1. INTRODUCTION

This Environmental Assessment ("EA") has been prepared by Bennett Environmental Inc. (Bennett), a leading provider of treatment services for the remediation of contaminated soil and solids in North America, to obtain approval under the Ontario *Environmental Assessment Act* ("EA Act") to construct a high temperature thermal treatment facility in Kirkland Lake, Ontario. This EA is submitted under Section 6.2 (c) of the EA Act.

Bennett wishes to take advantage of a business opportunity to provide a treatment service by building, owning and operating its proprietary Thermal Oxidizer process technology in Kirkland Lake, thereby providing Ontario with a world class facility for decontaminating soils and other solid materials contaminated with organic compounds. Construction of this facility is in keeping with the government of Ontario's desire to position itself as a leading environmental jurisdiction for environmental protection and, specifically in the management of environmentally sensitive waste.

The EA Act requires that the proponent put forth Terms of Reference (ToR) to define the scope of the Environmental Assessment. The Minister approved Bennett's proposed ToR with amendments on March 30, 2001. This EA document was prepared in accordance with the approved ToR.

Bennett is aware of the sensitivity of the proposed project on the population of Kirkland Lake and surrounding areas. Bennett also recognises that thermal treatment of hazardous waste has been recognized by many regulatory agencies such as USEPA as the best demonstrated available technology (BDAT) supported by numerous scientific studies and long-term monitoring of treatment facilities. The design and operation of the proposed facility mirrors a similar facility owned and operated by Bennett since 1996 in the Province of Quebec. The operating record of Bennett's facility indicates that the proposed Kirkland Lake facility can readily meet or surpass treatment and emission standards as prescribed in Ontario regulations that are protective of the public's best interest and the environment.

A comparison of proposed facility design parameters and North American emission standards are presented in Section 7.2 'Potential Effects on Air Quality'.

1.1. BACKGROUND

Bennett's wholly owned subsidiary, Récupère Sol Inc. (RSI) currently operates the company's facility in St. Ambroise, Québec, first established in 1996. RSI is licensed to treat up to 100,000 tonnes/year (t/yr) of soils contaminated with chlorinated and non-chlorinated organic compounds.

The potential market for Bennett's thermal treatment service is growing. The current and changing business and regulatory environments in North America in general and Canada and Ontario in particular, are factors that are contributing to the growth of the market. Bennett currently has a number of soil treatment contracts. These contracts commit a significant portion of RSI's treatment capacity over a number of years. Anticipated near-term contracts could easily exceed RSI's existing treatment capacity. This was the driver behind Bennett looking towards the construction and operation of a new facility in Ontario for the treatment of soils and solids contaminated with chlorinated and non-chlorinated organic compounds.

In December 2001, the Ontario Ministry of Environment and Energy (MOEE) proposed new initiatives for the management of hazardous waste. The province is looking to establish pre-treatment requirements for a class of hazardous waste before it can be landfilled. The U.S. EPA has implemented such regulations since 1986 called Land Disposal Restrictions (LDRs). By proposing such initiatives for Ontario, the MOEE is working at harmonizing regulations between the U.S. EPA and Ontario. Pre-treatment requirements create the need for infrastructure to provide the necessary treatment services.

Bennett publicly announced the proposed project in Kirkland Lake in November 1999. At that time, Bennett was seeking approval for the project under the Environmental Protection Act. In May 2000, Bennett volunteered to seek approval for the high temperature thermal treatment facility under the EA Act, which holds more stringent requirements. Terms of Reference were drafted and circulated for a first round of comments from the public. Details and additional issues were added to the ToR and it was submitted for approval in November 2000. The Minister of the Environment approved the ToR with amendments in March 2001.

The various studies identified in the Terms of Reference were carried out as described in the EA work plan. The required assessments that were part of the work plan included:

Air Quality	Appendix 3 and 4
Surface and Groundwater Quality	Appendix 5 and 6
Biophysical Sensitive/unique landforms and geological features, Vegetation, fish and wildlife	Appendix 7 and 8
Mining Impact	Appendix 9
Agricultural Impact	Appendix 10
Noise and Traffic Noise Impact	Appendix 11
Economic Impact	Appendix 12
General and social characteristics of the community	Appendix 13
Archaeological features of the site	Appendix 14
Traffic and transportation	Appendix 15
Spill Contingency Plan	Appendix 16
Human Health Risk Assessment	Appendix 17
Ecological Risk Assessment	Appendix 18

In December 2001, a draft version of the EA was circulated to government agencies and public stakeholders. Comments from both parties were forwarded to Bennett. Bennett listened carefully and thoroughly reviewed the comments received. As a result, changes have been made to the EA including, additional commitments as well as further work on clarifying presented information. Further details on public consultation can be found in Section 12 ‘Record of Public Consultation’.

This EA document provides information on the current environment in the vicinity of the proposed site in Kirkland Lake. In addition, information is provided on the potential impacts associated with the

construction and operation of the facility in the proposed location. Detailed information on the existing environment and potential impacts can be found in the consultant's reports in Appendices 3-18.

1.2. IN THE PUBLIC'S INTEREST

Contaminated industrial sites, former industrial sites and abandoned industrial sites (often referred to as brownfields) are a legacy from past industrial activities in the US and Canada. Brownfields are abandoned, idled, or under-used industrial and commercial properties where expansion or redevelopment is hindered by contamination. The largest number of these sites are not surprisingly, in the US northeast, Ontario and Quebec. Once thriving areas of economic activity, today brownfields lie abandoned, often contaminated from past uses. Sitting unused or underutilized brownfields are obstacles to economic development in rural and urban communities across the US and Canada; but redeveloped, brownfields can be a vehicle for community revival.

The brownfields challenge faces virtually every community; experts estimate that there may be as many as 500,000 brownfields sites throughout the US and Canada. The cleanup and revitalization of urban 'brownfields' represents one of the most challenging environmental and urban initiatives in the US and Canada.

The brownfields issue illustrates the connection among environmental, economic and community goals that can be simultaneously fostered through a combination of national, provincial and local leadership, and the innovation of private sector leaders.

If not cleaned up, brownfields pose serious threat to the environment and public health. Contaminated sites will eventually cause local and/or regional surface and groundwater contamination. Brownfields will also off gas contaminants of concern causing regional and global impact via long-range transport of air pollutants (LRTAP). The LRTAP has been singled out as a major source of Persistent Organic Pollutants (POPs) to the animal and human population in Northern Canada where chemicals such as toxaphene, which have never been used within 100's to 1000's of kilometres, have been found in significant quantities.

Through LRTAP, the residents of Ontario are being exposed to POPs and many other chemicals of concern from around the great lake basin and points further south. Exposure can also occur through ingestion of local water and foodstuff impacted by deposition of POPs and other chemicals of concern conveyed in wind currents via the LRTAP model. For example, US EPA has indicated that the principal source of PCB is presently from the cycling between environmental compartments (soil, air, water) [1]. Research performed for the Smithville, ON, PCB site cleanup (which used incineration) showed a significant and fast drop in ambient air concentrations of PCB once the contaminants were destroyed [2]. The best way to reduce exposure to these pollutants is the DESTRUCTION of the source of these chemicals of concern, irrespective of the origin, in an environmentally sound manner. Therefore the Bennett facility will certainly result in a net decrease in environmental loadings (including ambient air concentration) for the pollutants that are destroyed.

The use of centralized locations for standardized activities is used for industrial processes throughout the world because of economies of scale, better quality products and the ability to focus monitoring activities

on few locations. An analogy here would be setting up one (or a few) larger automobile manufacturing facilities compared to a series of small plants. The centralized location of a fixed facility also provides additional security through built-in safety, redundancy and backup systems that may not be economical for mobile facilities. The analogy here would be the difference in security between a permanent home and a camper.

Proximity to brownfields within the great lake basin provides a transport advantage for the proposed facility compared to similar facilities located in the US. Brownfield sites within the New England States and the States of New York, New Jersey, Pennsylvania, Ohio, Illinois and Michigan are closer to Kirkland Lake than similar facilities located in Nebraska, Utah, Texas and Alberta. Shorter transport distances mean less impact to the environment from vehicle emissions.

Recently the US federal Agency for Toxic Substances and Disease Registry (ATSDR) published a report entitled, "Public Health Reviews of Hazardous Waste Thermal Treatment" [3]. The document is intended to provide guidance to health assessors and other health professionals who are called upon for advice on the public health implications of a hazardous waste incinerator or desorption facility. A direct quote from the report is as follows:

> "As a matter of general public health policy, ATSDR supports waste minimization, recycling, and reuse as the preferred methods for reducing the volume of hazardous wastes and associated public health hazards. At the same time, the agency recognizes that not all hazardous waste can be eliminated, and that wastes require proper management, monitoring, and disposal. In some situations, such as the remediation of hazardous waste at Superfund sites, a review of all remedial technologies could indicate that thermal treatment is the preferred method of permanently eliminating or reducing potential public health hazards posed by those wastes."[3]

The proposed undertaking would provide the preferred disposal option for generators and owners of POPs and other chemicals of concern. Cleaning up and redeveloping brownfields provides numerous environmental, economic and community benefits including the following:

- Expediting the cleanup of thousands of contaminated sites and the destruction of POPs and chemicals of concern;
- The protection of public health and the environment through removal and destruction of POPs and contaminants of concern;
- Protects ground and surface water resources from contamination;
- Renewing local urban economies by stimulating redevelopment, creating jobs and enhancing the vitality of communities;
- Slowing of 'urban sprawl' by encouraging reuse of brownfield properties, increased tax revenues and use of existing infrastructure (e.g. roads, rail, water, sewer, schools and hospitals, etc.); and
- Limiting sprawl and its associated environmental problems such as air pollution, traffic and development of rapidly disappearing open spaces and prime agricultural land.

The proposed undertaking provides the infrastructure tool to achieve the above noted benefits. Furthermore, the proposed undertaking is proven to be environmentally sound and is the best-demonstrated available technology (BDAT) applied to the destruction of a wide range of organic waste. The risks associated with the proposed undertaking are well within the prescribed Ontario standard for risk assessment.

1.3. IMPORTANT PROVINCIAL AND FEDERAL ACTS AND REGULATIONS

There are a number of Provincial and Federal acts and regulations that are directly applicable to the proposed undertaking. They are listed and briefly described below.

1.3.1. Federal Acts & Regulations

1.3.1.1. Canadian Environmental Protection Act (CEPA)

The Canadian Environmental Protection Act (CEPA) promotes sustainable development through pollution prevention, and protection of the environment, human life and health from the risks associated with toxic substances.[1]

Part of CEPA's mandate is to manage and control toxic substances and hazardous waste related to the storage, import and export of said substances and wastes. CEPA is directly applicable to the proposed facility by virtue of the facility's requirements to store, import and export controlled wastes. Being in control of hazardous wastes further requires implementation of plans and procedures to preventing releases of controlled toxic substances and or hazardous wastes into the environment. Said plans and procedures also include the means to undertake emergency measures consistent with public safety to prevent or remedy a dangerous situations resulting from spills or releases of substances listed in Schedule 1 of the Act. Reporting requirements within the Act is also applicable to the proposed facility.

Bennett's role within the spirit of CEPA is to provide a service that contributes to the sound management and elimination of hazardous and persistent waste presently contaminating our environment.

1.3.1.2. Export and Import of Hazardous Wastes Regulations

Bennett's proposed service area is North American Free Trade Act (NAFTA) signatory Countries. Transboundary movement of waste is governed under CEPA. Bennett has imported contaminated soil from US states to Bennett's Quebec facility for the past four years and is familiar with the regulatory requirements for the importation of waste. At minimum, prior notification to Environment Canada, Agriculture Canada and the Ministry of Transportation and consent of the destination and transit jurisdictions must be obtained before shipping can commence. The federal government works in close cooperation with provincial jurisdictions. Compliance with this regulation will ensure that hazardous wastes are being transported, treated and properly disposed of at an approved facility.

[1] Canadian Environmental Assessment Agency website, http://www3.ec.gc.ca/EnviroRegs/Eng/SearchDetail.cfm?intAct=1001

1.3.1.3. Storage of PCB Material Regulations

This regulation applies to any persons who own, control or possess PCB material or who owns or manages a property in or on which PCB material is located, etc. Included in this regulation are requirements for maintenance and storage practices, fire protection, emergency planning, and record maintenance to name a few.

1.3.1.4. Transportation of Dangerous Goods Act

The Federal Transportation of Dangerous Goods Act (TDGA) prescribes regulations that are essential in promoting national safety during the transport of hazardous goods, for both the public and the surrounding environment.

The TDGA sets out requirements for proper documentation, material classification, dangerous goods safety marks during transport, required personnel training, and emergency response assistance plans (ERAPs), minimum requirements for driver qualifications and insurance requirements amongst the applicable regulation within the Act.

Prior to hiring a transport company for the transportation of contaminated materials from a generator site, Bennett commits to ensuring that the company has an approved ERAP for the transportation of dangerous goods, as well as adequate insurance (general, liability and environment impairment).

Prior notification and proper documentation must be in place before the transport of any dangerous goods can take place. Documentation required by TDGA includes information such as the name and address of the generator and consigner, the date the shipping document was given to the carrier, the description of the dangerous goods being transported, the UN number, waste classification, etc.

TDGA also sets out requirements for training and ERAPs. All persons who handle, offers for transport or transports dangerous goods must be adequately trained and hold a training certificate in accordance with the TDGA. ERAPs are required to ensure that there is immediate suitable response available for emergency situations involving the dangerous goods, as well as requirements for applying and approval of an ERAP.

1.3.2. Provincial Acts & Regulations

1.3.2.1. Dangerous Goods Transportation Act

The Federal Transportation of Dangerous Goods Act applies in the Province of Ontario by virtue of the Provincial Dangerous Goods Transportation Act.

Bennett has extensive experience in transporting hazardous waste in Ontario and is fully familiar with the requirements, including the need of obtaining Director's instructions and other related approvals prior to shipping wastes.

1.3.2.2. Ontario Water Resources Act (OWRA)

The OWRA mandate is to control the discharge of a polluting material in any waters, shores and banks or in any place that may impair the quality of the water. Bennett will be required to apply for a Certificate of Approval (CofA) under Section 53 of the OWRA for the surface water catchment area proposed for the facility. This CofA will ensure compliance with applicable sections of the OWRA relating to the proposed undertaking.

1.3.2.3. Ontario Environmental Protection Act

The *Environmental Protection Act* ("EPA") includes a number of important regulations directly applicable to the proposed undertaking such as:

- Reg 337: Ambient Air Quality Criteria
- Reg 346: General – Air Pollution,
- Reg 347: General – Waste Management,
- Reg 558/00 amending Reg. 347, and
- Reg 362: Waste Management – PCBs.

In addition to the above noted regulations, the EPA Part X deals with spills including reporting requirements to the Spills Action Centre of the Ministry of Environment and Energy.

Appendix 16 contains a Spill Contingency Plan (SCP) that was not required for the EA, but was included for good measure. The purpose of a SCP is to prepare operations personnel to respond to a spill to reduce the impacts or negate the impacts of a spill on the environment. The SCP contained in Appendix 16 is generic in nature and provides framework for those plans required for the hazardous waste transport companies. A SCP and Emergency Response Plan are also required components of the Certificate of Approval under Section 27 of the EP Act.

As previously mentioned, Bennett will be required to apply for and receive approval on a Certificate of Approval (CofA) under Section 27 for operation as a waste disposal site. This CofA requires supporting information for items such as:

- Site Plan/Location Map,
- Hydrogeological Assessment,
- Design and Operations Report,
  - Including emergency response plan,
  - Including spill contingency plan,
  - Including training plan.
- Drainage Study,
- Financial Assurance.

Bennett will also be required to apply for and receive approval for a Certificate of Approval under Section 9 for Air, of the EPA, before operation may begin. This CofA requires technical design for items such as:

- Engineering drawings and specifications,
- Contaminant Emission Summary Table,
- Supporting Information for Estimate of Contaminant Emissions,
- Site, Plot, Roof and Elevation Plans,
- Supporting Information for Noise and Vibration Assessment, and
- General Plan showing Distance to nearest Residential Zone.

1.4. KEY ISSUES

As part of the consultation process, Bennett held a number of open house and information sessions in Kirkland Lake, New Liskeard and Englehart. Some of the main concerns that arose during open house sessions with the public included:

- Transportation and emergency response preparedness,
- Proximity to schools, daycare and residences,
- CCME Guidelines,
- Upset Conditions,
- Baseline sampling and monitoring,
- Public Health,
- Bioaccumulation of contaminants,
- Impact on local agriculture, and
- First Nations.

1.4.1. Transportation & Emergency Response Preparedness

In May/June 2001, Bennett held an open house to discuss the draft reports for Economic Impact, Traffic Impact and Noise Impact. The potential effect of increased traffic was of concern to the public, as well as response procedures should there ever be a spill of contaminated material.

1.4.1.1. Transportation

Section 6.3 of this EA addresses the existing traffic conditions for the local road network shown in Figure 6-15. In addition, Section 9.3 of this EA addresses public concern by conservatively showing increase in traffic and the percentage of truck increase that can be expected. The findings of the study show that there will be no impact to the level of service for sections of highway or intersections, as a result of the proposed facility.

1.4.1.2. Emergency Response Preparedness

The Transportation impact assessment did not specifically address transportation emergencies and response mechanisms. This is because Federal and Provincial regulations governing the transport of hazardous goods are in place that addresses emergency response. These regulations warrant review and discussion in this report to demonstrate that these regulations are well understood by Bennett.

As discussed in section 1.3.2 and 1.3.3, the transport of dangerous goods both at the Federal and Provincial levels are well regulated. Any carriers that transport dangerous goods must have an approved Emergency Response Assistance Plan (ERAP) to operate, as well as certified trained employees, proper documentation at all times, and appropriate insurance. In ERAPs, it is common practice to describe inspection protocol, required personal protective equipment, emergency notification requirements, and training requirements.

Bennett has shipped over 140,000 tonnes of impacted soil in the Province of Quebec without incident. Some of that soil originated from Ontario as well as other Provinces in Canada and imports from the United States in the last four years. Bennett's policy is to hire only properly licensed waste carriers, with extensive driver training in accordance with regulatory requirements.

As previously discussed in Section 1.3.3.3, a Spill Contingency Plan was prepared to show the general framework required for dealing with an emergency situation. This is an example of what Bennett requires the hazardous waste carriers to have before a contract is signed.

1.4.2. Emissions from Process Upsets

In September 2001, Bennett held an open house to discuss the draft reports for Human Health Risk, Ecological Risk, Agricultural Impact and Air Quality. The proposed facility's potential upset conditions were a concern.

There is little doubt that an incinerator has the potential to impact its surroundings. There is also ample scientific proof that modern incinerators when properly designed and operated can effectively destroy and render hazardous waste harmless without undue impact on the environment.

A number of references are well documented, showing that modern incineration facilities (most operated with emissions limits even higher than Bennett's proposed facility), do not adversely impact their surrounding area. In addition, environmental monitoring carried out in the vicinity of the St. Ambroise RSI facility have not shown any impact due to stack emissions based on 1999, 2000 and 2001 soil sampling. The US Agency for Toxic Substances Disease Registry states [in Section 3.1 (page 9 of 95)] in a recent document Public Health Reviews of Hazardous Waste Thermal Treatment Technologies, "… a properly designed and operated thermal treatment technology can effectively and safely destroy or decontaminate certain types of hazardous waste."

The proposed undertaking intends to meet the most stringent emission standards from Ontario's A-7 guidelines, Canada Wide Standards (CWS), CCME incineration guideline and US EPA MACT standards.

The Air Quality Impact Assessment (Appendix 3) considered emission rates for air pollutants whose emission rates would increase during upset conditions. These include the acid gases, particulate matter and metals. All organic compounds will still undergo destruction in the afterburner and therefore, organic compound emission rates will not increase. Once the gases exit the stack they are quickly cooled and diluted by ambient air, stopping the formation of products of incomplete combustion. Dispersion modelling was carried out for a 1-minute bypass stack release.

A disruption to the electrical supply is considered the most significant emergency vent-triggering event, however, with engineering design Bennett anticipates that it should be possible to keep the emergency vent closed during power interruptions. Design upgrades over the existing RSI facility include back up systems for water, fuel and electricity (generators). Uninterruptible power source is proposed for critical components.

1.4.3. Proximity to Schools, Daycare and Residences

At the open house in September 2001, the public also had concerns about the proximity of the proposed facility to local schools and the daycare.

The distances from the proposed facility to the schools and residences are as follows:

Closest Residence	~700 metres
Kirkland Lake Daycare	~ 1670 metres
King George	~ 1690 metres
Kindercare	~ 1700 metres
St. Jerome's School	~ 1750 metres

Facilities the same as and similar to the proposed undertaking, require a number of support services (power, natural gas, water, sewer, transportation routes, emergency response etc.) that are often only available in urban areas. This is one of the reasons that a number of incinerators have been and continue to be operated within communities throughout the world.

For example, the incinerator operated at Smithville, ON which treated much higher concentrations and feed-rates (up to 409 kg/hr PCB vs. 250 kg/hr for the proposed Bennett facility), was within 350 m of residential housing (vs. 700m from Bennett's proposed site) and a primary school with kindergarten to grade 6 was located approximately 600 m away from the Smithville site (vs. >1500m from Bennett's proposed site). Regular ambient air monitoring was carried out at these "sensitive" locations. In our experience the presence of such perceived "at risk" populations can actually help to ensure the proper operation of a facility by increasing the level of community and regulatory scrutiny and oversight. Passive air monitoring will be carried out at the closest school , this is confirmed in Section 15, Summary of Commitments.

Residents must recognize that the worst-case scenario for a process accident at the Bennett facility would be very unlikely to result in an acute exposure problem. Therefore the principal concern is from chronic (that is long-term) exposure. Ongoing source testing, environmental monitoring and regulatory inspections will be carried out on regular basis to look for trends so that action could be taken practically to prevent any exposure of concern, in the unlikely event that monitoring began to show increases.

It must be emphasized that residents are already being exposed to long-range transport of these pollutants. Therefore, the only way to remove their exposure to these pollutants is to destroy the sources of the pollutant themselves, which is the goal of the proposed Bennett facility. Thus, when properly operated it is expected that the Bennett facility could actually result in a net decrease in ambient air concentrations of the pollutants that are destroyed.

In this EA, the closest school is mentioned in Section 7.1 with regards to inclusion as a sensitive receptor in the air quality report and Sections 6.1.2.8 and 9.1.3 with regards to social/cultural aspects.

1.4.4. CCME Guidelines

Work on the CCME Guidelines pertaining to hazardous waste incinerators began in the mid 1980's with the Ontario Ministry of Environment taking on a more active role in preparing the document in the late 1980s. The Guidelines were subsequently published in March 1992.

Significant improvements have occurred in incinerator and emission control technology and operations since the Guidelines were prepared and are not reflected in the CCME Guidelines. For example, the CCME PCDD/DF emission limit of 0.5 ng/Rm^3 (I-TEQ) has since been further tightened to reflect the recent Canada Wide Standards (CWS) of 0.08 (approximately 1/6 the 1992 limit).

Another example of improvements has come in the field of computerized controls and control software. In October 2001, Bennett installed a computerized burner controller in its facility in Quebec. This system can measure the instantaneous mass flow of fuel and air and provide on ratio firing (ie. proper oxygen to fuel ratio) at all times. Temperature changes in the combustion air from seasonal or daily changes can no longer affect the burner fuel to air mixture**.**

The Kirkland Lake Citizen Advisory Committee (CAC) selected the Archer drive location in 1999. The CAC did take into consideration the CCME Guideline as well as Ontario Regulation on industrial siting when selecting this site.

In choosing this site, the CAC and Bennett considered the intent of the CCME Guidelines, which is to protect human health and the environment. Distances from sensitive receptors recommended in the CCME Guidelines are one of many factors in assessing the overall potential impact of a facility on the surrounding community.

A review of the background to the preparation of the CCME guidelines document indicates that 1.5 km distance was a consideration when a site-specific air modeling, risk assessment and environmental monitoring program were not undertaken. The Guidelines do not prohibit closer "buffer zones" if the environment and public health are still protected.

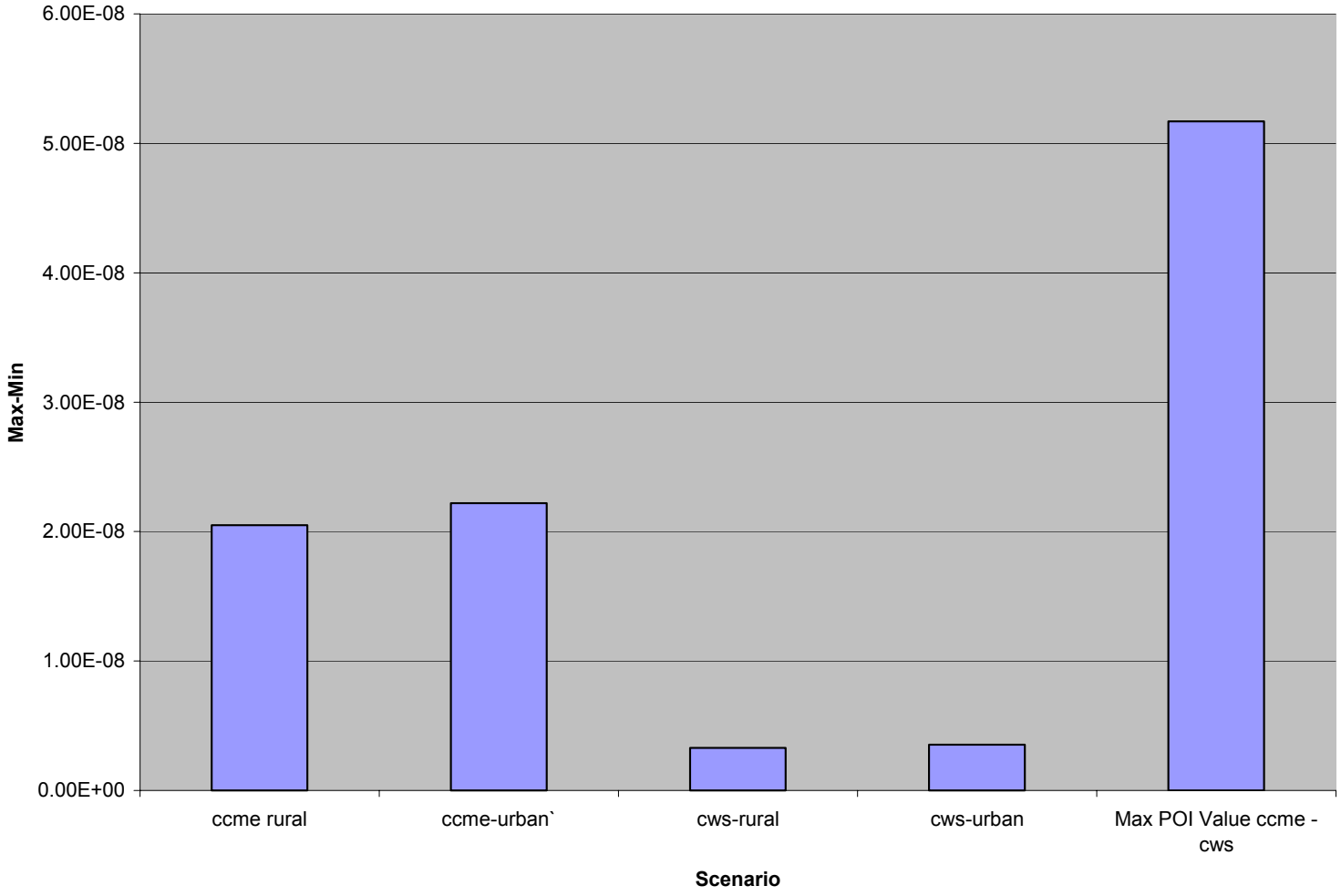
It should be noted that during the Smithville PCB Incineration project (1990-1993) some homes were as close as 350m and schools within 650m of the incinerator. This issue was addressed during the public hearings by the information developed in the air modeling and risk assessment studies.

While it is noted that the distances from the schools meet the guidelines, more importantly, technological advancements incorporated into the design of the facility, will mitigate the potential impacts on the overall surrounding community. Bennett's studies demonstrate that this facility will meet or better all Ontario air regulations. In fact, the studies have demonstrated that emissions from the proposed facility will not result in any exceedances of ambient air quality standards.

Additionally, as a result of input from the CAC, comments received from the public during various EA consultations steps and information developed in the various studies, Bennett has made other significant changes to the design of the facility that further reduce potential risks. These include:

- Eliminating liquid hazardous wastes from the facility
- Fully enclosing the facility and treating the exhausted air to reduce potential for fugitive emissions
- Paving the grounds to prevent potential ground water contaminaton
- Developing and instituting sound operational controls
- Developing and instituting sound emergency controls and response procedures
- Environmental monitoring to ensure no adverse effects

Bennett has also performed comprehensive air dispersion modeling study to evaluate the relative importance of the lower emissions versus a larger "buffer zone" of 1500 m. The emissions rate for PCDD/DF under the CWS versus the CCME guideline was modeled. Using the Screen3 model supplied by Lakes Environmental. The model study indicates that the effect of the lower emission rate under the CWS is much more important than the difference between a 700 vs. 1500 m buffer zone. The Bennett facility will still have a much lower impact at 700m than would have been seen at 1500 m under the CCME Guidelines.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Scenario

1.4.5. Baseline sampling and monitoring

1.4.5.1. Air

A lot of discussion has taken place surrounding the ambient air monitoring that was done for the Air Monitoring Report (Appendix 3). A two-week data collection was performed to confirm that the Kirkland Lake air shed could be classified as typical rural Ontario for the purpose of modeling. There has been concern from the public, stating that the two-week period of data collection was not long enough to adequately describe the area with respect to air quality.

It therefore has been recommended by Envirometrex Corporation (consultant for air quality) that a four season pre-operational monitoring program be carried out if the Bennett facility is approved. Bennett commits to this in Section 15 Summary of Commitments.

1.4.5.2. Water, Soil and Vegetation

The drinking water supply for Kirkland Lake is Gull Lake. A number of Kirkland Lake residents have indicated concern over the potential impact of the water in Gull Lake, as well as the area groundwater.

As a result it has been decided that Bennett will do a baseline monitoring program for surface and groundwater, soil and vegetation around the proposed site. A monitoring plan will be developed and a draft version will be circulated to the public and MOEE for comment before being submitted to the MOEE for approval. Bennett commits to this in Section 15 Summary of Commitments.

1.4.5.3. Beef and Dairy

There is an active agricultural area located approximately 35km to the south of Kirkland Lake and stretches southward for approximately 35 kilometres. Although the distance between the proposed site and the farms is sufficiently large, the agricultural community are concerned about the perceived risk of a hazardous waste treatment facility in the same district. An agricultural impact assessment (Appendix 10) was completed and carried out a case study about the farmers around Bennett's Québec facility. The case study found that negative public perception about the waste treatment facility dissipated in a few months.

Also being considered for the agriculture community is a baseline study of contaminant levels in the area. Having baseline information would be useful in predicting trends of future monitoring efforts. However, a study like this is outside of the scope of this assessment and Bennett is investigating methods of carrying out a baseline study for this issue.

1.4.6. Public Health

1.4.6.1. Waste Treatment Facilities and Public Health

The proposed Bennett facility will address the market presented by contaminated sites in North America. These sites represent a public health danger due to their ongoing, uncontrolled airborne release of chemicals to the environment and threat to the surface and groundwater contamination on a regional basis. The impacts of these sites on the environment can be both local and remote. In recent years the impact of Persistent Organic Pollutants (POPs) including PCB on animals and humans in remote areas such as the Canadian North, where they could only have arrived by long range transport (LRT), has led to recognition that the only successful strategy is the permanent DESTRUCTION (not long term storage) of these chemicals.

Public Health and environmental issues need to address:
1. Impacts on local vicinity of a contaminated or brownfield site
2. Impacts from long range transport of contaminants from a site
3. Impacts of transportation
4. Local impacts of disposal or destruction technology

The consensus of the international community is that issues 1) and 2) are important and resulted in the Stockholm Convention. The Kirkland Lake facility is actually closer to many of the contaminated sites around the great lake basin than other commercial facilities located in the southern US. Shorter transport would result in less impact from vehicle emissions.

Two (2) recent reports have been produced that have reviewed and summarized issues and concerns regarding public health and incineration [4,5]. A prestigious national research council (NRC) panel produced a report in 2000 that included the following

> "When operated properly by well-trained employees, modern waste incinerators pose little risk to public health…says a new report by the National Research Council of the National Academies. Three federal agencies asked the Research Council to assess the relationship between waste incineration and human health.
>
> Few studies have tried to establish a link between an incinerator and illness in the surrounding area, and most studies have been unable to detect any adverse health effects, said the committee that wrote the report. The studies that did identify effects on health had shortcomings and failed to provide convincing evidence."[4]

Even more recently the Agency for Toxic Substances Disease Registry (ATSDR) released a report that included summaries of ATSDR sponsored studies regarding impacts of incineration:

> " It is important to note that no other remediation technology has undergone as many stack emission tests, as much ambient air monitoring, or as many health studies as has incineration. It is equally important to note that only one incineration facility, … was implicated by the ATSDR-

> funded studies as the potential cause of adverse health effects in some workers and community members…." [4].

Three studies reviewed in the ATSDR document are of particular importance for evaluating Public Health impacts from incineration (since they were for hazardous waste incinerators at Jacksonville, Arkansas[2] and Times Beach, MO [4] and an epidemiological study of pulmonary function for six communities, three of which had incinerators).

The Vertac incineration project generated considerable controversy, with accusations of public health impacts of the project by several citizens groups, however the ATSDR study stated that:

> "Biological samples were taken and analyzed before incineration began and after it was completed. Preliminary reports indicate that there was no increase in dioxin body burdens in residents living near the site attributable to the incineration of VERTAC wastes"[6]

The Times Beach project, which is a relatively close match to the proposed Bennett facility in terms of matrix (soil) and federates was the object of one of the better public health studies [5]. This study found that

> "Lipid adjusted serum levels of TCDD and TEQ decreased from pre-incineration to four months after incineration, [7] and decreased further by the end of incineration."

A recent ATSDR sponsored study [8] investigated the chronic effects of emissions from three different waste incinerators on pulmonary function of both healthy and sensitive subjects with chronic respiratory symptoms.

> "Exposure was assessed by three methods: living in an incinerator community; distance from the incinerator; and an incinerator exposure index, a function of the distance and direction of each subject's residence to the incinerator, days downwind, and average time spent outdoors. The results generally showed no statistically significant association between pulmonary function and these three incinerators, …"

Coalition for Responsible Waste Incineration (CRWI) comments on the draft version of the ATSDR document [3] included:

> "Previous work has suggested that the contributions from hazardous waste combustors (HWC's) to ambient concentrations are very small. WTI (East Liverpool, OH) has been one of the most studied hazardous waste combustors [9,10]. ….. Based on worst-case dispersion models from stack concentrations, the contribution from this facility to the ambient air concentration of chromium and manganese was less than 0.5% and 0.03%, respectively. … , the contribution from most hazardous waste combustors is likely to be so small that a meaningful correlation cannot be developed….Therefore, CRWI suggests that the language be modified to recognize that ambient air monitoring decisions should be made on a site-specific basis.[9]"

It is important to note that the proposed Bennett facility will include a fully enclosed facility under negative pressure to maximize control of fugitive emissions. Exhaust air from the soil preparation areas

will be directed to the incinerator, resulting in a highly effective fugitive emissions control system. Thus Bennett's facility is expected to have a much lower impact on the surrounding environment.

Overall the properly operated facility will not have an adverse impact on Public Health and in fact could result in enhanced public health by permanently eliminating hazardous materials and destruction of sources of POPs eventually leading to lower LRT components to Canadian Arctic inputs.

1.4.7. Bioaccumulation of contaminants

The Air Quality Impact Assessment summarized in Section 3 (full report in Appendix 3) of this report discusses the model used to predict the dispersion of process, ventilation, fugitive and upset emissions from the proposed facility. The results of the air quality modeling were used to predict the deposition in Kirkland Lake and surrounding area for up to a 50 kilometer radius.

The deposition model for the Kirkland Lake area human health risk assessment used the result of 25 years of predicted operation although the facility is only expected to operate for 20 years. The human exposure assessment then estimated the amount of chemicals received by individuals each day from the deposition via multiple exposure pathways. A hypothetical individual was assumed to live at the point of maximum impingement 24 hours per day, 365 days per year for 70 years while supplementing their diet with local produce, meat, fish and dairy products from local farming community and the local lake. Under the modelled scenario, the human health assessment concludes that the chronic human health risk is within acceptable Ontario standards.

As part of the Terms of Reference for the agricultural assessment, the performance of a bioaccumulation study was required to determine the potential impact of the routine operation of the proposed thermal treatment facility on the agricultural products grown in the Kirkland Lake-New Liskeard area. The potential for bioaccumulation of contaminants in the farm food chain was cited as a concern that may ultimately impact the marketability of agricultural products from the area. A screening level assessment of the potential for bioaccumulation of contaminants was therefore performed to evaluate the risk posed to the agricultural economy of the Kirkland Lake - New Liskeard area.

Results of the bioaccumulation study for the proposed thermal treatment facility at Kirkland Lake demonstrate that increases in parameter concentrations within meat and dairy products will be minimal. The maximum calculated increase in cancer risk stemming from operation of the facility for an individual consuming 100% of his/her meat and dairy products from the Englehart area is of 1 in 15 million.

When considering all sources, the total mean dietary intake (MDI) of each modeled parameter for an individual consuming 100% of his/her beef and dairy products from the Englehart area is less than 1% of the benchmark MDI. When considering all sources, the maximum risk for the incidence of cancer is 1 in 1.39 million for dioxins and furans, 36km from the proposed facility. To put this risk into perspective, The National Cancer Institute of Canada estimates an individual's lifetime probability for developing cancer at 40.4% (1 in 2.5) for males and 35.3% (1 in 2.8) for females. It is therefore felt that operation of the proposed treatment facility will have a virtually undetectable impact on the quality of meat and dairy products produced in the Kirkland Lake/New Liskeard area.

1.4.8. Impact on local agriculture

To help address concerns by the Temiskaming Federation of Agriculture, an Agricultural Impact Assessment was conducted by ESG International Inc, located in Guelph, Ontario. The study assessed issues such as the value of agriculture in the area, active farm locations, types of crops grown, biomagnification in food production processes, and potential effects on local agriculture employment.

The agricultural assessment found that the bioaccumulation of contaminants as a result of the routine operating emissions from the proposed treatment facility will have virtually no impact on the quality of meat and dairy products produced in the Kirkland Lake/New Liskeard area. The consumption of agricultural goods from the study area will not impose any appreciable increases in health risk.

A similar case study of the St.Ambroise farming community, in which Bennett's Récupère Sol Inc. treatment facility is located, indicated that there was little to no effect on the local agriculture economy or the productivity of the farms in the area. It is expected that the proposed treatment facility in Kirkland Lake, Temiskaming Region will also have little to no effect on the agriculture sector. For more information on the Agricultural Impact Assessment, please refer to Section 4.6.

1.4.9. First Nations

As part of Bennett's public consultation plan, a concerted effort was put forth to meet with First Nations Communities and discuss the proposed facility. A detailed discussion of consultation with First Nations Communities can be found in Section 12.1.2.1.

As part of the Human Health Risk Assessment (HHRA) conducted by Cantox Environmental Inc. (CEI), a separate exposure scenario was evaluated for First Nations Communities. This was done to ensure that the unique dietary patterns and behaviours of First Nations Communities were considered in the HHRA. A summary of the findings are presented in this section, but for further information please refer to Section 10.7.

Local First Nations people living in the Kirkland Lake area may participate in a variety of hunting and trapping activities and therefore may consume a significant amount of local wild game and fish. To capture this dependency of the First Nations peoples on local resources (i.e., local wildlife and fish), an exposure scenario was designed to specifically evaluate the potential human health impacts of emissions from the proposed Bennett facility on the local First Nations people.

For First Nations receptors, all point estimate chronic human health risk estimates associated with chemical emissions from the proposed Bennett facility alone, were either below a Cancer Risk Level (CRL) value of 1-in-1,000,000 (one in a million) or an Exposure Ratio (ER) of 1.0. For many chemicals of potential concern, chronic health risks as a result of annual facility emissions were at least one to two orders of magnitude (10- to 100- fold) less than health risks associated with regional background concentrations. For some compounds incremental CRL estimates were 15- to 10,000-fold lower than a CRL value of 1-in-1,000,000.

All long-term human health risk estimates associated with chemical emissions from all regional industrial sources, including the proposed Bennett facility, were either below a CRL value of 1-in-1,000,000 or an ER value of 1.0.