Network Program." All signs shall be located and maintained to the satisfaction of an Inspector.

6. The Licensee shall post signs in the appropriate areas to inform the public of the location of the Water Supply Facilities and the Waste Disposal Facilities. All signs shall be located and maintained to the satisfaction of an Inspector.

7. The Licensee shall immediately report by calling collect the 24-hour Spill Report Line (867) 920-8130 any spills of Waste, which are reported to or observed by the Licensee, within the municipal boundaries and in the areas of the Water Supply Facilities or the Waste Disposal Facilities.

8. The Licensee shall ensure a copy of this Licence is kept at the municipal office and the Sewage Treatment Plant at all times.

PART C: CONDITIONS APPLYING TO WATER USE

1. The Licensee shall obtain all fresh water from Lake Geraldine using the Water Supply Facilities or as otherwise approved by the Board.

2. The annual quantities of water used for all purposes shall not exceed 1,100,000 cubic metres.

3. The Licensee shall maintain the Water Supply Facilities to the satisfaction of the Inspector.

4. The Lake Geraldine freshwater intake shall be equipped with a screen with a mesh size sufficient to ensure no entrainment of fish.

5. The Licensee shall submit to the Board, before November 1, 2001, an inspection report of the Lake Geraldine dam prepared by an Engineer in accordance with the requirements of the Canadian Dam Association's current edition of the *Dam Safety Guidelines*.

6. The Engineer's report referred to in Part C, Item 5 shall include a cover letter by the Licensee addressing the recommendations of the Engineer and shall include a schedule for their implementation.

7. The Licensee shall submit to the Board for approval, at least six (6) months before the expiry of this Licence, a report on the long-term water supply options for the Municipality of Iqaluit. The report shall include, but not be limited to:

    a. Hydrological assessment of Lake Geraldine and its capacity to meet Iqaluit's current and future needs;

    b. Assessment of the potential effects of Lake Geraldine's current and future water drawdown, and in particular on its fish populations;

    c. Assessment of alternative water sources if Lake Geraldine's capacity is inadequate for Iqaluit's long-term needs;

    d. Preferred option for long-term water supply and its implementation schedule.

PART D: CONDITIONS APPLYING TO SEWAGE AND SLUDGE DISPOSAL

1. The Licensee shall direct all Sewage to the Sewage Treatment Plant as soon as the plant is operational but in any event no later than August 1, 2001. Until the plant is operational, all Sewage shall be disposed of in the Sewage Lagoon.

2. All effluent discharged from the Sewage Lagoon at "Surveillance Network Program" Station Number IQA-3 shall meet the following quality standards:

Parameter	Maximum Average Concentration
Total Suspended Solids	180 mg/L
BOD5	120 mg/L
Faecal Coliform	1×10^6 CFU/100 ml

The effluent discharged shall have a pH between 6.0 and 9.5

3. All effluent discharged from the Sewage Treatment Plant at "Surveillance Network Program" Station Number IQA-3 shall meet the following quality standards:

Parameter	Maximum Average Concentration
Total Suspended Solids	30 mg/L
BOD5	25 mg/L
Faecal Coliform	1000 CFU/100 ml

The effluent discharged shall have a pH between 6.0 and 9.5

4. A Freeboard limit of 1.0 metre, or as recommended by a qualified Geotechnical engineer and as approved by the Board, shall be maintained at all dykes and earthfill structures associated with the Sewage Lagoon.

5. The Sewage Lagoon shall be maintained and operated in such a manner as to prevent structural failure.

6. The Licensee shall submit to the Board, before November 1, 2001, an inspection report on the Sewage Lagoon dykes prepared by an Engineer in accordance with the requirements of the Canadian Dam Association's current edition of the *Dam Safety Guidelines*.

7. The Engineer's report referred to in Part D, Item 5 shall include a cover letter by the Licensee addressing the recommendations of the Engineer and shall include a schedule for their implementation.

8. The Licensee shall maintain the Sewage Disposal Facilities to the satisfaction of an Inspector.

9. No later than thirty (30) days following the issuance of this licence and quarterly until the Sewage Treatment Plant is commissioned, the Licensee shall submit to the Board a report on the status of the completion of the Sewage Treatment Plant. The report shall include, but not be limited to:

   a. The schedule of modifications, repairs, and proposed date of commissioning, including possible delay in its commissioning;

   b. Reasons for the modifications and repairs that have been made or proposed to the system;

   c. Assessment of how modifications and repairs are expected to affect the efficiency of the system, the overall effluent quality and the life expectancy of the plant.

10. The Licensee shall submit to the Board for approval, at least two month before the planned commissioning of the Sewage Treatment Plant, a plan for the interim disposal of Sludge removed from the Plant.

11. The Licensee shall submit to the Board for approval, before December 31, 2001, a long-term plan for the disposal of Sludge removed from the Sewage Treatment Plant. The Plan shall include, but not be limited to:

   a. Characterization and quantification of the Sludge;

   b. Treatment and disposal alternatives, including composting;

   c. Proposed option;

   d. Monitoring program;

   e. Implementation schedule.

12. The Licensee shall implement any of the plans specified in Part D of this Licence as and when approved by the Board. If a plan is not approved by the Board, the Licensee shall resubmit it no later than sixty (60) days following notification from the Board.

PART E: CONDITIONS APPLYING TO SOLID WASTE DISPOSAL

1. The Licensee shall dispose of and contain all Solid Waste at the Solid Waste Disposal Facilities up to October 31, 2001 or as otherwise approved by the Board.

2. The Licensee shall burn only Solid Waste at the Solid Waste Disposal Facilities under the following conditions:

   a. A 5-m buffer zone is maintained around the combustion area;

   b. The wind is from the north or the south and the air temperature is below 15 degrees Celsius;

   c. If the wind is not blowing towards the Town. If wind shifts during burnings, attempts to reduce the size of burn shall be made;

   d. If the wind does not blow from the northwest between May 1st and September 30th;

   e. Periods of higher risk for the fuel tank farm (i.e., tank filling, venting of tank during high wind, or site spill at the tank farm).

3. Effective June 1, 2001, the Licensee shall limit open burning at the Solid Waste Disposal Facilities to food waste, paper products, paperboard packaging and untreated wood, subject to the conditions of Part E, Item 2.

4. If a new solid waste disposal facility will not be operational before August 31, 2001, the Licensee shall submit to the Board for approval, as soon as possible before that date, a contingency plan for the interim period.

5. The Licensee shall implement any of the plans specified in Part E of this Licence as and when approved by the Board. If the Board does not approve a plan, the Licensee shall resubmit it no later than sixty (60) days following notification from the Board.

PART F: CONDITIONS APPLYING TO MODIFICATIONS

1. The Licensee may, without written approval from the Board, carry out modification to the Water Supply Facilities and Waste Disposal Facilities provided that such modifications are consistent with the terms of this Licence and the following requirements are met:

   a. The Licensee has notified the Board in writing of such proposed modifications at least sixty (60) days prior to beginning the modifications;

   b. Such modifications do not place the Licensee in contravention of the Licence and/or Act;

   c. The Board has not, during the sixty (60) days following notification of the proposed modifications, informed the Licensee that review of the proposal will require more that sixty (60) days; and

d. The Board has not rejected the proposed modification.

2. Modifications for which all of the conditions referred to in Part F, Item 1 have not been met may be carried out only with written approval from the Board.

3. The Licensee shall provide to the Board as-built plans and drawings of the modifications referred to in Part F, Item 1 within ninety (90) days of completion of the modifications.

PART G: CONDITIONS APPLYING TO CONSTRUCTION

1. At least sixty (60) days prior to the commencement of construction of any dams, dykes or structures intended to contain, withhold, divert or retain water or Waste, including facilities or systems for the treatment and disposal of Solid Waste, the Licensee shall notify the Board of its intentions and submit to the Board design drawings and plans stamped by an Engineer.

2. The Licensee may, without written approval from the Board, carry out the construction of any dams, dykes or structures intended to contain, withhold, divert or retain water or Waste, including facilities or systems for the treatment and disposal of Solid Waste, provided that such constructions are consistent with the terms of this Licence and the following requirements are met:

   a. The Licensee has notified the Board in writing of such proposed construction at least sixty (60) days prior to beginning the construction;

   b. Such construction do not place the Licensee in contravention of the Licence;

   c. The Board has not, during the sixty (60) days following notification of the proposed construction, informed the Licensee that review of the proposal will require more that sixty (60) days; and

   d. The Board has not rejected the proposed construction.

3. Constructions for which all of the conditions referred to in Part G, Item 1 have not been met may be carried out only with written approval from the Board.

4. The Licensee shall provide to the Board, within ninety (90) days of completion of the construction of any dams, dukes or structures intended to contain, withhold, divert or retains water or Waste, including facilities or systems for the treatment and disposal of Solid Waste, all respective

design drawings and construction reports, including as-built drawings, documentation of field decisions that deviate from original plans, and any data used to support these decisions.

PART H: CONDITIONS APPLYING TO OPERATION AND MAINTENANCE

1. The Licensee shall, within four (4) months of the issuance of this Licence, submit for Board approval a revised manual for the operation and maintenance of the Sewage Lagoon and Solid Waste Disposal Facilities prepared in accordance with the "*Guidelines for Preparing an Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities*", October 1996. The Operation and Maintenance Manual for the Sewage Lagoon shall specifically address monitoring and maintenance of west dyke and more particularly ice and snow accumulation at the toe.

2. The Licensee shall submit for Board approval the Operation and Maintenance Manual for the Sewage Treatment Plant at least two (2) months prior to any discharge of effluent. This manual shall outline, among other things, the handling, treatment and disposal of sludge generated by the plant as approved by the Board.

3. If the Board does not approve the manuals referred to in Part H, Item 1, and Part H, Item 2, the Licensee shall revise these manuals and resubmit them to the Board for approval within two (2) months of receiving notification of the Board's decision.

4. The Licensee shall implement the manuals specified in Part H, Item 1, and Part H, Item 2 as and when approved by the Board.

5. The Licensee shall operate and maintain all Waste Disposal Facilities in accordance with their approved Operation and Maintenance manual.

6. The Licensee shall review, and amend, as needed, all Operation and Maintenance manuals on an annual basis and shall advise the Board of any revisions in accordance with Part B, item 1 of this Licence.

PART I: CONDITIONS APPLYING TO SPILL CONTINGENCY PLANNING

1. The Licensee shall, within three (3) months of the issuance of this Licence, submit for Board approval a revised Spill Contingency Plan prepared in accordance with "*Guidelines for Contingency Planning, January 1987*".

2. The Licensee shall revise the Plan referred to in Part I, Item 1 if not approved. The revised Plan shall be submitted for Board approval within two (2) months of receiving notification of the Board's decision.

3. The Licensee shall review, and amend as needed, the approved Spill Contingency Plan on an annual basis and shall advise the Board of any amendments in accordance with Part B, Item 1 of this Licence.

4. If during the period of this licence, any unauthorized discharge of Waste occurs, or if such a discharge is foreseeable, the Licensee shall:

   a. Employ the appropriate contingency plan;

   b. Report the incident immediately by calling collect the 24-hour Spill Reporting Line at (867) 920-8130;

   c. Submit to an Inspector a detailed report on each occurrence no later than thirty (30) days after initially reporting the event.

PART J: CONDITIONS APPLYING TO ABANDONMENT AND RESTORATION

1. The Licensee shall submit to the Board, within six months of the new Sewage Treatment Plant becoming operational, a plan for the abandonment and restoration of the Sewage Lagoon and/or its conversion to a contingency back-up facility for short-term storage and treatment of sewage. The plan shall address, but not be limited to:

   a. The use of the existing Sewage Lagoon or part of it as a back-up facility;

   b. Details on the abandonment and reclamation of any unused portion of the Sewage Lagoon;

   c. The long-term maintenance and inspection of the lagoon dykes;

   d. Characterization and quantification of the Sludge, treatment and disposal alternatives, and the quality of any run-off;

   e. Environmental site assessment;

   f. Maps delineating all disturbed areas, borrow material locations, and site facilities;

   g. Altered drainage patterns;

   h. Type and source of cover materials;

   i. Future area use;

   j. Immediate and long term water quality monitoring requirements;

k. An implementation schedule; and

l. Identification of measures by which restoration costs will be financed by the Licensee upon abandonment.

2. The Licensee shall submit for Board approval, by no later than December 31, 2002, Abandonment and Restoration Plans for the Solid Waste Disposal Facilities, the Apex dump, the two metal waste sites (Site 4 known as *Honey Bag Hill*, and Site 3 adjacent to the Solid Waste Disposal Facilities) and, unless the Licensee disprove the ownership of the site, the North 40 metal dump.

3. The Licensee shall implement the plans specified in Part J, Item 1 and Part J, Item 2 as and when approved by the Board.

4. If the Board does not approve the plans referred to in Part I, Item 1 and Part I, Item 2, the Licensee shall revise and resubmit them to the Board for approval within two (2) months of receiving notification of the Board's decision.

NUNAVUT WATER BOARD
SURVEILLANCE NETWORK PROGRAM

Licensee:	**Municipality of Iqaluit**
License Number:	**NWB3IQA0103**
Effective Date of Licence Renewal:	**January 1, 2001**

A: GENERAL REQUIREMENTS

1. All sampling, sampling preservation and analysis shall be conducted in accordance with methods prescribed in the current edition of "*Standard Methods for the Examination of Water and Wastewater*".

2. All analysis shall be performed in a certified laboratory.

3. The Licensee shall submit a Quality Assurance/Quality Control Plan to an Analyst designated under the *Northwest Territories Waters Act* for approval within three (3) months of the issuance of the licence. The plan shall include analysis of field blanks and certified reference material, and replicate sampling in order to assess accuracy, precision and field contamination.

4. The Licence shall annually review the approved Quality Assurance/Quality Control plan and modify it as necessary. Proposed modifications shall be submitted to an Analyst for approval.

5. The approved quality assurance/quality control plan shall be implemented as approved by an Analyst.

6. Additional sampling and analysis may be requested by an Inspector.

B. STATION LOCATION, REQUIREMENTS AND PARAMETER ANALYSIS

Refer to Table 1

Table 1				
Station	**Location**	**Requirements**	**Parameter Analysis** Total (T)	
IQA-1	Raw water supply at Lake Geraldine prior to treatment (Former SNP Station 0087-1)	Not Required	Not Required	
IQA-2	Leachate from the West 40 Solid Waste Disposal Facilities (Site 3 -metal dump) at Former SNP Station 0087-4	Not Required	Note Required	
IQA-3	Final Discharge from the Sewage Disposal Facilities to Koojesse Inlet at Former SNP Station 0087-2	Annually during periods of flow	BOD5 (T) Suspended Solids pH Faecal Coliform Ammonia Nitrogen	
		Four times annually	Bioassay	
IQA-4	Raw Sewage to the Sewage Disposal Facilities at Former SNP Station 0087-3	Not Required	Not Required	
IQA-5 IQA-6 IQA-7 IQA-8	Leachate from the North 40 Solid Waste Disposal Site (Site 6) at Former SNP Station 0087-5 Leachate from the Abandoned Solid Waste Disposal Site (Site 4, *Honey Bag Hill*) in the West 40 at Former SNP Station 0087-6 Leachate from the Solid Waste Disposal Site (adjacent to Site 3) in the West 40 at Former SNP Station 0087-7 Leachate from the Abandoned Solid Waste Disposal Site (Site 5) in Apex	Monthly during periods of flow	pH T Suspended Solids Nitrite-Nitrite T Phenols Sodium Magnesium T Arsenic T Iron T Mercury	Conductivity Ammonia Nitrogen Oil and Grease (visual) Sulphate Potassium Calcium T Copper T Nickel T Zinc
		Water and sediment once during high runoff period	Polynuclear Aromatic Hydrocarbons Total Aroclor PCBs	

NOTE: Field pH, sample temperature and ambient wind and weather conditions shall be recorded at all locations at the time of sampling.

C. FLOW AND VOLUME MEASUREMENT REQUIREMENTS

1. The monthly and annual quantities of water pumped from Surveillance Network Program Station Number IQA-1 for domestic purposes shall be measured and recorded in cubic metres.

2. The annual quantities of Sludge removed from any Sewage Disposal Facilities shall be measured and recorded in cubic metres.

D. REPORTS

1. The Licensee shall, unless otherwise requested by an Inspector, include all of the data and information required by the "Surveillance Network Program" in the Licensee's Annual Report, which shall be submitted to the Board on or before March 31st of the year following the calendar year being reported.

E. MODIFICATIONS TO THE SNP

1. Modifications to the SNP may be made only upon written approval of the Chief Administrative Officer.

FIGURE 1 – MUNICIPALITY OF IQALUIT SNP STATIONS
(To be provided later by the NWB).

MUNICIPALITY OF IQALUIT

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This is Exhibit " G " referred to in the Affidavit of
PAUL CROWLEY
Sworn before me this 14TH day of AUGUST A.D. 2001
A COMMISSIONER FOR OATHS IN AND FOR NUNAVUT TERRITORY

Nunavut Water Board
MAY 31 2001
Public Registry

INTERNAL

May 31, 2001

Thomas Kudloo, Chair
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU
X0B 1J0

Via fax: (867) 360-6369

Dear Sir:

Re: Iqaluit Water Licence NWB31QA0103 - Progress Update

On behalf of the City of Iqaluit, I write to provide an update on our work towards meeting the conditions of our water licence. Although I am still waiting for a detailed response from the Minister of Indian and Northern Affairs with respect to the legality of our licence, the Council and I wish to impress upon the members of the Water Board that we are making every attempt to meet the high ideals of our licence and complete many of the tasks detailed within

At this point in time the Council is negotiating with the Northern Employees Union to establish a new contract for our staff. Unfortunately the bargaining unit has yet to accept any offer put before them by management. As such, many of our employees are currently locked out. This is a very difficult time for our organization and the remaining staff is falling behind with many administrative tasks. Council is working very hard to resolve the dispute and hopes to once again concentrate on dealing with the long list of issues facing our community.

With our present labour situation in mind, I offer the following information and ask that appropriate amendments be made to our licence to provide us with more time to meet those conditions which will not be completed in time.

Part B - #1 Information for the Annual Report will be compiled once the present labour dispute has been resolved.

Part C - #5 The Inspection Report of Lake Geraldine is scheduled to take place this summer, and will be completed by November 1st, 2001.

Part C - #7 Information is being compiled for the report on long term water supply options. Consultants are being retained by the City, and the project will be completed by the end of this summer. The report will be submitted to the Water Board by the end of 2001.

Part D - #6 The inspection of the sewage lagoon dykes will be completed this summer and the

report will be submitted on time.

Part D - #9 The sewage treatment plant is still under construction. Legal and contractual difficulties, as well as structural flaws in the plant, have slowed completion dramatically. The entire sewage treatment plant project is under review. The Nunavut water Board will be kept informed.

Part E - #1 The disposal and containment of solid waste has been continuing as per the Municipality's license. One exception, however, was the weekend of May 19, 2001. Due to the City's current labour dispute, garbage collection and disposal has stopped. As a result of increasing health risks associated with the waste build-up, the Municipality gave residents the opportunity to take their garbage to the landfill sit on May 19 from 1 to 5 pm. Union members prevented garbage from actually being taken into the dump, thus forcing Council to create a 'transfer station' adjacent to the dump. This temporary storage location was cleared of garbage on May 26 with the waste being transported across the picket line into the landfill. Orders from the Government of Nunavut's Department of Sustainable Development and the Department of Indian and Northern Affairs Canada forced the cleanup of this area.

Part E - #3 The Municipality has devised an aggressive recycling program, which will eventually see a recycling station at the present solid waste disposal facilities. Blue garbage bags intended for separating recyclable materials (plastics, aluminum) from food waste, will be available for purchase and will initially be distributed free of charge to residents. Presently, the Municipality is doing every thing it can to raise public awareness of this new program. Actual implementation has been delayed due to the current work stoppage.

Part E - #4 The Water Board will soon be receiving a proposal from the Municipality to, as a contingency plan, use the current solid waste disposal site in its same capacity until an incinerator is in place. It is proposed that the site be expanded by building up the existing burms.

The Water Board has already received a proposal for the use of the current landfill site as an ashfill and metal dump with the construction of an incinerator in another area of the City. The construction that would take place this year at the landfill would be adaptable for use as an ashfill and metal dump.

Part H - #1 The revised Operation and Maintenance Manual has not been completed due to the current work stoppage. It will be completed once the current labour dispute has been resolved.

Part I - #1 The revised Spill Contingency Plan has not been completed due to the current work stoppage. It will be completed once the current labour dispute has been resolved.

Although many administrative tasks have been put on hold during the current labour dispute, our staff are continuing to provide essential services to our residents such as the provision of potable water and the safe disposal of sewage. Regular inspections of the lagoon are taking place and the Surveillance Network Program will continue as per usual.

Please do not hesitate to contact me if you need any additional information.

Sincerely,

John Matthews
Mayor of Iqaluit

Cc Stephen Traynor, Director of Operations, DIAND Iqaluit, Fax: 975-4560

P.O. Box 119
GJOA HAVEN, NU X0B 1J0
TEL: (867) 360-6338
FAX: (867) 360-6369

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NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN KATIMAYINGI

June 8, 2001

By Email and Telecopier (867) 979-5922

Mr. John Matthews
Mayor
City of Iqaluit
Iqaluit NU X0A 0H0

Subject: Application for Amendment to Licence **NWB3IQA0103**

Dear Mr. Matthews:

Further to your May 31, 2001 application for amendment to licence NWB3IQA0103, the Nunavut Water Board hereby gives notice to the Municipality and interested parties listed in the distribution list that it proposes to process your application by way of a *written* hearing.

Where applicable, the Board's *Rules of Practice and Procedure for Public Hearings*, a copy of which is available upon request, will govern the conduct of the written hearing, including the service of documents and submissions to interested parties. Comments from interested parties shall be submitted to Rita Becker, NWB Licensing Administrator, **no later than June 22, 2001**. All submissions shall be submitted in both English and Inuktitut except those of private citizens who may file in any of the official languages of Nunavut.

Sincerely,

Original signed by:

Philippe di Pizzo
Executive Director

c.c. Distribution List

This is Exhibit "H" referred to in the Affidavit of
PAUL CROWLEY
Sworn before me this 11TH day
of AUGUST A.D., 19 2001
A COMMISSIONER FOR OATHS IN AND FOR
NUNAVUT TERRITORY

DISTRIBUTION LIST- NWB3IQA0103 – June 8, 2001

Contact	E-mail	Fax	
Municipality of Iqaluit	Matthew Hough	hough@nunanet.com	(867)979-5922
	Rick Butler-CAO	city.iqaluit.cao@nunanet.com	
	John Tidball	jtidball@millerthomson.ca	
Mayors and Councillors	John Mathews		(867) 979-5922
NTI	Carson Gillis	cgillis@polarnet.ca	(867) 983-2723
NTI	Stefan Lopatka	slopatka@polarnet.ca	(867)983-2723
NIRB		gladys@polarnet.ca	(867) 983-2594
QIA	Solamie Shoo	lands@nunanet.com	867) 979-3238
QWB	Joe Tigullaraq	qwbrwo@nunanet.com	(867) 979-1491
Amarook HTO			867) 979-3390
NWMB	Josee Galipeau	jgalipeau@nwmb.com	(867) 979-7785
NPC	Michele Bertol	mbertol@npc.nunavut.ca	
DIAND-Iqaluit	Paul Smith	smithp@inac.gc.ca	(867)975-4560
Justice Canada	Lee Webber	lee.webber@justice.gc.ca	867) 920-4022
DIAND-Inspector	Philippe Lavallee	lavalleep@inac.gc.ca	(867) 979-6445
DFO-Iqaluit	Jordan deGroot	degrootj@dfo-mpo.gc.ca	(867) 979-8039
DOE-YK	Paula Pacholek	paula.pacholek@ec.gc.ca	(867) 873-8185
DSD	Chris Nichols	cnichols@gov.nu.ca	(867) 975-5980
Baf-Health Board	Shaun Mackie	smackie@gov.nu.ca	(867) 979-7659
Nunavut Justice	Susan Hardy	shardy@gov.nu.ca	(867) 975-6349
CG&T	Doug Sitland	dsitland@gov.nu.ca	(867) 975-5305
Dillon Consulting	Tanya Smith	DILLON@NUNANET.COM	(867) 979-0345
Marcel Mason		masonm@nunanet.com	(867) 979-1513
Paul Crowley		pcrowley@nunanet.com	(867) 979-2102
CBC			(867) 979-6147
Nunatsiaq News	Valerie Connell		(867) 979-4763
News North			(867) 873-8507

P.O. Box 119
GJOA HAVEN, NU X0B 1J0
TEL: (867) 360-6338
FAX: (867) 360-6369

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NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN KATIMAYINGI

July 3, 2001

By Telecopier (867) 979-5922

Mr. John Matthews
Mayor
City of Iqaluit
Iqaluit NU X0A 0H0

Subject: Application for Amendment to Licence NWB3IQA0103

Dear Mr. Matthews:

Further to your May 31, 2001 application for amendment to licence NWB3IQA0103, the Nunavut Water Board gave notice to the Municipality and interested parties listed in the distribution list that it proposed to process your application by way of a written hearing and further informed all parties that submissions should be received no later than July 1, 2001.

I attach for your review and consideration all submissions received to date. The City of Iqaluit may wish to respond in writing no later than **July 10, 2001**, after which date the Nunavut Water Board will decide on the outcome of your application. In light of concerns expressed to the Nunavut Water Board by the general public and government departments and agencies, this *may* include the possibility of conducting an oral hearing instead of a written hearing.

Meanwhile, please be informed that Nunavut Water Board licence **NWB3IQA0103 is valid** and all current terms and conditions remain in effect.

Sincerely,

Philippe di Pizzo
Executive Director

Encl. Submissions (19)

c.c. Distribution List

This is Exhibit " I " referred to in the Affidavit of
PAUL CROWLEY
Sworn before me this 11TH day of AUGUST A.D. 19 2001
A COMMISSIONER FOR OATHS IN AND FOR NUNAVUT TERRITORY

This is Exhibit " J " referred to in the
Affidavit of
PAUL CROWLEY
Sworn before me this 11TH day
of AUGUST A.D., 19 2001
A COMMISSIONER FOR OATHS IN AND FOR
NUNAVUT TERRITORY

Box 2208
Iqaluit, Nunavut
X0A 0H0

June 21, 2001

Thomas Kudloo
Chairman
Nunavut Water Board
P.O. Box 119
Gjoa Haven, Nunavut
X0B 1J0

Dear Mr. Kudloo:

Re: Iqaluit Water Licence

I am writing to express my concerns with the time extension that may be given to the Municipality of Iqaluit to meet the requirements for its Water Licence. I do not believe that an extension of time is what is needed for the Municipality of Iqaluit to fulfil its obligations under the Water Licence. It has been given ample time to address the issues.

The Municipality of Iqaluit is growing and a proper landfill site is required as well as a functioning sewage treatment system. It is unacceptable that it plans to continue to burn garbage in the open air. The health of Iqalungmiut is being put at risk in the short term and long term by this situation.

If the Municipality of Iqaluit cannot meet its obligations, it is the Nunavut Water Board's responsibility to intervene and set in place measures that will ensure the requirements of the Water Licence are met for the health and safety of Iqalungmiut. Particularly with the current situation in Iqaluit, where garbage is accumulating throughout the city, it is imperative that the Nunavut Water Board give direction that will not allow the Municipality of Iqaluit to start burning garbage. The burning of garbage poses immediate health risks as far as air pollution but also future land and water contamination. It is an unacceptable way of dealing with the garbage of a city with thousands of inhabitants. At the very least, the current garbage load needs to be divided and composting or recycling examined as options. Other options that need to be seriously considered are portable incinerators as well as shipping some of the garbage south by sealift where it can be properly disposed.

/...2

It is critical for the future of Iqaluit that these issues are dealt with now. The Muncipality of Iqaluit needs a proper landfill site, sewage treatment system, recycling program and a long term plan for dealing with waste issues now. The requirements of the Water Licence need to be complied with as outlined by the Nunavut Water Board.

I hope you will take my comments under consideration.

Yours truly,

Neida Gonzalez

Neida Gonzalez

Rita Becker

From: Lynn Peplinski <lynnp@nunanet.com>
To: <rbecker@polarnet.ca>
Sent: June 22, 2001 3:45 PM
Subject: Iqaluit water licence

Dear Rita Becker:

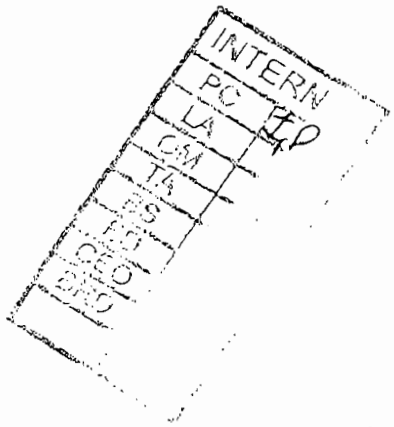
I am writing to voice my concern about the NWB extending Iqaluit Water Licence - which would allow the town to continue to burn its garbage.

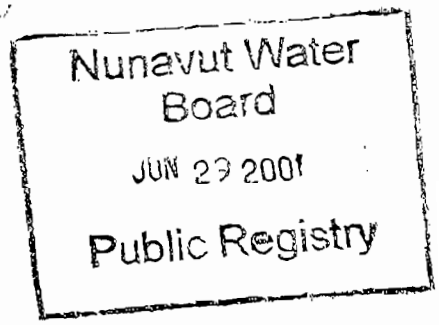
As a result of the strike the amount of garbage that has piled up, uncontained, is considerable. The Mayor has warned the citizens that the Town will have to burn garbage at the dump for 24 hours every day until they can reduce the considerable of volume of waste accumulated in these past months. This will be a dangerous (in terms of public and environmental health) time for Iqaluit if the burning is allowed to happen. There has been no real call to the Iqaluit public to ask us to reduce our garbage volumes or to separate it. I cannot imagine what is meant by Iqaluit having an "aggressive recycling program". Maybe such a program is desirable but that it is in existence is false - or wishful thinking at best.

Again, the intensity of the burning that the Town proposes after this strike will be very damaging if allowed to proceed - perhaps more than the burning that was allowed to proceed previously. In a Town/City this size, we need to find more environmentally responsible solutions.

I would ask the NWB to decline the Town's request for an extension.

Lynn Peplinski
Box 1693
Iqaluit, NT X0A 0H0
867-979-3396
979-2100
lynnp@nunanet.com or lynnp@magma.ca





This is Exhibit " K " referred to in the Affidavit of

PAUL CROWLEY

Sworn before me this 11TH day of AUGUST A.D. 20 01

A COMMISSIONER FOR OATHS IN AND FOR NUNAVUT TERRITORY

I ta Becker

I om: Maltin, Elise <EMaltin@GOV.NU.CA>
T : <RBecker@Polarnet.ca>
at: June 22, 2001 12:52 PM
Subject: No burning

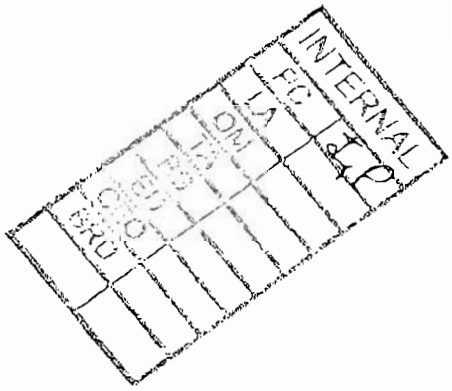
I am writing to you regarding Iqaluit's permit for the dump. Contrary to Mayor John Mathew's claim that there is an agressive recyling program, there i absolutely no sorting of garbage in Iqaluit.

As it stands, anything and everything ends up at the dump, and when burned t comes a smog cloud that very frequently blows over the town. I have concerns about the air quality and the water quality that would be affected by the plastics and other toxics that are burned and spewed into the air.

When the huge backlog of garbage is moved from the areas behind the Brown Building and the city offices, the dump could be burning night and day to c al with the mess. This could have a terrible impact on the air and water quality. There should be a plan to sort and properly deal with all the garbage in a safe manner.

Thank you

E se Maltin
E x 182
Iqaluit, Nunavut



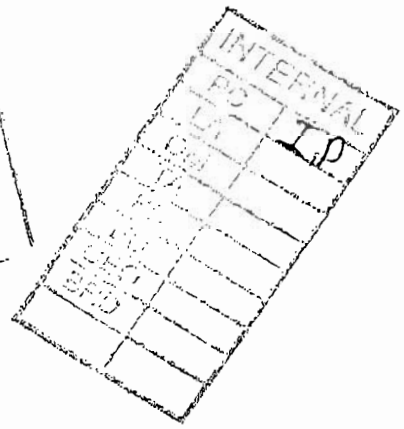
This is Exhibit " L " referred to in the Affidavit of
PAUL CROWLEY
Sworn before me this 11TH day
of AUGUST A.D., 19 2001
A COMMISSIONER FOR OATHS IN AND FOR NUNAVUT TERRITORY

Rita Becker

From: peter and julia krizan <peter.julia@nv.sympatico.ca>
<rbecker@polarnet.ca>
At: June 22, 2001 2:06 PM
Subject: burning of garbage in Iqaluit

Dear Rita Becker,
We got your name and address from a friend. We are writing to you with regards to the attempt of the town of Iqaluit to extend the deadline to burn garbage in the Iqaluit dump. As you are probably aware, due to the labour dispute between the town and its workers, enormous amounts of garbage have piled up during the last 2 months. The town intents to burn this garbage after an end of the dispute. If this should happen, the dump would burn for many many days, 24 hours a day. We are very concerned that this would have an enormous impact on the health of all residents. We have 2 little children and we would see no other choice than leaving Iqaluit for some time. We would like to ask you to do everything in your power in order **not to extend the deadline**. We are very concerned and fear for our and our children's well being.
Thank you very much for your time
Regards

Julia and Peter Krizan
Iqaluit



This is Exhibit " M " referred to in the Affidavit of
PAUL CROWLEY
Sworn before me this 11TH day
of AUGUST A.D., 19 2001
A COMMISSIONER FOR OATHS IN AND FOR
NUNAVUT TERRITORY

NUNAVUT WATER BOARD

RECORD OF CONVERSATION/INTERVIEW

Date: June 28, 2001 2:50 pm (MT)	**File No**: NWB3IQA

Recorded by: Dionne Filiatrault, Technical Advisor

Held with: Miali Coley		
Tel:	**Fax**:	**Email**: inralik@yahoo.com

Details: Read urgent public notice from the hospital. Would like the NWB to consider holding Public hearing with respect to allowing or not allowing the town to continue open burning practices. Need to look into issues surrounding burning need to consult with experts, and issues are impacts public health for residents of Iqaluit and to the local environment.

Signature:

This is Exhibit "N" referred to in the Affidavit of
PAUL CRAWLEY
Sworn before me this 11TH day
of AUGUST A.D., 2001
A COMMISSIONER FOR OATHS IN AND FOR
NUNAVUT TERRITORY

This is Exhibit " O " referred to in the Affidavit of

PAUL CROWLEY

Sworn before me this 11TH day

of AUGUST A.D., 19 2001

A COMMISSIONER FOR OATHS IN AND FOR NUNAVUT TERRITORY

Record of Conversation

Date: June 28, 2001	9:40 am	
NWB Licence: NWB3IQA0001	Project: Iqaluit Renewal	

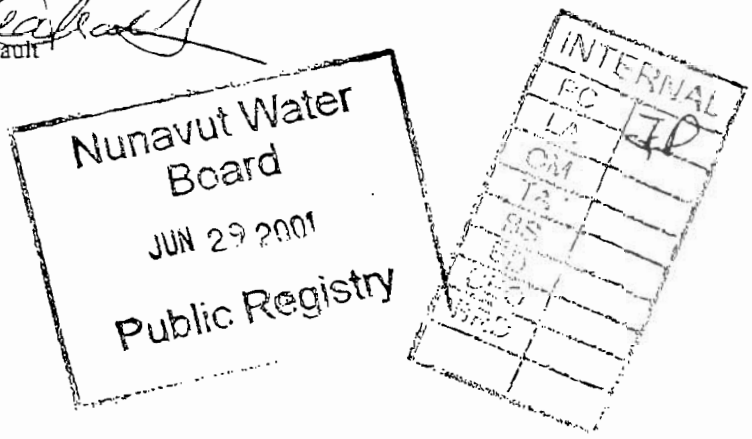
From: Jim Little	Organization: Citizen
To: Dionne Filiatrault	Phone/Fax:

Re: Deadline and Potential public hearing

Jim indicated he would be filing a written submission before the deadline. Requested information on public hearing vs. written hearing process. Dionne indicated that the decision would be made by the Board following the deadline. Jim asked " how many people it would take for the Board to decide on a public hearing?" Dionne indicated that she could not presume to answer for the Board, they would make the decision after reviewing all the submissions. Jim indicated that some expertise on burning, and incinerators was needed. He asked informally " how many southern locations open burn" Dionne indicted that this figure was unknown and beyond her expertise. Jim also asked Dionne is role with the NWB. Dionne indicated she was the engineer which provided technical advise on matters before the Board or made necessary arrangements to ensure Board had necessary information.

Dionne asked if conversation needed to be recorded. Jim stated no really he would be filing a submission before the deadline.

27/06/01 By: Dionne Filiatrault



PO Box 1816
Iqaluit, NU
X0A 0H0

This is Exhibit " P " referred to in the Affidavit of
PAUL CROWLEY
Sworn before me this 11TH day
of AUGUST A.D., 18 2001
A COMMISSIONER FOR OATHS IN AND FOR
NUNAVUT TERRITORY

Nunavut Water Board
Gjoa Haven, NU By Fax: (867) 360-6369

29 June, 2001

Dear Sir,

I am writing to you about the Water License issued by the Nunavut Water Board (NWB) to the City of Iqaluit, in relation to our current municipal garbage crisis.

As I understand, the license stipulates that as of June 1 2001, prior to disposal/treatment, all garbage must be sorted into burnables (untreated wood, paper products, food wastes, etc.) and non-burnable materials (e.g. all plastic products, treated woods, synthetics, etc.). The former can then be burned at the dump, while the latter would have to be land-filled or disposed of in some other way.

It is my view that open-burning of garbage poses a significant health risk to the people of Iqaluit, and especially to infants and children. As you know, this City and all of Nunavut have a very young age structure. Furthermore, the contaminants produced by open-burning pose a hazard to the marine and terrestrial ecosystems, getting into the food chain and contaminating the wildlife which many people harvest and depend on. The Medical Officer of Health for Nunavut has stated that such human health risks exist.

It is only in the last few years that I have noticed the air quality in this City deteriorate significantly, coincident with the building-boom and the economic and population growth experienced by Iqaluit since the creation of Nunavut on April 1, 1999. Last summer (2000) there were many days (even on Sundays and holidays) when burning was being carried out and winds were drifting the smoke into the downtown area where people were outdoors in great numbers, including many young children on the playgrounds. I felt that this was an unacceptable situation in that it compromised the health of many people trying to enjoy a pleasant summer day.

Also this past winter, we had extended periods of stable cold weather with light or no winds, and the air quality in Iqaluit was very poor for days at a time. When I asked the City Administration if they could suspend burning during this kind of weather, I was informed that burning was required because of Ministry of Transport regulations, that without burning there would be too many ravens around the dump and that aircraft safety would be compromised, and that the

garbage would pile up. Well, at this moment there is a good city block of garbage in front of the City Hall and perhaps 200 meters of garbage alongside the road near the dump, not to mention the garbage in the dump itself. I believe this shows that the "bird hazard" theory is untenable.

The City of Iqaluit has a very poor record when it comes to appropriate planning and development. The City has had many years available to prepare for the coming of Nunavut and Iqaluit's becoming the capital of the new territory.

I request and urge the Nunavut Water Board to up-hold and enforce all the terms and conditions of Iqaluit's water license, and to reject any recent or forthcoming requests from the City for extension to the June 1 implementation deadline. The health of residents and our environment is at stake here. If the NWB decides to consider such requests from the City of Iqaluit, at the very least a Public Hearing on this issue must be held. In this event, the NWB must conduct an assessment of the short-term and long-term risks to human and ecosystem health stemming from open burning.

Thank you for the opportunity to address you on this issue and for your consideration of my concerns.

Sincerely,

Keith Hay

Tel: (867) 979 - 0605
keith_inumiaq@yahoo.ca

CC: Ed Picco, Minister of Health and Social Services and MLA, Iqaluit East
Editor, Nunatsiaq News, PO Box 8, Iqaluit, NU

NorthWinds Arctic Adventures

P.O. Box 820, Iqaluit, NT, XOA OHO Canada Tel: 867 979-0551 Fax: 867 979-0573

FAX TO:	Nunavut Water Board Gjoa Haven, Nunavut
FAX #:	**867 360-6369**
FROM:	Paul Landry ***NorthWinds Arctic Adventures***
DATE:	June 30, 2001
# OF PAGES:	1

Re: Iqaluit Water License

The City of Iqaluit is considering open burning of the garbage that has accumulated during the strike. This is un-acceptable. The current Water Board license states that open burning of garbage and plastics will cease as of June 1, 2001. Eighty percent of household garbage contains plastic. The burning of the garbage accumulated during the strike will cause extreme pollution to the surrounding waters and the people of Iqaluit. The days of open burning in Iqaluit are over.

There are other alternatives to open burning that the City of Iqaluit can consider. A portable incinerator could be leased and transported to Iqaluit this summer. Garbage could be compressed and shipped south on the empty boats to be burned in incinerators.

I urge the Water Board to enforce its current license that states **no open burning after June 1, 2001**.

Thank you for taking the time to read my letter.

A concerned citizen.

Paul Landry

This is Exhibit " Q " referred to in the Affidavit of

PAUL CROWLEY

Sworn before me this 11TH day

of AUGUST A.D., 19 2001

A COMMISSIONER FOR OATHS IN AND FOR NUNAVUT TERRITORY

This is Exhibit " R " referred to in the Affidavit of
PAUL CROWLEY
Sworn before me this 4TH day of AUGUST A.D., 19 2001
A COMMISSIONER FOR OATHS IN AND FOR NUNAVUT TERRITORY

Tim Little
P.O.Box 189
Iqaluit N.T. X0A-0H0
Phone 867-979-3261
Fax 867-979-6400
July 1 2001

INTERNAL

Nunavut Water Board
JUL 0 1 2001
Public Registry

TO: Nunavut Water Board
Gjoa Haven
Fax: 867-360-6369

Attention: Phillipe di Pizzo

Dear Mr. di Pizzo ,

I am writing regarding the City of Iqaluit's request to have an extension to their current water license so they can continue disposing of solid waste by open burning. The reason I feel there should not be an extension to open burning is simply the health of our children. I have yet to hear a single argument that burning is good for anything other than a convenient space saving solution.

I think a well advertised appropriately scheduled Public Hearing would give, what I see as a ground swell of opposition at the grass roots level, the opportunity to voice their concerns to your board as well as our elected community and territorial leaders. Personally I would use the forum of a hearing to present to your board and city council some alternatives that do not put our health nor the environment at risk. One councillor that I have spoken with has voiced clear doubts regarding the compounds leaving the stack of the best maintained incinerators, let alone the known carcinogens etc. released from slow open burns. I would also like experts to thoroughly and honestly describe all the negative effects of open burning on our environment and public health. I will do what I can to bring these concerns to the public and encourage their attendance as well as all the leaders.

I am a relatively new at publicly voicing my concerns regarding our environment and public health. I am not an expert by any means, but I am a concerned citizen with a broad background. With my business, I travel

throughout Nunavut cleaning bulk fuel storage tanks, usually for the Nunavut Government. I have seen excellent examples of the government taking care to protect the environment and in the same community I've seen, what I consider to be, gross negligence. Secure well maintained tank farms with excellent secondary containment systems then just down the road barrels of waste crankcase oil, and other contaminates, haphazardously stored , soaking the ground of so called dumps and in some locations, the beach. This has prompted me to research possible solutions that could be used throughout Nunavut to better protect our environment. During my research regarding the above I have discovered how solid waste is handled in other jurisdictions in Canada and around the world. My objective soon thereafter was to invision a solid waste management system using existing technologies, that would not present a problem to the environment or our health, now or anytime in the future. How some of these endeavors were financed was not a great concern to me but judging from information packages I got from existing southern facilities the rough plan I have developed will be less expensive than our Cities projected cost for the construction of an incinerator not to mention the yearly operation, maintenance and ongoing fuel costs.

I have found many authorities in our government that support my concerns but none appear ready to take any responsibility for a solution. Perhaps I have been talking to the wrong people. It appears to me that the Nunavut Water Board has the authority to effect positive change. Hats off to your organization.

The Director of Engineering has given me some of his time but I have not been assured that work was proceeding in any meaningful way. There have been at least three pertinent Requests for Proposal that I'm aware of. In our local paper, since the lockout /strike began, two have been canceled. The third was to design an expansion of our existing land fill site for another three years. Part of the requirements of that RFP was for it to later accommodate ash from the future incinerator. I cannot help thinking the city fully intends to openly burn until an incinerator can be established. I do not know if that RFP was awarded or not, I have been unsuccessful in my attempts to contact Mr. Hough.

I can only begin to understand Mr. Hough's workload, considering the current lockout/strike not to mention the demands of a growing community.

It seems to me that he does not have the time to give to the solid waste solution. I know of no others working on this problem with the possible acceptation of a young man recently hired to recycle paper from offices etc. around Iqaluit.

Another council member who heads the Waste Management Committee has made it clear to me that I would be able to make a presentation to his committee but told me he does not want to deal with [illegible] that the issue should be of a greater priority. In actuality that committee meets infrequently and members have told me the committee has been ineffectual for some time now.

Our local paper quoted our mayor saying " Iqaluit has developed an aggressive recycling program". That may be, but there is no program I am aware of that addresses , in any way, the threat to our health. Furthermore, the mayor told me last week that they intend to burn the garbage. Burning may be an expedient way to deal with the problem but how thoroughly have any our leaders examined the alternative methods?

All our locally elected officials are successful professionals in responsible positions and some with young families, all of which, I'm sure, put great demand on their time. This is not to diminish their responsibilities to our community's many growing pains.

The solid waste problem should have a dedicated researcher/planner working full time reporting to the community , options based on facts, scientific evidence and existing operation around the world.

I fear the choices the city is making regarding our solid waste problem is producing the same cynicism with the grassroots as our new multi-million dollar sewage disposal system which has yet to go into service.

In my mind the burn policy is an ongoing threat to our health. Just look at the recent media coverage of recent health studies. The council and city management should be looking for help with solutions where ever it is available. The clock is still ticking and soon it will be too late to initiate any substantive programs this year that could have a direct impact on the problem. As you know any infrastructure must be established during a short season and be shipped here on our annual summer shipping season.

I have gathered much information from engineering firms, manufacturers and municipalities in the south that deal with these

problems everyday. I think if developed properly, some non specific examples of existing operations could provide a solution in a cost effective an environmentally friendly way to the problem facing all of us here in Iqaluit. Yet I have found that no one on Council or in City management has any time or much interested in hearing about any of these ideas. I hope I'm wrong, but I think they privately see burning as a convenient solution used in the past and they plan to continue doing so at least until some of the other community problems are solved.

Our health and environment should not be put at risk due to other community demands for infrastructure. Nor should our children's health be sacrificed because of the cities internal labor dispute.

Respectfully,

Jim Little

This is Exhibit " 5 " referred to in the Affidavit of
Paul Crowley
Sworn before me this 11TH day
of August A.D., 19 2001
A COMMISSIONER FOR OATHS IN AND FOR NUNAVUT TERRITORY

From: Paul Crowley
P.O. Box 1226
Iqaluit, Nunavut
X0A 0H0
Tel.: (867) 979-3396
Fax: (867) 979-2100
Email: pcrowley@nunanet.com

June 22, 2001

To: Nunavut Water Board
Cjoa Haven, Nunavut

Via Email

Dear Water Board Members:

Re: Request to Amend Iqaluit Water Licence

Please accept the following comments with regards to the City of Iqaluit's request to amend their exiting water licence.

I am very concerned that the City of Iqaluit may be considering open burning of the garbage that has been accumulating during the strike of the municipal workers. The amount of accumulated garbage is very large and the resulting pollution from an open burn will contaminate the waters (as well as the land, animals and people) in the vicinity of Iqaluit. I am sure I need not remind the Water Board that open pit burning of household garbage which typically contains up to 80% plastic results in the production of toxic products such as dioxins and furans. I urge the Nunavut Water Board to keep to the current licence which does not allow the burning of plastics after June 1, 2001. Burning must not be seen as a possible solution to deal with the accumulated garbage.

I also take issue with the City of Iqaluit's contention that the City has embarked on an 'aggressive' recycling program. As a resident of the City of Iqaluit, I am not aware of any new recycling initiatives. I ask that the Water Board direct the City of Iqaluit to immediately inform the Water Board and the residents of Iqaluit of the particulars of this 'aggressive' recycling program.

I am very concerned about the lack of containment of solid waste during the strike. Garbage has been left in a number of un-contained areas and is subject to being dispersed by ravens, dogs, and particularly the wind. Once again much of this garbage is plastic and it is being blown into the waters around Iqaluit. I ask that the Water Board direct the City of Iqaluit to contain the garbage that has accumulated within City limits so as to ensure that it does not affect the waters around Iqaluit.

I am, of course, aware of the difficulties created by the current labour dispute in Iqaluit. This dispute should not endanger our waters or our health. I urge the Water Board to ensure that the City lives up to their responsibilities.

Yours truly,

Paul Crowley

Douglas Workman
P.O. Box 1163
Iqaluit, NU
X0A 0H0
June 22, 2001

Nunavut Water Board
JUN 29 2001
Public Registry

INTERNAL
PC JP
LA
OM
TA

Mr. Philippe di Pizzo,
Executive Director
Nunavut Water Board
PO Box 119
Gjoa Haven, NU X0E 1J0

Dear sir,

I am writing to you as a concerned citizen and ratepayer who lives in the capital city of Nunavut. As a result of a newspaper article, which was published in the Friday June 15, 2001 edition of the Nunatsiaq News, I am appealing the apparent decision to allow an extension for this municipality's water licensing situation.

In this article, the mayor states the current labour dispute as the main obstacle to its compliance to the terms of its water license. In view of the fact that the city locked its own employees out on April 17, 2001, thereby deliberately preventing these employees from performing the work needed to comply with its obligations, how can Mr. Matthews seriously think of requesting a reprieve? Indeed, it has now become apparent, from a guarded official city planning document recently obtained by the union, that the current labour dispute was instigated by the town administration as way to buy time and avoid having to deal with its obligations.

Far from making any honest attempts to comply with the terms of its water license, on several occasions over the past two months, the mayor and council have invited the population of Iqaluit to take their own garbage to the landfill site, in violation of its own By-Laws. As for the sewage lagoon, this situation has dragged on far too long. The environment in which we live play and work has suffered far too long. The safety and health of all living creatures in the Iqaluit area are at risk. It is not possible to turn the back the clock, but it is certainly reasonable to stop further damage to occur from now on.

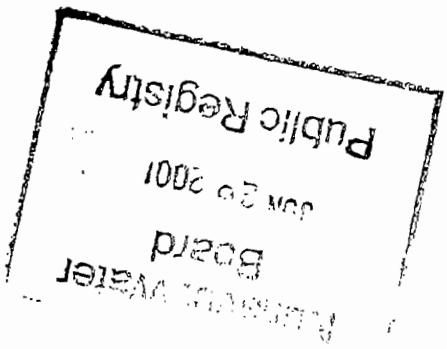
Sir, it is not my intention to see the City of Iqaluit penalized with heavy fines, as this would only be passed on to the citizens of this community. We have already paid heavy enough a price for the wanton foolishness of this group of ill-advised politicians. But it should be made absolutely clear to them, in the strongest possible terms, that they can no longer escape their responsibilities and that their request for an extension must be denied.

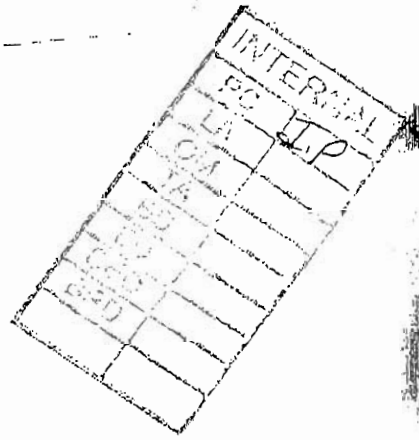
Thank you for your attention to this matter.

Sincerely,

[signature]

This is Exhibit " T " referred to in the Affidavit of
PAUL CROWLEY
Sworn before me this 11TH day
of AUGUST A.D. 2001
[signature]
A COMMISSIONER FOR OATHS IN AND FOR
NUNAVUT TERRITORY





June 21, 2001

Mr. Philippe di Pizzo,
Executive Director,
Nunavut Water Board,
PO Box 119,
Gjoa Haven, NU
X0E 1J0

Dear Sir,

I am writing to you as a concerned citizen of Iqaluit. I feel compelled to write to you as a result of a newspaper article which was published in the Friday June 15, 2001 edition of the Nunatsiaq News. In this article, it was reported that the mayor of our city, Mr. John Matthews has written to you pleading for an extension to the deadline the city was issued by your office to provide for a plan to have its new sewage lagoon operating by August 1, 2001 and try to have a new dump open by August 31.

In this article, the Mayor quotes the current labour dispute as the main obstacle to its compliance to the terms of its water license. In view of the fact that the city locked its own employees out on April 17, 2001, thereby deliberately prevented these employees from performing the work needed to comply with its obligations, how can Mr. Matthews seriously think of requesting a reprieve? Indeed, it has now become apparent, from an official city planning document recently obtained by the bargaining agent, that the current labour dispute was instigated by the town administration as a way to buy time and avoid having to deal with its obligations.

Far from making any honest attempts to comply with the terms of its water license, on several occasions over the past two months, the mayor and council have invited the population of Iqaluit to take their own garbage to the landfill site, in violation of its own By-Laws. As for the sewage lagoon, this situation has dragged on far too long. The environment in which we live, play, and work has suffered. The safety and health of all living creatures in the Iqaluit area are at risk. It is not possible to turn the clock back, but it is certainly reasonable to stop further damage from occurring from now on.

This is Exhibit " U " referred to in the Affidavit of
PAUL CROWLEY
Sworn before me this 11TH day
of AUGUST A.D., 19~~2~~2001
A COMMISSIONER FOR OATHS IN AND FOR
NUNAVUT TERRITORY

It is not my intention to see the City of Iqaluit penalized with heavy fines, as this would only be passed on to the rate payers of this community. We have already paid a heavy enough a price for the foolishness of this group of ill-advised politicians. But it should be made absolutely clear to them, in the strongest possible terms, that they can no longer escape their responsibilities and that their request for an extension should be denied.

Thank you for your attention to this matter.

Yours truly,

M. E. Thomas

Mary Ellen Thomas
Concerned Citizen

Rita Becker

om: Marcel <masonm@nunanet.com>
Rita Becker <rbecker@polarnet.ca>
ont: June 11, 2001 5:20 PM
tach: landfill_enterance.jpg; roadside_transferpoint.jpg; road_garbage_2.jpg; outside_town_office_2.jpg; outside_town_office.jpg
Subject: Re: NWB3IQA0103-AMENDMENT

: Rita Becker wrote:
>
> Please see attached letter and attached amendment request. Any
> parties wanting a copy of the licence NWB3IQA0103 or of the mentioned
> procedures, please send me an e-mail.

(mments on the Municipal amendment request as follows:

[the section titled [Part B #1] the Municipality states "The disposal
solid waste has been continuing as per the Municipality's license.
One exception, however, was the week-end of May 19, 2001. Due to the
City's current labour dispute, garbage collection and disposal has
pped. As a result of increasing health risks associated with waste
build-up, the Municipality gave residents the opportunity to take their
garbage to the landfill site on May 19 from 1 to 5 pm. Union members
vented garbage from actually being taken to the dump, thus forcing
Council to create a 'transfer station' adjacent to the dump. This
emporary storage location was cleared of garbage on May 26 with waste
ng transported across the picket line into the landfill. Orders from
the Government of Nunavut's Department of Sustainable Development and
he Department of Indian and Northern Affairs Canada forced the cleanup
his area."

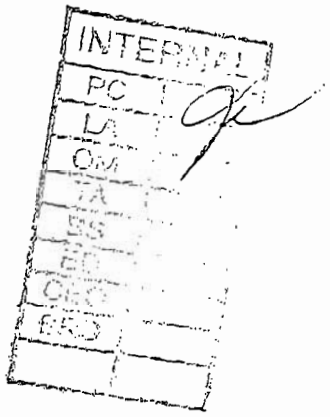
With respect to the first portion of this statement disposal and
tainment of solid waste has not been continuing as per the licence.
ached please find images named 'landfill_enterance.jpg',
oad_garbage_2', 'outside_town_office.jpg', and
side_town_office_2.jpg' taken this date showing that disposal is not
ng place within the landfill as required by the license.

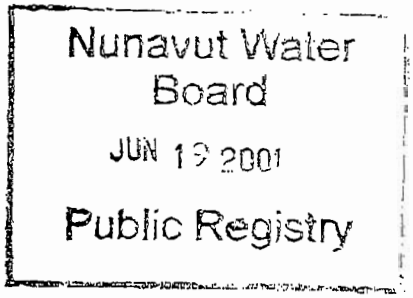
image named 'landfill_enterance.jpg' clearly shows that the gates to
Municipal Landfill are completely blocked making disposal of waste
the landfill impossible.

image named 'road_garbage.jpg' shows a large volume of domestic and
mmercial waste that has been deposited along the side of the road at
near the landfill.

he images named 'outside_town_office.jpg' and
side_town_office_2.jpg' show the large volume of domestic and
mercial waste that has been deposited outside the Municipal Office
ar the centre of the community.

respect to the portion of the statement dealing with the clean up
ne 'transfer station' please see image named
adside_transferpoint.jpg'. As can be seen the temporary transfer
t is still being used and while the bulky material left at the site
as removed to the landfill the area has not been cleaned up.





w/ pictures attached

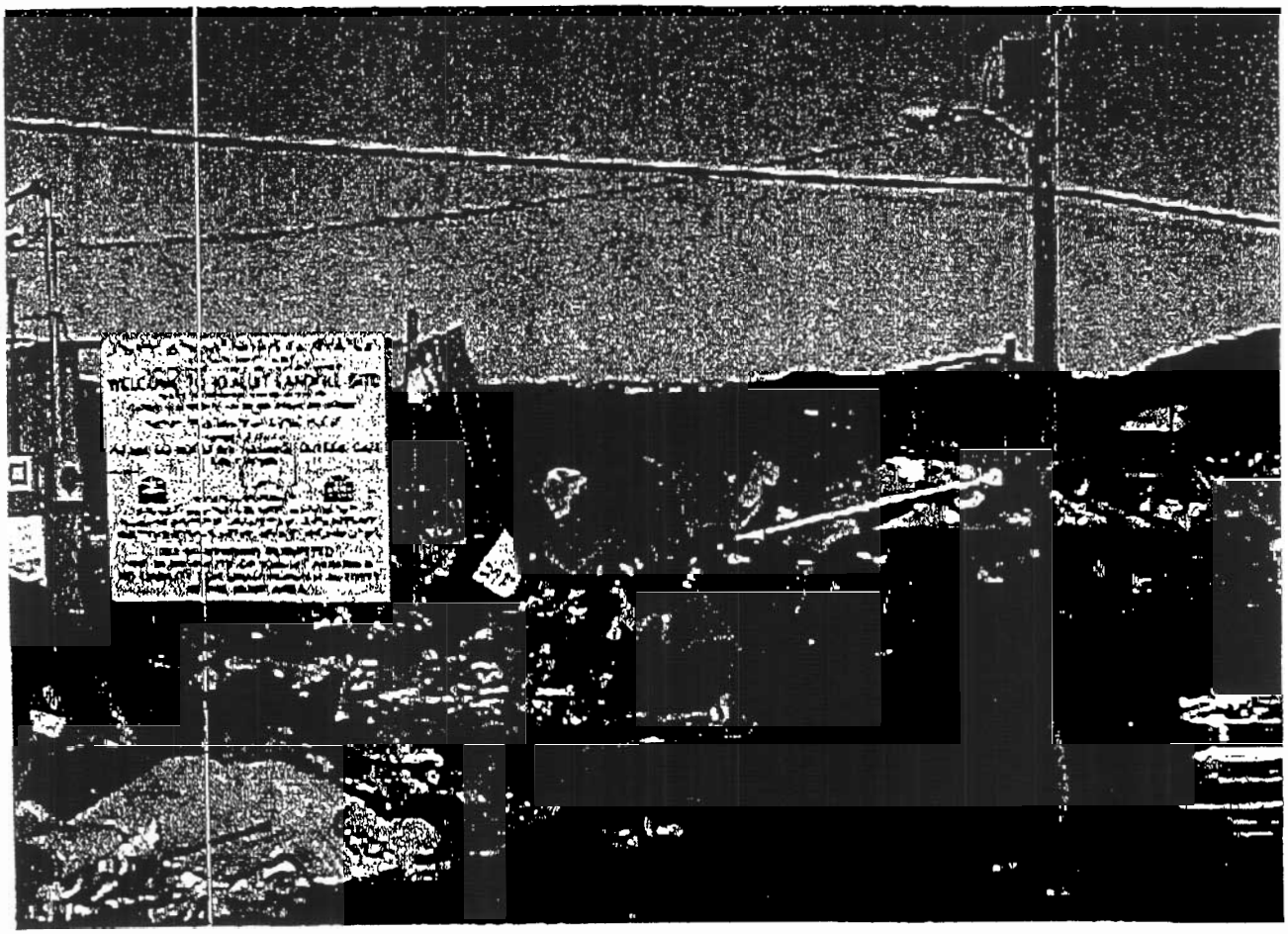
This is Exhibit " V " referred to in the Affidavit of
PAUL CROWLEY
Sworn before me this 11TH day
of AUGUST A.D., 19 2001
A COMMISSIONER FOR OATHS IN AND FOR NUNAVUT TERRITORY

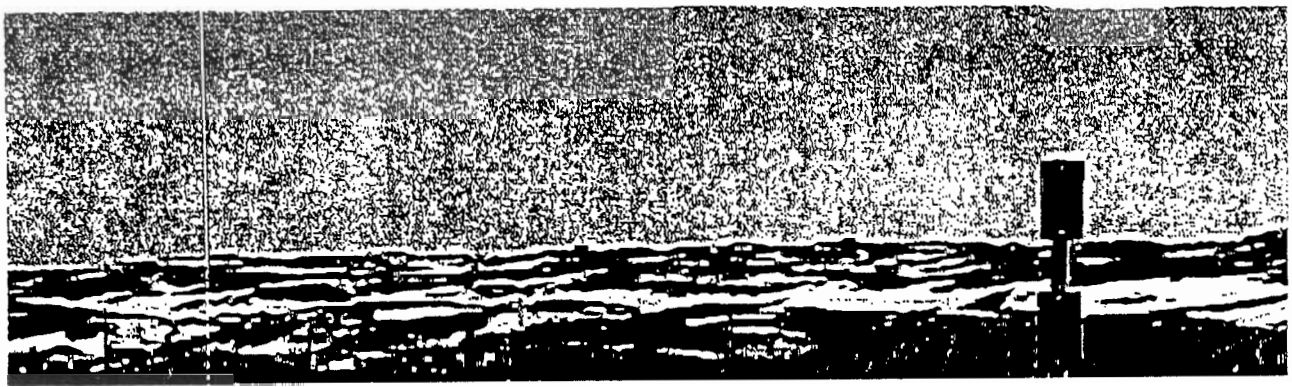
Municipality has devised an aggress[illegible] recycling program .....
Presently, the Municipality is doin[illegible]very thing it can to raise public
a[illegible]areness of this new program."

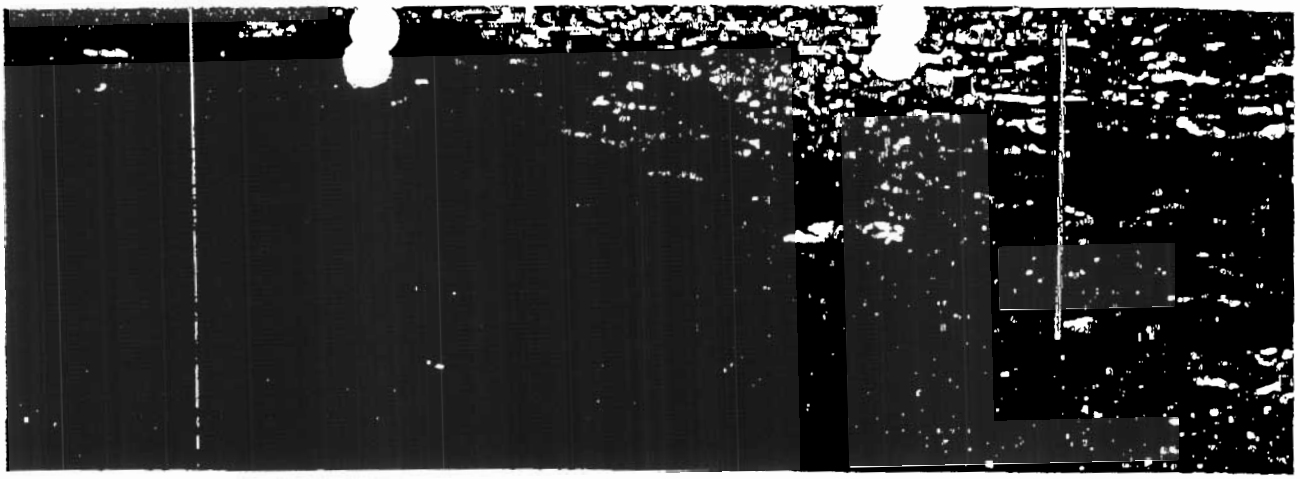
[illegible]'s application is the first that I have heard of either an aggressive
[illegible]ycling program or of a "blue bag" program. On this date (June 11,
2001) I asked a number of community residents if they were aware of any
recycling initiatives other than the 'green box' program of a few months
a[illegible]) and they were also unaware of such programs.

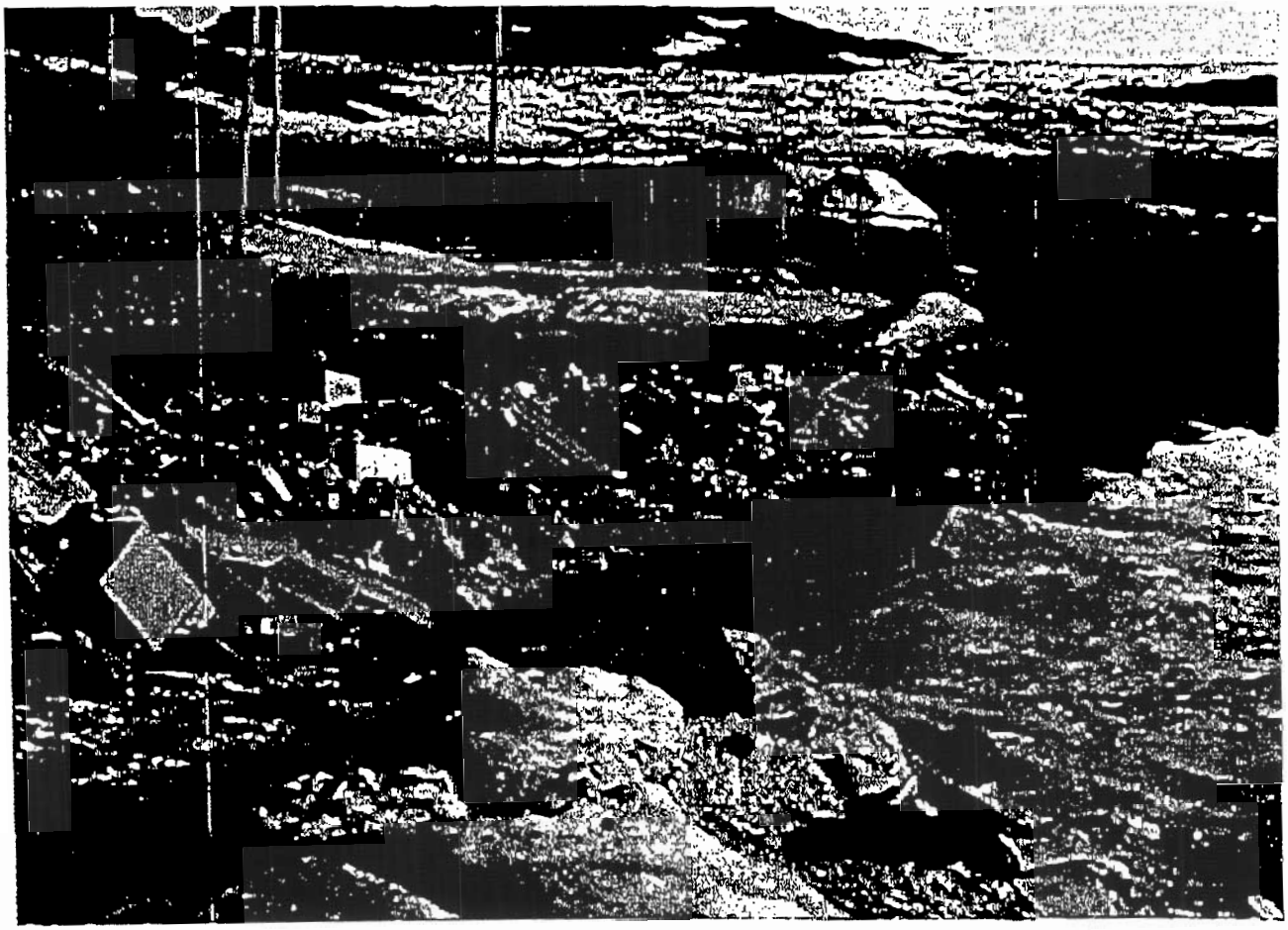
If you have any questions or require further information please do not
h[illegible]itate to contact me.

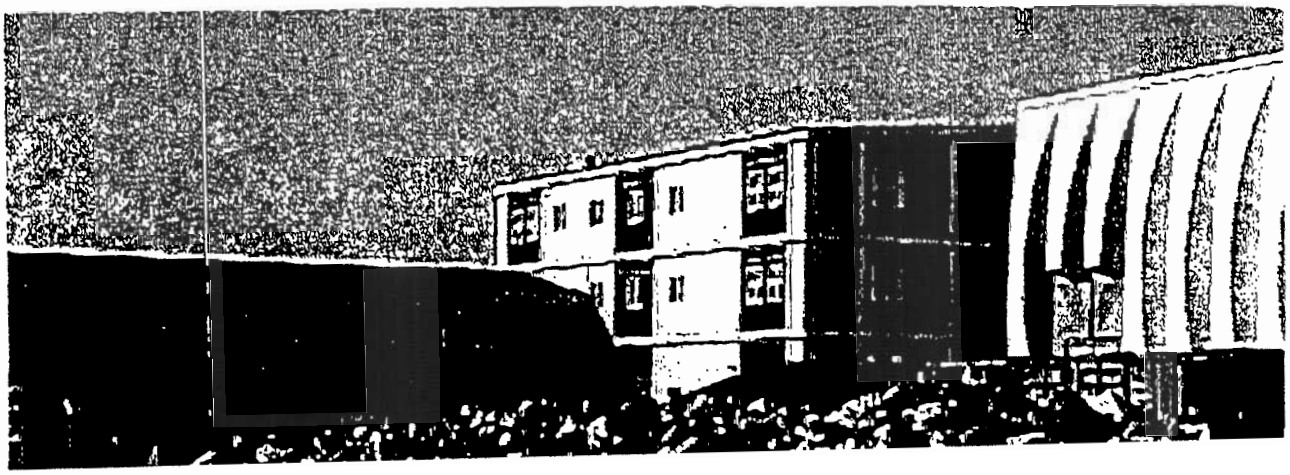
Marcel Mason
[illegible]luit, Nunavut

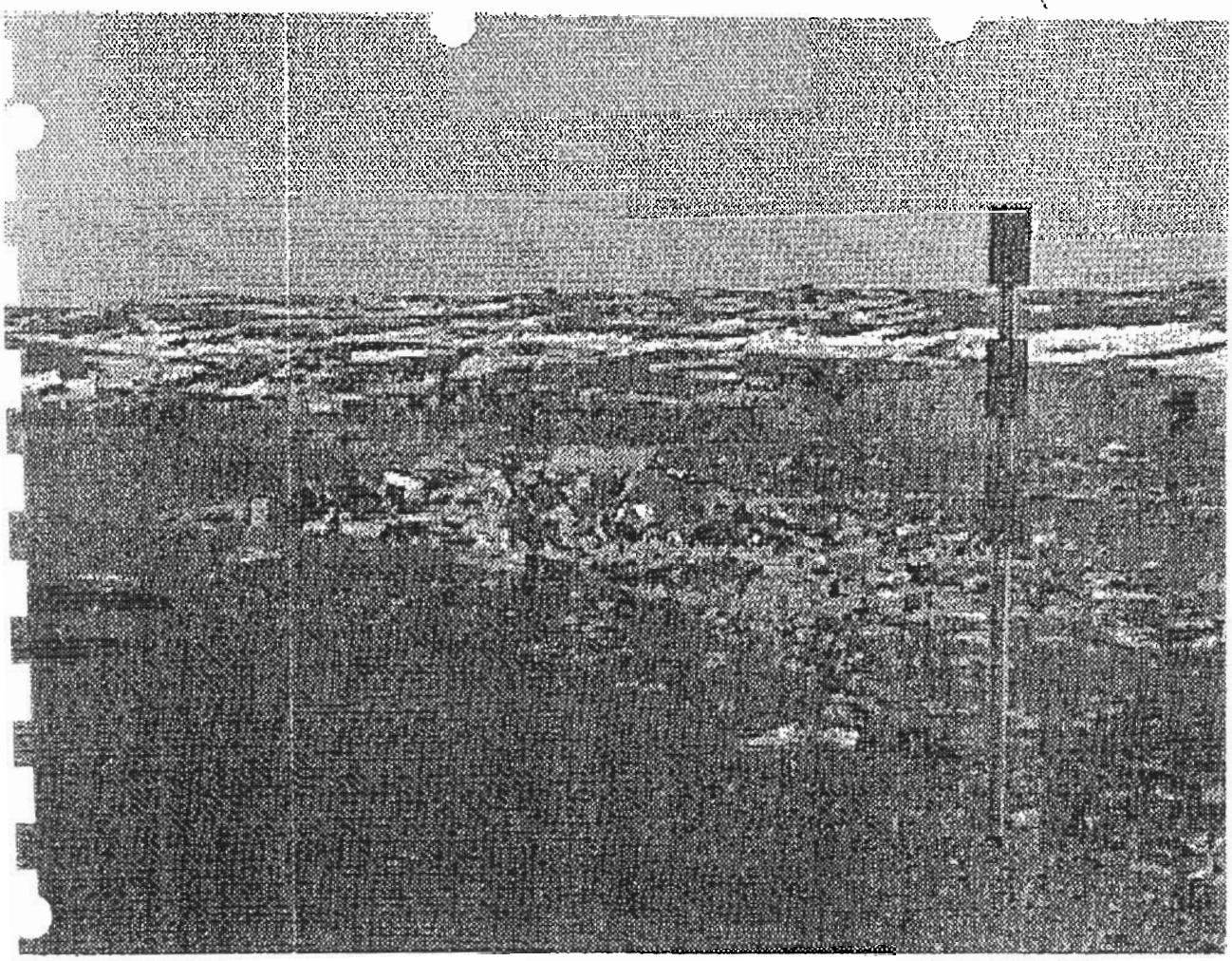












ORDER Pursuant to the PUBLIC HEALTH ACT and GENERAL SANITATION REGULATIONS of NUNAVUT

WHEREAS Ann Roberts, Chief Medical Health Officer appointed pursuant to subsection 2(1) of the Public Health Act (Nunavut), R.S.N.W.T. 1988,c. P-12, as amended (The Act), has reason to believe, that the City of Iqaluit is not providing measures for waste disposal and sanitation at the City's landfill which are adequate to safeguard public health;

AND WHEREAS the City has failed to cause all garbage and refuse deposited in the landfill to be rendered sanitary, contrary to section 27 of the *General Sanitation Regulations* (The Regulations) pursuant to the Act;

AND WHEREAS the current condition of the waste present at the landfill is likely to become injurious to public health, contrary to sections 3, 4 and 5 of the Regulations;

THEREFORE Ann Roberts, pursuant to sub subsection 2(2)(a) of the Act does hereby order the City of Iqaluit to:

1. Render the waste present in the landfill sanitary, by burning at such times as the local atmospheric conditions permit;
2. Provide a qualified operator to supervise at all times during burning, and to manipulate the burn pile using the bulldozer present;
3. Provide the qualified operator with a means of communication so that the City's fire department can be quickly summoned, should the need arise;
4. Ensure a buffer of 10 meters is maintained around the burn pile;
5. Ensure the burn pile does not exceed 3.5 meters in diameter;
6. Continue to comply with the stipulations set forth in this order unless revoked or amended by a duly qualified person.

Dated at Iqaluit on June 28, 2001

Ann Roberts, MD
Chief Medical Health Officer
Territory of Nunavut

This is Exhibit "W" referred to in the Affidavit of

PAUL CROWLEY

Sworn before me this 11TH day of AUGUST A.D. 2001

A COMMISSIONER FOR OATHS IN AND FOR NUNAVUT TERRITORY

MUNICIPALITY OF IQALUIT

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July 10, 2001

This is Exhibit "X" referred to in the Affidavit of
Paul Crowley
Sworn before me this 14th day
of August A.D., 2001
A COMMISSIONER FOR OATHS IN AND FOR
Nunavut Territory

Thomas Kudloo, Chair
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU
X0B 1J0

Sent by fax: (867) 360-6369 Pages: 2

Dear Sir:

Re: Iqaluit Water Licence NWB31QA0103 – Response to Submissions

The Council has, for the last two years, respected the views and opinions of the Nunavut Water Board. I reiterate, however, that the question of whether our licence is valid remains unresolved. In the letter from DIAND dated June 22, DIAND states that "the proposed licence will not be 'issued', and thus will not be valid or effective, unless and until it is approved by the Minister. The Minister has not yet approved the proposed licence. Consequently, it would appear that the Board lacks the authority to revisit the licence terms at this time." **I respectfully request that the Water Board and DIAND resolve ALL outstanding questions of jurisdiction and ensures that our licence is valid prior to any further discussion of issues facing our community.**

In response to the many submissions received by the Water Board from residents concerned about the adverse affects of open burning at our dump, the following explains our position with respect to open burning, solid waste disposal and recycling:

On Friday June 29 we received an order from the Chief Medical Officer of the Government of Nunavut to start burning. This was due to the huge amount of waste piling up throughout Iqaluit caused by the current labour dispute.

As we have done throughout the three month labour dispute, we continue to utilize public service announcements and brochures to encourage residents to separate their waste and hold on to their plastics and metals and take only their burnable material to the dump. We will also continue to do everything we can to avoid burning inappropriate material at the landfill and will burn only when the wind conditions are right.

We are also trying to make progress on the longer term solid waste management plan which includes a high tech incinerator and an aggressive recycling program. Planning and design for the incinerator

P.O. BOX 460 • IQALUIT, N.W.T. X0A 0H0 • TEL: (867) 979-5600 • FAX: (867) 979-5922
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is underway while we work to find the many millions of dollars still required beyond Government of Nunavut commitments. The implementation of our recycling program has been delayed significantly by our labour dispute; but we hope by the end of September to have a "blue bag" plastics and metals recycling program to supplement our very successful office paper recycling program.

Sincerely,

John Matthews
Mayor of Iqaluit

Cc The Honourable Minister Robert D. Nault, DIAND, Fax: (819) 953-4941
James Eetoolook, Acting President, NTI, Fax: (867) 983-2723
Stephen Traynor, Director of Operations, DIAND Iqaluit, Fax: 975-4560

P.O. Box 119
GJOA HAVEN, NU X0B 1J0
TEL: (867) 360-6338
FAX: (867) 360-6369

kNK5 wmoEp5 vtmpq
NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN KATIMAYINGI

July 11, 2001

To: Distribution List

Regarding: Iqaluit Water Licence *NWB31QA0103* **Decision on Submissions** regarding Licence Amendments

The Board has received and reviewed all submissions regarding the above. See Appendix A for a list of respondents. The submissions include those filed late as well as a letter from the President of NTI dated July 9, 2001 and from the licence holder (per Mayor Matthews) dated July 10, 2001. Both letters are enclosed for your information.

On the matter of enforceability, we agree entirely with the NTI:

> "DIAND is responsible for enforcement of NWB licences under *the NWT Waters ACT*, which continues to apply in Nunavut where not inconsistent with the *Nunavut Land Claims Agreement*. The City of Iqaluit has not complied in all respects with the NWB licence . . ."[Eetoolook letter 7/9/2001, page 1]

Therefore, the Board's position is the same as before: the Board has issued its decision in the form of a licence and whether or not DIAND or the Town agrees (see, e.g., P. Smith's letter of June 22, 2001) does not invalidate the licence or its terms. The licence is valid until set aside by a Federal Court judge. The question of enforceability is in the hands of DIAND inspectors who should act whenever there is evidence of a breach of a licence.

In the meantime, the Board would like the Town to forward to the Board a copy of the letter of the Chief Medical Officer of Nunavut. We will copy it to each of you and will take it into account at the next hearing. Further, due to the great public interest in this Application, the Board will indeed convene a public hearing before approving any application for amendment,
but will await a reasonable time before doing in respect of allowing the Hon. Robert Nault to respond to NTI's July 9th 2001 letter.

If you have any questions, please contact our office.

Yours truly,

ORIGINAL SIGNED BY

Philippe di Pizzo
Executive Director

cc: Hon. Robert Nault

This is Exhibit "Y" referred to in the Affidavit of
PAUL CROWLEY
Sworn before me this 11TH day
of AUGUST A.D., 2001
A COMMISSIONER FOR OATHS IN AND FOR
NUNAVUT TERRITORY

APPENDIX A - July 11, 2001- NWB3IQA0103

May 31, 2001 Letter from Town to the Nunavut Water Board (NWB).

Submissions from Interested Parties

1. June 10, 2001 E-mail from Marcel Mason to DIAND(P. Lavallee)
2. June 15, 2001 E-mail from Robert Eno to NWB
3. June 15, 2001 Letter from NWMB to NWB
4. June 20, 2001Letter from HSS to NWB
5. June 21, 2001 Letter from Mary Ellen Thomas to NWB
6. June 21, 2001 Letter from Language Commissioners to NWB
7. June 22, 2001 Letter from DIAND to NWB
8. June 22, 2001 Letter from Doug Workman to NWB
9. June 22, 2001 E-mail Elise Maltin to NWB
10. June 22, 2001 E-mail from HSS to NWB
11. June 22, 2001 Letter from Dept. Of Justice to NWB
12. June 22, 2001 E-mail from Lynn Peplinski to NWB
13. June 22, 2001 E-mail from Peter/Julia Krizan to NWB
14. June 22, 2001 Letter from Mary-Lou Fennell to NWB
15. June 22, 2001 Letter from DIAND to NWB
16. June 23, 2001 E-mail from Paul Crowley to NWB
17. June 27, 2001 Letter from DSD to NWB
18. June 28, 2001 Rec. Conversation from Miaili Coley
19. June 28, 2001 Rec. Conversation from Jim Little
20. June 29, 2001 Letter from Keith Hay to NWB
21. June 30, 2001 Fax from NorthWinds Arctic to NWB
22. July 1, 2001 Letter from Jim Little to NWB

Submissions received after July 1, 2001 deadline:

1. July 3, 2001 email Marcel Mason to NWB
2. July 5, 2001 Letter from Environment Canada to NWB
3. July 9, 2001 Letter from NTI to Minister Nault

July 3, 2001 Letter NWB to Town of Iqaluit
July 10, 2001 Letter Town of Iqaluit to the NWB Response to submission

Contact	E-mail	Fax		
Municipality of Iqaluit	Matthew Hough	hough@nunanet.com	(867)979-5922
	Rick Butler-CAO	city.iqaluit.cao@nunanet.com	
	John Tidball	jtidball@millerthomson.ca	
Mayors and Councillors	John Mathews		(867) 979-5922
NTI	Carson Gillis	cgillis@polarnet.ca	(867) 983-2723
NTI	Stefan Lopatka	slopatka@polarnet.ca	(867)983-2723
NIRB		gladys@polarnet.ca	(867) 983-2594
QIA	Solamie Shoo	lands@nunanet.com	867) 979-3238
QWB	Joe Tigullaraq	qwbrwo@nunanet.com	(867) 979-1491
Amarook HTO			867) 979-3390
NWMB	Josee Galipeau	jgalipeau@nwmb.com	(867) 979-7785
NPC	Michele Bertol	mbertol@npc.nunavut.ca	
DIAND-Iqaluit	Paul Smith	smithp@inac.gc.ca	(867)975-4560
Justice Canada	Lee Webber	lee.webber@justice.gc.ca	(867) 920-4022
DIAND-Inspector	Philippe Lavallee	lavalleep@inac.gc.ca	(867) 979-6445
DFO-Iqaluit	Jordan deGroot	degrootj@dfo-mpo.gc.ca	(867) 979-8039
DOE-YK	Paula Pacholek	paula.pacholek@ec.gc.ca	(867) 873-8185
DOE-Iqaluit	Lawrence Ignace	Lawrence.Ignace@EC.GC.CA	(867) 975-4645
DSD	Chris Nichols	cnichols@gov.nu.ca	(867) 975-5980
Baf-Health Board	Shaun Mackie	smackie@gov.nu.ca	(867) 979-7659
Nunavut Justice	Susan Hardy	shardy@gov.nu.ca	(867) 975-6349
CG&T	Doug Sitland	dsitland@gov.nu.ca	(867) 975-5305
Dillon Consulting	Tanya Smith	DILLON@NUNANET.COM	(867) 979-0345
Marcel Mason		masonm@nunanet.com	(867) 979-1513
Paul Crowley		pcrowley@nunanet.com	(867) 979-2102
CBC			(867) 979-6147
Nunatsiaq News	Denis Ridout	deniser@nunatsiaq.com	(867) 979-4763
(867) 979-4763			
News North			(867) 873-8507
Douglas Workman			(867) 979-0172
Mary Ellen Thomas			(867) 979-0172
Jim Little			(867) 979-6400
Elise Maltin		Emaltin@GOV.NU.CA	
Julia and Peter Krizan		peter.Julia@nv.sympatico.ca	
Keith Hay		keith_inumiaq@yahoo.ca	(867) 979-0605
Miali Coley		irralik@yahoo.com	
Nadia Gonzalez			
Lynn Peplinski		lynnp@nunanet.com	(867) 979-2100
Mary-Lou Sutton Fennell		mfennell@nunanet.com	(867) 975-6172
Paul Landry			(867) 979-0573
Patricia Bell	CBC		(867) 979-6144
Ooleepeeka	CBC Television		(867) 979-6147

July 3, 2001 Letter NWB to Town of Iqaluit

July 10, 2001 Letter Town of Iqaluit Response to submission to the NWB

This is Exhibit " Z " referred to in the Affidavit of

PAUL CROWLEY

Sworn before me this 14TH day of AUGUST A.D., 19 2001

A COMMISSIONER FOR OATHS IN AND FOR NUNAVUT TERRITORY

BURNING IS NOT AN OPTION

Presentation by Citizens for a Clean Iqaluit
To
Iqaluit City Council
July 24, 2001

On behalf of a number of concerned Iqaluit citizens, I am here to address the public health crisis that we are facing with the waste management in Iqaluit. I am here to urge the City Council to stop endangering our health and the health of our children by illegally burning unsorted commercial and residential waste at the Iqaluit dump.

1. The City is in Denial

The effects of open burning of unsorted commercial and residential waste are well documented:

Burning garbage in general exposes you to smoke that can cause burning eyes, headaches, nausea, and fatigue. The longer you are exposed to smoke the greater the risks including damage to your lungs, nervous system, kidneys and liver. Children are at the greatest risk.

Burning plastics like bottles, children's toys, flooring and siding materials, drainpipe and many other materials produce carbon monoxide, heavy metals, dioxins and chlorinated furans. Dioxins and furans are two of the most toxic products known. They are linked to cancer and birth defects.

Burning foam cups, egg cartons, food packaging produces styrene gas. Styrene gas can be absorbed through the skin, respiratory system and gastrointestinal tract. High doses of styrene gas can render you unconscious and lead to death.

Burning drapes, furniture foam, wood finishes, sealants, adhesives and many other products produces clouds of yellow smoke containing varying amounts of hydrogen cyanide and phosgene. Exposure to high concentrations of hydrogen cyanide gas for 30-60 minutes can cause death.

Burning slick coloured papers and items with synthetic inks produces heavy metals. Exposure to heavy metals has been linked to birth defects, interference with red blood cell production, liver and kidney deterioration and loss of coordination.

Burning pressured treated wood releases arsenic and chromium compounds. These contaminants have the same effects as heavy metals.

More on Dioxins

In Nunavut, dioxin concentrations in Inuit mothers' breast milk are twice the levels observed in southern Quebec. The majority of dioxins in Nunavut are transported here from other parts of North America. Elevated dioxin levels appear in fish, seal and caribou meat. Dioxins enter the food chain on land through lichen, mosses and shrubs and in water through algae.

Dioxins and furans exhibit the same 'grasshopper effect' as PCBs. That is they can volatilize and be transported by the wind to be deposited elsewhere. So even when the wind is blowing the smoke from the dump away from the City, they may volatilize at a future date and be blown back to town where we live.

Health effects of dioxins may include reproductive abnormalities, behavioral effects, weakened immune system and a higher risk of contracting cancer. The lifetime risk of dioxins causing cancers is now considered to range as high as 1 in 1,000 to 1 in 100. Children and fetuses may be even more sensitive to dioxins because of their rapid growth and development.

A recent study found that garbage burning from a single home could release more dioxin into the air that an industrial incinerator. Garbage burning in Iqaluit is adding to the dioxin load in Nunavut, where people are already vulnerable, due to a higher level of exposure to dioxin than normal. The City of Iqaluit should find an alternative to the burning of unsorted garbage as soon as possible to protect the people of Iqaluit and Nunavut.

The Government of Canada recently signed an international treaty (POPs Treaty) committing to eliminate the production of dioxins, among other persistent organic pollutants.

Perhaps the City of Iqaluit was not aware of the dangers of burning unsorted commercial and residential waste. You are now aware of the dangers. It is clear that burning is no longer an option to solving this crisis.

2. The City is Acting Illegally

Last Friday, July 20th, the Nunavut Department of Public Health lifted the 'burn order'. The City can no longer hide behind Public Health to justify burning unsorted commercial and residential waste.

The City is subject to the licensing regimen of the Nunavut Land Claims Agreement. The current water licence imposed a ban on burning unsorted commercial and residential waste as of last June 1, 2001.

It is clear that there are jurisdictional issues that need to be resolved with regards to enforcement of the water licence. This does not change the following facts.

The Nunavut Water Board issued a licence in 1998 and in 2001 based on a public hearing process. Citizens spoke clearly at both hearings.

No party has challenged the validity of the water licence at the Federal Court. Until the Federal Court declares the licence invalid, it remains in place.

No party can unilaterally declare a licence invalid without a ruling of the Federal Court. Any party acting unilaterally as if the water licence is invalid without a ruling of the Federal Court is acting illegally and is subject to liability for those actions.

By continuing to burn after Public Health has lifted the 'burn order', the City of Iqaluit is acting illegally and is subjecting itself and its ratepayers to potential liability for those actions.

A prudent course of action is to abide by the water licence until such time that licence is amended or the Federal Court has ordered otherwise.

3. The City is Acting Against the Will of its Citizens

The existing water licence was issued taking after a public hearing process in which Iqaluit citizens participated and spoke clearly against burning of unsorted commercial and residential waste.

In 1998, citizens first made it known to the public regulator that burning was a dangerous practice that was no longer appropriate for Iqaluit.

In 2000, citizens once again reiterated their opposition to the practice of burning unsorted commercial and residential waste to the regulator.

In the past few weeks, the City has heard the outpouring of citizens' opposition to burning of unsorted commercial and residential waste.

City Council is clearly acting against the will of its citizens by continuing this illegal and dangerous practice.

4. The City Has Become the Chief Apologist and Scapegoat for the Federal and Territorial Governments

It is clear that a lack of financial resources has exacerbated the waste management problems that the City must overcome. Sufficient resources were asked for and denied by the Federal and Territorial governments. The lack of support of the Federal and Territorial governments of the citizens of Iqaluit is a major reason for the crisis that we are facing.

Unfortunately, the City of Iqaluit by its actions has become the chief apologist and scapegoat for the lack of support of the Federal and Territorial governments of the

citizens of Iqaluit. The City of Iqaluit has, perhaps unwillingly but nonetheless undeniably, covered up that lack of support by endangering our health and the health of our children.

Unless the City of Iqaluit changes its illegal and dangerous practice of burning unsorted commercial and residential waste, it will continue to take the majority of the blame for endangering the health of its citizens.

By disregarding the dangers, the will of the citizens and the law, the City of Iqaluit has taking itself from the moral, ethical and legal high ground – effectively eliminating its ability to effectively represent the public trust to the two levels of government that are key to finding a solution to this public health crisis.

The City of Iqaluit must stop doing the dirty-work of the Federal and Territorial governments. It must regain the public trust and represent the will of its citizens.

5. Solutions

Solving the crisis will require courage and leadership. We are convinced that solutions can be found, solutions that do not endanger our health or the health of our children.

a. Take Back the High Road and Regain the Power of Your Citizens

The City of Iqaluit must stop burning unsorted commercial and residential waste immediately. By observing the scientific warnings, the law and the will of your citizens, the City of Iqaluit will again harness the power of its citizens and will be able to bring pressure on the Territorial and Federal governments who have a large responsibility for the crisis and for findings its solution.

Unless the City regains the power of its citizens, it will remain powerless – without the financial resources to bring about a solution and without any ethical, moral or legal means by which to put pressure on the levels of government that have the financial resources.

b. Look Within the City's Budget First

In order to regain further negotiating leverage, the City of Iqaluit must immediately hold an emergency budget review to find any available financial resources that we can bring to solving this crisis. Unless, we have exhausted all our possible means at the municipal level, it will be difficult to convince either the Territorial or Federal governments to find additional financial resources.

c. Request an Emergency Sitting of the Nunavut Legislative Assembly

The Government of Nunavut must be convinced of the immediacy of this crisis and the City should request an emergency sitting of the Legislative Assembly in order to re-allocate sufficient capital budgets to meet basic infrastructure needs.

The urgency of this crisis must be clearly communicated to our MLAs, including a very active regular Member, the Minister of Health and the Premier.

When both the municipal and Territorial levels have brought all of its own resources to solving the crisis then the case for additional financial resources from the Federal government will be much stronger.

d. A Concerted Lobbying Effort of the Federal Government is Required

With environmental problems such as in Cape Breton and infrastructure problems in major cities such as Halifax and in First Nations reserves all over the country, it will take a major coordinated lobbying effort to secure additional funds from the Federal government. That lobbying effort must come from the Territorial government, the City and from citizens. It must be coordinated so that all resources are used effectively.

e. Realistic Technical Solutions Must Be Found

As burning unsorted commercial and residential waste is no longer an option then short term and long term solutions must be found.

Short term solution are stockpiling waste in the current dump or creating another interim dump where it can be stockpiled safely while waiting for the completion of the long-term waste management system.

Long-term solutions such as incineration must continue to be pursued but not if it is clearly not possible within the financial resources that are available. The Iqaluit Waste Management Committee may have recommended incineration as a preferable option for waste management if it could be brought on line this year without the need for continued burning of unsorted commercial and residential waste. However, the Committee did not recommend that the dangerous and illegal practice of burning be continued indefinitely until the financial resources could be assembled. Other less expensive options such as a landfill should now be considered in view of the fiscal realities the City is facing.

Any option must, of course, be subject to the appropriate environmental assessment and public consultation. Any waste management option must have full waste reduction (bottle deposits, re-useable diaper service for example), waste recycling (paper and aluminum cans for example) and diversion (hazardous waste for example) mechanisms in place.

Iqaluit should be at the forefront of clean environmental practices in the circumpolar world. Perhaps even creating economic opportunities for know-how and technologies exportable to the rest of the circumpolar world.

6. The Price of Ignoring Citizens

As Council for the City of Iqaluit you have a choice.

Continue a dangerous and illegal practice against the will of your citizens or take back the high ground and lever the power of your citizenry to find a safe solution.

DEPARTMENT OF CHEMISTRY, UNIVERSITY OF JYVÄSKYLÄ

RESEARCH REPORT No. 54

CEOEC'95

Third Finnish-Russian Seminar: Chemistry and Ecology of Organo-Element Compounds

Extended abstracts

Edited by
Jaakko Paasivirta

Seminar in Moscow October 2-7.1995

Supported by Academy of Science and Ministry of Science and Technical Policy of the Russian Federation

Cover picture:
Results of: E.S.Brodsky et al.
PCDD's and PCDF's determination
in flue gas and atmospheric
air samples in Archangel'sk.

This is Exhibit "AA" referred to in the Affidavit of
PAUL CROWLEY
Sworn before me this 11TH day
of AUGUST A.D., 19 2001
A COMMISSIONER FOR OATHS IN AND FOR NUNAVUT TERRITORY

1085

Jyväskylä, Finland 1995

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ISSN 0357-346X

EMISSIONS OF PCDDs, PCDFs AND PCBs IN WASTE LANDFILL FIRES

Päivi Ruokojärvi, Juhani Tarhanen and Juhani Ruuskanen
Department of Environmental Sciences, University of Kuopio, Finland
Matti Ettala and Päivi Rahkonen
Ettala & Rossi Avoin yhtiö, Hollola, Finland

Polychlorinated dibenzo-p-dioxins and -furans (PCDDs and PCDFs) and polychlorinated biphenyls (PCBs) are ubiquitous in our environment and these substances and their formation in different combustion processes has been studied since 1970s. The formation of PCDD/Fs and PCBs in waste landfill fires have previously been studied only in pilot test /1/. However, the combustion conditions in landfill fires are often uncontrolled and the burning waste may be partly of unknown origin, especially in old waste landfills, so the formation of these highly toxic compounds during landfill fires is very probable. In this study we examined concentrations and isomeric patterns of PCDD/Fs and PCBs in ambient air of two municipal waste landfill fires: at an experimental waste landfill and at an uncontrolled municipal waste landfill where the fire started spontaneously.

An experimental field with a height of 10 m and a volume of 35000 m^3 was built on a municipal waste landfill. The area was filled with household waste and set on fire with wood, heptane and light heating oil. Four air samples were collected from the site: one before the ignition and two during the active fire and one after the fire. One air sample was collected from another site from the uncontrolled municipal landfill fire where the fire started spontaneously during our experimental fire. The site in the uncontrolled landfill fire consists of municipal waste as in the experimental site, but there are also some industrial waste e.g. from paper industry /2/. Details of the site /3/, sampling and analysis techniques /4,5/ have been described elsewhere.

Concentrations of PCDD/Fs were higher at the experimental site than at the site of the spontaneous fire (Fig. 1).

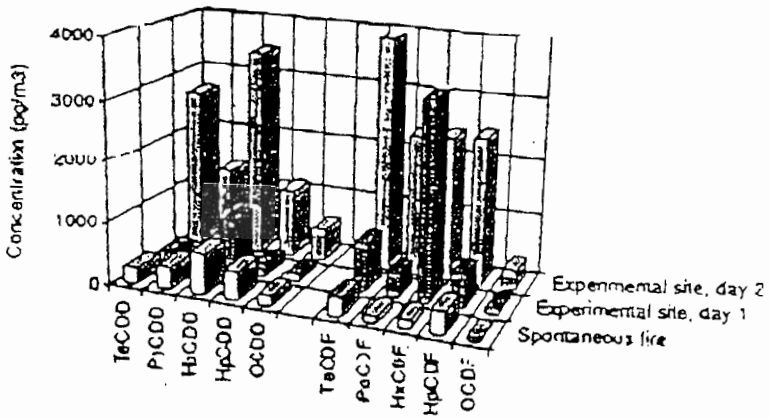

Fig. 1. PCDD/PCDF isomeric distribution in two waste landfill fires

and after the fire.

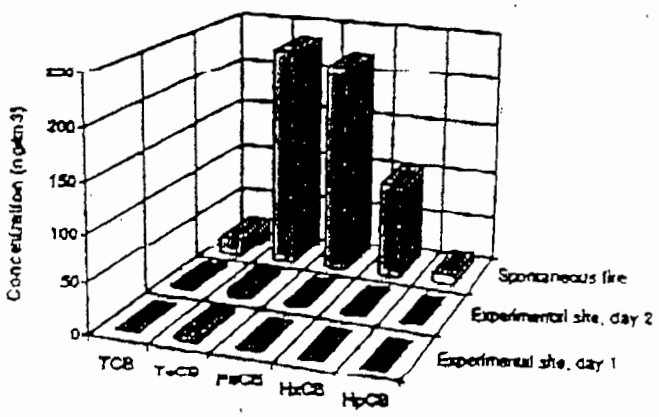

Fig 2. PCB isomeric distribution in two waste landfill fires

Although the threshold limit value for PCBs in Finland (500 µg/m³ /37) was not exceeded at either site, the difference in PCB air concentrations between the two burning sites was remarkable. The burning waste material naturally effects the air emissions, and the waste material burning was analyzed at both sites for PCDD/Fs and PCBs.

The PCDD/F concentrations in waste from the experimental site varied from 4 to 87 pg(TE)/g d.w. (five samples) and in the waste from the uncontrolled landfill fire from 106 to 288 pg(TE)/g (three samples). Higher PCDD/F concentrations in the waste from the uncontrolled fire did not result in higher PCDD/F concentrations in the air samples at the site of the uncontrolled fire than at the site of the experimental landfill fire. This indicates that PCDD/Fs are formed during the incineration process from the burning material.

Total PCB concentrations in waste varied from 90 to 290 ng/g at the experimental site and from 750 to 7900 ng/g at the site of the uncontrolled fire, so the difference in PCB concentrations between the two sites was notable. Thus PCB was released from

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POLYCHLORINATED DIBENZO-P-DIOXINS AND -FURANS (PCDDs AND PCDFs) IN MUNICIPAL WASTE LANDFILL FIRES

Ruokojärvi P.[1*], Ettala M.[1,2], Rahkonen P.[2], Tarhanen J.[1] and Ruuskanen J.[1]

[1] University of Kuopio, Department of Environmental Sciences, BOX 1627, SF-70211 Kuopio, Finland

[2] Ettala & Rossi Avoin yhtiö, Kalevantie 1 E, SF-15870 Hollola, Finland

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ABSTRACT

Polychlorinated dibenzo-p-dioxin and dibenzofuran samples were collected from two waste landfill fires. The first fire was ignited at the experimental field built on a municipal waste landfill, and another municipal waste landfill caught fire spontaneously during the landfill fire test. Air samples were collected five meters from the center of the fire, representing diluted smoke in the breathing zone. After these fires, burnt waste samples were collected in the vicinity of the fire centers. The PCDD/PCDF concentrations in the working air during the active fire were from 51 to 427 pg(TE)/m^3. During the fires, the acceptable daily intake value of PCDD/Fs was exceeded at both sites. The toxic congener profiles were similar to those detected in municipal solid waste incinerators. The PCDD/PCDF concentrations in the burnt waste samples at the experimental site were surprisingly low, [illegible] pg(TE)/g, but at the site of the real landfill fire the concentrations were higher, 106 - 290 pg(TE)/g, which is due to the slightly different waste material and conditions during the fire.

Key words: polychlorinated dibenzo-p-dioxins, polychlorinated dibenzofurans, waste, landfill fire, exposure

INTRODUCTION

Polychlorinated dibenzo-p-dioxins (PCDDs) and furans (PCDFs) are ubiquitous in our environment due to their formation in various combustion sources and manufacturing processes. There have been many reports on PCDD/PCDF formation in municipal solid waste incinerators, but there are only a few published reports on

their formation in landfill fires. According to an inquiry among Finnish waste landfill personnel and the personnel in fire departments, there are approximately 380 fires per year in Finnish waste landfills. Swedish researchers have estimated that the amount of polychlorinated dioxins and furans from Swedish landfill fires (217 fires/a in Sweden) is 35 g(TE, Nordic)/a, which is over three times higher than the estimated dioxin formation from Swedish waste incinerators (Bergström and Björner, 1992). In Finland the amount of PCDD/PCDF emissions from landfill fires is estimated to be even greater, 50-70 g(TE,Nordic)/a (Ainola, 1993).

In pilot tests Swedish researchers investigated the formation of PCDD/Fs in the flue gases from landfill fires (Bergström and Björner, 1992). Results of this investigation indicated that the amount of dioxins and furans formed during the pyrolysis of domestic waste is high. The PCDD/PCDF concentrations in these tests were between 66 and 518 ng (TE, Nordic)/m^3.

In this study we examined concentrations and isomeric patterns of polychlorinated dioxins and furans in the working air and burnt waste material at two landfill fires: at our experimental field in municipal waste site and during a real landfill fire at another waste site. We also evaluated exposure of the waste site personnel and firemen to PCDD/Fs via inhaled air during these landfill fires.

MATERIALS AND METHODS

The description of the experimental field

An experimental field was built on a municipal waste landfill in the autumn of 1993. The experimental area was 10 m high and the volume of the waste bench, which was built on clay soil, was 35 000 m^3. The area was filled with household waste, which consists of the paper and cardboard fraction (20-35 %), the kitchen and garden waste fraction (30-40 %), the plastic, rubber, wood and textile fraction (15-20 %), the metal-, glass- and other non-burnable waste fraction (10 %) and hazardous waste fraction (< 1 %) (Kourilehto and Lahti 1991). In order to monitor the progress of the fire, the experimental area was equipped with 66 thermoelements at depths of 3 and 7 m.

In the end of January 1994 the area was first ignited with 50 l light oil, 10 l heptane and 1.5 m^3 wood. The fire remained uncovered for one hour and was then covered with soil and waste. The temperatures in the test area did not rise, and therefore the center was dug open after one week. The fire was ignited a second time by burning 64 m^3 wood for 7.5 hours, and the center of the fire was then covered with soil and waste. No external signs of the fire were seen, which was at least partly due to soil frost. The center was opened three

weeks after the second ignition, at which time the fire center started smoking strongly.

The air samples were collected two and three days after the fire center was opened (Sampling days 1 and 2, respectively), and seven days after it had been opened the fire was put out by digging up the center of the fire and mixing the burning waste with snow and water. The waste samples were taken after the fire was extinguished.

The real waste landfill fire started in February, while the test area had not yet caught fire properly. The landfill, where the spontaneous landfill fire started, is similar to that at the experimental site, with the height of the waste bench being 8 m and the bench being compressed with a landfill compactor as on the experimental site. The waste at the site of the real landfill fire consists of domestic waste which is partly covered with deinking waste (with a PCB content of 2.1 mg/kg d.w. (Ettala, 1993)) from the paper industry.

Sampling

The air samples from the experimental site were collected before, during and after the active fire. Samples were collected with a high-volume sampler twice during the fire, five meters downwind of the fire. The location of the high volume sampler was chosen in order to evaluate the PCDD/F concentrations in the vicinity of the center of the fire and the working air of the firemen and the waste site's personnel. The air temperatures during sampling days were -6°C to - 13 °C.

Particles were collected on a glassfiber filter and gaseous compounds in polyurethanefoam (PUF). The air sample from the real landfill fire was taken with the same equipment during the active fire. The sampled air volume in these fires varied from 269 m^3 to 574 m^3.

After the fire, five waste samples were taken with an excavator from the experimental landfill fire:

Sample 1: Waste above the ignition point, depth 2-4 m, no temperature test result at this point due to breaking of a thermoelement

Sample 2: Waste collected around the ignition point, depth 4-6 m. highest temperature during the fire >704 °C

Sample 3: Waste in the center of the fire, depth 5 m, highest temperature during the fire > 704 °C

Sample 4: Non-burnt waste, several meters from the fire center, depth 2-4 m, temperature during the fire 25-46 °C

Sample 5: Smoldered waste, 5 meters from the fire center, depth 2-4 m, temperature during the fire 200-300 °C

Three waste samples were taken from the real landfill fire:

Sample 6: Waste above the center of the fire, depth 1-3 m
Sample 7: Waste above the center of the fire, depth 3-4 m
Sample 8: Waste in the center of the fire, depth 5-7 m

All samples were wrapped in aluminium foil and frozen at -30 °C until analyzed.

During the fires several air samples from the work air (dust, asbestos, benzene, toluene etc.) were taken. Results of those measurements will be published elsewhere.

Analysis

Waste samples were homogenized and dried with four times that amount of activated Na_2SO_4 in the desiccator at room temperature. Approximately ten grams of the dried waste sample (dry weight of the waste was determined by drying at 120 °C for 24 h) was extracted with toluene in a Soxhlet apparatus for 24 h. Before extraction, 15 ^{13}C labelled 2378-substituted PCDD/PCDF congeners were added as internal standards. The air samples were extracted similarly.

After extraction, toluene was removed by a rotary evaporator and the extract was dissolved in n-hexane. The cleanup was made using concentrated sulphuric acid and multistep columns (silicagel, carbon and alumina).

PCDD/PCDFs were analyzed with high-resolution mass spectrometry after gas chromatographic separation with DB-DIOXIN column (60 m x 0.25 mm I.D., film thickness 0.25 µm). The resolution of the equipment used was 10,000.

RESULTS

Working air samples

The PCDD/PCDF isomeric distributions in the air samples collected from the experimental field and the real landfill fire are presented in Figures 1 and 2.

The most abundant isomers in the air samples taken before the experimental field fire were hexa- and heptachlorinated furans and octachlorinated dioxins. After the fire, tetrafurans and penta-, hexa- and octadioxins dominated.

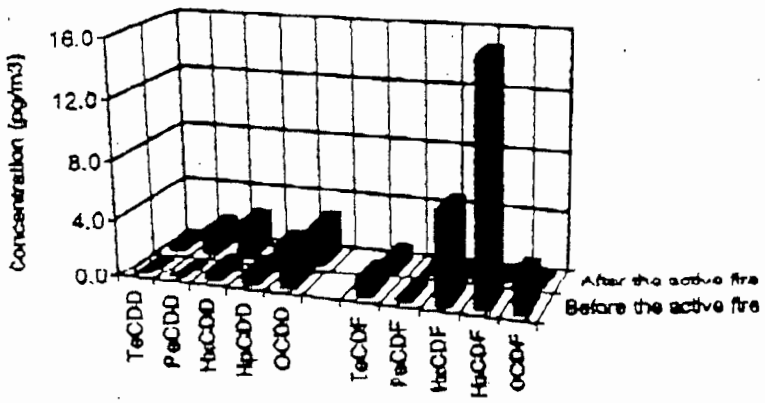

Figure 1: PCDD/PCDF isomeric distributions in the experimental field air samples before and after the active landfill fire

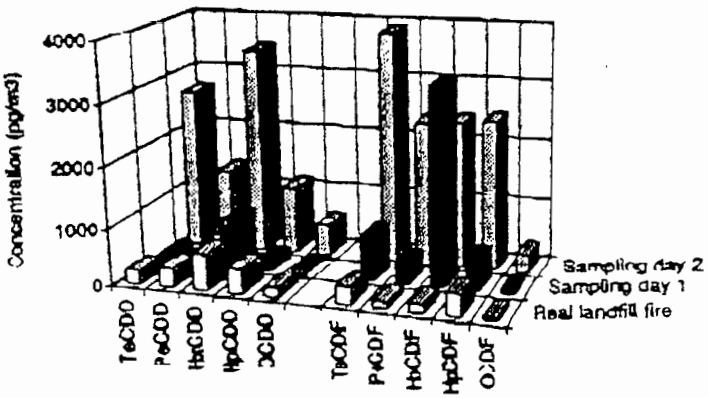

Figure 2: PCDD/PCDF isomeric distributions in the experimental field and the real landfill air samples during the landfill fires

During the active fire at the experimental site tetra-, penta- and hepta-chlorinated furans and hexachlorinated dioxins dominated. On the first sampling day the amount of hexachlorinated furans was very high compared to other furanisomers.

As can be seen in Figure 3, the most abundant toxic congeners during the fire at the experimental site were 1,2,3,4,6,7,8-HpCDD and OCDD and 1,2,3,7,8- PeCDF, 2,3,4,7,8- PeCDF and 1,2,3,4,6,7,8-HpCDF. The total amount of PCDD/PCDFs on the first sampling day was 6760 pg/m^3 and in the second sampling day, 20540 pg/m^3 (113 pg(TE)/m^3 and 427 pg(TE)/m^3, respectively). The highest contribution to toxic equivalents during sampling days 1 and 2 was made by 1,2,3,7,8-PeCDD and 2,3,4,7,8-PeCDF (Figure 4).

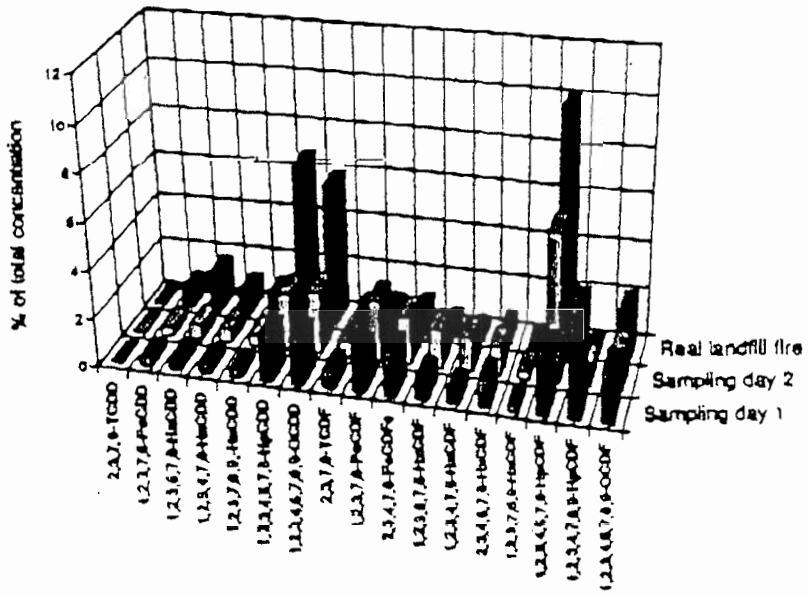

Figure 3: Toxic congeners in the air samples from the experimental field and the real landfill fires

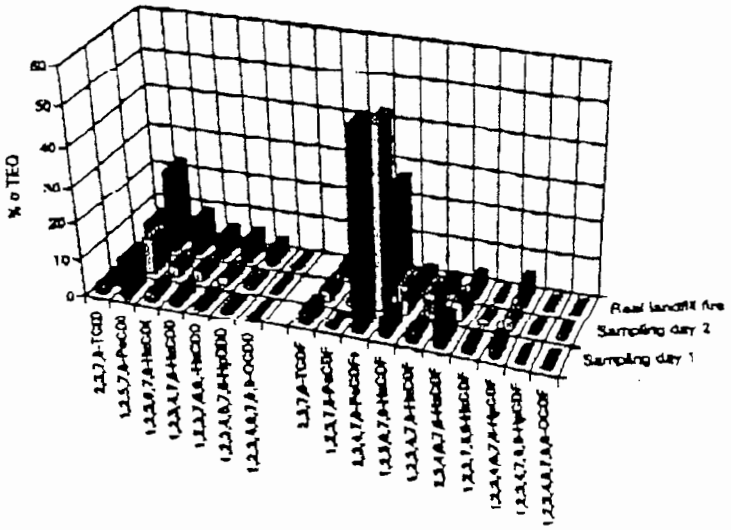

Figure 4: Toxicity fingerprints in the air samples from waste landfill fires

During the real waste landfill fire, the total amount of PCDD/Fs was 2880 pg/m^3 (51 pg/m^3 in toxic equivalents). The most abundant isomers were penta- and hexachlorinated dioxins and tetra- and heptachlorinated furans and the most abundant toxic congeners were 1,2,3,4,6,7,8-HpCDD and OCDD and

1,2,3,4,6,7,8-HpCDF and OCDF. The highest contribution to toxic equivalents was made by 2,3,4,7,8-PeCDF and 1,2,3,7,8-PeCDD.

Waste samples

The total concentrations of PCDDs and PCDFs in the burnt waste samples collected from the experimental field were lower than in the waste samples collected from the real landfill fire (Table 1).

Table 1: PCDD/PCDF concentrations in waste samples after landfill fires
(E and R denote the experimental field and the real landfill fires, respectively)

Sample	PCDD-conc. (pg/g d.w.)	PCDF-conc (pg/g d.w.)	Total PCDD/PCDF conc (pg/g d.w.)	PCDD/PCDF (pg/g d.w.-TE, Nordic)
Waste 1 (E)	10682	466	11148	87
Waste 2 (E)	4375	873	5248	27
Waste 3 (E)	6113	1786	7899	59
Waste 4 (E)	965	464	1429	8
Waste 5 (E)	836	407	1243	4
Waste 6 (R)	16309	1692	18001	220
Waste 7 (R)	24638	5622	30260	288
Waste 8 (R)	9524	5919	13443	106

In the waste samples from both the experimental site and the site of the real landfill fire the hepta- and octachlorinated dioxins and heptachlorinated furans dominated (Figures 5 and 6).

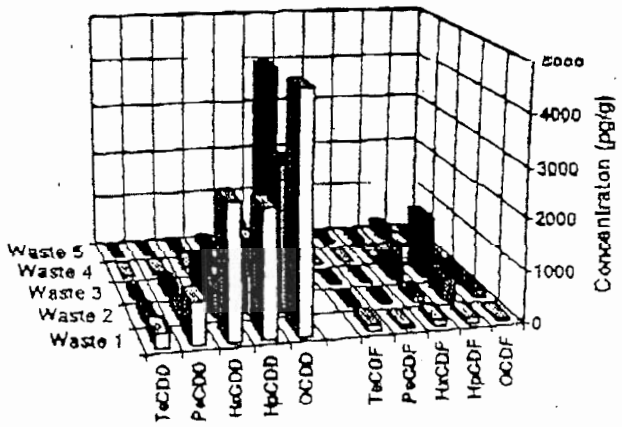

Figure 5: Isomeric distributions in the waste samples from the experimental field landfill fire

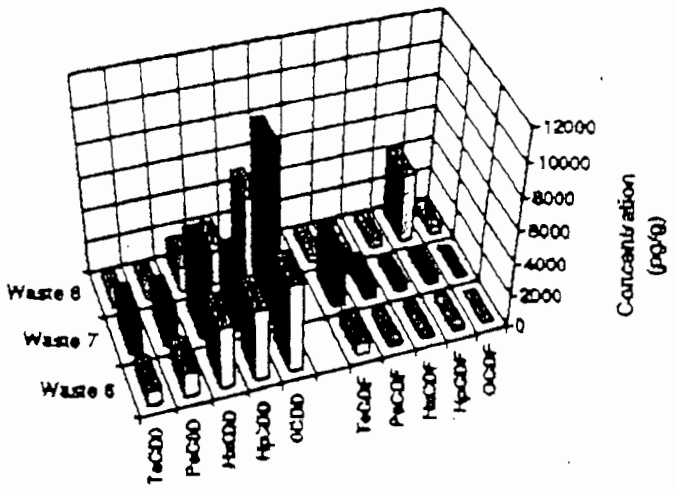

Figure 6: PCDD/PCDF isomeric distributions in the waste samples from the real landfill fire

As can be seen in Figure 7, the most abundant toxic congeners in waste samples from both the experimental field and the real landfill fire were 1,2,3,4,6,7,8-HpCDD, OCDD and 1,2,3,4,6,7,8-HpCDF.

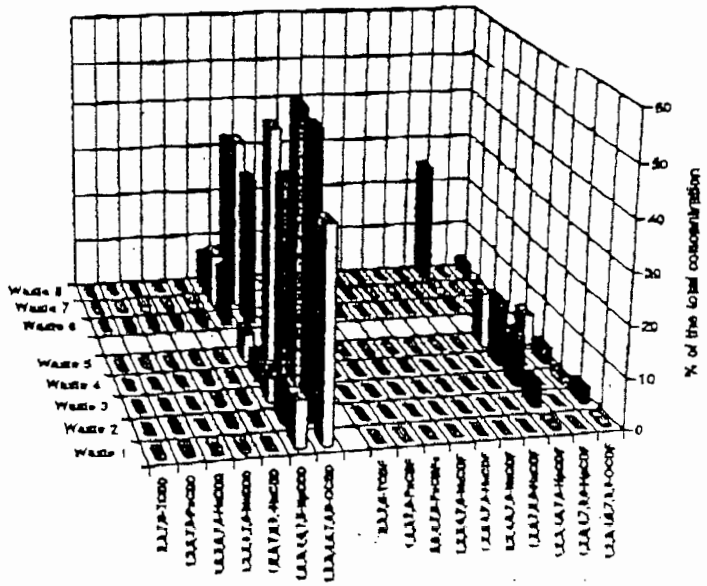

Figure 7: Toxic congeners in the waste samples after waste landfill fires

DISCUSSION

The PCDD/PCDF concentrations and isomeric distributions in the air samples taken before and after the landfill fire at the experimental field were similar to the profiles and concentrations presented in many previous reports on samples of background air (Eitzer BD and Hites RA 1989, Broman D et al. 1991, König J et al. 1993). Rappe and Kjeller (1988) observed that landfills do not give rise to PCDD/PCDF concentrations in ambient air, which can also be seen in our research. The only exceptionally high PCDD/PCDF concentrations in our samples were those of hexa- and heptachlorinated furans in the sample taken before the active fire. Increased concentrations of hexa- and heptafurans have indeed been detected in air samples collected from industrial areas and near municipal solid waste incinerators (Tiernan et al. 1989). The increased concentrations of hexa- and heptafurans in our sample might be due to the fact that an attempt had already been made to light the fire before the first sample was taken, and the center of the fire was being dug open while the first air sample was taken. The effect of this activity can be seen in the profile of the first air sample.

The PCDD/PCDF concentrations during the fires at the experimental site and the real landfill fire were much higher than in the samples taken before and after the landfill fire. The concentrations during the fires were, however, much lower than those measured by Bergström and Björner, 1992. This is because in their pilot tests the samples were taken directly from the flue gas, but in this study the samples were taken from the surrounding working air, where the flue gas had already diluted. This surrounding air is, afterall, the air that people breathe while they are working at waste landfills during fires. On both sampling days the PCDD/PCDF concentrations during the landfill fire at the experimental site measured in the vicinity of the fire exceeded 0.1 ng(I-TE)/m^3 , which is the limit value for waste incineration plants in many European countries. In the real landfill fire the TE- value was half of this value.

The isomeric distributions in the experimental and real landfill fires differed from those measured in stack gas from municipal solid waste incinerators (Pitea et al. 1992). The toxic congener distributions in our research were, however, very similar to those presented by Bergström and Björner (1992) and to those detected in municipal solid waste incinerators by Marklund et al (1986). When individual toxic congeners were examined in relation to their contributions to toxic equivalents, it was found that the 'toxicity fingerprints' in both air samples from the experimental site were almost identical differing only slightly from the air sample taken at the real landfill fire. Furthermore, the 'toxicity fingerprints' in MSW incineration emissions and in our research are very similar (Marklund et al. 1986, de Jong et al. 1993, Bolt and de Jong 1993).

The PCDD/PCDF concentrations were surprisingly low in burnt waste samples, particularly in the waste samples from the experimental site. According to Wilken et al. (1992), who analyzed total PCDD/PCDF concentrations in different non-burnt municipal solid waste fractions, the amount of PCDD/Fs in the paper and cardboard fraction, the food and garden waste fraction and in the plastics, wood , leather and textile fraction

varied from 8 to 1370 pg(I-TE)/g. In the actual waste samples they reported concentrations of 2 - 50 pg(TE)/g. Johnke and Stelzner (1992) reported that PCDD/PCDF concentrations in household waste that reaches waste incinerators vary from 11 to 255 pg (I-TE)/g. According to them, PCDD/PCDF concentrations in the bottom ash from MSW incinerators have been 0.6 - 10 pg (I-TE)/g. In our burnt waste samples at the experimental site, the PCDD/PCDF concentrations were 1240 pg/g - 11170 pg/g (4- 87 pg(TE,Nordic)/g). In the waste samples from the real landfill fire the PCDD/F concentrations were somewhat higher, 15440 - 30260 pg/g (106 - 288pg(Nordic TE)/g).

The limit value for 2,3,7,8-TCDD in contaminated soil, 0.5 ng/kg (Puolanne et al. 1994), was not exceeded in any burnt waste samples. At both sites the highest PCDD/F concentrations were detected in the samples taken 1- 3 m above the center of the fire. The optimum temperature for PCDD/PCDF formation was obviously exceeded in the center of the fire, and the highest concentrations of PCDD/Fs were thus detected, not in the center, but around the center of the fire. The lowest PCDD/PCDF concentration near the fire center was detected in the sample 2, which was taken near the ignition point. At this point the temperature during the fire exceeded 704 ° C.

The isomeric patterns of the experimental field waste samples differed from those in waste samples from the real landfill fire. In both the experimental and the real landfill fire waste samples, hepta- and octachlorinated dioxins dominated; but in the real landfill fire samples, other dioxinisomers were also abundant. The trend in all samples was a rise in concentration with an increase in degree of chlorination in PCDDs. In PCDFs the trend was different. Compared to the amount of PCDDs, the amount of PCDFs in all samples was small. Wilken et al. (1992) also observed this kind of isomeric distribution in non-burnt municipal solid waste. The PCDF isomer patterns were different in the experimental site and the real landfill fire samples, and no other obvious trend could be seen except for the slightly increased concentrations of heptachlorinated furans in burnt waste samples from the experimental site. In the samples from the real landfill fire the trend for PCDF isomers was a decrease in concentration with an increase in degree of chlorination. Only the amount of heptachlorinated furans was an exception: their concentrations were somewhat higher, especially in the sample taken from the center of the fire in the real landfill fire.

The acceptable daily intake for polychlorinated dibenzo-p-dioxins and dibenzofurans of 5 pg(TE, Nordic)/kg has been presented by Ahlborg et al. (1988). An assumed worker's (weighs 70 kg, works 8 h/day during active fire putting out the fire and breaths 20 l/min air) daily intake of PCDD/PCDFs via breathing on the experimental site was calculated as 16 pg/kg/d and 58 pg/kg/d (Sampling days 1 and 2, respectively) and in the real landfill fire 6 pg/kg/d. Thus the acceptable daily intake was exceeded during the fire at both waste sites. Therefore, use of a respirator or compressed air breathing apparatus is necessary while working at the waste site during a fire.

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CONCLUSIONS

During the fires, the concentrations of polychlorinated dibenzo-p-dioxin and -dibenzofurans in the air of the landfills were high; even the limit value for waste incineration plants in many European countries, 0,1 ng/m³, was exceeded during the active fire. The toxic congener distributions in the air samples were the same as have already been detected in pilot tests and MSW incinerators, and the greatest contribution to the toxic equivalent was made by the same toxic congeners as detected in the landfill fire pilot tests and MSW flue gas samples. In our research the isomeric distributions were, however, different from those measured from MSW incinerators. The PCDD/PCDF concentrations in the waste samples taken after the fire were small, and the profiles were similar to the profiles analyzed from household waste samples. The highest PCDD/F concentrations in the waste samples were detected in those samples that were taken 1-3 m above the center of the fire. The acceptable daily intake of PCDD/PCDFs exceeded the recommended value, and thus protective breathing equipment must be used by those working at a waste site during a fire.

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Persistent Organic Pollutants – POPs

What are POPs?

Persistent Organic Pollutants, or POPs, include industrial chemicals such as PCBs, pesticides such as DDT, chlordane and toxaphene, and contaminants and by-products such as dioxins and furans. POPs bioaccumulate in living organisms, persist in the environment and have long-term toxic effects. They enter the environment as a result of human activity.

Why are POPs a problem?

The weight of scientific evidence strongly suggests that POPs cause significant adverse effects to human health and wildlife. A unique feature of POPs is that they move through the food chain to humans. They are passed on from mother to child across the placenta, and through breast milk.

Where do POPs come from?

While most POPs have been banned or severely restricted in Canada for years, they are still produced, used and released in a number of other countries. Most of the POPs currently entering the Canadian environment come from foreign sources in North and Central America, Eastern Europe and Southeast Asia.

This is Exhibit "BB" referred to in the Affidavit of Paul Cleveley sworn before me this 11th day of August A.D., 2001

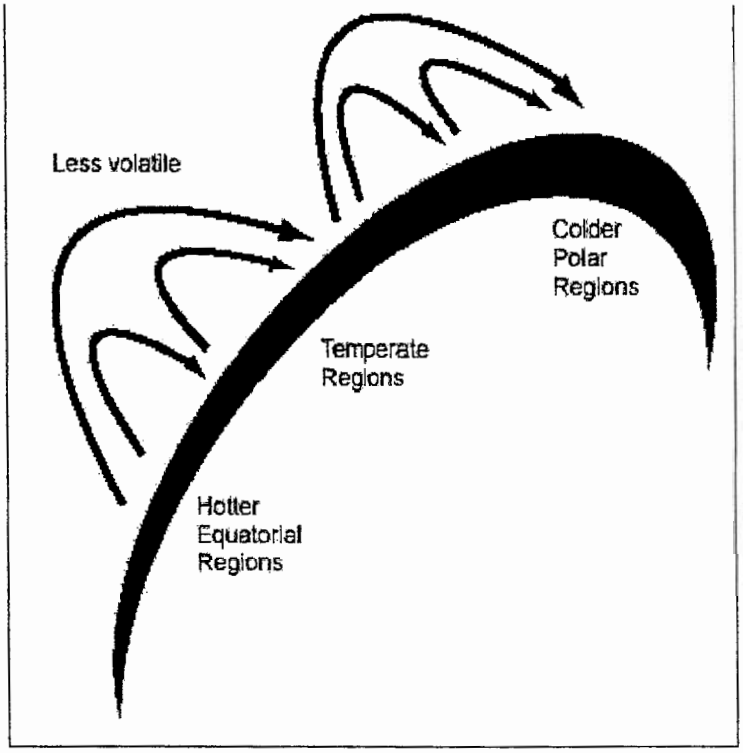
A COMMISSIONER FOR OATHS IN AND FOR NUNAVUT TERRITORY

The Science of POPs

- POPs are semi-volatile chemicals. After their release into the environment, they travel in multiple cycles of evaporation, transport by air and condensation. Called the grasshopper effect, this process allows POPs to travel great distances quickly. In the cold climate of the Arctic, low evaporation rates trap POPs, and so they enter the food chain. In Canada, the highest concentrations of POPs are found in the Arctic, Great Lakes and St. Lawrence basin.

The Grasshopper Effect or global distillation

More volatile



- POPs tend to concentrate in colder climates such as Canada's north. Scientific evidence shows levels of PCBs in the blood of some Inuit women are higher than Health Canada guidelines, and levels of certain POPs in breast milk have been found up to nine times higher than in women who live in southern Canada.

- The geographic location and socio-economic activities of Aboriginal Northerners make them particularly susceptible as they eat country food that has been contaminated. Country food is economically essential for most Aboriginal Northerners.

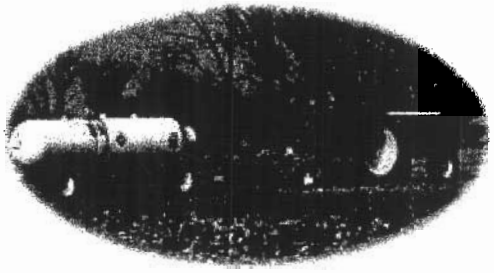
- Data from sediment samples in the Great Lakes and other regions reveal that the concentrations of dioxins and furans have increased steadily since the 1940s, indicating that these substances are generated and released through industrial activities.

- DDT in the environment causes the eggshells of gulls and eagles to become so thin they break during incubation. Registration of all uses of DDT was discontinued in 1985. Over 10 years, DDT levels around the Great Lakes in gulls and their eggs decreased by up to 10 times, and the health and size of fish-eating bird populations increased.

- At the Airborne Toxic Substances Measurement Station in Villeroy, Quebec, scientists are furthering the knowledge of how pollutants move and dissipate within the atmosphere. The Integrated Atmospheric Deposition Network, established by the United States and Canada for air monitoring and research, can help pinpoint the sources of pesticides reaching Canada.

- Sophisticated technology enables the Canadian Global Emissions Interpretation Centre to determine pesticide

applications by region, time and mode of application, properties, and soil and meteorological conditions.



Canadian Action on POPs

- PCBs have never been manufactured in Canada. Commercial, manufacturing and processing uses of PCBs were restricted in Canada in 1977, bringing to an end the manufacture and import of new PCB equipment and the refilling of existing equipment. As a result of this and the management controls that followed in the 1980s, the overall level of PCBs in the Canadian environment has declined.

- Dioxins and furans, released into the environment as by-products from various manufacturing and industrial processes, were declared toxic under the *Canadian Environmental Protection Act* in 1990. As a result of industry response to regulations passed in 1992 and 1994, releases of dioxins and furans from the pulp and paper industry have decreased by almost 100% since 1988.

- In 1995, the federal government adopted the Toxic Substances Management Policy. The policy provides a science-based framework to identify toxic substances that are bioaccumulative, persistent and predominantly released as a result of human activity. The policy calls for the virtual elimination of these substances from the environment.

- Through the Northern Contaminants Program, sources and pathways of contaminants reaching the Canadian north have been identified, and levels of POPs measured in air, snow, water, soil, plants, fish, wildlife and the people living there. This program also provides information and promotes cooperation with the eight countries in the circumpolar community.

- The Canadian International Development Agency has funded over $8 million in projects for the Russian Arctic to introduce sound environmental management and encourage more sustainable practices.

International Action on POPs

A protocol on POPs has been negotiated under the United Nations

Economic Commission for Europe Convention on Long-range Transboundary Air Pollution. With the signing of this regional Protocol, the stage has been set for the next step: a global agreement on POPs under the United Nations Environment Programme (UNEP).

Other examples of international action on POPs

- UNEP is sponsoring the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities.
- The Arctic, one of the world's most sensitive ecosystems, is being further protected by projects under the Arctic Council fostered by Canada, Denmark/Greenland, Finland, Iceland, Norway, Russia, Sweden and the United States. Results of the Arctic Monitoring and Assessment Program help form a data source for those involved in Arctic contaminants research.
- Canada, the United States and Mexico have developed joint regional action plans on PCBs, DDT and chlordane.
- POPs are included in the Great Lakes Binational Toxics Strategy (Canada/U.S.) and other complementary agreements.

Protecting the Future

There is evidence that steps taken to reduce or eliminate the use or release of POPs in the environment can lead to measurable environmental improvements. The negotiation of a global and legally binding instrument will contribute to the protection of the world's environment and human health.

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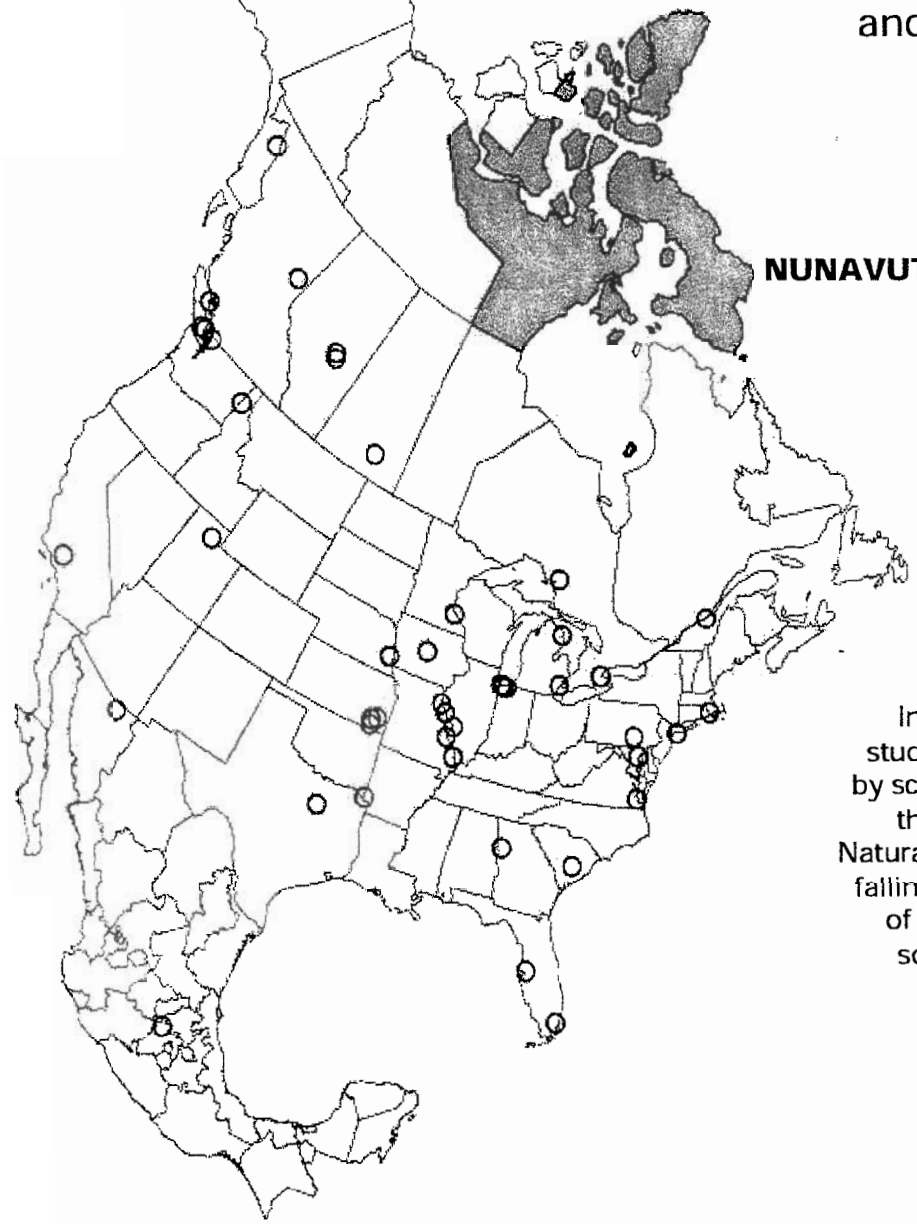
PAUL CRAMLEY

Sworn before me this 14TH day of AUGUST A.D., 2001

A COMMISSIONER FOR OATHS IN AND FOR NUNAVUT TERRITORY

Tracking dioxins

NACEC study tracks dioxins from Canada, Mexico and the United States to the Arctic



In a groundbreaking NACEC study conducted by a team led by scientist Barry Commoner of the Center for the Biology of Natural Systems (CBNS), dioxins falling in the new polar territory of Nunavut are linked to their source regions thousands of kilometers away.

NACEC · CCAAN · CNA

For years, dioxins have been detected in the Arctic diet of fish, seal and caribou meat and, recently, in Inuit mothers' breast milk. There are few sources of these carcinogenic toxins in the Arctic, so they clearly migrate to the region from somewhere else. But where they come from has not been known until now.

Scientists have long recognized that air pollution can travel long distances and fall on communities thousands of kilometers away. These downwind communities typically have little control over the far-away pollution sources, or even the ability to identify the upwind source regions most affecting their local environment. Now the North American Commission for Environmental Cooperation (NACEC), through work conducted by the Center for the Biology of Natural Systems at the City University of New York, has helped develop a cost-effective tool to aid local communities in identifying the pollution sources most affecting them.

The tool used in this assessment is an adaptation of the Hybrid Single-Particle Lagrangian Integrated Trajectory (Hysplit-4) model, an air transport model created by scientists with the US National Oceanic and Atmospheric Administration (NOAA) during the 1980s. NOAA scientists originally developed this powerful technique to track radioactive material in the atmosphere and applied it to radiation releases such as the Chernobyl reactor incident.

Recently, researchers at CBNS developed a new dioxin chemistry component for the Hysplit model, which extended its capabilities. For the NACEC effort, scientists at CBNS used the dioxin adaptation to track "puffs" of dioxin-containing air pollution released at various locations in North America (Canada, Mexico, and the United States) and deposited in eight regions of the polar territory of Nunavut. In doing so, the model was able to evaluate the relative importance of 44,091 identified North American sources that may contribute to dioxins deposited in Nunavut. This study is the first of its kind to "connect the dots" from dioxin source regions to Nunavut receptor sites performed on a continental scale.

NACEC asked scientists at CBNS to study airborne dioxins because of dioxins' known health effects, their persistence in the environment, and their ability to travel long distances through the air far downwind from their original sources. Nunavut is an ideal region to test the model because of the absence of large local dioxin sources that might otherwise complicate an analysis of dioxins' long-range transport.

The study modeled dioxin deposition in Nunavut based on emissions from July 1996 to June 1997, creating a "snapshot" of atmospheric transport during that time. A number of the facilities referenced in the study have reduced or eliminated dioxin emissions since 1997. Nonetheless, the study illustrates the dynamics of long-range transport on a continental scale. Dioxins, like other persistent organic pollutants, may remain present in the environment for years after their deposition.

There are always limitations and uncertainties associated with the use of any specific air transportation model, including the forward-trajectory modeling utilized in this study. Models, however, are important as part of a full range of information tools needed for providing policymakers and the public with a better understanding of the long-range transportation of air pollutants. In this instance, the model was employed to determine the source-receptor relationships for a specific region during a specific time period. These results can be considered in combination with other information, such as dioxin concentration measurements in the indigenous Nunavut population and the local fauna.

Health Effects of Dioxins

Dioxins are a family of some 70 toxic chemicals, consisting of polychlorinated dibenzo dioxins (PCDDs), polychlorinated dibenzo furans (PCDFs), and polychlorinated biphenyls (PCBs). Dioxins are a public health and environmental concern because some types have known carcinogenic and toxic properties that may produce a broad spectrum of adverse effects in humans. These include reproductive dysfunction and developmental abnormalities, suppression of the immune system, chloracne (a severe acne-like disease that sometimes persists for many years), and cancer. EPA characterizes TCDD [2,3,7,8-tetrachlorodibenzo-p-dioxin] as a "human carcinogen" based on the weight of evidence of animal and human studies and characterizes other dioxins as "likely human carcinogens" [US EPA, *Dioxin: Summary of the Dioxin Reassessment Science,* Information Sheet 1, 12 June 2000].

Dioxins are widely distributed in the environment at low concentrations and are not easily broken down by natural processes. Human exposure to dioxin is almost entirely through animal foods, especially those that are rich in fat. As a result, most people have detectable dioxin levels in their tissues that have bioaccumulated over their lifetime. According to the US EPA, "[t]his background exposure is likely to result in an increased risk of cancer and is uncomfortably close to levels that can cause subtle adverse non-cancer effects in animals and humans" [US EPA, Persistent, Bioaccumulative, and Toxic (PBT) Initiative, 2000].

Due to past measures to reduce or eliminate the production of dioxins, levels in the environment have been declining since the early 1970s. Even with this decline, the lifetime risk of dioxins causing cancer is now considered to range as high as 1 in 1,000 to 1 in 100, a ten-fold increase over earlier estimates [US EPA, *Dioxin: Scientific Highlights from Draft Reassessment (2000),* Information Sheet 2, 12 June 2000]. Children and fetuses may be even more sensitive to dioxins because of their rapid growth and development. This is a much higher risk

range than the generally regarded "acceptable" lifetime cancer risk of one in a million typically used as the regulatory threshold for action by the US EPA.

In Nunavut, dioxin concentrations in Inuit mothers' breast milk are twice the levels observed in southern Quebec, yet there are few dioxin sources in Nunavut or within 500 kilometers of its boundaries. Despite the paucity of local sources, elevated dioxin levels appear in fish, seal, and caribou meat that forms the cultural basis of the Inuit diet. This dioxin must have arrived in the Arctic after being transported long distances from regions of high dioxin emissions. Once deposited in the Arctic, dioxins enter the major terrestrial (caribou) food chain mainly through lichen, mosses and shrubs, and enter the marine (fish, seal) food chain chiefly through algae.

Application and Results of the Dioxin Transport Model

The Arctic region provides a textbook case for NACEC's interest in addressing the long-range transport of pollutants across North America. Nunavut is a relatively pristine region with few local dioxin sources, yet relatively high dioxin levels are found there. The Inuit population of Nunavut must be exposed to dioxins in their diet that traveled thousands of kilometers from sources located far from their communities. The challenge is to develop a tool that can locate the source regions of most concern so that control efforts can focus on the sources most likely having the greatest impact in the Arctic. With this goal in mind, NACEC collaborated with leading environmental scientist Barry Commoner at the Center for the Biology of Natural Systems to help develop such a tool.

As expected, the modeling tool used by Dr. Commoner found that only two-thousandths of the total predicted dioxin deposition in Nunavut could be attributed to local sources. About 2 to 20 percent come from sources outside North America, while the vast majority of deposited airborne dioxins come from sources in North America hundreds or thousands of kilometers away from Nunavut.

Dioxins are a byproduct of a number of chemical processes, including some metal refining methods, the chlorinated bleaching of pulp and paper, and, most importantly, the combustion of certain materials, especially plastics. Of the 23 classes of dioxin sources identified in the study, only six classes accounted for 90 percent of all dioxin emissions in North America. These six classes, listed in order from largest to smallest emitting class, are:

- municipal solid waste incinerators,
- backyard trash burning,
- cement kilns burning hazardous waste,
- medical waste incinerators,
- secondary copper smelters, and
- iron sintering plants.

Dioxins may also have natural sources but they are vanishingly small compared to dioxin emissions arising from human activity. For example, lake sediment cores in the United States show dramatic increases in dioxin levels since the 1930s corresponding to increasing industrial activity, with recent decreases since the 1970s likely corresponding to pollution control efforts. The large increase in dioxins since the 1930s indicates that pre-industrial levels were low compared to current deposition amounts.

On a per-country emission basis during the period of study (1996–97), sources in the United States accounted for 62 percent of North American dioxin emissions related to human activity, Mexico accounted for 30 percent, and Canada accounted for 8 percent. Dioxin sources within Nunavut account for less than 0.002 percent of the North American total. (Another achievement of this research was the development of a dioxin inventory for Mexico—the first national inventory ever compiled for this country.) Current dioxin emissions in the three countries may differ from these relative percentages due to recently required reductions from many large dioxin sources that were implemented after the study period.

The amount of dioxin deposited in the Arctic depends on many factors, including the rate of emission of dioxin, the distance between the source and receptor, and the prevailing weather patterns at a given time of the year. The study found that dioxin deposition varied over the year, with high dioxin deposition occurring when the weather patterns favored efficient transport from areas in North America with high emissions. For example, in one Arctic community, Ikaluktutiak, over half of the annual dioxin burden from July 1996 to June 1997 was deposited in two months, September and October.

The study found that only a relatively small number of the over 40,000 dioxin sources in North America contribute most of the dioxin deposited in Nunavut. For example, at the Coral Harbour land receptor area in northern Hudson Bay, only 19 sources contributed 35 percent of the total deposition, 43 sources contributed 50 percent, and 605 sources contributed 75 percent. This illustrates the power of the modeling technique to serve as a "screening tool" for helping policy makers focus first on the relatively small subset of dioxin sources likely having the biggest impact on dioxin deposition in downwind communities.

Overall, the model results indicated that, during the period of study, the greatest contribution to dioxin deposition in Nunavut was due to US sources: 70 to 82 percent depending upon the location within Nunavut. Canadian sources contributed 11 to 25 percent and Mexican sources five to 11 percent. The relatively small contribution of Mexican sources to dioxin deposition in

Nunavut compared to their larger share of the total North American dioxin emission inventory (30 percent) is in part a reflection of their greater distances from the receptor areas compared to US and Canadian sources.

There are limitations in the modeling due to uncertainties in the dioxin inventories used as model inputs. This is a common issue with virtually any emission inventory using such techniques. The strength of this study, therefore, is not in "pinpointing" precise contributions from individual sources, but in providing linkages between a collection of sources within source regions and dioxin deposition in Nunavut.

As noted, the study modeled dioxin deposition in Nunavut based on emissions from July 1996 to June 1997. This was the most recent period with comparable data available from Canada and the United States on dioxin emissions and weather conditions at the time of the study. Countries, however, are constantly revising data on pollutants such as dioxin. Canada and the United States are preparing new inventories of dioxin emissions for 1999 that show a substantial reduction in dioxin emissions since 1996–97.

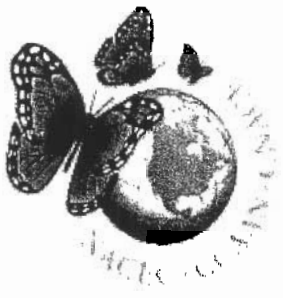
Already, since the period covered in this study, a number of the major sources and source types identified in the study as contributing to dioxin deposition in Nunavut have come under new requirements to reduce their dioxin emissions. In late 1997, the US EPA adopted regulations that will reduce dioxin emissions from medical waste incinerators by about 95 percent by the year 2002. In 1998, the EPA promulgated a federal plan to ensure a 99 percent reduction in dioxin emissions from large municipal waste incinerators before the end of 2000. Similarly, the EPA also promulgated regulations to reduce dioxin from some hazardous waste incinerators, including cement kilns. Additionally, a number of US states have taken active steps toward dioxin reduction.

In Canada, environment ministers in June 2000 accepted a Canada-wide Standard for Dioxins and Furans that may be endorsed at the next meeting of the federal and provincial environment ministers in November 2000. Six sectors, including waste incineration, burning salt laden wood, residential wood combustion, and electric arc furnace steel manufacturing, have been identified for early action. The municipal waste incinerator in Quebec has undergone modifications to virtually eliminate its dioxin emissions. The model's results are an affirmation of these government efforts to reduce dioxin emissions from some of the largest source types.

Future Directions

The NACEC study helps develop a screening tool for use in identifying and focusing on the most significant pollution source regions affecting local communities. Owing to their toxicity, persistence in the environment, and potential for long-range transport, persistent organic pollutants such as dioxins represent a continental, indeed global, challenge. This study demonstrates the application of a powerful new tool to better understand how these pollutants are transported great distances through the environment. This is of great value because policymakers must increasingly consider all sources—local, distant, large or small—as they seek solutions to better protect human health and the environment.

In the context of Nunavut, the modeling tool suggests a set of sources whose control could significantly reduce the deposition of dioxins in the Arctic. Although a number of the major source groups have already reduced, or are already under obligation to reduce, their dioxin emissions, additional studies should be conducted with updated inventories to assess current source-receptor relationships affecting the Arctic and other regions in North America.



The North American Commission for Environmental Cooperation (NACEC) was established by Canada, Mexico and the United States to help build cooperation among the NAFTA partners in the protection of their shared environment, with a particular focus on the opportunities and challenges presented by continent-wide free trade.

NACEC continues working to reduce or eliminate exposures to harmful pollutants that travel great distances in North America. As part of NACEC's Sound Management of Chemicals initiative, the governments have agreed to take concrete measures to address harmful substances, such as PCBs, DDT, chlordane and mercury. NACEC will soon develop a regional action plan to address dioxins as well. Additionally, NACEC tracks certain North American toxic pollutant emissions in its annual Taking Stock report and supports North American pollution prevention efforts.

For more information, please visit the NACEC web site at: http://www.cec.org

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LAST MODIFIED: Monday, 18-Jun-2001 10:28:05 EDT

Ideas:

EPA Reports That Garbage Burning Is A Health Threat

Submitted by Tim Carroll, Oswego County Environmental Management Council

A recently released study by the Environmental Protection Agency proved that household garbage burning is more dangerous to a person's health than a well-run incinerator. Commonly referred to as "backyard burning," the EPA has released its first comprehensive report that studied the smoke and ash produced from burning garbage in a 55-gallon drum. In their report, the EPA noted that when backyard burning is compared to a well-run incinerator, the backyard burn barrel will release over 20 times more dioxin.

The New York State Department of Health had originally asked the EPA to look into the problem because dioxin is considered one of the most toxic compounds ever identified. Dioxin can cause cancer, produce severe reproductive and developmental problems, and damage a person's immune system. Dioxin is the byproduct of the herbicide 2,4,5-T and was a component of Agent Orange. Dioxin is one of the toxic chemicals responsible for the federal evacuation of Love Canal in Niagara Falls and was the sole reason for the 1982 permanent evacuation of the town of Times Beach in Missouri.

In the past decade, the United States Environmental Protection Agency, the New York State Department of Health, and several independent research groups have all studied the pollutants from backyard burning. Although dioxin is the most notable toxin released from the burning of household garbage, several other possible cancer causing agents have been found in the smoke and ash. These studies have identified literally hundreds of toxic chemicals released into the environment by the smoke and ash produced from the backyard burning of garbage. Among them are soot particulate, sulfur dioxide, carbon monoxide, and volatile organic compounds. The particulates in the smoke can cause respiratory problems.

Dioxins are the biggest health concern because they accumulate in

This Exhibit "DD" referred to in the Affidavit of
PAUL CROWLEY
before me this 17TH day
AUGUST A.D., 19 2001
COMMISSIONER FOR OATHS IN AND FOR NUNAVUT TERRITORY

fat in large concentrations. The concentration of toxin increases as it moves up the food chain. An example of a typical food chain includes algae, eaten by the water flea, eaten by a minnow, eaten by a trout, which is finally consumed by an osprey or human being. According to the Extension Toxicology Network, each step in the food chain results in increased concentrations. An animal at the top of the food chain accumulates much greater concentrations of dioxin than was present in the animals they ate. The major source of dioxin exposure in humans is through our own diet, especially if the beef, dairy products, milk, poultry, pork, fish and eggs we eat come from animals which were fed from contaminated pastures and feed.

Some people may argue that their family has burned garbage for generations without adverse health effects. That may have been true in the past when garbage was composed of mainly paper and food waste. The households who continue to burn their garbage today may not realize this, but they could be potentially damaging their health and the health of their families. Today's trash contains large amounts of plastics. The smoke and ash produced can impact their neighbors' health as well.

Dioxins are formed when these plastics are burned at low temperatures with insufficient oxygen. These are the conditions that are typically found in a backyard burn barrel or open pit. Dioxins in the smoke can then be carried long distances before settling out of the atmosphere on to pastures, gardens and waterways where they enter the food chain.

Do you know someone who still burns garbage in a 55-gallon drum in the back yard?

It's likely that you do. A study funded by the Oswego County Environmental Management Council estimated that as many as 4,500 households in Oswego County may be burning household waste in a burn barrel or open pit. Open burning is not as efficient as an incinerator because the garbage burns at low temperatures and lacks pollution control devices. The EPA report concluded that backyard burning accounts for a significant portion of the dioxin in the environment that cannot be attributed to a regulated facility. Therefore, garbage burning should be discouraged.

Homeowners have alternatives to backyard burning. The first is to allow a local municipality or independent hauler to handle all household waste. An independent hauler will take the garbage to a facility specially designed to dispose of it. In Oswego County, much of the household plastic is sorted and sold as recycleables. The remaining waste is incinerated at the Energy Recovery Facility or deposited in the county landfill.

If a town doesn't have free trash pickup, or if a homeowner can't afford a private hauler then Oswego County residents have the convenience of five transfer stations. Each of these county transfer stations accepts recyclable waste free of charge. The removal of recyclables reduces a significant portion from household waste that might otherwise be burned. Also, the proper recycling of Number 1 & 2 plastics, paper, metal and glass drastically decreases the amount of trash that would normally be assessed a fee if dumped with regular trash.

The best way to deal with household waste is to prevent it. Choose to buy unpacked or bulk food whenever possible. Select items with the least amount of packaging. Purchase reusable items such as travel mugs instead of paper or plastic cups, and cloth or net shopping bags instead of the usual paper or plastic. Before making any purchases, think about the alternatives. You will find that you will also be saving money.

U.S. report to firmly link dioxin with cancer

Wednesday, May 17, 2000
By Maggie Fox, health and science correspondent
REUTERS

This is Exhibit "EE" referred to in the Affidavit of
PAUL CROWLEY
Sworn before me this 11TH day of AUGUST A.D. 2001
COMMISSIONER FOR OATHS IN AND FOR NUNAVUT TERRITORY

The U.S. government is poised to declare firmly that dioxin, a toxin found throughout the food supply and in Agent Orange which U.S. troops sprayed over Vietnam, causes cancer in people, officials said today.

Made notorious when it was fingered as the toxic component in Agent Orange — used to clear forests in the Vietnam war --dioxin caused the evacuation of the town of Times Beach, Missouri, in 1983. The town was later bulldozed because it was found to be contaminated with the chemical.

A draft report leaked to The Washington Post newspaper upgrades dioxin to the status of a "human carcinogen" but also concludes that health and environmental officials have done as good a job as possible to control it.

Officials at the U.S. Environmental Protection Agency, who have been reviewing dioxin for 10 years and who worked on the draft, confirmed the newspaper report.

Dioxin has hormone-like effects on the human body, causing changes that can lead not only to cancer but to infertility and other sexual changes. Vietnam veterans exposed to dioxin claim it has caused a variety of ills including cancer and birth defects in their children.

The National Toxicology Program of the National Institute of Environmental Health Sciences (NIEHS) also tried to declare dioxin a known human carcinogen in its report on cancer-causing substances released this week. But a lawsuit by New York restaurant owners, who claim the link to cancer will scare customers away from their food, has blocked the publication.

The EPA report, due out in June, notes that emissions of dioxin have plummeted from peak levels in the 1970s but still pose a significant cancer threat to some people who ingest it --mostly in food, especially food of animal origin.

George Lucier, director of the National Toxicology Program and author of some of the chapters in the EPA report, said there is no avoiding dioxin.

"Even penguins in Antarctica have dioxin in them," Lucier said in a telephone interview.

"It is found in food you eat and have to eat. Food in the United States is probably

any kind of fatty meat, eggs, and so on."

Over the past five years, the EPA has imposed regulations on major dioxin emitters, including municipal waste combustors, medical waste incinerators, hazardous waste incinerators, cement kilns that burn hazardous waste, pulp and paper operations, and sources of toxic chemicals known as PCBs.

"I think to a large extent we have done pretty well with it," Lucier said. "Dioxin levels are coming down in people's bodies, especially young people, which is good news."

There are many different dioxins but the form named in both the EPA and NIEHS reports is 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). "No one sets out purposely to make dioxin. It is an unwanted side-product that you get from burning," Lucier said.

"Any time you combine heat, chlorine and organic material, there is the possibility of making dioxins."

Lucier said scientists do not quite understand how it damages the body, but it acts on a universal mechanism that controls cell functions. Dioxin attaches, or binds, tightly to a receptor called the AH receptor — a kind of cellular doorway found in virtually all cells in the body.

Once there, it changes the function of hundreds of genes. "It can make them more or less active. It will either stimulate gene expression or suppress it," Lucier said.

Dioxin exposure has been linked to many different kinds of tumors, especially non-Hodgkin's lymphoma. One study of Italians exposed to dioxin as children found evidence of hormonal changes. "When they have children, most all their kids are girls, not boys," Lucier said.

"Dioxin affects pathways that are involved in normal growth and differentiation so it can cause birth defects. It can cause effects on sperm counts."

Lucier said his program hopes it can raise dioxin's status to a known human carcinogen, mostly so that government agencies can be encouraged to monitor its effects on the population.

But a group of New York restaurant owners, lead by business consultant Jim Tozzi, along with a medical device maker, have filed suit in federal district court claiming the upgrade would cause them economic harm.

The restaurant owners argue that people would stop eating at their restaurants because dioxin is found in food, while the device maker objects to statements that medical products containing polyvinyl chloride contribute to environmental dioxin when incinerated as medical waste.

Lucier said the next hearing on the case is in U.S. district court in Washington on June 14.

Backyard Burn[illegible]els vs. Municipal Waste [illegible]busto[illegible]

When the amount of chemicals emitted from a barrel burn is compared to what is emitted from a municipal waste combustor (MWC it becomes obvious how much dirtier the smoke is from a burn barrel than a MWC.

Pound for pound of garbage burned:

- A burn barrel emits 10,000 times more total dioxin than a MWC.
- A burn barrel emits 1000 times more total furans than a MWC.
- A burn barrel emits 3000 times more polycyclic aromatic hydrocarbons than a MWC.

Alternatives to Burning Household Waste

Reduce: Avoid disposable items. Buy products in bulk or economy sizes versus individually wrapped or single serving sizes. Buy durable, repairable products and products that can be recharged reused, or refilled.

Reuse: Donate unwanted clothing, furniture and toys to friends, relatives or charities. Give unwanted magazines and books to hospitals or nursing homes. Mend and repair rather than discard or replace.

Recycle: Separate the recyclable items from your residential waste and prepare them for collection or drop-off at a local recycling program.

Disposal: As a last resort have your household waste picked up by a licensed waste removal company or take it to a licensed disposal facility (landfill or incinerator).

[illegible]ousel [illegible]Vaste [illegible]ng I

Determining *if* you may burn and, if so, *what* you may burn can be confusing for Michigan residents. Citizens and business owners usually want to "do the right thing" but may not be quite sure just what the right thing is. Some of the laws that regulate the burning of household waste in Michigan include the Natural Resources and Environmental Protection Act (Act 451 of 1994) Parts 55 (regarding air pollution control); 115 (regarding Solid Waste Management); and 515 (regarding Forest Fire Prevention). In addition, local units of government such as city, county and township boards often regulate the burning of household waste through local laws.

For information regarding the regulation of open burning in Michigan contact the Michigan Department of Environmental Quality's Environmental Assistance Center at 1-800-662-9278. A general Open Burning brochure is available or you can obtain it via the DEQ Internet Website at http://deq.state.mi.us/aqd then select 'Publications' in the menu.

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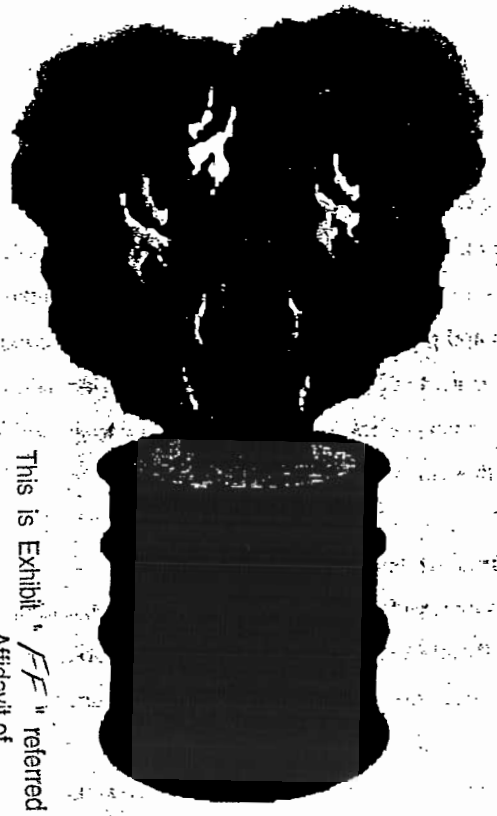
Sworn before me this [illegible] day of [illegible] A.D., 19[illegible]
COMMISSIONER FOR OATHS IN AND FOR [illegible]
[illegible]
[illegible]

This is Exhibit "FF" referred to in the Affidavit of [illegible] Crowley

Burning Household Waste



A Source of Air Pollution in Michigan

DEQ Air Quality Division
Michigan Department of Environmental Quality
John Engler, Governor — Russell J. Harding, Director

In many parts of Michigan -- urban as well as rural -- burning of household waste continues to be the disposal method of choice for a significant part of the population. It may be illegal to burn household waste in the area where you live, or you may need a permit to burn your waste. Even if you live in an area where burning household waste is allowed there are several reasons why you should choose to dispose of your waste in another manner.

Burning Garbage Releases Toxic Air Pollution

Household burn barrels or similar homemade devices produce low temperature fires. They receive very little oxygen and produce a lot of smoke. Under these conditions a great many toxic substances are produced. Virtually all of the pollutants are released into the air close to ground level where they are easily inhaled.

Pollutants Are Emitted From Burn Barrels

Carbon monoxide (CO), carbon dioxide (CO_2), and nitrogen oxides (NO_x) represent the largest portion of pollutants emitted from burning household waste in a burn barrel. Smaller amounts of more poisonous chemicals are also released into the air when household waste is burned. Chemicals commonly detected in the smoke include benzene, styrene, formaldehyde, polychlorinated dibenzodioxins (PCDDs; also known as dioxins), polychlorinated dibenzofurans (PCDFs; also known as furans), polychlorinated biphenyls (PCBs), and heavy metals such as lead, mercury and arsenic. Estimates of garbage burned at home show that this is a significant source of air pollution (see Table 1).

... Burning Household Waste ... Health

Smoke from burning household waste is unhealthy to breathe. Small children, pregnant women, older adults and people with asthma or other respiratory ailments are especially sensitive to its effects.

- Smoke from burn barrels can contain hydrochloric acid as well as formaldehyde and other aldehydes. These chemicals are especially irritating to the eyes and lungs.
- Bleached paper products, lightweight white cardboard, and certain plastics contain chlorine which create dioxins when burned with other trash at low temperatures. Exposure to dioxins is associated with cancer, birth defects and altered immune function.
- Burning slick colored papers and cardboard printed with synthetic inks releases heavy metals into the atmosphere. The absorption of heavy metals by humans has been linked to birth defects and cancer.
- The burning of polystyrene polymers - such as foam cups, meat trays, egg containes, yogurt and deli containers - releases styrene. Styrene gas can readily be absorbed through the skin and lungs. At high levels styrene vapor can damage the eyes and mucous membranes. Long term exposure to styrene can affect the central nervous system, causing headaches, fatigue, weakness, and depression.

2. Burning household waste harms the environment

Pollutants released from burning waste in a burn barrel are transported through the air either short or long distances, and are then deposited onto land or into bodies of water. A few of these pollutants such as mercury, polychlorinated biphenyls (PCBs), dioxins and furans persist for long periods of time in the environment and have a tendency to bioaccumulate which means they build up in predators at the top of the food web. Bioaccumulation of pollutants usually occurs indirectly through contaminated water and food rather than breathing the contaminated air directly. In wildlife, the range of effects associated with these pollutants includes cancer, deformed offspring, reproductive failure, ... humans can be exposed indirectly just like ... life, especially through consumption of contaminated fish.

3. Burning household waste causes odor problems

Smoke released from burning waste in a burn barrel is released close to the ground and may drift onto a neighbor's property. Field staff from the Michigan Department of Environmental Quality Air Quality Division frequently respond to odor complaints resulting from burning garbage.

Every Little Bit Counts

The United States is a big place. How can burning a little trash be bad? The average person in the U.S. generates 3.72 pounds of solid waste (excluding yard waste) per day. More than 50 million people live in non-metropolitan areas in America. The U.S. EPA[1] estimates that 40% of the people living in non-metropolitan areas burn their waste and that 63% of their daily waste is burned in burn barrels. This means that over 1.8 billion pounds of household waste is burned in burn barrels every year.

Table 1. National Emissions from Household Burn Barrels

Chemical	Estimated Emissions from all Household Waste Burn Barrels in the US (lbs./year)**
benzene	4,500,000
styrene	3,400,000
formaldehyde	3,100,000
total PCDD (dioxins	139
total PCDF (furans)	22
total PCBs	10,962
hydrochloric acid	1,000,000
hydrogen cyanide	1,700,000
lead	1790
mercury	232
arsenic	8186

** Based on a household that does not recycle.

[1] EPA. 1998. The Inventory of Sources of Dioxin in the United States. EPA/600/P-98/002Aa.

Information Bulletin

Manitoba Environment

No.: 98-05E
December 1998

IMPLICATIONS OF OPEN BURNING OF GARBAGE AT WASTE DISPOSAL GROUNDS

The main concerns with the open burning of garbage at waste disposal grounds relate to the potential effects on human health and the environment. The following summarizes the main concerns, namely the release of air pollutants, the health risks to people on and off the site, and the potential environment effects due to the smoke and ash.

Contaminants Released from the Open Burning of Garbage

- Open burning is an inefficient combustion process and releases significant amounts of air pollutants and ash, and dense white or black smoke.
- During calm or inversion conditions, the levels of the pollutants are higher because of their reduced dispersion in the atmosphere. At other times, the area affected by the smoke cannot be predicted because of the variability in the wind direction and wind speed.
- The air contaminants released depend on the material being burned and the conditions of the fire. The smoke may include aldehydes, acids, nitrogen oxides, sulphur oxides, polycyclic aromatic hydrocarbons (PAHs), dioxins, furans, other organics and volatilised heavy metals. For example, treated wood wastes may release arsenic, PVC plastics may release hydrogen chloride, wood painted with lead-based paints may release lead, *etc.*
- The ash from the waste may be contaminated with toxic chemicals such as dioxins and furans, PAH's, heavy metals, and other potentially carcinogenic compounds. Some of the ash will be carried off into the atmosphere with the smoke plume, while the rest will remain behind after the fire has been extinguished.

Health Effects of Open Burning of Garbage

- The greatest health risk from the open burning of garbage at a waste disposal ground would be to those closest to the fire who may inhale the smoke. Other individuals on-site and off-site may also be affected, depending on factors such as the distance to the fire, exposure duration, amount and type of material burned, individual sensitivity, *etc.*
- The pollutants are all toxic to humans, depending on their concentration, and may cause irritation, skin and respiratory problems; some are carcinogenic. Those individuals with respiratory problems such as asthma or with allergies may be even more sensitive to the smoke.

Environmental Effects of Open Burning of Garbage

- The smoke from open burning may be a major source of complaints from the public because of its odour and its effects on visibility.
- The smoke from waste disposal ground fires may reduce visibility on local roads. This has the potential to cause traffic accidents.
- The ash, which may be dispersed by the wind or leached by water, may contain toxic contaminants.
- Toxins may be leached from any ash remaining which could lead to the contamination of surface water or ground water.
- There is always a risk of the fire burning out of control.
- Across the province, the total pollutant contributions from the open burning at waste disposal grounds, if allowed, would have an effect, although small, on the global environment

Manitoba Waste Disposal Grounds Regulation (Reg. 150/91) states that "the operator of a waste disposal ground shall ensure that no burning takes place unless otherwise specified in the operating permit". Currently, licences and permits for some waste disposal grounds do allow burning of selected combustible materials only (*e.g.*, branches, loose straw, *etc.*) within the confines of a bermed area at the waste disposal grounds. Other terms and conditions are also placed on the burning of these materials (*e.g.*, weather conditions, supervision, record keeping, *etc.*). **Based on the large number of complaints routinely received in the past, Manitoba Environment's experience is that the public does not want open burning of garbage to occur at waste disposal grounds.**

Based on the concerns noted, only the open burning of selected combustible materials (*e.g.*, branches, loose straw, *etc.*) at waste disposal grounds may be permitted by Manitoba Environment. The open burning of garbage is not permitted.

It is recognized that the delivery of this open burning policy by local administrators would be difficult if the policy were not uniformly applied on a province- wide basis. Consequently, exemptions for remote waste disposal grounds cannot be granted.

More detailed technical information on the burning of garbage at waste disposal grounds is available, upon request.

For more information on this issue, contact your local Manitoba Environment Regional Office:
Eastern/Interlake Region: 1 (204) 346-6060
South-Central Region: 1 (204) 325-1750
Northern Region: 1 (204) 627-8362
Winnipeg Region: 1 (204) 945-7100
Park-West Region: 1 (204) 726-6565

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POPs treaty signed

Nunatsiaq News

IQALUIT — A landmark treaty to reduce Arctic pollutants was signed in Stockholm, Sweden this week.

A total of 110 nations, including Canada, signed the treaty May 23.

Called the Stockholm Convention, the agreement requires countries to reduce or eliminate their use of so-called persistent organic pollutants.

POPs — which include PCBs, DDT and dioxins — are produced mainly in industrial areas, but they settle out of the air in the Arctic and collect in the fat of animals. Northerners who eat those animals run a higher risk of cancer, birth defects and developmental disabilities.

Negotiations on the Stockholm Convention took two years and involved more than 120 nations.

The Inuit Circumpolar Conference was one of the key organizations in pushing for the treaty.

To become law, the treaty must be ratified by the national legislatures of 50 nations. Ratification is likely to take place within the year.

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This is Exhibit "HH" referred to in the Affidavit of
PAUL CROWLEY
Sworn before me this 11TH day
of AUGUST A.D. 2001
A COMMISSIONER FOR OATHS IN AND FOR
NUNAVUT TERRITORY