

**Bennett Environmental Inc**  
**Proposed Kirkland Lake Thermal**  
**Oxidizer Facility**

**Proposed Terms of Reference**

Pursuant to the Environmental Assessment Act

Background Document 2  
Detailed Description of the Undertaking

*November 2000*

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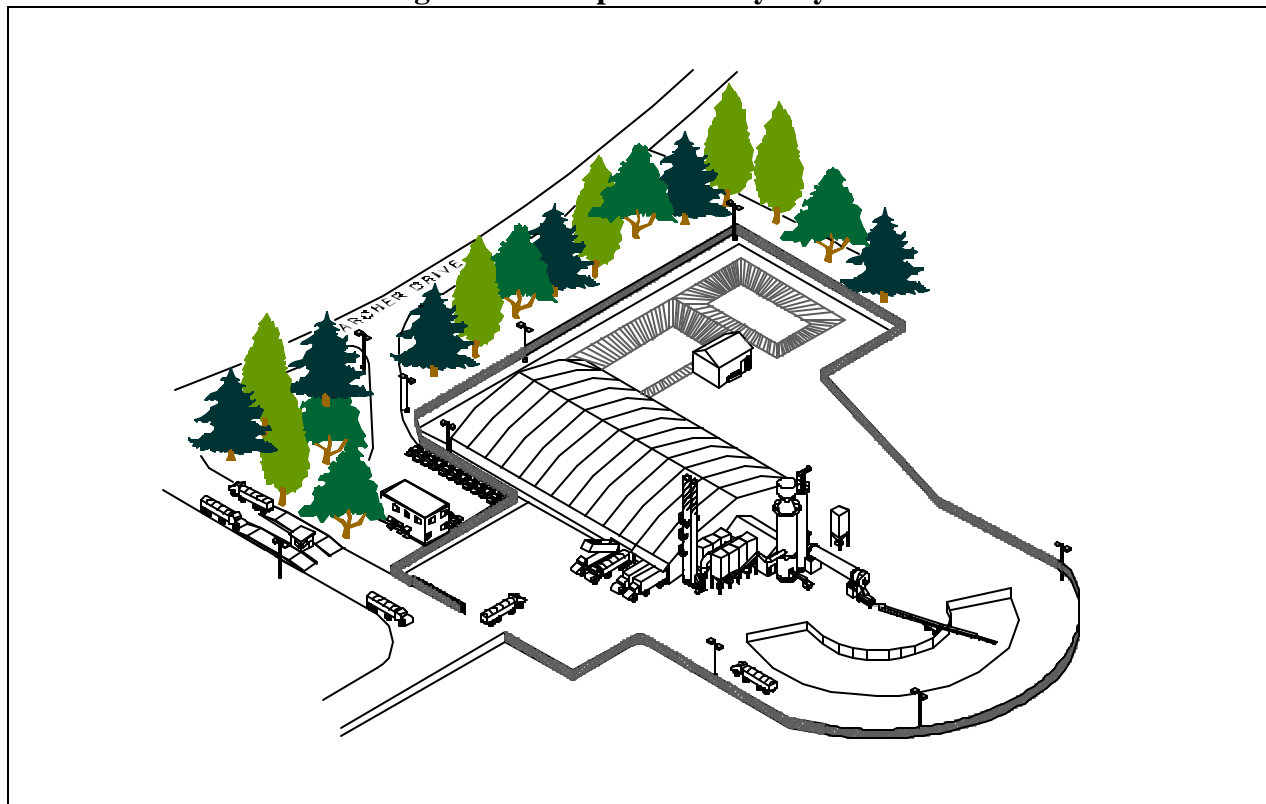
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## 1 Description of the Undertaking.

The proposed undertaking is the construction and operation of Bennett Environmental Inc.'s (BEI) high temperature thermal destruction rotary kiln (referred to as the Thermal Oxidizer process) to be located in an industrial park at 233 Archer Drive, Kirkland Lake, Ontario.

**Figure 1: Conceptual Facility Layout**



The proposed facility will treat up to 50,000 kg/hour of hazardous waste impacted soils, sediments, dredgings, dewatered sludge, aggregates, concrete, bricks, tiles, asphalt, wood, packaging materials, sorbents, granular materials, spent activated carbon and other similar materials contaminated with chlorinated and non-chlorinated organic compounds.

These organic compounds will include pesticides, herbicides, fungicides, wood preservatives, PCB, PCP, PCDF, PAH, PCDD, TCE, coal tars, hydrocarbons, creosote, and other organic compounds amenable to thermal destruction. A wide variety of organic contaminants are suitable for treatment by thermal oxidation. BEI will develop a detailed protocol to determine if a waste is suitable for treatment at the facility as part of the EPA Certificate of Approval process. This protocol will include concentration limits on halogens (e.g. chlorine), sulphur, volatile metals (i.e. mercury), nitrogen and organics.

A major source of the material will be from impacted site remediation projects; therefore, a portion of the waste may include miscellaneous items such as gloves, personal protective equipment, paper, and packaging materials.

Based on consultation with the CAC, the Town of Kirkland Lake municipal council and residents of Kirkland Lake at various Open Houses held by BEI, BEI has committed not to accept liquid PCBs for treatment at the proposed Kirkland Lake facility.<sup>1</sup>

The Kirkland Lake facility will be designed to meet a number of existing regulations, standards and guidelines including:

- MOE's<sup>2</sup> Guideline A-7 ("Combustion and Air Control Requirements for New Municipal Incinerators") requirement,
- "National Guidelines for Hazardous Waste Incineration Facilities" including the Canada Wide Standards for Mercury and for Dioxins and Furans.
- MOE's draft document "Criteria for the Management of Inert Fill".
- MOE's "Guideline for Use at Contaminated Sites in Ontario"
- MOE's proposed "Toxicity Characteristic Leaching Procedure (TCLP), Method 1311"
- [Ontario Environmental Protection Act Regulation 346](#)

The facility will be equipped with a dry scrubber to remove the HCl content in the exhaust gases to meet A-7 requirements. A continuous emission monitor (CEM) will monitor A-7 parameters HCl, CO, Hydrocarbons, O<sub>2</sub>, NO<sub>x</sub> and SO<sub>2</sub>, on a continuous basis.

## **1.1 The Facility**

The proposed facility in Kirkland Lake consists of four basic functional components:

- feedstock receiving, handling, preparation, storage and fugitive control;
- thermal treatment including emission control;
- treated material and residual solids handling; and
- water collection and treatment.

### *1.1.1 Feedstock Receiving, Handling, Preparation and Storage*

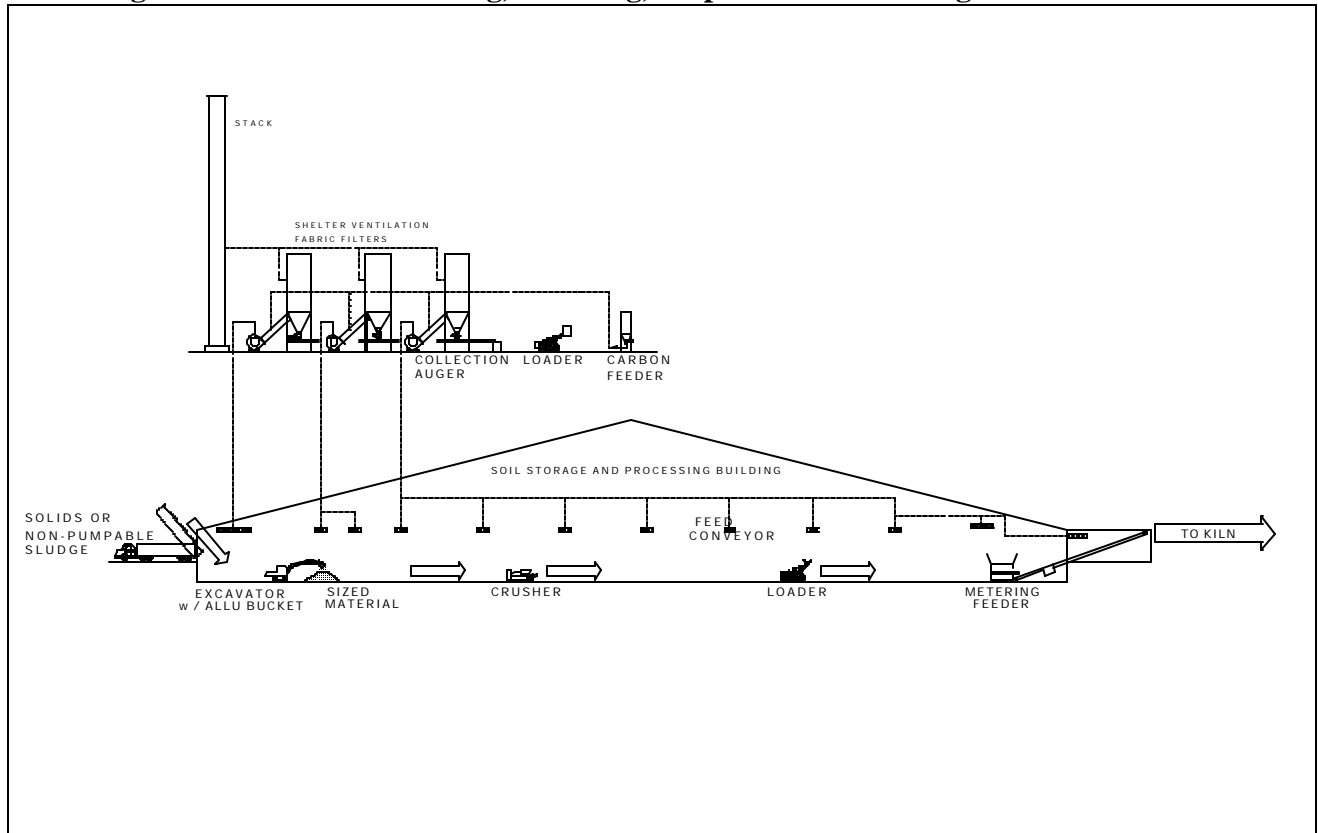
To contain fugitive emissions, contaminated material will be received, handled, stored and prepared inside a building ventilated through dry scrubber/filters. The ventilation system maintains a negative pressure inside the building to control fugitive emissions. Material preparation handling will include sizing of solids and oversized pieces. Other solids and packaging material may be shredded prior to thermal treatment.

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<sup>1</sup> BEI first committed to receiving no liquid PCBs in a response letter from the Citizen's Advisory Committee to a concerned resident of Kirkland Lake. Refer to Background Document #6: Record of Public Consultation Prior to the EA Process, for supplementary detail.

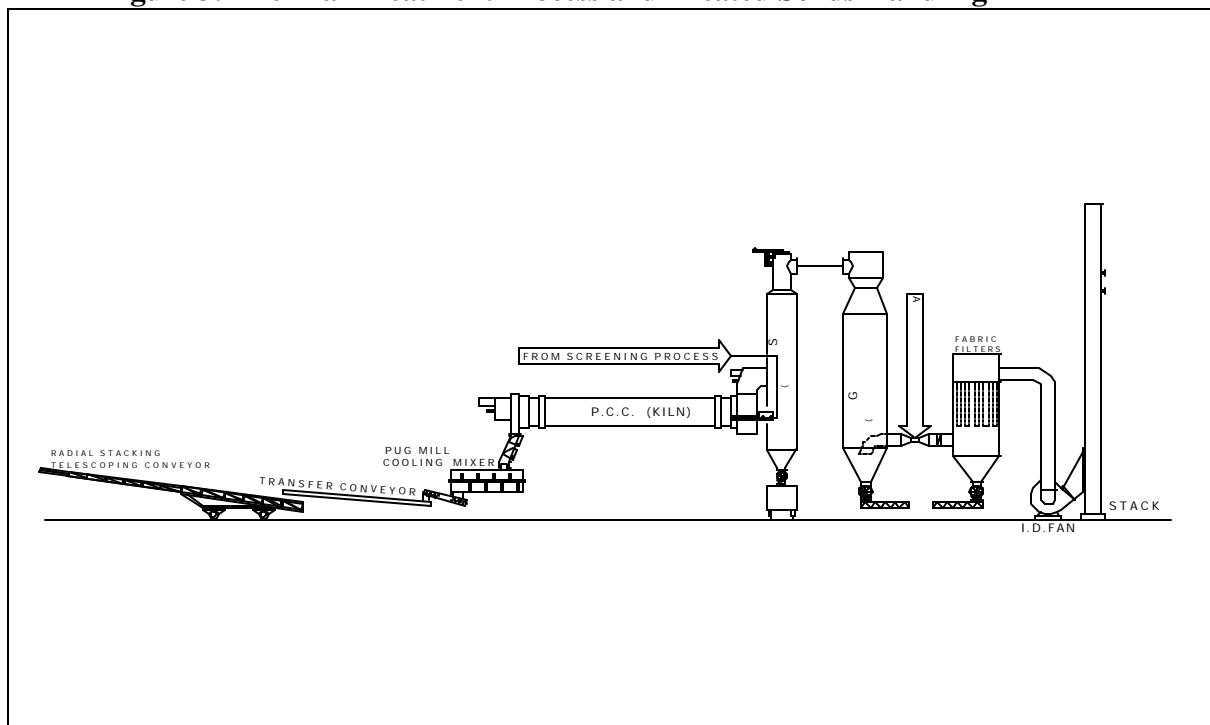
<sup>2</sup> MOE is an abbreviation for the Ontario Ministry of the Environment

**Figure 2: Feedstock Receiving, Handling, Preparation and Storage**



### 1.1.2 Thermal Treatment and Emission Control

BEI's state-of-the-art thermal treatment process equipment consists of a rotary kiln primary combustion chamber, a secondary combustion chamber (afterburner) and an emission control system. The emission control system consists of an evaporative gas conditioning chamber, a dry scrubber system, a fabric filter and a continuously monitored emission stack.

**Figure 3: Thermal Treatment Process and Treated Solids Handling**

Hazardous wastes contaminated with chlorinated and non-chlorinated organic compounds, will be fed to a rotary kiln where they will be heated to a sufficiently high temperature to desorb and destroy chlorinated and non-chlorinated organics. Solids treatment time will vary with media type and contaminant. Gases will be exhausted from the kiln and further oxidized in an afterburner at a temperature of over 1000°C and a retention time of over 2 seconds.

Hot gases leaving the afterburner will be directed to the gas conditioning chamber, where the gases will be rapidly cooled by the controlled injection of finely atomized water. Acid gas scrubbing will be accomplished by the injection of reagents, typically calcium hydroxide [Ca(OH)<sub>2</sub>], to chemically and/or physically react with the acids in the gases. Powdered activated carbon will also be injected into the cooled gas stream for additional control of organic compounds that may be present in the gas stream.

The dry scrubbed gases will be directed to the fabric filter for particulate removal before discharge to the atmosphere. The induced draft fan provides the mechanical means of moving gases and maintaining negative pressure throughout the thermal system. The emission stack will be equipped with continuous emission monitors to analyze and record various emission parameters listed above.

### 1.1.3 Decontaminated Solids and Residual Solids Handling

The decontaminated material will exit the rotary kiln into a mixer that adds water to cool and moisturize the decontaminated material to provide dust control. When required, stabilizing agents can be introduced to make the decontaminated material easier to recycle. The treated

material will be conveyed to concrete storage pads. The fabric filter catch will consist of fine particulate carried over from the thermal process as well as reacted and unreacted reagents.

Repeated source testing at the Récupère Sol Inc. facility has proven that BEI's Thermal Oxidizer consistently meets the Canadian Council of Ministers of the Environment (CCME) 99.9999% destruction and removal criteria for PCB's. The same removal efficiencies are expected at the Kirkland Lake facility. Over two years of experience at RSI has demonstrated that as long as the temperature of the solids exiting the kiln is greater than the target desorption temperature, the residual organic contamination of the solids exiting the kiln will consistently meet the decontamination criteria.

If for any reason, the temperature of the exiting solids falls below the target desorption temperature, the feed to the kiln will be stopped, the kiln rotation will be slowed from revolutions per minute to revolutions per hour, and any material discharged from the kiln over that period will be segregated, tested and reprocessed if required.

The decontaminated solids from the kiln, afterburner solids discharge, conditioning tower solids discharge and fabric filter catches will be assayed and will be disposed of in accordance with Ontario regulations.

#### *1.1.4 Water Collection and Treatment*

The site will be designed such that all rainwater and snowmelt on the active portions of the site will be collected in storm water retention pools for use in the thermal treatment process. A water treatment system will be installed to clean the collected water prior to use.<sup>3</sup>

BEI's preliminary calculations of the volumes of water collected due to precipitation will supply less than 20% of the thermal treatment process requirements. Therefore, it is expected that it will be necessary to discharge collected storm water to the city storm-water drainage system only during extended shutdown periods.

By capturing and utilizing as much storm water and snowmelt as possible, it will normally be possible to have zero water discharge if the thermal process is operating. Capturing the rain and storm water will also to minimize the possibility of release of contaminants to the environment via water.<sup>4</sup>

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<sup>3</sup> The facility water collection and treatment system will require a MOE EPA Approval - Industrial Sewage Works.

<sup>4</sup> Note: Sanitary sewage will be discharged to the Kirkland Lake sewer system.