ENVIRONMENTAL ASSESSMENT REGISTRATION

PROPOSED BIOMEDICAL WASTE TREATMENT AND TRANSFER FACILITY

BIO-MEDICAL WASTE DISPOSAL SERVICES INC.

PROJECT NO. NSD19482

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REPORT TO	**Bio-Medical Waste Disposal Services Inc.** **Burnside Industrial Park** **93 Gloria McCluskey Drive** **Dartmouth, NS** **B3B 2Z3**
FOR	**Environmental Assessment Registration**
ON	**Proposed Biomedical Waste Treatment and Transfer Facility**

July 2005

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1.0 PROJECT INFORMATION

Ship to Shore Disposal Service Inc. (Ship to Shore) is currently operating a commercial waste treatment facility on Gloria McCluskey Drive in the Burnside Industrial Park in Dartmouth, Nova Scotia (see Figure 1). The facility, which currently treats international waste, is operating under an approval from the Nova Scotia Department of the Environment and Labour (NSEL) (Appendix A). The treatment method consists of sterilization of the waste in a hydroclave unit. Once treated, the residual solid waste is transported to an approved landfill for final disposal.

Bio-Medical Waste Disposal Service Inc., an affiliate of Ship to Shore, wishes to expand the treatment process and capacity of the existing facility on Gloria McCluskey Drive to allow for treatment of biomedical waste from a number of facilities such as hospitals, dentist offices, and veterinary hospitals. Depending on the volume of waste to be treated, the facility may expand to the adjacent property in order to accommodate construction and operation of two additional hydroclave units.

It is understood that biomedical waste is considered a waste dangerous good under the Dangerous Goods Management Regulations; therefore, Bio-Medical Waste Disposal Service Inc. is required to register this project as a Class I Undertaking pursuant to the Environmental Assessment Regulations under the Nova Scotia *Environment Act*.

1.1 Proponent Identification

Bio-Medical Waste Disposal Services was first registered in 1990 and was recently incorporated to provide services to the medical community offering a safe and environmentally sound approach to the collection, treatment and subsequent transfer of biomedical wastes for appropriate disposal.

The proponent has operated a number of waste related companies over the past fifteen years with a firm focus on safe waste handling processes with particular emphasis on environmental issues. In that time, they have been active in providing advice and solutions on regional waste management issues such as the unforeseen closure of a waste incineration facility which required immediate action, prompting the need for the development of short and long term solutions. The company has also had experience handling large scale emergency clean up operations including oil spills and the aftermath of a collision and loss of cargo between two container vessels in Halifax Harbour. None of the proponent's companies have ever been cited by the Halifax Regional Municipality (HRM), NSEL or the Canadian Food Inspection Agency for any environmental infractions nor have there ever been any Workers' Compensation claims arising from their operations.

Name of the Proponent: Bio-Medical Waste Disposal Services Inc.
Postal Address: Burnside Industrial Park
93 Gloria McCluskey Drive
Dartmouth, NS B3B 2Z3
Tel: (902) 481-9113
Fax: (902) 481-9115

Company President, Chief Executive Officer and/or Environmental Assessment Contact:

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Official Title:	Chief Executive Officer	President
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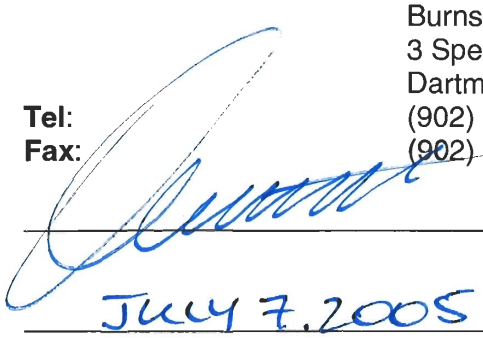


Signature of Signing Officer

July 7, 2005

Date

1.2 Project Identification

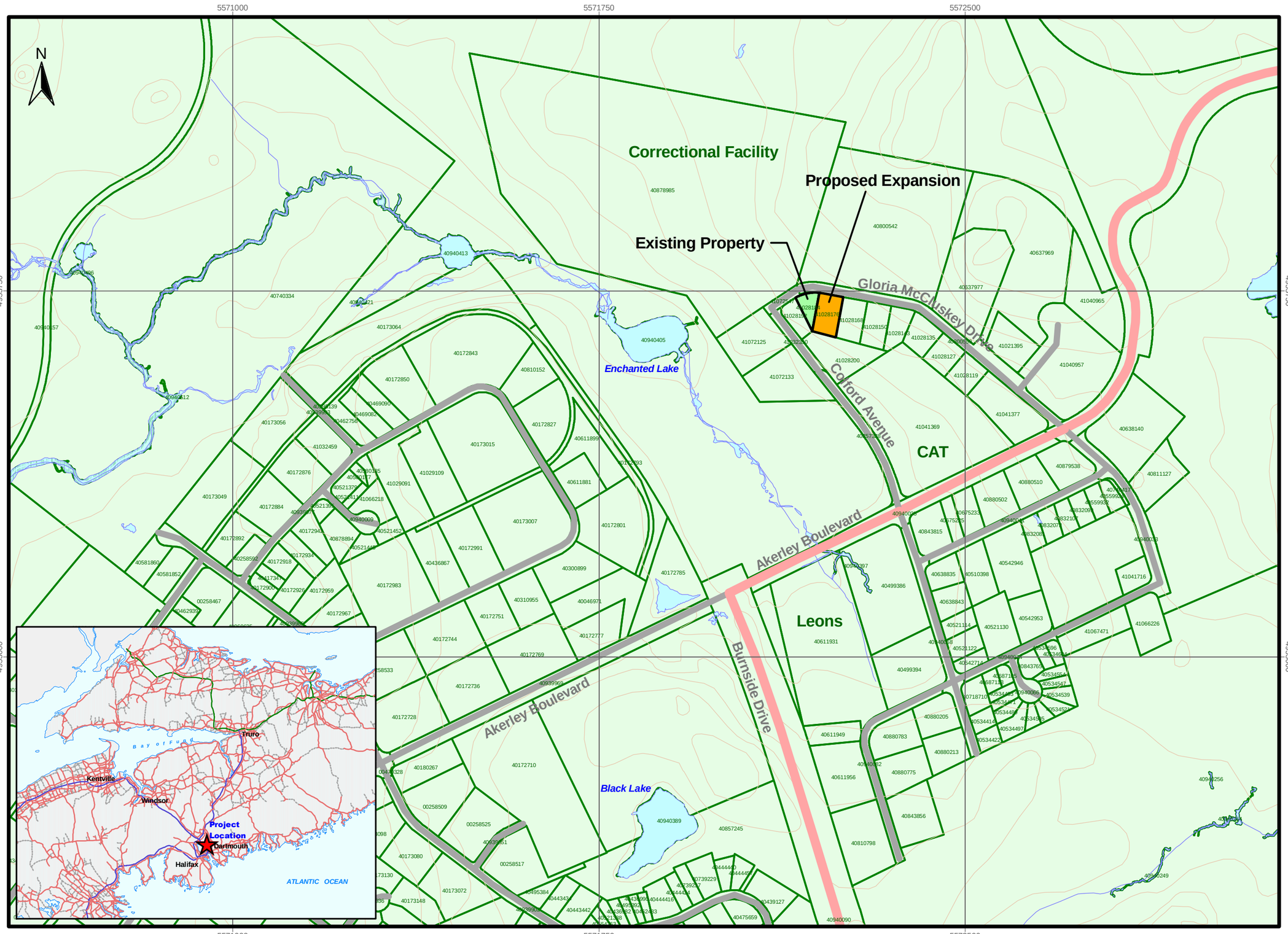
Name of the Undertaking: Bio-Medical Waste Treatment and Transfer Facility

Location of the Undertaking: Burnside Industrial Park
93 Gloria McCluskey Drive
Dartmouth, NS

Biomedical Waste
Disposal Services Inc.

Figure 1

Project Location



Map Features

Properties
- Existing Property
- Proposed Expansion

Road Networks
- Major Road
- Minor Road

- Watercourse
- Elevation Contour (m)
- Waterbody
- Property Boundary

0 100 200 300 400
Metres

Map Parameters
Projection: MTM, ATS77, Zone 5
Date: April 18, 2005
Project: NSD19482

Jacques Whitford

2.0 NATURE OF THE UNDERTAKING

2.1 Project Overview

Bio-Medical Waste Disposal Services Inc. proposes to employ hydroclave technology to treat biomedical waste from a variety of sources including provincial health care facilities as well as private facilities in the health care sector such as extended health care facilities, dentist offices, veterinary hospitals and laboratories. Depending on the volume of waste to be treated, the existing waste treatment facility on Gloria McCluskey Drive, Dartmouth, NS, may be expanded by construction of a new building to house two additional hydroclave units.

The Project will include the collection, transportation, treatment and disposal of biomedical waste. Refrigeration facilities will also be installed and employed to temporarily store waste, as appropriate, prior to treatment or transfer. In accordance with the Guideline for the Management of Biomedical Waste in Canada (CCME 1992), waste that is not appropriate for treatment at the facility in Dartmouth, such as 'red bag' (human tissues, organs, body parts), cytotoxic, and pharmaceutical waste, will be properly stored and transferred for disposal at the existing approved incineration facility in Moncton, New Brunswick.

Additional project details are provided in the following sections.

2.2 Project Background

International Disposal Services Inc. (IDS) was established in 1990 to meet the needs of waste removal and disposal, including biomedical waste, for vessels and aircraft frequenting the Port of Halifax and the Halifax International Airport. Since that time, the Company has diversified but has continued to research various methods of disposal for biomedical waste with a view toward developing an environmentally sound alternative to incineration. After an in-depth investigation of various technologies used in other jurisdictions, it was determined that hydroclaving, or steam-sterilization, of biomedical waste was, in the proponent's opinion, the safest possible method and provided an effective, efficient and environmentally sound method of waste management.

A sister company, Ship to Shore, utilizes the same technology in the existing waste treatment facility on Gloria McCluskey Drive. This facility treats international waste from ships and aircraft prior to disposal to eliminate potential pathogens such as animal diseases or insect pests that may be present in waste from other countries. The hydroclave technology was developed for the treatment of biomedical waste and is used successfully in other jurisdictions in Canada and the US. Appendix B contains correspondence from various hydroclave facility operators and regulatory agencies with information on the effectiveness of the technology. These include the facilities in the Ottawa and Kingston General Hospitals in Ontario, Hospital Sterilization Services in Port Coquitlam, BC, and BioMed Recovery & Disposal in Aberdeen, Saskatchewan.

The proponent has recently incorporated Bio-Medical Waste Disposal Services Inc. and proposes to expand the treatment process and capacity at the existing facility on Gloria McCluskey Drive to allow for treatment of biomedical waste from a number of facilities such as hospitals, dentist offices, seniors' homes, extended care facilities, veterinary hospitals, laboratories and mortuaries. Depending on the volume of waste to be treated (*i.e.*, if a large contract were awarded), the facility may expand to the

adjacent property in order to accommodate construction and operation of two additional hydroclave units.

2.3 Geographic Location

The proposed location for the Project (Figure 1) is the existing facility at 93 Gloria McCluskey Drive in the Burnside Industrial Park in Dartmouth, Nova Scotia. The location proposed for expansion is lot 937 on Gloria McCluskey Drive (PID 41028176). This lot is bounded on the west side by the property occupied by Ship to Shore. The north side of the lot is bounded by Gloria McCluskey Drive and to the south and east by undeveloped lots 940 and 936 at 111 Colford Avenue and 77 Gloria McCluskey, respectively.

Adjacent to the established roadway the lot is partially occupied by a small grove of birch trees. A small rock fill ridge intersects the front third of the lot. The back of the lot slopes down and to the south. Most of the lot comprises fill that was placed during development of the industrial park.

The nearest occupied and active properties include the BFS Burnside Fleet Services Inc. and the Nova Scotia Correctional Institute, both located on Gloria McCluskey Drive. Other neighbours in the immediate area include the Miller Waste Composting Facility, Miller Tires, Maritimes and Northeast Pipeline Pressure Reduction and Odour Injection Station and the CAT Store.

2.4 Project Components

2.4.1 Equipment and Infrastructure

The primary components required to carry out the work include the H-65 hydroclave, steam producing boiler, condensation unit, conveyors and shredder/compactor unit in operation at the existing facility in Burnside. For the proposed expansion, a 15 m by 30 m building will be erected to house the following: a boiler, two H-200 hydroclaves, condensation units, loading platforms, conveyor belts, waste shredder/compactors and waste bin, and control panels. Two steam condensers, sized to fully conden se all vented steam from the hydroclave with 2 – 16 °C municipal water, will be installed in the expansion facility. All steam water and vent lines will be fitted with electrically or pneumatically driven valves operated by the control system.

To allow the existing facility to treat biomedical waste, the following equipment will be installed: scanning, tracking and computer software (see below), a refrigerated storage area for temporary storage of waste to be transferred for incineration, and a security fence around the property. Waste bins will be required to contain wastes prior to treatment, for temporary storage on site, and for transfer of wastes to appropriate disposal facilities. A back-up power supply (*i.e.*, generator) will also be installed.

A computerized tracking system capable of scanning, weighing and tracking waste will also be installed in the facility and will include the computer, a bar code label printer for waste containers, customized proprietary tracking software, electronic weighing scale and accounting software.

The new building will include a separate 4.2 x 4.2 m room for the boiler and a 3.6 x 5.5 m refrigerated storage room with the capacity to contain 18 tonnes or approximately 3 or 4 days worth of waste. In accordance with CCME guidelines, anatomical waste will be stored at 4°C (or lower) as will all biomedical waste to be stored for more than 4 days.

As the Project includes collection and transportation of waste to and from the facility, a variety of trucks will also be required to collect and transport the waste to the facility for treatment and to transport treated waste to an approved landfill for disposal. The transfer of waste that is not appropriate for treatment at the Dartmouth facility (*i.e.*, red bag waste, cytotoxics and pharmaceuticals) to the incineration facility in Moncton, New Brunswick will be undertaken by Mr. Shredding Waste Management Ltd., owner and operator of an approved incineration facility. The incineration facility has all of the required federal and provincial permits and approvals for operation of the facility for the treatment of bio-medical waste (including cytotoxics and pharmaceuticals) as well as for treating waste originating from outside the province (Appendix C). Further, the incineration facility has the appropriate permits and approvals to transport waste within and outside of the province of New Brunswick (Appendix C). Containment and vehicle specific requirements are determined by the federal Transportation of Dangerous Goods Regulations and related provincial regulations as summarized in Section 3.2.

2.4.2 Waste Description

Sources of waste to be treated at the facility are varied and may include provincial and private facilities. Large quantities of waste may be generated by hospitals, laboratories and clinics, and teaching facilities for human and animal medicine. Smaller quantities may be generated by private care facilities such as seniors' homes and extended care facilities, dental offices, veterinary offices and hospitals, private laboratories and mortuaries. The types of waste proposed for treatment are described in this section.

The Canadian Council of Ministers on the Environment (CCME 1992) defines biomedical waste as "waste that is generated by human or animal health care facilities, medical or veterinary research and training establishments, health care teaching establishments, clinical testing or research laboratories, and facilities involved in the production or testing of vaccines." Further detail of individual waste types described by CCME is provided below.

Wastes received from facilities under the direction of the Nova Scotia Department of Health are sorted and categorized as 'red bag' and 'yellow bag' waste as indicated below, where applicable, and may include the following (NSDH 2005) wastes defined by the CCME guideline:

- Human Anatomical Waste consisting of human tissues, organs and body parts excluding hair and teeth (red bag);
- Microbiology Laboratory Waste consisting of laboratory cultures, stocks or specimens of microorganisms, live or attenuated vaccines, human or animal cell cultures and laboratory material that may have come in contact with any of these (yellow bag);
- Human Blood and Body Fluid Waste consisting of human fluid blood and blood products (excluding urine or feces), items saturated or dripping with blood, body fluids contaminated with blood, and body fluids removed for diagnosis during surgery, treatment or autopsy. This does not include urine or feces (yellow bag); and
- Waste Sharps consisting of clinical and laboratory materials including needles, syringes, blades or laboratory glass (rigid container (yellow)).

While not defined as biomedical waste by the CCME guideline, the following types of waste may accompany the above noted wastes for treatment and disposal:

- Cytotoxic Waste may consist of cytotoxics which are hazardous pharmaceuticals used in patient treatment or diagnosis. This commonly refers to pharmaceuticals used to treat cancer (red bag);
- Pharmaceutical Waste including expired or non-useable medications (excluding cytotoxics and narcotics); and
- Miscellaneous Waste (Non Hazardous) which may be inadvertently mixed in with biomedical wastes. This may consist of soiled dressings, sponges, surgery drapes, lavage tubes, casts, catheters, disposable pads, disposable gloves, specimen containers, lab coats and aprons, dialysis wastes such as tubing, tubing filters towels and disposable sheets. Other miscellaneous waste may include paper towels, coffee cups, packaging and other organic and inorganic waste which has inadvertently moved into the hazardous waste stream, and cannot be separated out after exposure to biomedical waste (yellow bag).

Waste from private facilities such as extended care facilities, dentist offices and laboratories are expected to contain similar components. Waste from animal hospitals may contain similar components (sharps, gloves, microbiology waste *etc*.) as well as animal waste which is defined as waste consisting of all animal tissues, organs, body parts, carcasses, bedding, fluid blood and blood products, items saturated or dripping with blood, body fluids contaminated with blood, and body fluids removed for diagnosis or removed during surgery, treatment, or autopsy, unless a trained person has certified that the waste does not contain viruses and agents as specified in the CCME Guidelines (CCME 1992). This excludes teeth, hair, nails hooves and feathers (orange bag/container).

The existing waste treatment facility on Gloria McCluskey Drive treats waste from the Port of Halifax and the Halifax International Airport. These wastes include food and assorted wastes which may include pathogens and/or insect pests not indigenous to the region. NSEL has categorized this waste as non hazardous.

In accordance with the CCME guideline (1992), “Biomedical waste does not include waste that is:

- From animal husbandry;
- Household in origin;
- Controlled in accordance with the Health of Animals Act (Canada); or
- Generated in the food production, general building maintenance and office administration activities of those facilities to which the definition applies.”

The facility will not accept or process illegal drugs seized as part of a police investigation.

2.5 Waste Treatment Process

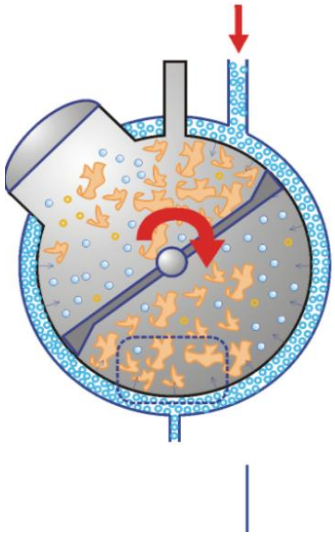
The hydroclave technology was developed in Canada for the treatment of biomedical waste through a grant from the National Research Council. The technology was first tested at the Kingston General Hospital (KGH) in 1995. The University of Ottawa served as an independent testing facility. The technology is able to achieve an inactivation of a microbial load of greater than log 6 equivalent of *Bacillus stearothermophilus* (Springthorpe & Sattar, 1995), the desired level of sterilization. The technology does not treat other parameters such as elevated metals.

The waste treatment process begins at the waste generating facilities with primary waste sorting prior to collection. At provincial medical facilities the waste is sorted and bagged in coloured bags or containers (*e.g.* red bag, yellow bag) to separate biomedical waste types. Other facilities will sort waste in a similar fashion. Waste is collected from the facilities as needed or by predetermined schedule, using the appropriately sized and equipped vehicle (*e.g.*, trucks with refrigerated compartments). Upon arrival at the facility on Gloria McCluskey Drive, waste will be weighed. Information will be recorded and entered into a computer waste management data program designed for the Project.

Waste will be removed from the storage containers and bags deposited in the hydroclave for treatment. Each hydroclave unit will have two top loading doors. A raised loading platform at the level of the loading door will be installed to eliminate unnecessary handling of the waste while discharge conveyors will be installed for each hydroclave unit to carry the treated waste to the central shredding unit and receiving container.

The hydroclave is a double walled, cylindrical vessel with the inner wall of the vessel providing containment for the waste and the outer wall (or jacket) forming a steam chamber surrounding the inner vessel (Figure 2). In the inner chamber, the waste is mixed by rotators which break it into small pieces. Steam then fills the outer chamber, heating the inner vessel and vaporizing the liquids in the waste. The heat from the steam raises the temperature inside the vessel and causes the liquids in the waste to vaporize. The pressure in the inner chamber is raised to a specified level. The combination of pressure, high temperature and steam result in the sterilization of the waste. When moisture content in the inner chamber is determined to be below desired levels to produce the steam necessary for sterilization, steam from the boiler is automatically added to the load.

FIGURE 2 Hydroclave Schematic



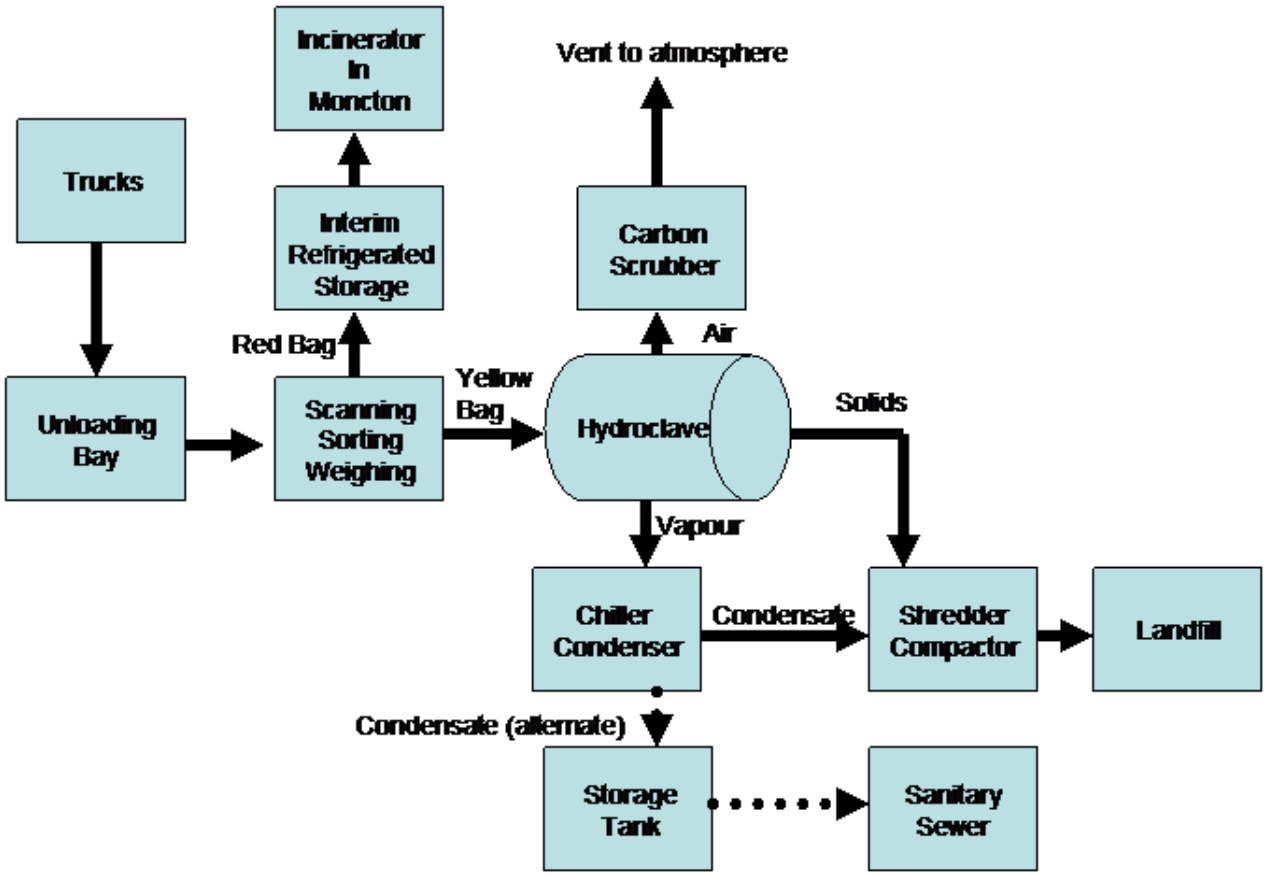
The operating temperature and pressure of the hydroclave are specific to the level of sterility to be achieved. Treatment temperatures may range from 121˚C – 140˚C with vessel pressure ranging from 103.4 to 206.84 kPa and treatment cycles varying from 15 to 30 minutes. To ensure adequate treatment of waste, it is proposed that, during commissioning of the facility and for a period of 30 consecutive days of successful operation (*i.e.*, 30 days of successful treatment results), each load be tested with live spore test strips (*i.e.*, 12.92 Rapid B.I. Steam). In the event testing indicates inadequate

or unsuccessful treatment, the load will be reprocessed. After 30 days of successful operation, it is proposed that the frequency of confirmatory testing be adjusted to once daily (*i.e.*, the first treated load each day). In the event testing indicated inadequate treatment, all waste processed between since the last successful test will be reprocessed. The proponent will ensure that only waste that is adequately treated will be disposed of at an approved landfill facility.

The vent is opened to depressurize the hydroclave through a condenser unit and mixing continues in the heated vessel until the waste is dry, reducing the volume by as much as 40%, depending upon the liquid content of the waste. Overall, the reduction in waste volume can be as much as 75-80%, including shredding and compaction.

When the waste is ready to be removed from the hydroclave, the mixer rotates in the opposite direction pushing the dry, sterile waste out the loading door to the conveyor leading to the shredder. The waste is further fragmented in the shredder/compactor. Shredding of the waste not only reduces the volume, it minimizes the potential for injuries or exposure to employees. The waste bin is detached from the compactor and is transported to an approved disposal facility (*i.e.*, second generation landfill). Total processing time is approximately 90 minutes and includes loading and unloading of the hydroclave, depressurization, and shredding and compaction. The process is further illustrated in Figure 3.

FIGURE 3 Process Flow Diagram



The internal material loading capacity of the H-65 hydroclave unit is 1.9 m^3 with a treatment capacity of approximately 230 kg/hr. The internal material loading capacity of the H-200 is approximately 5.7 m^3 with a treatment capacity of 680 kg/hr. Processing times will vary with different loads as there will be variability in waste composition and moisture.

Waste which is not appropriate for treatment in the hydroclave, specifically the red bag waste, cytotoxics and pharmaceuticals, will be temporarily and properly stored at the facility and subsequently transferred to the approved incineration facility in Moncton, New Brunswick.

2.6 Site Preparation/Construction Activities

To prepare the existing facility for treatment of biomedical waste, a security fence would be erected around the property to ensure controlled access to the facility. A refrigeration unit and area will also be added as well as the waste scanning, tracking, and computer software package.

Should an expansion be required to accommodate treatment of biomedical waste, some construction would be required at the site. The lot proposed for occupation by the expansion facilities is immediately adjacent to the existing facility. This site would have to be cleared of a small grove of birch trees which currently occupies the street front of the lot (Figure 4). If possible, clearing will be undertaken to avoid sensitive periods for most breeding birds (*i.e.*, outside of the mid-April to early August breeding season). If clearing during this sensitive period is necessary, a qualified biologist will conduct a survey of the site prior to clearing to identify and breeding or nesting activity. The Proponent will avoid disturbance of such activity to ensure compliance with the *Migratory Bird Convention Act*.

FIGURE 4 Proposed Expansion Site

Construction related activities will include filling, compaction and grading to level the lot. Some minor trenching/excavation may be required to accommodate lines for water and sewer and natural gas, and to provide for installation of the building foundation and footings. The building to house the two new hydroclave units and associated equipment will be constructed as a Tilt-Up structure approximately 15 m x 30 m in size. This type of building reduces the amount of work required on site as the exterior walls and roofing system are cast and formed off site and are shipped to the location ready for installation by the time the foundation and slab are completed.

In accordance with best practices and standard NSEL requirements, erosion and sedimentation controls will be in place to ensure that runoff generated during site construction is managed appropriately. This will include diversion of clean surface drainage away from disturbed areas, coordination of construction activities with seasonal constraints, to the extent possible, and minimization of the amount and duration of exposure of erodible soil at all times. Site drainage and surface runoff collection and controls will be in place prior to the commencement of construction of the expansion facility. Upon completion of construction, the site will be landscaped, minimizing the potential for sediment-laden runoff during operations.

2.7 Operations and Maintenance

Operation of the biomedical waste treatment and transfer facility includes the following activities:

- collection of waste from various facilities;
- installation of a bar code label on all waste (*i.e.*, all waste that will be treated and all waste that will be subsequently transferred to the incineration facility) to ensure only waste that is appropriate for treatment is processed at the facility;
- transport of the waste to the treatment facility on Gloria McCluskey Drive;
- weighing, scanning and recording of the waste;
- treatment (as described above) and/or temporary storage of the waste until it is treated or transferred for incineration;
- transport of the treated waste to an approved landfill facility and transport of the red bag waste and other waste that is not approved for this method of treatment to the incineration facility in Moncton, New Brunswick; and
- facility maintenance and repairs.

2.7.1 Facility Operations

Upon obtaining all required approvals (and amendments) for the treatment and transfer of biomedical waste, and the successful negotiations between the Proponent and various biomedical waste generating facilities, as well as a few facility upgrades, as described above, the existing facility will begin the process for the collection and treatment of biomedical waste. The treatment of biomedical waste at the existing facility may occur on an 8-10 hour rotation or a 3-4 day rotation. That is, international waste will be treated for a period of 8-10 hours or 3-4 days (depending on the volumes of the various waste types to be treated) then biomedical waste will be treated.

Expansion of the facility will not begin until such time as the volume of waste to be treated is increased such that the expansion is warranted and economically feasible. Once the facility is expanded, it is anticipated that the treatment of international waste will be undertaken at the existing facility while the treatment of biomedical waste will move to the expanded facility.

The existing facility operates in accordance with an operations manual prepared for the hydroclave system/technology and modified for the facility. The manual will be further modified and updated, as appropriate, for the expanded facility. The operations manual contains information and detail related to waste collection, transportation, receiving and storage as well as the treatment process, safety regulations and policies, emergency response procedures, environmental monitoring, risk management and record keeping.

2.7.2 Waste Collection and Storage

Waste will be collected from the various waste generating facilities on a regular basis according to an established schedule, or on an as needed basis depending upon the volume of waste to be collected and agreements in place with waste generators.

The estimated number of trucks hauling waste to and from the facility is not known at this time as it will depend on the number and types of facilities who will use this facility for their waste collection and treatment. In any case, the number of trucks will be small relative to other local traffic. If a large contract were awarded, as many as 5 trucks per day could be transporting waste to the facility. The approximate capacity for each truck is 2500 ft^3 (71 m^3). Given that waste could potentially be gathered from all across the province, it is difficult to clearly identify specific trucking routes. The location of the facility within the Burnside Industrial Park is easily accessed from several provincial highways (*i.e.,* Highway 107, Highway 118 and 111, and Highway 101 and 102). Within the Park, truck traffic will likely be limited to Burnside Drive, Akerley Boulevard, and Gloria McCluskey Drive.

Transportation of waste from the waste generating facilities to the treatment facility is regulated federally through the *Transportation of Dangerous Goods Act* and provincially through the *Dangerous Goods Transportation Act*. The Proponent will comply with all applicable legislation and will acquire necessary permits related to transportation of waste to the facility. The facility in Moncton, Mr. Shredding Waste Management, has all the appropriate approvals for transporting waste from Nova Scotia into New Brunswick (Appendix C).

The biomedical waste will be received inside the building at the facility in a designated area. The waste will either be treated immediately or temporarily stored in accordance with CCME Guidelines (CCME 1992) and the operations manual. Prior to treatment or storage, the waste will be weighed, scanned and sorted (which will ensure only waste approved for treatment is processed) and the information will be entered into the waste data management system. A bar code system included with the tracking system will produce bar code labels to be scanned to ensure that waste types are properly coded and verified prior treatment, minimizing potential errors in waste identification. The bar code information will include waste category, name and location of the waste generator and identification number, method of treatment, waste receiver information, weight of waste and date of treatment and/or shipment.

Treated waste will be stored in large containers, separate from untreated waste. Furthermore, international waste will be stored separately from biomedical waste. Red bag waste and cytotoxic and pharmaceutical waste will be stored in a refrigerated area, away from all other waste, and in accordance with CCME Guidelines.

2.7.3 Waste Volumes

The existing facility treats approximately 800 tonnes of international waste annually by Ship to Shore. Treated waste is transported to the Otter Lake Landfill facility. The proposed expanded facility will have the capacity to treat approximately 3,500 tonnes of biomedical waste annually. This could include approximately 2,300 tonnes of waste from the public sector and another 1,200 tonnes of waste from various private sector facilities.

2.7.4 Maintenance Activities

In accordance with standard maintenance practices, the equipment will undergo a full maintenance check (*i.e.,* oil changes) and cleaning on a monthly basis. Other minor maintenance activities are undertaken daily (*i.e.,* check of oil and grease levels in gear box, seal gaskets) and bi-weekly activities (*i.e.,* top up oil on gear box, cleaning of gaskets). To minimize the duration of waste storage, the proponent will ensure that, prior to the scheduled maintenance, all stored waste is treated.

2.7.5 Project Employment

It is anticipated that the Project will generate the following employment:

- management and administration staff (3-4);
- health and Safety Officer (1);
- facility Operators (3-4); and
- waste collection and delivery (8)

All personnel working in the transportation, receiving, and processing areas of the facility will be properly trained for their respective roles (*e.g.*, TDG training for collection and delivery personnel). Training will include WHIMIS, safety and accident prevention procedures and all personnel will wear personal protective equipment as required. Additional information related to health as safety is provided in Section 2.10.

2.8 Emissions and Discharges

Emissions and discharges associated with the proposed waste treatment process include liquid, gaseous and solid wastes. Specifically these include:

- sterile condensate from the steam/vapour generated from the waste;
- wash water from the container/bin washing and decontamination process;
- vapour, which may include some VOCs, that may be released from the hood vent or when the hydroclave door is opened;

- residual solid waste which is (and will be) transported for disposal at an approved landfill facility; and
- general domestic/office waste.

2.8.1 Liquid Waste

A small amount of liquid waste will be generated by the treatment process. The liquid waste is made up of the moisture content of the waste as well as any liquids that may be present in the waste that have been sterilized. Generally, the volume of liquid waste per load will be in the range of approximately 500 ml. In tests conducted on liquid effluent from a hydroclave operating in a hospital (MacLellan Water Technology, 2001), analysis indicated that formaldehyde, styrene and toluene were present in detectable concentrations. The latter two are likely attributable to the presence of plastics commonly found in the waste, and the former likely attributable to disinfectant materials in use at the hospital. The existing facility in Burnside has been treating international waste. It is expected that liquid effluent from this treatment process would not be representative of the liquid effluent from the treatment of biomedical waste.

A sampling port is located downstream of the condenser unit to allow for testing of effluent. Further, the current facility is equipped with two underground storage tanks with an approximate volume of 10,000 litres. The tanks have been installed for the collection (and possible treatment) of liquid waste prior to discharge. The proponent intends to discharge the liquid effluent generated from the process to the municipal sanitary sewer system. Bio-Medical Waste Disposal Services Inc. will work with HRM and NSEL to establish and confirm the suitability of the effluent for discharge into the municipal system and will develop an appropriate monitoring and reporting program in consultation with HRM and NSEL. Unless otherwise specified by HRM or NSEL, monitoring will be undertaken for parameters identified in HRM Bylaw W101. Alternatives to discharge to the municipal system include incorporating the sterile liquid with the dry, shredded and compacted waste for disposal at the landfill or storage of liquid effluent in the holding tanks and subsequent removal and disposal by a qualified contractor to an approved facility.

The hydroclave units, conveyors and shredder will be situated in a dyked area to contain any potential spills. A drain leading to the underground holding tanks will facilitate wash down and disinfection of the area. The holding tanks will be equipped with a sump pump to redirect any liquid resulting from a spill or leak and or any liquids resulting from wash down back into the hydroclave for treatment, as required, prior to release or disposal. Backflow preventers are in place at the existing facility on the hydroclave and boiler and will be in place at the expansion facility as well.

A separate area of the building will be dedicated to washing and disinfection stations for the emptied waste bins. The area will be equipped with a large conveyor for washing and drying, as well as large steel tanks of disinfectant solution to receive the bins immediately after the contents are loaded into the hydroclave units. The wash station will consist of a 500 gallon tank equipped with automatic sodium hypochlorite injection to a maximum level of 150 ppm. The tank will require draining and replenishing once per week. It is intended that the tank contents be discharged to the municipal sanitary sewer system. As indicated above, the proponent will work with HRM and NSEL to ensure suitability of the liquid waste for discharge into the municipal system and will develop an appropriate monitoring and reporting program in consultation with HRM and NSEL. Unless otherwise specified by HRM or NSEL, monitoring will be undertaken for parameters identified in HRM Bylaw W101. Alternatives to discharge

to the municipal system include incorporating the sterile liquid with the dry, shredded and compacted waste for disposal at the landfill or storage of liquid effluent in the holding tanks and subsequent removal and disposal by a qualified contractor to an approved facility.

2.8.2 Air Emissions

Emission testing has not been conducted on the existing plant. Due of the nature of the process, the emission gases are only those contained within the hydroclave upon opening, and it is not possible to apply conventional source testing processes (Canadian federal protocol is for steady state emissions). This is a distinct advantage of this technology. Testing will be carried out during commissioning to confirm that the scrubber system adequately captures the releases on opening of the system. These tests will focus on the volatile organic compounds before and after the air scrubber.

Early tests conducted on VOC emissions from a hydroclave operating in a hospital (A.Lanfranco and Associates Inc., 1998) indicated that some compounds, in particular, carbon disulphide, benzene, styrene and vinylidene chloride were present in concentrations above Occupational Exposure Limits (OEL) at the post condenser exhaust, which was vented outside. Analysis of the same parameters at the hydroclave unloading door indicated that these compounds were well below OEL. It is noted that the use of carbon filters (not used in the above-noted project) significantly reduces air emissions should these be identified as a concern. The proposed facility will include carbon filters.

The most representative test of atmospheric emissions was conducted in triplicate over a 40 minute period on the stack from a hydroclave operating at Hospital Sterilization Services of Port Coquitlam, BC (A. LanFranco, 2002). These tests indicated that no significant organic emissions were present in exhaust samples analyzed for chlorinated/brominated substances and volatile organic compounds, including mostly aliphatic hydrocarbons.

With respect to potential emissions of odour compounds, the proposed process dries the waste during processing reducing potential for odours. To date, there have been no complaints regarding noise, odours or other emissions from the existing facility employing this technology. The technology available to address potential odours includes the installation of condensation units, HEPA filters, scrubbers and the use of additive treatments. For example, the current international waste operation employs an autoclave deodorizer in gelatine capsule form to further reduce potential for odours in the hydroclave.

Other air emissions associated with the Project include vehicle emissions (*i.e.,* CO_2, SO_2, NO_X) and dust. Waste delivery vehicles will be kept in good working order to maintain the positive company image. As part of the extensive training program for the drivers, they will be instructed on the ways in which environmental impacts may be minimized. This will include driving styles and behaviours, including the strict enforcement of no-idling policies. Upon arrival at the facility, all waste transport vehicles will back up to the loading/unloading bay and turn off the engine prior to opening the bay door. This will minimize vehicle exhaust from entering the work area. The impact of the vehicle emissions on the environment will not be significant.

Minor dust emissions may result from construction activities. Water sprays will be used to control fugitive dust emissions. No dust emissions will result from the operation. The parking lot is paved, as are all access roads.

2.8.3 Solid Wastes

Following treatment in the hydroclave, solid wastes will be further fragmented and compacted by a shredder/compactor into a waste bin and transported to an approved second generation landfill for disposal. For the existing operation, treated waste is transported to the Otter Lake Waste Management Facility. In all other jurisdictions in Canada in which this technology is employed for the treatment of biomedical waste, residual wastes are disposed of at a landfill facility. The proponent is negotiating with several of the approved second generation landfill operators in the province regarding the acceptability of the treated waste (i.e., treated yellow bag waste). As part of the approval/amendment under Part V of the *Environment Act*, an approved facility for the disposal of the residual solid waste will be identified.

Domestic and solid waste will be sorted for recycling on-site prior to disposal at an approved facility.

Construction waste and debris will be managed by the construction contractor. Waste will be appropriately reused, recycled or disposed of at an appropriate and approved disposal facility. Given the type of building to be constructed (i.e., tilt-up structure), less construction waste is generated.

Maintenance of construction equipment and vehicles used for the transport of waste will be conducted off-site at a licensed facility.

2.8.4 Hazardous Materials and Contingency Planning

Other than the biomedical waste to be treated, the presence or use of hazardous materials on site will be limited and may include cleaning solutions for the waste bins and the hydroclave unit(s). The current facility uses natural gas from the local gas distribution system, eliminating the need for on site storage of petroleum products.

Contingency plans are in place for the current operation and form part of the facilities operations and maintenance manual. As part of the application for amendments under Part V of the *Environment Act*, the proponent shall prepare additional plans to address issues associated with the treatment and transfer of biomedical waste. Plans will be developed in accordance with the provincial regulations and federal Transportation of Dangerous Goods regulations. The contingency plan will include, at a minimum, provision for training for all staff, as well as definition and dissemination of a reporting protocol to ensure rapid and accurate reporting of accidents to the appropriate authorities. The reporting system will address: a) what is to be reported and with what urgency; b) who is responsible for reporting; and c) to whom the incident is reported. Procedures will also address notification of municipal and provincial authorities where circumstances warrant; response procedures which will include chain of command notification; designated responsibilities; and location of equipment. The response plan will provide procedures for emergency response and post-emergency clean up. The local fire department will be invited to a briefing session and tour of the facility, so they may have an understanding of the procedures and plant operations in case of an emergency. With regards to transportation of waste, the plan may include but is not limited to a transportation protocol to be referenced including specific routing information, details of requisite safety, personal protective and load restraint equipment to be maintained in collection and transport vehicles at all times.

Contingency plans are required for any business that relies on mechanical processing equipment. With any large mechanical processing plant it is expected that such a facility may from time to time experience operational disruptions. To this end, the proponent has developed a contingency plan to address any foreseeable circumstances with respect to maintenance and repair. For example, the

expanded facility will incorporate duplicate equipment such as two hydroclaves, two shredding units and two condensation units. Contingency measures for the installation of a portable boiler are in place, in the event of boiler malfunction. A natural gas fired generator will be on-site to ensure continued operation in the event of a power failure. Arrangements have been made to have a back-up portable generator on-site within one hour in the event of a malfunction of the on-site generator.

During facility shutdown, untreated waste will be stored in the refrigeration room until the facility is up and running again. The refrigerated storage area will be capable of accommodating approximately 18 tonnes of biomedical waste, or three to four days of waste collected. The refrigeration area can store all waste until such time that Bio-Medical Waste Disposal Services and/or Ship to Shore Disposal Services are operational again. Facility shutdown will not impose an interruption in collection service to health-care facilities, and treatment will resume immediately upon recommencement of operations. If, for any reason, either of the above contingency plans cannot be executed, waste can be transported to the approved incinerator in Moncton, New Brunswick for treatment and disposal until such time as the equipment is repaired. In the event the facility in Moncton experiences a disruption in service, waste can be stored at the Moncton facility or transferred to the approved biomedical waste incinerator at the Dr. Everett Chalmers Hospital in Fredericton, New Brunswick (*i.e.*, the approved contingency/back-up for the Moncton facility).

2.9 Health and Safety

Occupational Health and Safety is a key component of any workplace; the goal is to afford adequate protection to workers. Bio-Medical Waste Disposal Services Inc. is committed to ensuring the health safety of their employees and the public in all aspects of their operations through implementation of safe work procedures, exposure control plans and emergency procedures developed by the owners of the technology which are part of the facilities operations and maintenance manual. Upon approval of the EA, the manual will be reviewed and updated to ensure compliance with the *Nova Scotia Occupational Health and Safety Act* and Regulations and conformance with the CCME Guidelines for the Management of Biomedical Waste in Canada.

Equipment in place at the facility such as the conveyors helps to minimize waste handling by plant employees. A separate area of the building will be allocated for personal requirements of facility staff such as a rest area and lunch room, washrooms complete with showers, storage lockers, and change rooms. These areas of the facility will be separated from the waste treatment area by two doors, with receptacles for soiled and/or disposable clothing or equipment placed between the two to minimize potential for cross contamination.

Employees will be hired in advance of the commencement of operations to ensure adequate time is allocated for training. Staff to be trained includes staff responsible for plant operations, including the plant Safety Officer, hydroclave technicians, transport personnel and labourers. Training will address a number of issues ranging from Workplace Hazardous Materials Information System (WHMIS) training to waste handling and tracking. Training will include first aid, safe work procedures and hazard identification, including use of personal protective equipment, and equipment and process training. Transportation of Dangerous Goods training will include specific requirements for packaging and labelling of wastes, waste manifests, transportation placards and routing, as well as spill response and reporting. Employees will be trained in emergency procedures in the event of an injury or exposure to potentially pathogenic or infectious materials. Training records will be maintained on site and training

updated as required by regulations (*e.g.* annual WHMIS update training) or by changes in process equipment or operations.

2.10 Decommissioning

The hydroclave equipment has a life expectancy of 25 years which may be extended with implementation of appropriate maintenance and repair program. With equipment replacement, it is intended that the facility operate for more than 25 years. There is no current plan or schedule for decommissioning and abandonment of the facility. Decommissioning and abandonment will be undertaken in accordance with the regulatory requirements applicable at the time of such activities.

Removal of buildings or structures is expected to have similar effects and considerations as construction and will be conducted in accordance with regulatory requirements applicable at the time of removal. Disposal of related waste will be conducted in accordance with NSEL waste management regulations and guidelines.

2.11 Project Schedule

The Project will commence once all necessary provincial and federal approvals are in place and the Proponent has modified the facility to handle the treatment of biomedical waste (*e.g.*, installed security fence, refrigeration unit/area). Expansion of the facility will occur once the agreements with waste generators are in place such that the capacity of the existing facility can no longer handle volume of waste to be treated.

The typical hours of operation for the proposed facility is from Monday to Friday from 08:00 to 18:00 hours, excluding holidays. The Proponent wishes to have the flexibility to increase the operating hours to 24 hours a day, 7 days a week, year round, depending on the volume of waste to be treated and the status of the expansion. Given the location of the facility (within an industrial park), the limited interaction with the receiving environment (i.e., minimal emissions and noise), and the low volume of trucks hauling to and from the facility, continuous operation of the facility will not likely result in significant environmental effects.

3.0 SCOPE

As it is the intent of Bio-Medical Waste Services Inc. to expand current operations at Gloria McCluskey Drive to accommodate transfer and treatment of biomedical waste, the Project must be registered for Environmental Assessment under the Nova Scotia *Environment Act*. This report fulfils the primary requirements for Project Registration under this legislation.

3.1 Scope of the Undertaking

The proposed Project involves the collection, treatment and disposal of biomedical waste originating from various institutions throughout Nova Scotia including provincial facilities such as hospitals, clinics and laboratories as well as private facilities such as seniors' homes, extended care facilities, veterinary offices and hospitals, private laboratories and mortuaries.

A portion of the waste which is not considered appropriate for treatment in the hydroclave system, (*i.e.,* the red bag waste, cytotoxics and pharmaceuticals) will be transferred for incineration to the existing incinerator facility in Moncton, New Brunswick. This facility, in operation for ten years, currently accepts biomedical waste from facilities throughout the Atlantic and Quebec.

3.1.1 Purpose and Need for the Undertaking

Currently, biomedical waste collected from the provincial hospitals and affiliated facilities is collected and transported to the Cape Breton Regional Municipality waste incinerator. This facility is scheduled for closure on December 31, 2005. As such, an alternative treatment and disposal of biomedical waste is required. In addition to the need to replace the capacity provided by the Cape Breton incinerator, there is the need for additional capacity to service the demand from a variety of waste generators as noted above.

3.1.2 Project Alternatives

Bio-Medical Waste Disposal Services Inc. has conducted in depth research of a variety of technologies to determine the treatment method of choice to provide the required level of sterilization with minimal environmental impacts. The following alternative biomedical waste treatment technologies were investigated.

Microwave/Macrowave Technology

Microwaving or macrowaving biomedical waste is not a widely used technology. The process involves treating biomedical waste using micro/ macrowaving which must be followed by incineration, as micro/macrowaving alone is not considered effective in treating biomedical waste. Double processing of the waste is required to achieve desired levels of treatment.

Plasma Arc Technology

Plasma arc treatment is an experimental technology and also requires incineration of the biomedical waste following treatment. Given the experimental nature of the process and the need for double processing, this alternative was not favoured.

Molten Salt Treatment

Molten salt treatment of biomedical waste requires that the volume of salt be adjusted depending on the volume and contents of each load of waste to be treated. The time and calculations required to employ this technology were considered inefficient.

Hammermill Treatment

The hammermill method involves the shredding of biomedical waste prior to treatment by submersion in a chemical bath. Concerns related to the use of this technology included the potential risk to employees from handling waste to shred it prior to treatment, the risk of cross contamination from untreated waste, difficulties cited with the mechanical aspect of the shredders used in this process, the disposal of chemicals used to treat the waste, and the 1992 CCME guidelines which indicate that this technology is not appropriate for treatment of pathogenic or cytotoxic waste.

Having reviewed the above technologies as well as the proposed technology, Bio-Medical Disposal Services Inc. determined that the hydroclave process presented the most effective treatment with the least environmental concern.

3.2 Scope of the Environmental Assessment

Part IV Section 31 of the provincial *Environment Act* stipulates that projects prescribed as undertakings by the Minister or under the Environmental Assessment Regulations are subject to Ministerial approval under the environmental assessment process. As stipulated in Section 3 and Schedule A of the regulations, a permanent commercial facility for the handling of waste dangerous goods is a Class I Undertaking. As per Section 3 (2), the regulations also apply to the modification, extension, abandonment demolition or rehabilitation of an undertaking. Given that biomedical waste is considered a waste dangerous good under the provincial Dangerous Goods Management Regulations, Bio-Medical Waste Disposal Service Inc. is required to register this project as a Class I Undertaking pursuant to the Environmental Assessment Regulations under the Nova Scotia *Environment Act*.

The Project is subject to a number of provincial and federal statutes applicable to the management and transportation of dangerous goods. Provincially, management of waste dangerous goods is regulated under the Dangerous Goods Management Regulations under the *Environment Act*, while the transportation of dangerous goods in the province is regulated by the provincial Dangerous Goods Transportation Regulations under the *Dangerous Goods Transportation Act*. These regulations describe the requirements of waste management, storage and transportation.

Federally, the *Transportation of Dangerous Goods Act* and Transportation of Dangerous Goods Regulations stipulate the requirements of transportation of dangerous goods. These requirements include, but are not limited to, details of required waste manifest information, packaging, signage, contingency planning and compatibility of shipping groups for transportation. Permits and approvals required for the proposed Project under this legislation include a Permit for Equivalent Level of Safety and approval of an Emergency Response Assistance Program.

Since a portion of the waste that is not appropriate for hydroclave treatment will be transported to Moncton for incineration, the federal Interprovincial Movement of Hazardous Waste Regulations (IMHWR 2002) under the *Canadian Environmental Protection Act, 1999* applies. These regulations are applicable to substances identified under the federal Transportation of Dangerous Goods Regulations

and require that the manifest and relevant attachments be sent to the appropriate provincial authorities in the province of origin and destination. Mr. Shredding Waste Management Ltd. will be responsible for the transportation of waste from the proposed facility in Burnside to the approved incineration facility in Moncton.

One of Canada's strategies to protect biological diversity is to address species at risk. These are native species that are sensitive to human activity due to their rare occurrence, restricted range in Canada, dependence on specialized habitats or declining population or distribution (Canadian Wildlife Service 2004). This has been achieved through, amongst other initiatives, the Species at Risk Act (SARA). SARA serves to protect listed species by prohibiting activities that may harm individuals or critical habitat. Specific prohibitions under SARA came into force on June 1, 2004; those relevant to the proposed Project include the following:

- Section 32 (1): *No person shall kill, harm, harass, capture or take an individual of a wildlife species that is listed as an extirpated species, an endangered species or a threatened species.*
- Section 33: *No person shall damage or destroy the residence of one or more individuals of a wildlife species that is listed as an endangered species or a threatened species, or that is listed as an extirpated species if a recovery strategy has recommended the reintroduction of the species into the wild in Canada.*
- Section 58: *Subject to this section of the Act, no person shall destroy any part of the critical habitat of any listed endangered species or of any listed threatened species – or of any listed extirpated species if a recovery strategy has recommended the reintroduction of the species into the wild in Canada - if (a) the critical habitat is on federal land, in the exclusive economic zone of Canada or on the continental shelf of Canada; (b) the listed species is an aquatic species; or (c) the listed species is a species of migratory birds protected by the Migratory Birds Convention Act, 1994.*

Additional legislation applicable to the Project includes the provincial Activities Designation Regulations which stipulates the requirement for an approval to operate the facility. Domestic and office waste generated at the facility, such as paper, cardboard, garbage *etc*, will be sorted and disposed of in accordance with provincial Solid Waste Resource Management Regulations.

Municipal by laws outline the requirements of a variety of permits and regulations related to construction and operation of the facility such as building and occupancy permits, wastewater management and land use, among others.

The scope of the environmental assessment in relation to the proposed Project has been determined by the Proponent and their consultant and is based upon the proposed Project elements and activities, the professional judgement and expert knowledge of the study team, consultations with stakeholders and regulatory authorities on this and similar projects.

The proponent and their consultant met with representatives of Nova Scotia Environment and Labour on March 24, 2005 to discuss the location, proposed expansion, and elements and activities associated with the proposed Project, in an effort to focus the scope of the assessment. Some NSEL representatives are familiar with the existing operation as it is currently permitted by NSEL.

Business owners/operators adjacent to the existing facility were also contacted (see Section 4.0) for the purpose of consultation and issue identification. In an effort to further identify potential issues associated with the proposed Project and confirm the effectiveness of the system, existing hydroclave operators were contacted. The Director of Plant Engineering and Maintenance Services at the Kingston

General Hospital confirmed that the system in operation in the hospital has achieved the required level of sterilization 100% of the time. Despite provincial requirements to test the loads once every six days, KGH tests every load treated on site and have confirmed that they have not yet had any loads fail compliance testing (J. Carr-Braint, pers. comm. April 2005). Further information related to the effectiveness of the technology is provided in the table below.

TABLE 3.1 Consultation with Hydroclave Systems Operations

Site	Equipment	Contact	Application	Effectiveness
Kingston, ON	H-100 (340 kg/hr capacity)	Joel Carr-Braint, Director of Plant Engineering and Maintenance Services	In hospital biomedical waste treatment	100%
Ottawa, ON	Eight H-15 (54 kg/hr capacity each)	Katherine Flemming, Manager Environmental Services	In hospital biomedical waste treatment	100%
Aberdeen, SK	H-65 (230 kg/hr capacity)	Victor DeFehr, President BioMed Recovery & Disposal	Treatment of Biomedical Waste (SK and AB)	100%

There are several facilities throughout Canada and the world employing this technology to treat biomedical waste. As the provinces are responsible for waste management, testing requirements are stipulated under approvals and operating permits. In addition to the above, contact with provincial regulators was made to further to confirm and identify the various treatment methods in use in other jurisdictions and, opportunistically, identify potential issues associated with the technology. This information is summarized in Table 3.2 below and 4.1.

TABLE 3.2 Summary of Jurisdictional Treatment of Biomedical Waste

Province	Agency	Contact	Technologies In Use
Nova Scotia	Environment and Labour	Helen MacPhail	Incineration
New Brunswick	Environment and Local Government	Andre Tardiff	Incineration
Prince Edward Island	Environment, Energy and Forestry	Glenda McKinnon Peters	Incineration
Newfoundland and Labrador	Environment and conservation	Craig Bogden	No treatment on Island
Quebec	Developpement Durable, Environnment et Parcs	Ginette Courtois	Autoclaves, incineration
Ontario	Ministry of the Environment	Debra Hurst	Pending confirmation
Manitoba	Manitoba Conservation	Randy Pelser	Transfer for incineration out of province, autoclave and incineration in hospitals
Saskatchewan	Environment	Wes Kotyk	Microwave, hydroclave
Alberta	Department of Health	Kevin McLeod	Incineration, landfilled
British Columbia	Water, Land and Air Protection	Kul Bindra	Incineration, autoclave and hydroclave

The only issue raised during this consultation process was that an earlier system design, which did not include a condensation unit, resulted in odour problems. Installation of the condensation unit, which captures and condenses much of the vapours and discharges them to the municipal sewer system, resulted in significant improvements.

This environmental assessment evaluates the potential environmental effects of the proposed Project elements and activities, for all Project phases, with regard to each of the identified Valued Environmental Component (VEC) and Valued Socio-economic Component (VSC). By assessing potential impacts on VECs/VSCs within the study boundaries, a meaningful evaluation of Project effects on relevant environmental parameters is achieved. Given the nature of the Project, the location of the

Project within the industrial park and the limited potential for interaction with the biophysical and socio-economic environment, components evaluated include:

- air quality (as a result of concern related to potential process air emissions and odours);
- land use (given the nature of the facility with an urban area); and
- transportation infrastructure in consideration of the potential effect of increased traffic in the vicinity of the Project on traffic patterns.

A description of the bio-physical and socio-economic environment is provided in Section 5.0.

Based on professional judgement and existing information, and given the size, nature and location of the proposed Project, the Proponent and its consultants are confident that the zones of influence and subsequent boundaries of the assessment for this Project are limited. The physical footprint of Project will only be expanding to the adjacent lot, which is approximately 40 m x 50 m. The solid and liquid emissions will be disposed/discharged to an approved facility (*i.e.,* approved landfill and municipal sewer). Therefore, assessment of the terrestrial environment (*i.e.*, flora, fauna) is not considered appropriate for this Project. Furthermore, there are no streams or wetlands or other potentially sensitive ecological areas in the vicinity of the Project or could be impacted by Project emissions.

Archaeological and heritage resources have not been selected as a VSC in this assessment since the area has been determined to have low archaeological potential (M&NP 1998). Archaeological deposits, if present, would likely have been disturbed during previous industrial/commercial development of the surrounding lands.

4.0 STAKEHOLDER AND PUBLIC CONSULTATION

4.1 Methods of Involvement

The Proponent and their consultant met with representatives of NSEL on March 24, 2005 to identify potential issues of concern associated with the proposed Project and to focus the scope of the assessment. On April, 19, 2005, a Project Information Bulletin was distributed to all business owner/operators in the vicinity of the Project, specifically those along Gloria McCluskey Drive as well as other retail stores along Akerley Boulevard. A copy of the bulletin is provided in Appendix D. The purpose of the bulletin was to inform the neighbours of the proposed Project and identify issues and concerns associated with the Project to ensure they are addressed directly or in this EA report.

4.2 Stakeholder Comments and Steps Taken to Address Issues

Table 4.1 summarizes the comments received and issues raised as a result of the issues scoping and consultation efforts described above and in Section 3.2 as well as the Proponent's proposed response or resolution. The table also includes a summary of regulator comments on a draft submission of the EA.

TABLE 4.1 Summary of Stakeholder Comments and Concerns

Raised By:	Issue/Concern	Response/Resolution
NSEL	Use of ozone depleting substances (ODS)	The Proponent has committed that the condensation unit/chiller will be free of ODS.
NSEL	Sorting of waste and potential for inadvertent treatment of red bag waste	The Proponent will employ a scanning and tracking system (*i.e.,* bar code system) for all red bag waste as it is collected from the waste generating facilities and scan all waste as it enters the facility as further assurance that only waste that is appropriate for treatment in the hydroclave is processed.
NSEL	Lack of knowledge/ understanding (*i.e.*, the technology is new to Nova Scotia	The Proponent has provided (in Appendix B) copies of correspondence and test results from other facilities in other jurisdictions employing the technology to raise the level of comfort of reviewing agencies and stakeholders.
NSEL	Mercury in waste	Section 6.1 of this report considers the potential issue.
NSEL	Monitoring of liquid emissions	The Proponent will monitor liquid emissions from the facility in accordance with HRM's sewer use by-law or as otherwise directed.
Kingston General Hospital, and Aberdeen, SK	Odour	Odours are minimized with the implementation of the condensation unit. Carbon filtration will remove the remainder of the mercury and organic vapours including those that potentially cause odours (see Section 6.1).
Kingston General Hospital	Health and safety related to sharps in landfill	Landfill operators (in the Ontario region) were concerned about the health and safety of employees and requested that waste be shredded prior to disposal. The Proponent has incorporated shredding equipment into the process (Section 2.4.1).
Burnside Fleet Services	Processing of anatomical waste (*i.e*., body parts)	The proponent assured that the facility would not process such waste (Section 2.5). Such waste will be temporarily and properly stored on-site and transferred to an approved incineration facility in New Brunswick.
NSEL and Environment Canada	EIA may be required for incinerator in Moncton to accept out of province hazardous waste.	The facility in Moncton is already authorized by the New Brunswick Department of Environment and Local Government to accept and treat hazardous waste of this nature at their facility (see Section 2.4.1).
Nova Scotia Department of Health and NSEL	Efficiency of the process to fully treat the waste.	Additional information has been provided in Section 2.5 regarding confirmatory testing to ensure complete treatment of the waste.

TABLE 4.1 Summary of Stakeholder Comments and Concerns

Raised By:	Issue/Concern	Response/Resolution
Nova Scotia Department of Health, NSEL, and Environment Canada	Liquid effluent monitoring and air emissions monitoring	Additional information regarding liquid effluent is provided in Section 2.8.1. Additional information regarding air emissions is provided in 2.8.2 and 6.1.2.
NSEL	How will project impact existing facility	Operation of the existing facility may be modified as described in Section 2.7.1. Upon approval of the EA, the proponent will seek an amendment of the existing Approval to operate to incorporate treatment and transfer of biomedical waste.
NSEL	Surface runoff	Additional information related to surface water bodies and surface runoff has been provided in Sections 2.6 and 5.1.1
NSEL	Contingency planning	Contingency plans are in place for the existing operation. Additional plans will be prepared as part of the application for approval/amendments under Part V of the *Environment Act* (Section 2.8.4).
NSEL	Air emissions and use of carbon filters	Additional information regarding treatment of air emissions has been provided in Section 6.1.2.
NSEL	Safe Work Practices	Upon approval of the EA, the proponent will update the operations and maintenance manual, including safe work practices to ensure compliance with the Nova Scotia Occupational Health and Safety Act and conformance with the CCME Guidelines for the Management of Biomedical Waste in Canada (Section 2.9).
NSEL	Handling of cytotoxic wastes	This type of waste will be stored on-site temporarily and subsequently transferred to the incineration facility in Moncton for treatment and disposal (2.4.2)
NSEL	Exhaust of VOCs	Additional information related to VOCs is provided 2.8.2 and 6.1.2.
NSEL	Vehicle exhaust in the building	Additional information regarding vehicle exhaust is provided in Section 2.8.2.
NSEL	Shredding of sharps	All waste processed at the facility will be shredded prior to disposal at the landfill.
NSEL	Impacts on groundwater	A discussion of potential impacts on groundwater is provided in Section 5.1.2.
Environment Canada	Which landfill will accept the treated waste	The Proponent is negotiating with several second generation landfill operators regarding tipping fees. An approved facility will be identified as part of the approval/amendment under Part V of the *Environment Act* (Section 2.8.3).
Environment Canada and NSEL	Reporting to NPRI	The proponent will assess the requirement for NPRI reporting.
Environment Canada	Management of hazardous materials and waste	Additional information related to waste management is provided in Section 2.8.
Environment Canada	Erosion and sedimentation	Additional information related to sediment and erosion control has been provided in Section 2.6.
Environment Canada	Species at Risk	A discussion of the applicability of SARA is provided in Section 3.2.
Environment Canada	Migratory Birds	Additional information regarding compliance with the *Migratory Birds Convention Act* is provided in Section 2.6.
NSEL	Treatment / handling of controlled substances	The facility will not accept or process illegal drugs seized as part of a police investigation.

5.0 ENVIRONMENTAL AND SOCIO-ECONOMIC SETTING

5.1 Biophysical Setting

5.1.1 Surface Water

The existing and proposed expanded facilities are located in the Burnside Industrial Park, Dartmouth NS (Figure 1). The nearest surface water body is Enchanted Lake, and associated inflow and outflow streams, located approximately 250 m west of the facility. There are three storm sewers located on Gloria McCluskey Drive adjacent to the facility. Two are located along the street immediately in front of the proposed expansion facility and a third is located downgradient, approximately 50 m west of the facility. The topography of the site is such that the much of the surface runoff would drain to the vacant vegetated lot, south of the facility on Colford Avenue. Sediment-laden surface runoff will be managed on-site prior to discharge off-site. Surface runoff will likely be captured by the municipal storm sewers along Gloria McCluskey Drive or Colford Avenue. Therefore, the potential for Project to interact with Enchanted Lake is very limited, given the distance from the lake and the limited potential for surface runoff from the site.

5.1.2 Groundwater Resources

The proposed Project is located within Burnside Industrial Park which obtains its water from the municipal system which draws its water from a freshwater lake located approximately eight kilometres to the east-northeast of the site. No potable wells are known to exist within a two kilometre radius of the proposed site and therefore impacts to potable drinking water supplies are not likely to occur within the study area.

Groundwater in the vicinity of the site may provide recharge the baseflow of the inflow and outflow streams and Enchanted Lake located approximately 250 meters downgradient from the site. The potential for impacts to groundwater and subsequently to the streams and lake are associated with a potential malfunction or accidental event where the underground storage tanks (holding liquid effluent) were to leak or rupture. In the event the proponent utilizes the tanks for longer term storage of liquid effluent prior to disposal, and depending on the concentration of metals or other deleterious substances in the effluent, precautions such as installing monitor wells down-gradient of the underground tanks should be implemented.

5.1.3 Terrestrial Habitat

The study area contains four plant communities including white birch dominated forest, white birch/white pine forest, sweet fern dominated shrub thicket, and coltsfoot dominated vacant lot. No listed species were observed within the study area during the field surveys. A brief description of each is provided below and illustrated in Figure 5.

Plant Community Description

1 = White Birch Dominated Forest
2 = White Birch/White Pine Dominated Forest
3 = Sweet Fern Dominated Shrub Thicket
4 = Coltsfoot Dominated Vacant Lot

Plant Community Distribution

Property Boundary

Figure 5

Plant Community Distribution

0 30 60 Meters

Map Parameters
Projection: UTM-NAD83-Z20
Scale - 1:1,000
Project: NSD19482
Date: July 2005

Jacques Whitford

White Birch Dominated Forest

White birch dominated forest occurs in a narrow strip at the northern edge of the property and is approximately 0.081 hectares (ha) in size. This area is a remnant of forest habitat that was left after the lot was grubbed and levelled. The stand is dominated by white birch (*Betula papyrifera*) but also contains some red maple (*Acer rubrum*) and red oak (*Quercus rubra*). The shrub understory consists of a dense layer of low ericaceous shrubs, the most abundant of which are black huckleberry (*Gaylussacia baccata*), sheep sorrel (*Kalmia angustifolia*) and late low bush blueberry (*Vaccinium angustifolium*). Bracken fern (*Pteridium aquilinum*) and wintergreen (*Gaultheria procumbens*). This stand is estimated to be approximately 40 years old and probably originated as a result of forest fires that burned this area in the 1960s.

Coltsfoot Dominated Vacant Lot

This plant community is found in the center of the property on the most heavily disturbed areas and is approximately 0.126 ha in size. This area contains a lot of crushed rock which provides poor habitat for plants. There are no tree sized plants and shrub cover consists of a few willows (*Salix sp.*), blackberries (*Rubus sp*.) and white birch seedlings. The ground vegetation layer is sparse and composed largely of patches of coltsfoot (*Tussilago farafara*), Canada bluegrass, mouse-ear hawkweed, evening primrose, and Canada goldenrod. Most of the plant species found here are introduced weed species characteristic of ditches and old fields. A few tree and shrub species characteristic of early successional forests are present in small numbers.

White Birch/White Pine Forest

This plant community occupies a narrow strip at the southern edge of the property at the base of an infill, covering approximately 0.039 ha. The stand is dominated by a mixture of white birch and white pine with lesser amounts of red maple, red oak, red spruce (*Picea rubens*), and large-tooth aspen (*Populus grandidentata*) are also present. The tree canopy of this stand is characterized by the presence of two distinct layers. The upper layer consists of large white pine with an estimated age of 70 years. The lower layer is estimated to be approximately 40 years old and is composed of white birch, red maple, red oak, red spruce, and large-tooth aspen. The large white pines are probably trees that survived the fire in the 1960s. The shrub understory is moderately dense and similar in species composition to the white birch forest. The dominant shrub species are sheep laurel, black huckleberry and late lowbush blueberry. Some white birch and red spruce saplings are also present in the shrub layer. The ground vegetation layer consists of a mixture of mosses, ferns and forbs. The most abundant species are wintergreen, bunchberry (*Cornus canadensis*), bracken fern, knight's-plume moss (*Ptilium crista-castrensis*), partridge berry (*Mitchella repens*), and broom moss (*Dicranum sp*.).

Sweet Fern Dominated Shrub Thicket

Sweet Fern dominated shrub thicket is found on the steep slope at the southern end of the property and near the crest of the slope and covers approximately 0.165 ha. This area has been heavily disturbed by infilling which has resulted in the displacement of all of the forest plant species that once occupied this area. This plant community is characterized by low to moderate plant cover that consists of patches of low shrub cover dominated by sweet fern (*Comptonia peregrina*) and green alder (*Alnus viride*) that are interspersed with patches of ruderal forbs and grasses. The most abundant of these species include poverty oat grass (*Danthonia spicata*), mouse-ear hawkweed (*Hieracium pilloselloides*), wild carrot (*Daucus carota*), Canada bluegrass (*Poa compressa*), evening primrose (*Oenothera biennis*), and

Canada goldenrod (*Solidago canadensis*). The species composition in this community consists of a mixture of native and introduced species. Most of the species present are typically associated with highly disturbed sites and are not associated with forest habitats.

5.1.4 Wildlife

Given the time of the year of the site visit it was not possible to conduct a wildlife survey on the property. JW has conducted a number of bird, mammal and herpetile surveys in the general vicinity of the property and is familiar with the wildlife species that inhabit this area. The property has low value as wildlife habitat given the small size of the property and the small amount of forest habitat present. No listed species are believed to be present near the site.

Birds

Few if any birds are expected to nest on the property. The area most likely to be used as nesting habitat is the thin fringe of white birch/white pine forest found at the southern edge of the property. This habitat is part of a patch of a mixedwood and hardwood forest, extending beyond the proposed Project footprint, which forms an island of forest cover approximately 2 ha in size. Birds that could potentially nest in this area include Black-capped Chickadee (*Poecile atricapillus*), Downy Woodpecker (*Picoides pubescens*), American Robin (*Turdus migratorius*), Chestnut-sided Warbler (*Dendroica pensylvanica*), Magnolia Warbler (Dendroica magnolia), Black-and-white Warbler (*Mniotilta varia*), American Redstart (*Setophaga ruticilla*), Cedar Waxwing (*Bombycilla cedrorum*), White-throated Sparrow (*Zonotrichia albicollis*), Dark-eyed Junco (*Junco hyemalis*), and American Goldfinch (*Carduelis tristis*). It is unlikely that more than one pair of birds would nest within the area of mixedwood forest located within the property. The fringe of white birch dominated forest located at the northern edge of the property may provide nesting habitat for Song Sparrow (*Melospiza melodia*), Dark-eyed Junco, American Robin and Common Yellowthroat (*Geothlypis trichas*). Again, no more than one pair of birds is likely to nest in this area. The heavily disturbed areas on the property provide few nesting opportunities for birds since there is little cover available to hide nests. Killdeer (*Charadrius vociferous*) is the only species likely to nest in these habitats. One rare bird species, Whip-poor-will (*Caprimulgus vociferous*) has been recorded within one kilometre of the study area. This species had been recorded in the area south of the study area near the present intersection of Burnside Drive and Akerley Boulevard. It has not been recorded in this area since 1988. Various surveys conducted in suitable habitat surrounding the study area have not recorded this species suggesting that it no longer nests in the area. Whip-poor-wills typically nest on the forest floor in dry hardwood forest. The small patch of hardwood forest at the northern edge of the study area would not be large enough to provide suitable nesting habitat for this species.

Mammals

Three mammal species were recorded during the site visit including red squirrel (*Tamiasciurus hudsonicus*), varying hare (*Lepus americanus*) and raccoon (*Procyon lotor*). Other species that may be expected to use the property would include eastern chipmunk (*Tamias striatus*), deer mouse (*Peromyscus maniculatus*), masked shrew (*Sorex cinereus*) and woodland jumping mouse (*Napaeozapus insignis*). The property does not provide valuable habitat for mammals.

Herpetiles

The property provides limited habitat for herpetile species. There is no open water habitat so there is limited breeding habitat for amphibians. The only amphibians that would be expected to be present on a regular basis would be eastern redback salamander (*Plethodon cinereus*) and eastern American toad (*Bufo americanus*). Eastern redback salamanders nest in subterranean burrows under rocks or in rotting logs and do not require open water for larval or adult stages. Adult eastern American toads can live in relatively dry habitats, however, they must return to permanent water bodies to breed. This species nests in sphagnum moss hummocks adjacent to pools in swamps and bogs. There is no suitable habitat for this species on the property. Reptile species that could be expected to use the property include Maritime garter snake (*Thamnophis sirtalis*) and northern redbelly snake (*Storeria occipitomaculata*). One uncommon amphibian species, the four-toed salamander (*Hemidactylium scutatum*), has been recorded approximately 400 m south of the property in a wetland located near Enchanted Lake. No other rare or sensitive herpetile species have been recorded in the area.

5.2 Socio-economic Setting

Burnside Industrial Park is eastern Canada's largest industrial park. It is approximately 1,400 hectares in area with 1,300 businesses and 17,000 people. Ninety percent of the businesses are small and medium-sized enterprises (SMEs), employing between 2 and 50 people. It is a very diverse park with several dozen sectors represented and in which many of the sectors are represented by similar businesses. By sector, 10% of the businesses are in the manufacturing sector, 48% in sales and service, 11% in the construction industry, 9% in distribution and warehousing, 8% in retail and 14% in professional, financial and other business services.

There are a large number of companies in the same categories. For example, there are approximately 18 businesses in the printing sector, 25 vehicle maintenance facilities, 20 companies involved in computer assembly and distribution, 17 companies in electronics sales and service, 17 businesses involved in chemical processing and distribution, 21 companies in paints and coatings, 17 companies in the metal plating and finishing category and 36 trucking companies.

The park is serviced by road and rail. Halifax Regional Municipality provides water, sanitary and storm sewers while the private sector provides electrical and advanced telecommunications services.

HRM has strengthened its development standards over the 25 year period since the Park was first established. The objectives of the standards and covenants which apply to the Park's development are:

- to protect property values and enhance the investment of businesses located in the Park by providing a well planned and maintained development;
- to create an attractive and efficient business environment through sound land use, planning and environmental management standards; and
- to ensure harmonious relationships among uses.

The covenants are intended “to ensure that the Park continues to be developed in a manner consistent with superior aesthetic and environmental protection standards and with the declared intention of creating a pleasant and harmonious environment for the Park’s residents.” These covenants apply to architecture, landscaping, signage, protection of natural areas particularly streams, lakes and wetlands and require buffer zones of undisturbed habitat or suitable areas of green space around all watercourses.

Burnside is composed of old areas, which are now being redeveloped (brown field), sections which are relatively new and areas yet to be developed (green field). Companies come and go and in some years as many as 10% of the businesses in the park are undergoing some change; locating in new premises, closing, opening, and expanding. Therefore there are continuing opportunities to investigate the application of the strategies in the transformation of the park into an industrial ecosystem.

Burnside Park has excellent highway, airport, seaport, rail and public transit access. Its position on Bedford Basin near the A. Murray MacKay Bridge allows enterprises at Burnside to conveniently access amenities on both sides of the Halifax Harbour. When travelling within Halifax and beyond, Burnside Industrial Park is:

- directly accessible to Highways 111, 118 and 107
- 6 mi. (10 km) to Downtown Halifax CBD
- 3 mi. (5 km) to Ceres Container Terminal
- 7 mi. (11 km) to Halterm Container Terminal
- 13 mi. (21 km) to Halifax International Airport

6.0 VALUED ENVIRONMENTAL AND SOCIO-ECONOMIC COMPONENTS AND EFFECTS ASSESSMENT

Field studies were conducted by Jacques Whitford In March and April 2005 and consisted of a tour of the existing facility during operation as well as site reconnaissance surveys to describe the proposed expansion area and neighbouring businesses.

Temporal and spatial boundaries encompass those periods during, and areas within which, the VECs are likely to interact with, or be influenced by, the Project. Both the temporal and spatial boundaries for the assessment vary according to the VEC, but are generally limited to the duration of, and for a period of time after, the activities and the immediate Project area unless otherwise noted.

To assess the potential environmental effects of a project and determine the significance of an effect, it is important to consider the magnitude, frequency, duration, geographical extent and reversibility of the potential effect. The study team has considered these elements for each VEC/VSC, as well as the following:

- negative effects on the health of biota;
- loss of rare or endangered species;
- reductions in biological diversity;
- loss of critical/productive habitat;
- fragmentation of habitat or interruption of movement corridors and migration routes;
- transformation of natural landscapes;
- discharge of persistent and/or toxic chemicals;
- toxicity effects on human health;
- reductions in the capacity of renewable resources to meet the needs of present and future generations; and
- loss of current use of lands and resources for traditional purposes by Aboriginal persons.

6.1 Atmospheric Environment

6.1.1 Description of Existing Environment

NSEL monitors air quality at ten stations across Nova Scotia susceptible to air quality problems. Common air pollutants monitored regularly are sulphur dioxide (SO_2), particulate matter (PM), carbon monoxide (CO), ground level ozone (O_3), nitrogen dioxide (N_2O), and hydrogen sulphide (H_2S). Exceedances for these contaminants are generally small and infrequent in Nova Scotia. The closest NSEL monitoring site is in downtown Halifax.

Air quality in the region is generally good, with few exceedances noted from the downtown station. Occasional odours may be found in the vicinity of the Project originating from the nearby composting facility. Few other facilities in the immediate area of the proposed Project have a perceptible odour.

6.1.2 Potential Effects, Mitigation, Monitoring and Follow-up

The hydroclave process is a batch process, with an approximate 90 minute cycle time. During the heating phase of the cycle, the liquid in the waste is converted to vapour which pressurizes the inner chamber during the treatment period. When the pressure is released, it is done through a vent that directs the vapour to a chiller condenser unit. The water vapour and certain other materials including some volatile organic compounds are largely captured in the condensation phase in the chiller. Within the condenser, the water vapour is returned to the liquid phase which will be either directed to the municipal sanitary sewer system, underground holding tanks for subsequent disposal at an approved facility, or mixed with the sterile dry waste and disposed of at an approved landfill facility. Quantities of condensate are likely to range from a few millilitres to a few hundred millilitres from each load.

As no air is used to purge the treatment vessel, the emission from the unit will consist largely of the release of air volume within it when the loading door is opened and processed material removed. Thus the actual volume of air released during the cycle is approximately equal to or less than the volume of the treatment cylinder. There is no purging of the system before, during, or following the sterilization process. Hydroclave technology employed at the Kingston General Hospital has been monitored for contaminants in these air releases. Their samples included an extensive list of target compounds, but only four were found at levels comparable to the criteria for Ontario occupational health and safety. These criteria are applicable to time-averages, whereas the release from opening the hydroclave is in the nature of a brief puff at the release point. Acetone, carbon disulphide, methyl ethyl ketone and styrene were detected at the unloading door of the hydroclave. Detectable levels of carbon disulphide, benzene, styrene and vinylidene chloride were detected in the exhaust from the condenser. It should be noted that due to the short cyclic nature of the emissions, the sampling was conducted on a “grab” basis from the maximum release at opening.

Emissions from the Kingston facility were directed to a roof top vent. The proposed facility will direct ventilation exhaust to a scrubber. Tests conducted for the hydroclave facility in Port Coquitlam, BC (A. Lanfranco, 2002) showed that the stack emissions contained no significant organic compounds. It is anticipated that the results of testing for the proposed undertaking will be similar, and that there will be no significant impact on the environment.

Testing during commissioning will be conducted to confirm that the capture efficiency at the opening of the hydroclave is protective of worker health and safety, and that the efficiency of the scrubber unit is protective of emissions to the environment. The scrubber inlet/outlet capture efficiency will be determined by real-time measurements using an ultra sensitive device for measuring volatile organic compounds (*e.g.,* ppbRAE). During the commissioning phase, a series of readings will be taken and the results will be used, in conjunction with the manufacturer's recommended practice, to determine an appropriate and safe replacement procedure for the scrubber filter elements.

The results of work to date have indicated that the process emissions can meet the more rigorous air quality standards of Ontario where the specific volatile organic compounds are regulated. This work was directed at occupational health and safety compliance and not on emission testing. Accordingly, the proponent will conduct confirmation testing of the exhaust against the Ontario criteria and modify the scrubber system, if required, to meet the point of impingement criteria.

In addition to the above, there will be exhaust emissions from trucks delivering waste material to and from the facility. The existing facility location was selected to help optimize the routing of traffic (*i.e.,* close proximity and easy access from many provincial highways (*e.g.*, Highway 107, 111, and 118)

thereby minimizing volume of traffic and associated emissions. To further minimize vehicle emissions, trucks will be maintained regularly and kept in good working. As part of the extensive training program for the drivers, they will be instructed on the ways in which environmental impacts may be minimized. This will include driving styles and behaviours, and the strict enforcement of no-idling policies. The impact of the vehicle emissions on the environment will not be significant.

The facility will use test results from commissioning to ascertain the potential quantities of substances that are reportable through the National Pollutant Release Inventory (NPRI) and will determine the eligibility for reporting and take appropriate action. The results of the determination will be kept on file and updated as required.

It is estimated that the process and vehicle emissions will have no significant effect on the environment.

6.2 Land Use

6.2.1 Description of Existing Environment

As noted in Section 5.2, Burnside Industrial Park hosts commercial and industrial facilities of various sizes and sectors. Ship to Shore, an associate company of Bio-medical Waste Disposal Services (*i.e.*, common ownership) currently operates a hydroclave facility at 93 Gloria McCluskey Drive (Lot 938 (PID 41028184)) which currently treats international waste. Northwest of the site is the Central Nova Scotia Correctional Facility. Other nearby industrial/commercial land uses on Gloria McCluskey Avenue include:

- Miller Waste Composting Facility;
- Burnside Fleet Services;
- Himmelman Elastomers (manufacture/repair of rubber and urethane products);
- Miller Tire; and
- Atlantic Tractors and Equipment Ltd (sales/rental of CAT equipment).

Other nearby land uses include a Pressure Regulating Station for the Maritimes and Northeast Pipeline (M&NP) Halifax Lateral Pipeline, and a water supply tower owned by HRM. These facilities are typically not permanently staffed.

The proposed site for the expansion of the existing facility is a vacant site located immediately adjacent to (east) the existing facility operated by Ship to Shore. This property is currently owned by HRM.

6.2.2 Potential Effects, Mitigation, Monitoring and Follow-up

The site for the proposed facility and possible expansion are located in Burnside Industrial Park in an area zoned for industrial and commercial purposes. The aesthetics of the facility and proposed operations would be compatible with existing infrastructure and land uses in this area.

There will be some noise associated with construction of the new facility, however this noise will be temporary (*i.e.*, over a 20 week construction period) and will not exceed the NSEL Noise Guidelines. As noted in Section 5.2 and 6.2.1, the majority of land uses in the area are industrial/commercial in nature and would not be sensitive to this construction noise. While the Correctional Facility could be

considered a more sensitive receptor, the predicted sound levels associated with construction would likely be masked by existing ambient noise levels in that area (*e.g.*, existing traffic and processing facilities) and therefore not likely distinguishable at this source.

There will be minimal noise emissions associated with operation of the expanded facility, with the largest contributor of noise being truck traffic entering and leaving the facility. This type of noise is consistent with existing land use activity of the existing and adjacent facilities and sound levels currently occurring in the immediate area.

Transportation issues associated with the Project, including consideration of cumulative effects with existing traffic levels are addressed in Section 6.3.

There are therefore no predicted significant adverse environmental effects on land use as a result of this Project. No monitoring or follow-up measures are proposed with respect to land use.

6.3 Transportation Infrastructure

6.3.1 Description of the Existing Environment

The proposed Project is located on Gloria McCluskey Drive in the northwest end of the Burnside Industrial Park. This region of the Park is easily accessible from the major throughways in the Park (*i.e.*, Burnside Drive and Akerley Boulevard) and many provincial highways such as Highway 107, 111, 118, 101 and 102 and Route 7.

Akerley Boulevard is a four lane street with a curbed median. The street is a primary entrance point to Burnside Park, connecting to Highway 107 and Highway 118 just east of the intersection of Gloria McCluskey Ave. and John Savage Ave. Akerley Blvd. also provides the primary connection between Gloria McCluskey Ave. / John Savage Ave. and Burnside Drive.

Traffic data for Akerley Blvd, both east and west of the intersection with Gloria McCluskey Drive, was collected in support of this EA. The 2004 traffic volume data show an average weekday volume of 23,000 vehicles per day west of Gloria McCluskey Drive (*i.e.*, between Burnside Drive and Gloria McCluskey Drive). The peak hour traffic volumes were 2,300 in the morning and 2,200 in the afternoon/evening. On the east side of the intersection with Gloria McCluskey Drive, the average weekday volume is 18,000 vehicles per day with a morning peak of 2,000 vehicles per hour and an afternoon/evening peak of 1,900 vehicles per hour.

For the existing operation, which treats international waste, approximately 1 vehicle per day transport untreated waste to the facility and an additional 1 vehicle per day haul treated waste from the facility to the Otter Lake Waste Management Facility. This level of traffic is not anticipated to change as a result of the Project.

The level of traffic associated with the Project is presently not known at this time; however, once expanded, the potential level of traffic hauling waste to the facility could be 3-4 vehicles per day and that hauling treated waste from the facility could be 1 vehicle per day. These values are based on the treatment capacity of the proposed expanded facility. The volume of traffic hauling red bag and other waste not suitable for hydroclave treatment, could be 1 vehicle per week

6.3.2 Potential Effects, Mitigation, Monitoring and Follow-up

As indicated in Section 2.7.2, truck traffic delivering waste to the facility will be originating from various locations around the province. Truck will also haul the treated waste to an approved landfill facility. Due to the nature of the material being hauled, vehicle operators will follow a predetermined route from the waste generating facilities directly to the treatment facility. Haul routes will be identified in advance and will be done so in consultation with the Emergency Response Assistance contractor for the Project.

Given the location of the Project within an industrial park, its proximity to provincial highways and major roads, and the anticipated volume of traffic associated with the Project compared to the existing traffic volumes on Akerley Blvd, there are no predicted significant adverse environmental effects on traffic infrastructure as a result of this Project. No monitoring or follow-up measures are proposed with respect to traffic.

7.0 EFFECTS OF THE PROJECT ON THE ENVIRONMENT

Activities associated with this proposed Project will be conducted in accordance with the terms and conditions of the Environmental Assessment Approval and the amended Industrial Approval for the facility. Environmental effects of the Project will include minor air emissions and a slight increase in traffic. Terrestrial habitat within the expansion footprint indicates that this area does not include unique habitat or rare or sensitive species; therefore, these effects are not anticipated to be significant.

Assuming the mitigative measures specified in this report are implemented, and the Project is operated according to municipal, provincial, and federal legislation, guidelines and approvals, no significant adverse residual environmental or socio-economic effects are likely. Positive effects associated with the Project include:

- reduction in air emissions from incineration;
- greener technology (*i.e.*, no chemical treatment); and
- more central facility (as opposed to the existing incineration facility).

With respect to employment, a positive effect for the operation will be realized; however, this benefit to the operation may result in a decrease in employment at other similar waste handling and treatment facilities.

8.0 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

The definition of an environmental effect often includes any change to the project that may be caused by the environment. Potential effects of the environment on the Project, in this instance, are predominantly related to extreme weather events.

On a national basis, Canada shows a warming and cooling pattern with a higher overall warming trend of approximately 1.1 ºC since 1895. The Atlantic Region, however, shows a warming trend from 1895 which peaked in the mid 1950s, followed by a cooling trend in the 1990s. The overall warming trend of 0.4 ºC in Atlantic Canada since 1895 is not statistically significant. With respect to precipitation, the Atlantic Region shows an overall increasing trend in precipitation since 1948, with an increasing trend in the number of daily precipitation events above 20 mm and a slightly increasing trend in the number of daily snowfall events above 15 cm (Lewis 1997). These changes would not affect the project.

The building and lot will be designed to accommodate extreme precipitation conditions. No flooding would occur on this property.

Extreme weather events such as heavy snow fall or blizzard events, or heavy fog, wind, or rainfall have potential to affect the transportation of the waste during collection or transfer and/or could result in a loss of power at the facility. Treated waste is contained in bins which can provide storage until the processed waste can be transferred to the approved disposal facility. Contingencies are in place to provide for temporary storage of the untreated waste should extreme weather dictate the need to delay transfer of red bag, cytotoxic and pharmaceutical waste to Moncton. The refrigeration systems would provide adequate storage capacity for extended periods of weather-induced or maintenance-induced delays. Such events are anticipated to be of short duration and the provisional storage would provide for safe containment of the waste until the weather permits resumption of transportation. As an additional contingency measure in the event of extended power interruptions, waste can be transported to the incineration facility in Moncton, New Brunswick.

There is potential for heavy rainfall to affect the Project during the construction phase. Grading and site preparation activities will be minimized conducted during these periods. This will be a temporary effect and is not considered significant.

In summary, climate and meteorological conditions, including climate change, are not anticipated to significantly effect the operation of the Project over its proposed lifetime.

9.0 OTHER APPROVALS REQUIRED

As noted in Section 3.2 a permanent commercial facility for the handling of waste dangerous goods is subject to environmental assessment as a Class I undertaking under the provincial *Environment Act* Environmental Assessment Regulations.

Other provincial approvals required to operate the facility include an Approval pursuant to the Activities Designation Regulation, the approval of plans and specifications to construct and repair a steam plant (the boiler) under the *Steam Boiler and Pressure Vessel Act* Steam Boiler and Pressure Vessel Regulations. Federal approvals and permits required for the Project relate to the transportation of waste and include a Permit of Equivalent Level of Safety and approval of the Emergency Response Assistance Program.

Compliance with federal, provincial and municipal regulations and by laws referenced in Section 3.2 is also required.

10.0 FUNDING

This Project will be 100% privately funded.

11.0 REFERENCES

11.1 Literature

A. Lanfranco and Associates Inc. 2002. Organic Test Survey Results. Prepared for Hospital Sterilization Services, Port Coquitlam, BC.

Canadian Council of Minister on the Environment (CCME). 1992. *Guidelines for the Management of Biomedical Waste in Canada*. CCME-EPC-WM-42-E.

Springthorpe, Susan and Sattar, Syed. 1995. *Performance of the Hydroclave for Decontamination of Biomedical Waste: Trials Conducted on Unit Installed at Kingston General Hospital*. Prepared for Hydroclave Systems Inc. and the Ontario Ministry of Health. University of Ottawa Faculty of Medicine. Ottawa, ON. November 1995.

11.2 Personal Communications

Carr-Braint, Joel. Director of Plant Engineering and Maintenance Services. Kingston General Hospital. Kingston, ON. April, 2005.

DeFehr, Vic. President BioMed Recovery & Disposal. Aberdeen, SK. April, 2005.

Flemming, Katherine. Manager Environmental Services. The Ottawa Hospital. Ottawa, ON. April 2005.

APPENDIX A

NSEL Industrial Approval for Ship to Shore Disposal Services Inc.

NOVA SCOTIA
Department of Environment and Labour

Suite 224, Sunnyside Mall
1595 Bedford Highway
Bedford, NS B4A 3Y4

Tel: (902) 424-7773
Fax: (902) 424-0597

File:94400-30-BED-038723

November 30, 2004

Mr. Arthur Scott
Ship to Shore Disposal Services Inc.
5551 Stairs Place,
Halifax, N. S.
B3J 2Y3

Dear Mr. Scott:

RE: Amendment to Approval No. 2004-038723
Approval to Construct, Operate and Reclaim - International Waste Treatment Facility

Enclosed please find amended Approval # 2004-038723-A01 to construct, operate and reclaim the International Waste Treatment Facility at 93 Gloria Mc Cluskey Ave.,Burnside Industrial Park, Dartmouth, Halifax Regional Municipality.

This amendment revises section 7 of the approval and removes the requirement for a settling tank on the effluent discharge and incorporates a requirement for sampling as outlined below.

In relation to section 7(f) of the attached approval, Approval 2004-038723-A01, we are requesting monitoring of the liquid effluent being discharged from the Hydroclave unit (treatment vessel) for the parameters listed in the Halifax Regional Municipality Bylaw W101 Respecting Discharge into Public Sewers on the following frequency:

- Immediately after commissioning of facility
- Monthly for the first three months following commencement of operation.
- Quarterly thereafter for the first year of operation
- The failure of any sample result to meet the HRM sewer bylaw limits will require an immediate resampling of the effluent.

Monitoring information is to be submitted as outlined in section 3(o) of the Approval and notification of non-compliance as per section 3(m) of the Approval.

Please note that this sampling is independent of any sampling program that may be request/required by Halifax Regional Municipality

Strict adherence to the attached terms and conditions is imperative in order to validate this approval.

Should you have any questions, please contact me at the Central Region, Bedford Office at (902) 424-8183.

Yours truly,

Steve Westhaver, P. Eng.
Engineer

cc. D. Feldman
S. Dockerty

File: 2004-038723-A01ShiptoShore

NOVA SCOTIA
Department of Environment and Labour

APPROVAL

Province of Nova Scotia
Environment Act, **S.N.S. 1994-95, c.1**

APPROVAL HOLDER: **Ship to Shore Disposal Services Inc.**

APPROVAL NO: **2004-038723-A01**

EFFECTIVE DATE: **November 30, 2004**

EXPIRY DATE: **February 27, 2014**

Pursuant to Part V of the Environment Act, **S.N.S. 1994-95, c.1 as amended from time to time, approval is granted to the Approval Holder subject to the Terms and Conditions attached to and forming part of this Approval, for the following activity:**

The construction, operation and reclamation of a facility for the treatment of international waste at or near 93 Gloria Mc Cluskey Ave., Dartmouth, Halifax Regional Municipality in the Province of Nova Scotia.

Administrator Don Feldman
Date Signed November 29, 2004

TERMS AND CONDITIONS OF APPROVAL

Nova Scotia Department of Environment & Labour

Project: **Ship to Shore Disposal Services Inc.**
International Waste Treatment Facility
93 Gloria Mc Cluskey Ave.,
Burnside, Dartmouth,
Halifax Regional Municipality

Approval No: 2004-038723-A01

File No: 94400-30-BED-038723

Reference Documents:

- Application for Approval signed January 26, 2004 and all supporting documentation submitted to the Department in file # 94400-30-\BED-038723.
- Application for amendment signed June 23, 2004 and attachments.
- Ship to Shore Disposal Services Inc E-mail and attached letter dated November 24, 2004.

Terms and Conditions:

This approval is subject to the following terms and conditions:

1. Definitions:

a) "Act" means the Environment Act S.N.S. 1994-1995, c.1 and includes all regulations made pursuant to the Act

b) "Department" means the Central Regional Office, of the Nova Scotia Department of Environment & Labour located at the following address:

Nova Scotia Department of Environment & Labour,
Central Regional Office,
Suite 224, 1595 Bedford Highway,
Bedford, Nova Scotia, B4A 3Y4.

Phone: (902) 424-7773
Fax: (902) 424-0597

c) "International Waste" means aircraft garbage and ship's refuse as defined by the federal "Health of Animals Regulations" and subsequent revisions or amendments. The waste stream does not include waste which originates in Canada or the United States.

d) "Facility" means the treatment and handling facility for international waste.

e) "Minister" means the Minister of the Nova Scotia Department of Environment & Labour.

f) "Approval Holder" means Ship to Shore Disposal Services Inc.

g) "District Manager" means the district manager of the Central Regional Office of the Nova Scotia Department of Environment & Labour or the Regional Manager's designate.

h) "Waste Dangerous Goods" means dangerous goods that are no longer in use for their original purpose or materials which have become waste dangerous goods through handling including dangerous goods intended for treatment, disposal, recycling, but does not include dangerous goods returned directly to the manufacturer or supplier of the dangerous goods for reprocessing, repacking or resale.

2. Scope of Approval

a) This Approval (the "Approval") relates to the Approval Holder and their application and supporting documentation, as listed in the reference documents above, to construct, operate and reclaim the Facility, situated at or near 93 Gloria McCluskey Ave., Burnside Industrial Park, Dartmouth, Halifax Regional Municipality (the "Site").

b) This Approval replaces previous Approval 2004-038723 which is now null and void.

c) The Approval Holder shall only accept international wastes as defined in Section 1(c). The Approval Holder shall not knowingly accept or treat waste dangerous goods or biomedical waste at the Facility.

d) Treatment of international waste shall be with Hydroclave Model H-65 or equivalent approved by the Department

3. General

a) The Approval Holder shall construct, operate and reclaim the Facility in accordance with provisions of the:

i) Environment Act S.N.S. 1994-1995, c.1 (the "Act")
ii) Regulations pursuant to the above Act;
iii) Any future amendments to the above Act and regulations;

b) The Facility shall be operated in accordance with the details, specifications and the referenced documents listed above.

c) No authority is granted by this Approval to enable the Approval Holder to construct the Facility on lands which are not in the control or ownership of the Approval Holder. It is the responsibility of the Approval Holder to ensure that such contravention does not occur. The Department reserves the right to revoke, cancel or suspend the Approval should such contravention occur.

d) Any changes from the facility details included with the reference documents must be authorized, in writing, by the Department prior to construction or implementation.

e) No authority is granted by this Approval to enable the Approval Holder, its agents, employees, or contractors to construct the Facility in contravention of any federal, provincial, or municipal act, regulation, guideline or bylaw. It is the responsibility of the Approval Holder to ensure that such contravention does not occur.

f) The Minister reserves the right to modify, amend, or add terms and conditions to this Approval at any time.

g) Pursuant to the Approvals Procedure Regulations, this Approval is not transferrable without the written permission of the Minister.

h) (i) Subject to Section 58(2)(b) and (4) of the Act, if the Minister determines that there has been non-compliance with any term or condition provided in this Approval, the Minister may cancel or suspend the Approval until such time as the Minister is satisfied that all terms and conditions have been met.

(ii) Notwithstanding (i), any non-compliance with this Approval, the Act, or regulations is subject to the penalty provisions under the Act.

i) The Approval Holder shall bear all costs and expenses incurred in carrying out the monitoring as and when required under the terms and conditions of this Approval.

j) Unless specified otherwise in this Approval, all samples required to be collected by this Approval shall be collected, preserved and analysed, by qualified personnel, in accordance with recognized industry standards/procedures.

k) Unless specified otherwise in this Approval, all samples required by this Approval shall be analysed by an accredited laboratory that is certified to analyse the specific parameter unless written approval otherwise is received from the Regional Manager.

l) The Approval Holder shall ensure that this Approval, or a copy, is kept on Site at all times and that personnel directly involved in the construction of the Facility are made fully aware of the terms and conditions which pertain to this Approval.

m) The Approval Holder shall immediately notify the Department of any incidents of non-compliance with this Approval.

n) The Approval Holder shall submit any monitoring results or reports required by this Approval to the Department.

o) Unless specified otherwise in this Approval, all monitoring results shall be submitted within 30 days following the month of monitoring.

p) The Approval Holder shall notify the Department prior to any proposed extensions or modifications of the Facility, including process changes or waste disposal practices which are not approved under authorization of this Approval.

q) Any request for renewal or extension of this Approval is to be made in writing at least sixty (60) days prior to the Approval expiry.

r) The Approval Holder shall designate in writing, to the Department, a contact for this Approval.

s) The Approval Holder shall forthwith submit to the District Manager any information respecting any adverse effect or potential adverse effect arising from any activity covered by this Approval.

t) The Approval Holder shall inspect the Site daily, maintain good housekeeping ~~practices and take appropriate action to reduce odour generation,~~ leachate losses and vector problems.

u) The Facility shall have adequate security to prevent illegal dumping and vandalism.

v) The Approval Holder shall develop and maintain a contingency plan to deal with the following mishaps:

i) disposal of leachate which does not comply with discharge requirements,
ii) handling and disposal of incidental waste dangerous goods in waste shipments,
iii) fire,
iv) odour release to environment,
v) equipment breakdowns, including provision for backup parts,
vi) rejection of wastes at the landfill,
vii) failure to meet other requirements

w) The contingency plan shall be made available to the Department upon inspection at the Site.

4. Operation

a) All vessels or containers used for handling international waste shall be leak proof, lockable and clearly labelled as international waste.

b) The Approval Holder shall not store in excess of 10 tonnes of treated and/or untreated international waste on Site at any one time unless given specific approval by the District Manager.

c) All international wastes shall be treated and removed from the Facility within 48 hours of acceptance at the Facility unless given approval by the District Manager.

d) Any rejected, residual or waste materials that are segregated from the international waste shall be stored for ultimate disposal in a manner which prevents odour, vector and aesthetic problems. These rejected materials shall be removed from the Facility on a minimum weekly basis and disposed in manner approved by the Department.

5. Air Emissions

a) The Approval Holder shall ensure that air emissions from the Facility comply with the following limits established as follows:

(i) Sound levels shall not exceed the following limits at any monitoring station designated by the Department which is situated at or beyond the property boundary:

Leq	65dBA (0700-1900 hours) Day 60dBA (1900-2300 hours) Evening 55dBA (2300-0700 hours) Night

(ii) Total suspended particulate shall not exceed the following limits at any monitoring station designated by the Department which is situated at or beyond the property boundary:

Annual Geometric Mean	70 µg/m^3
Daily Average	120 µg/m^3

(iii) Numerical or quantitative limits on odour shall be established at the discretion of the Department if odour impacts beyond the property boundaries are deemed to be excessive.

b) Where the Approval Holder is contributing to non-compliance with the limits established in condition 5(a), the Approval Holder shall be required to implement a corrective action plan which may include ambient air monitoring, air modelling or risk assessment studies. Monitoring to determine compliance with limits established in condition 5(a)(i),(ii) and (iii) shall be conducted at the request of the Department.

c) The generation of fugitive dust from the Site shall be suppressed by the use of water sprays or the application of other suitable dust suppressants approved by the Department. The use of used oil as a dust suppressant is not permitted.

d) The Approval Holder shall have standard procedures to address odour complaints associated with the Facility which would include;

(i) Immediately investigate the cause of the complaint and undertake immediate and appropriate action, if necessary, to correct the problem.

(ii) The Approval Holder shall record all odour complaints and document the date, time, name, address and telephone number of the individual lodging the complaint. The record shall also state any cause of the odour and the action taken to correct the problem.

(iii) Records referenced in condition 5(d)(ii) shall be made available to the Department upon request.

e) ~~The Approval Holder shall be required to implement odour control measures~~ in the time limit prescribed by the Department, if odour generation is deemed excessive by the Department. The Approval Holder shall be required to reduce or cease Facility operations if the odour control measures do not reduce odour to the levels deemed acceptable by the Department or if delays are experienced implementing odour control.

6. Erosion and Sediment Control During Construction

a) The Site shall be developed and maintained to prevent siltation of the surface water which is discharged from the property boundaries into the nearest watercourse or beyond the property boundary. The Nova Scotia Department of the Environment " Erosion and Sedimentation Control Handbook For Construction Sites" shall serve as the reference document for all erosion control measures. These measures are minimum requirements and additional controls shall be implemented if Site runoff exceeds the discharge limits contained herein.

b) No authority is granted by this Approval to enable the Approval Holder to discharge surface water beyond the property boundary and onto adjoining lands without the authorization of the affected landowner(s). It is the responsibility of the Approval Holder to ensure that the authorization of said landowner(s) is current and valid. Failure to retain said authorization will result in this Approval being null and void.

c) Erosion and sedimentation controls shall be installed prior to the commencement of construction.

d) The Approval Holder shall ensure the following liquid effluent levels from any discharge from the Site are met. Monitoring of liquid effluent discharges shall be conducted at the request of the Department. Monitoring stations and procedures shall be approved by the Department.

Liquid Effluent Discharge Limits During Construction

Parameters	Maximum in a Grab Sample	Monthly Arithmetic Mean	Monitoring Frequency
Total Suspended Solids	50 mg/l	25 mg/l	As requested by NSDEL
pH	5 - 9	5 - 9	As requested by NSDEL

e) Non-compliance of the effluent discharge limits noted in clause (d) shall be immediately reported to the Department.

f) The Department reserves the right to modify the monitoring locations, parameters and frequency, and to require remedial measures depending on the information obtained.

7. Wastewater Management

a) All international waste shall be unloaded from the shipping container or vessel in a designated area of the facility having impermeable secondary containment draining to a leak proof collection sump with a minimum 4,000 litre capacity.

b) All leachate, wastewater and wash water collected in the sump shall be directed to the hydroclave unit for treatment prior to discharge to the sanitary sewer.

c) The Approval Holder shall minimize leachate and liquid effluent generation at the Facility. All effluent shall be discharged to the municipal sanitary sewer system unless otherwise granted written authorization by the Department.

d) The Approval Holder shall provide written confirmation on or before December 31, 2004 that they have contacted Halifax Regional Municipality regarding the discharge of the effluent to the sanitary sewer system. The results of any sampling program requested by Halifax Regional Municipality shall be submitted to the Department on a quarterly basis.

e) The Approval Holder shall contact the Department immediately should a change in discharge location for the effluent be considered. No change in discharge location for the effluent shall take place without prior written approval from the Department.

f) The Approval Holder shall conduct monitoring of the liquid effluent as requested by the Department.

g) Based on the sample results, the Department may alter the frequencies, location, and parameters for analyses required for this Approval.

h) The Approval Holder shall, if necessary, be required to implement remedial measures including design, installation and operation of wastewater treatment systems to comply with the Halifax Regional Municipality's Bylaw W-101 Respecting Discharge into Public Sewers, if so directed by the Department.

8. Groundwater Management

a) The Approval Holder shall develop and implement a groundwater monitoring program at the request of the Department.

b) Adverse environmental impacts to ground water quality which are attributed to the operation of the Facility or activities occurring on the Site shall be remediated to the satisfaction of the Department.

9. Operation and Maintenance Manual

a) An Operation and Maintenance Manual shall be prepared for the Facility prior to the commencement of operation. The manual shall be updated routinely and include the following:

(i) Up-to-date as-built drawings and specifications for the Facility,
(ii) a copy of the most recent Approval for the Facility including the terms and conditions,
(iii) a complete description of the standard operating procedures for the Facility,
(iv) a copy of the most recent contingency plan.

b) The Operation and Maintenance Manual shall be available on-Site for inspection by staff of the Department.

10. Litter Control

All litter is to be contained on Site and periodically removed for disposal. Any off-site litter caused by the Facility shall be collected immediately for storage on-Site or disposal.

11. Vector Control

The Approval Holder shall provide effective means of vector control. If vector control measures employed by the Approval Holder are deemed to be inadequate by the Department, additional control measures or changes to the operation of the Facility may be requested.

12. Reports and Records

a) The Approval Holder shall maintain daily records of the following information for the previous two(2) years of operation:

i) Date of receipt of each load,
ii) Weight of waste received in each load,
iii) Quantity and types of treated and untreated waste stored on-Site,
iv) Quantity and types of waste disposed,
v) Waste disposal location,
vi) Operating times, temperatures and pressures for the Hydroclave unit,
vii) Approximate volume of effluent released to sewer

b) The Approval Holder shall submit to the Department an annual report which shall include the following information:

A summary of the wastes handled at the Site including,

(i) Quantities of international waste received at the Site during the period,
(ii) Weight of international waste sent for dispsoal,
(iii) Weight of other wastes sent for disposal,
(iv) Weight of other materials sent for disposal or recycling,
(v) Results of any liquid effluent or other environmental analysis conducted to comply with conditions of this Approval.

13. Abandonment and Reclamation

a) The Approval Holder shall submit a closure plan to the Department for approval. The closure plan shall indicate the method of Site cleanup and reclamation that will be used and shall be submitted 60 days prior to the proposed abandonment of the Facility.

APPENDIX B

Correspondence from Other Hydroclave Facility Operators

BIOMED
RECOVERY & DISPOSAL

Serving
Hospitals
Lodges
Clinics

To whom it may concern.

We are a medical waste company located in Saskatoon Saskatchewan Canada. Our company has been in the medical waste business since 1994. We had grown to the point where we had to build our own disposal facility. We looked at all the existing technologies for treating medical waste and settled on the H65 Hydroclave. We designed and built a processing plant to accommodate the new H65 complete with cooler, processing, office, maintenance and storage areas.

Because of the nature and reputation of the Hydroclave process we were able to obtain the necessary approvals from all 16 different government departments without much difficulty. From the time we made the decision to go with the Hydroclave until we were in operation was 15 months. We have all of our approvals, licenses and permits on display in our office including the sterilization test results as specified by the government. We are pleased to say that sterilization levels have consistently far exceeded government requirements. Requirements being log 4 and levels consistently obtained being log 6 to log 8.

We have found that the H65 can obtain or exceed the claims made by the manufacturer in terms of the volume and sterilization levels it can produce. However, we have found that dehydration of some high moisture wastes can lengthen the drying time by about 15 minutes. Therefore, operating the Hydroclave requires skill and training in terms of being able to select a balanced mixture and in terms of loading and unloading if optimum levels of production are to be reached. We have also found that the machine must be cleaned and maintained properly if down time is to be avoided.

In short we are convinced that we have made the right choice. Operating costs are proving to be consistent with the claims made by the manufacturer. Our capital costs and operating costs are proving to be much lower than our competitors. One of which has a microwave and the other an incinerator. We are able to consistently under bid them and our accountant says our profit margin is rising.

Sincerely,

Enos L. Willett

Enos Willett President

Hospital Sterilization Services Inc
1425 Kebet Way
Port Coquitlam, BC
Canada V3C 6L3
Tel: 604-945-8838
Fax: 604-945-8838
E-MAIL: rhaynes@iotron.com

September 24, 2002

To Whom It May Concern

Re: Hydroclave Systems Corp.

Hospital Sterilization Services Inc. (HSS) is a waste management facility operating in British Columbia Canada. HSS specializes in the collection, storage, treatment, and disposal of biomedical waste. Our British Columbia reference waste treatment facility has been designed as a turnkey solution to reduce downtime and maximize efficiency. The HSS facility is capable of treating up to 6,000 kgs of biomedical waste per day. HSS currently provides services to three major health regions encompassing 36 health facilities. Our waste management systems core technology is the Hydroclave. Two H-100 Hydroclaves are currently in use at the HSS Treatment Facility.

Prior to purchasing the Hydroclaves HSS researched other technologies (microwave, autoclave, rotoclave, pyrolysis, etc.) for the most environmentally friendly, lowest operating cost, high quality of workmanship and the ability to achieve sterility at 6^{10} log. The Hydroclave technology met these criteria and is by far the best available technology on the market. Our assessment of this technology was verified by an international biomedical waste technology panel, on contract by the British Columbia Government Health Regions, who found the Hydroclave technology to be the most appropriate technology for the destruction and sterilization of biomedical waste.

Our experience with the Hydroclave technology is that it is dependable, low operating costs ($0.025 Cdn per kilogram), continuously obtains sterility at 6^{10} log, and there is no harmful air or water effluent to be concerned with. The Hydroclave process is chemical free and its treatment process is through low temperatures and pressure resulting in no harmful emissions discharged to the environment.

In addition to the Hydroclave technology HSS purchased a boiler to operate the Hydroclave, a conveyor system, shredder and wash station for reusable waste containers. Mr. Vanderwal's firm were instrumental in the design and development of the HSS waste management system's equipment and we are very happy with the outcome of their efforts. All of the accompanying equipment has operated as specified and HSS is very pleased with the training provided by Hydroclave Systems Corp. Mr. Vanderwal has been extremely helpful in assisting with

operational issues and we continue to access his company's expertise in waste management equipment.

HSS experience with Hydroclave Systems Corp. owner, Mr. R. Vanderwal, and his staff, has always been positive and we look forward to a long term relationship with the Hydroclave technology.

I have no hesitation in recommending the Hydroclave Systems Corp. for the manufacture and installation of the Hydroclave and associated equipment.

Yours truly,

R. Haynes

Richard Haynes
Vice President Operations & Business Development

World's First in Biomedical Waste Management at Kingston General Hospital

Julie White

While the issue of proper cleaning, disinfection and sterilization of medical devices has been thrust into the spotlight for health care organizations across the province, officials at Kingston General Hospital (KGH) are going one step further by sterilizing their biomedical waste.

Through the use of "hydroclave" technology, the tertiary academic health care centre utilizes an effective, affordable alternative to biomedical waste incineration. Hydroclave technology sterilizes waste using steam with a fast, even heat penetration that hydrolyzes the organic components and dehydrates it. The resulting byproduct is a fragmented, sterile, lighter form of waste that is safe for landfill.

In layman's terms, the system allows the hospital to sterilize items such as discarded needles and blood-soaked materials, so that they may be safely sent to landfill. Environmental and medical waste regulations have tightened over recent years, creating a need for expensive upgrading for existing incinerators. Because health care providers are responsible for their own medical waste from the point of generation to final disposal, costs for disposal, as well as insurance, have increased.

At KGH, **Jim Jeroy**, Director of Environmental Services says the hydroclave has provided KGH with an affordable way of safely disposing of its biomedical waste. There are also environmental benefits, he notes, as the steam used through the process is recirculated into the institution's steam system.

The world was first introduced to hydroclave technology at KGH in 1995. Today, the facility is still a tour site for delegations from around the world.

In 1994, officials at KGH were investigating alternatives to contracting out biomedical waste disposal services. That's when Kingston area engineering entrepreneur **Richard Vanderwal**, now owner of Hydroclave Systems Corporation, entered the picture.

"*KGH was a partner in developing this technology when we secured a grant from the National Research Council,*" Vanderwal recalls. "*We participated with KGH to trial test and run the first hydroclave ever. It really has proven itself in terms of absolute sterility and extremely low environmental emissions.*" Other partners in the development of the prototype included the Ministry of Environment and Energy and the University of Ottawa, which acted as an independent testing facility.

"*We chose hydroclave as we thought it was the safest for our staff to operate, very cost effective and was a local supplier,*" notes **Joel Carr-Braint**, KGH Director, Plant Engineering and Maintenance. Competing autoclave technology left concerns about waste trapped inside containers and can be expensive to operate, while chemical, microwave and macrowave technology can be labour intensive and hard to test and monitor in-house, he maintains.

Monitoring is essential to ensure that infection control protocols are met, Jeroy notes. A live spore is placed in a specially designed basket and processed with each load of the hydroclave. Before the waste is shipped to landfill, a report must come back from the in-house laboratory stating that the spore was killed during the process. "*We have never seen a spore come back not killed with hydroclave technology,*" Carr-Braint states

But that isn't to say it has been a perfect process. Several operational concerns arose with the first prototype, particularly issues involving a pungent odour that was emitted. Located on the shore of Lake Ontario, wind blowing from the lake was sending the odour from the hydroclave back into the hospital through loading docks and air intake valves, resulting in many complaints.

Those challenges, and others that were identified by staff members, have been worked out with the recent installation of KGH's new H100 model. Now, the hydroclave is located in its own room and features air scrubbers similar to those used in rendering plants in the Kitchener-Waterloo area. The pipes are specially insulated and airflow into the room is carefully gauged.

It took a number of weeks to bring the new machine on-line, Carr-Braint adds, noting that, "*we made some pledges to our staff – environmental services and maintenance – with a commitment that their input would be taken seriously. We are doing the best that we can possibly do.*"

That credo rings true for the way in which biomedical waste is separated from regular landfill materials. "*Because KGH uses a hydroclave, we err on the side of caution. We use the hydroclave for disposing of things that could go to landfill that are close to being biomedical, but aren't,*" Jeroy notes.

With the hydroclave, a decision to pitch something into a yellow bag as opposed to a clear one doesn't carry a huge price tag, so less time is spent segregating waste at the source. "*We err on the side of safety,*" Carr-Braint says.

Throughout the process, masks, gloves and other personal protection gear are mixed together with traditional biomedical waste such as blood bags and needles. The savings have been incredible – KGH has saved more than $1 million through the use of the hydroclave technology.

"*To dispose of $100,000 of biomedical waste off-site through a licensed hauler, you would spend another $30,000 in boxes and bags for transport,*" Jeroy says. "*We don't have to do that with the hydroclave.*"

Today, KGH processes three loads through two-hour cycles in the hydroclave, five days a week, running approximately 400,000 pounds of biomedical waste through annually. The

processed material is then shredded and placed in a special bin. When it is full, Canadian Waste Systems takes it to landfill and places it in a separate cell from the regular stream of household waste.

For more information on the hydroclave, contact Joel Carr-Braint, Director of Plant Engineering and Maintenance Services, KGH at 613-549-6666 ext. 4030.

***Julie White** is a Public Affairs Specialist at Kingston General Hospital.*

Performance of the Hydroclave for Decontamination of Biomedical Waste

Trials conducted on unit installed at Kingston General Hospital

Submitted to

Hydroclave Systems Corp.

1361 Middle Road, Kingston, ON.

& Ontario Ministry of Health

Susan Springthorpe & Syed Sattar

Department of Microbiology & Immunology

Faculty of Medicine, University of Ottawa

Ottawa, ON.

November 1995

INDRODUCTION

Mr. Richard Vanderwal of Hydroclave Systems Inc. approached the University of Ottawa regarding testing of the machine (Hydroclave) which Hydroclave Systems Inc. had developed for the treatment of biomedical waste. A protocol for such testing was submitted to the Ontario Ministry of Health on September 27, 1995. Subsequent to verbal approval of this protocol given to Mr. Vanderwal, and authorization for him to conduct the testing using normal hospital waste, testing was conducted by the University of Ottawa on a prototype machine installed at Kingston General Hospital between October 4, 1995 and November 11, 1995. This report describes these tests in detail.

METHODOLOGY

The Hydroclave installed at Kingston General Hospital is shown in Figure 1. As noted above, the protocol for testing this machine was submitted to the Ontario Ministry of Health for approval in September 1995. Tests were conducted according to the submitted protocol. The only change was due to an unfortunate incident, which occurred when staff at Kingston General Hospital accidentally discarded all the biological indicator which were stored in the cold room. The tests were therefore conducted in two stages. The original tests to determine cycle time (Runs 1-6) and one additional run at 121°C (Run 8) and one run at 132°C (Run 7) were conducted using all of the biological indicators originally described. Discard of the biological indicators occurred shortly after October 6, 1995. This meant that an additional batch of biological indicators with nominal population in excess of 10^6 . Sportorol STS-06 were obtained with a nominal population of 1.7 X 10^6 (Appendix 1) and these were used for the remaining tests at 121°C and 132°C which took place between October 23 and November 11, 1995. All biological indicators were held in a specially constructed container (Figure 2) in order to hold them away from the rotating blades of the Hydroclave and to prevent them from damage during the operation of the unit.

It was difficult to assess the water content of the waste loads from the hospital but additional water (20 LB) was added to some of the loads as indicated in the tables in the results section to make sure the load was wet. Because of the way the Hydroclave functions however, the water content of the loads is used to generate the pressure and so the water content is a less important factor than in a conventional autoclave. Whenever steam was used in addition to the water content of the load, this is shown in the tables of results.

As described in the original protocol, measurements of temperature and pressure during the runs were taken manually during this initial testing of the prototype. The timing for the run was started only after the proper temperature was reached. Subsequently, automated instrumentation will be installed for this purpose. At that time, the cycle time will start only after the thermocouple indicates the proper preset temperature. The thermocouple will be located at the coolest part of the unit, which will be where any water in the load accumulates at the base of the machine.

Waste load weight reductions were determined on two runs only.

RESULTS & DISCUSSION

Specifications for the Bacillus stearothermophilus spores in the biological indicators used are shown in Table 1; all BI's were stored according to the manufacturer's recommendations. Populations were determined for all the biological indicators according to USP procedures. These values are shown in the last column: two of the BI's were marginally out of compliance with USP guidelines. Kilit showed values marginally below 50% of the nominal value, but this was not felt to be significant since it appeared to be the most robust during the testing. The Sportrol STS-06 was marginally more than 300% of the nominal value. Likewise, this was not felt to be significant. More disturbing was the lack of any growth in the Attest even after the minimum cycle time (Table 2) in spite of the fact that determination of the mean titre showed that it was in compliance with its nominal value. We have no explanation for this and could not examine it further since it was among the biological indicators discarded.

Table 2 shows a summary of all 16 runs performed. Runs 1-6 determined the cycle time at 121°C to be 30 min. Run 7 confirmed that an equivalent result could be obtained at 132°C in only 15 min. Run 8 repeated the 30 min. run at 121°C. After the loss of the biological indicators and their replacement by Sportrol STS-06 with a nominal population of 1.7×10^6, runs 9-11 repeated the 30 minute cycle at 121°C and confirmed it to be effective. Runs 12-14 repeated the 15-minute cycle at 132°C, which equally was shown to be effective at inactivating the biological indicators. Runs 15 and 16 were selected because they were comprised entirely of garburator waste and were very heavy wet loads. The biological indicators included in these runs at 132°C for 15 min. at temperature showed no growth. Tables 3-18 show details of the temperature and pressure achieved during the runs. It can clearly be seen from these data that the different nature of the waste in each of the runs had an effect on the length of the entire run time, although the time for which the load was held at temperature was constant. These differences in run time can be predicted from the way the Hydroclave is designed to function.

Weight reductions in the waste load during operation of the Hydroclave were determined on only runs 1 and 2; these showed reductions of 32.6% and 38.4%, respectively. However, the weight reductions achievable will be a function of the percentage of water in the load. Figure 3 and 4 show the dry waste removed from the Hydroclave after treatment. The overall size of the waste can be seen from the cans and jugs it contains. Addition of a grinder to further reduce the size of the waste and make it unrecognizable may be desirable when biomedical waste itself is being treated.

CONCLUDING REMARKS

The Hydroclave appears to be highly suitable for the treatment of biomedical waste and can achieve an inactivation of microbial load of $>10^6$ equivalent of B. stearothermophilus within 30 minutes at 121°C or within 15 minutes at 132°C. Although the cycle time may be able to be shortened even further at 132°C, 15 minutes is a relatively practical period and a shorter exposure may be unnecessary. If however it was desired to shorten the cycle time at temperature even further at 132°C, then further timed tests would be required.

Note: Although the Kilit biological indicator appeared to be the most robust in the initial tests, no equivalent bioindicator with $> 10^6$ spores was available.

Table 1 **Specifications of *Bacillus stearothermophilus* in Biological Indicators used**

Biological Indicator	Manufacturer	Lot #	ATCC Strain #	D_{121} [D_{132}] (min)	Expiry date	Nominal population per strip/ampoule	Mean Titre per strip/ampoule
Attest 1262/1262P	3M	282	7953	1.8[n/a]	July 97	4.60E+05	7.10E+05
Kilit	BBL	L5GMOD	7953	1.8[n/a]	June 96	4.40E+04	2.04E+04
Sportrol STS-05	NAMSA Inc.	S49503	7953	1.9[0.12]	Dec.96	1.90E+05	1.30E+05
Biosign	MDT	181195B	7953	2.78[0.44]	Aug. 96	1.00E+04	2.86E+04
In house BI	University of Ottawa	n/a	12980	n/a	not available, freshly prepared	not available	6.00E+05
In house BI	University of Ottawa	n/a	12980	n/a	not available, freshly prepared	not available	6.00E+04
In house BI	University of Ottawa	n/a	12980	n/a	not available, freshly prepared	not available	6.00E+03
In house BI	University of Ottawa	n/a	12980	n/a	not available, freshly prepared	not available	6.00E+02
Sportrol STS-06	NAMSA Inc.	S48403	7953	2.1[0.1]	Feb. 97	1.7×10^6	6.00E+06

n/a = not available

Table 2

Determination of cycle time required for fill of Bacillus stearothermophilus and test runs at 121°C and 132°C

Run #	Time (min)	Temp (°C)	Pressure (psi)	Attest (7.1×10^5)	Kilit (2×10^4)	Sportrol (1.3×10^5)	Biosign (2.9×10^4)	BI (6×10^5)	BI (6×10^4)	BI (6×10^3)	BI (6×10^2)	Sportrol (6×10^6)
1	15	121	20	-	+	+	+	+	+	+	+	nd
2	10	121	15	-	+	+	+	+	+	+	+	nd
3	20	121	22	-	+	+	+	+	+	+	-	nd
4	25	121	22	-	+	-	-	-	-	-	-	nd
5	30	121	25	-	-	-	-	-	-	-	-	nd
6	40	121	35	-	-	-	-	-	-	-	-	nd
7	15	132	45	-	-	-	-	-	-	-	-	nd
8	30	121	30	-	-	-	-	-	-	-	-	nd
9	30	121	30	nd	nd	nd	nd	-	-	-	-	-
10	30	121	28	nd	nd	nd	nd	-	-	-	-	-
11	30	121	30	nd	nd	nd	nd	-	-	-	-	-
12	15	132	40	nd	nd	nd	nd	-	-	-	-	-
13	15	132	37	nd	nd	nd	nd	-	-	-	-	-
14	15	132	42	nd	nd	nd	nd	-	-	-	-	-
15	15	132	37	nd	nd	nd	nd	-	-	-	-	-
16	15	132	37	nd	nd	nd	nd	-	-	-	-	-

nd = not done

IMSL

INDUSTRIAL MICROBIOLOGICAL SERVICES LTD

Grundon Waste Managment
Lakeside road
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Berkshire
SL3 0EG

IMSL
Pale Lane
Hartley Wintney
Hants
RG27 8DH

13th December 2004

Testing of Health Care Waste Sterilisation Unit at Grundon Waste Management using *Bacillus stearothermophilus* Spore Strips.
IMSL/2003/04/002.1B

Dear Bob,

We have now completed the analysis of the *Bacillus stearothermophilus* spore strips that were tested in your Health Care Waste Sterilisation Unit on the 8th December 2004. The spore strips used each contain a population of 1.5×10^6 viable spores of *Bacillus stearothermophilus*. The spores of this species are certified to survive for 9.7 minutes at 121°C, but absolute kill is achieved after 23.4 minutes although at higher temperatures these times may vary.

Spore strips were sent via Initial City Link to Grundon Waste Managemnet for exposure in your Health Care Waste Sterilisation Unit. All controls were held at room temperature while the tested spore strips were exposed. After exposure in the Health Care Waste Sterilisation Unit both the exposed and the non-exposed spore strips were sealed in labelled sterile bottles and were delivered to IMSL by hand. Once both the exposed and the non-exposed spore strips reached IMSL they were immediately transferred aseptically to flasks containing a liquid growth medium (50ml Trypcase Soy Broth). The flasks were then incubated at 50°C under constant agitation (orbital incubator at 200rpm) for a 5 day period and inspected visually for the presence of turbidity (indicating growth). The results are shown in the table below.

Table 1: Results of Growth Status on Processed Spore Strips.

Sample	Waste Volume (Litres)	Test	Control
8/12/04 am	Unknown	Clear	Turbid

It can be seen from the results above that the spore strips were not affected adversely by the transportation to Grundon Waste Management as the control samples showed good growth turning the growth medium turbid during the 5 day incubation period at IMSL. In contrast, the 'test' samples did not show any growth over the entire 5 day period and the growth medium remained clear throughout. As the recovery method is capable of detecting the presence of a single viable spore (ie Limit of Detection is 1 viable spore or greater per strip), an absence of growth suggests that a level of kill in excess of 6 orders of magnitude has been achieved. It can therefore be concluded that the *Bacillus stearothermophilus* spores were inactivated during the period in which they were in the Health Care Waste Sterilisation Unit and that a 6 log reduction in the size of the population was achieved.

Regards,

G W Iredale

Gillian W Iredale

LAIDLAW

LAIDLAW WASTE SYSTEMS

Laidlaw Waste Systems Ltd.
3410 South Service Road
P.O. Box 5057, Station A
Burlington, Ontario
L7R 3Y8

Burlington: (905) 333-5011
Toronto: (905) 826-3200
Fax: (905) 333-5027

Hydroclave Systems Inc.,
1361 Middle Road,
Kingston, Ontario,
K7L 5H6

1996 04 16

Attention: Richard Vanderwal

Dear Sir,

Re: Laidlaw landfill, Richmond Ontario
Acceptance of Biomedical Hospital Waste

Further to our conversation today, this letter provides you with Laidlaw Waste Systems (Richmond) Ltd.'s acceptance of the following materials subject to the conditions outlined in the Ministry of the Environment and Energy letter of March 1, 1996 from Mr. Gordon Donnelly to you.

1. **Non hazardous biomedical waste that has been hydroclaved to sterility.**
2. **Clothing and fibrous materials that have been hydroclaved.**
3. **Plastic, rubbers and sheet materials that have been hydroclaved.**
4. **Ground and/or shredded sharps and metals that have been hydroclaved.**
5. **Any "yellow bag waste".**

Please be advised that Laidlaw has a concern that all sharps and metal objects are crushed or shredded for the safety of our associates.

Specifically excluded are pathological, anatomical, radioactive and cyclo-toxic waste defined by Ministry of the Environment and Energy of Ontario in Regulation 347.

This material can originate from any hospital in Ontario and is to be delivered to the Laidlaw Landfill in Richmond Township, Ontario.

If there are any questions please contact either Jack Varrette at 613-388-1057 or the undersigned.

Yours sincerely,
LAIDLAW WASTE SYSTEMS (RICHMOND) LTD.

Michael J. Pullen P.Eng.
Director
Environmental Management Canada
cc. Jack Varrette
Dave Faoro
Gord Donnelly, MOEE Science and Technology, Approvals Branch

Ontario

Ministry of Environment and Energy
Ministère de l'Environnement et de l'Énergie

135 St. Clair Avenue West
Toronto ON M4V 1P5

135, avenue St. Clair ouest
Toronto ON M4V 1P5

Science and Technology Branch
2 St Clair Ave. W., 14th floor
Toronto, M4V 1L5

March 1, 1996

BY FAX

Richard Vanderwal
Hydroclave Systems Inc.
1361 Middle Road
Kingston, Ontario
K7L 6H6

Dear Mr. Vanderwal:

I am writing concerning the testing of the HYDROCLAVE biomedical waste treatment technology to determine whether or not it meets the biological criteria set forth by the Ministry of Environment and Energy for biomedical waste treatment technologies.

The data submitted by you and the University of Ottawa indicate that the HYDROCLAVE technology is capable of treating biomedical waste to an inactivation level of at least a 6 $\log_{10}$ reduction in spores of *B. stearothermophilus*. This meets the Ministry criteria for sterilization by autoclaving. Waste which is treated to this degree is deemed to be sterilized and can be disposed of as municipal waste at a municipal landfill site.

The microbiological evaluation was carried out by Mr. Michael Brodsky of the Ministry of Health. He is satisfied with the testing protocol and the results of the testing, based on tests 9 through 16 of the University of Ottawa testing report. These were the tests carried out with at least one million viable spores of *B. stearothermophilus*. The data indicate that the HYDROCLAVE is capable of sterilizing biomedical waste when operated for 30 minutes at 121°C or 15 minutes at 132°C. Nevertheless, to provide added safety a retention time safety factor of at least 33% should be added to the retention times from the tests.

The following are the minimum operating conditions which must be employed in the operation of the HYDROCLAVE for the treated waste to be disposed of at a municipal landfill site.

For a retention time of 40 minutes at temperature and pressure:

- minimum pressure of the inner vessel = 290 kPa (28 psig)
- minimum temperature in the waste = 121°C (250 °F)

For a retention time of 20 minutes at temperature and pressure:

- minimum pressure of the inner vessel = 390 kPa (42 psig)
- minimum temperature in the waste = 132°C (270 °F)

The abbreviation kPa means kiloPascals and psig means pounds per square inch gauge.

Any deviation below these minimum operating conditions would require additional testing.

You should also note that, according to Ministry guidelines, the technology should be tested at least once a month to demonstrate that the technology continues to be able to inactivate biomedical waste to a level of at least a 6 $\log_{10}$ reduction in spores of *B. stearothermophilus*.

This letter does not constitute or imply approval of the Ministry of Environment and Energy for the HYDROCLAVE technology. Also, no evaluation of the mechanical capability or the throughput capacity of the technology was made.

If you have any questions concerning the above, please call me at (416) 323-5130.

Yours truly,

Gordon Donnelly

Gordon Donnelly, P.Eng
Environmental Engineering Services
Science & Technology Branch

cc: M. Brodsky
L. Matthews
File TAS-03-15
5E010021.ltr

Province of
British Columbia
Ministry of
Environment,
Lands and Parks

BC Environment

Environmental Protection Department
777 Broughton Street
Victoria
British Columbia
V8V 1X4

Telephone: (604) 387-9974
Facsimile: (604) 356-9836

June 27, 1996

File: 23050-40/Hydroclave

Richard Vanderwal
Hydroclave Systems Corp.
1361 Middleton Road
Kingston Ontario K7L 5H6

Dear Richard Vanderwal:

Don Fast, Executive Director, Environmental Protection Department, has asked me to respond to your letter of April 30, 1996 regarding British Columbia's legislative requirements for the management of biomedical waste. I apologise for the delay in responding to your letter.

I understand that your local BC representative, Larry Purcheson of Moody Industrial Sales, has recently been in contact with Rob Dalrymple of my staff regarding the Hydroclave. I have taken the liberty of sending a copy of this letter to him.

The BC Special Waste Regulation (SWR) provides the current regulatory definitions and management requirements for wastes qualifying as "special", or in most cases, hazardous waste. Infectious wastes, as defined in the federal Transportation of Dangerous Goods Regulations (TDGR), are classified as special wastes in the SWR. The classification of a waste as an infectious waste is related to the presence of certain specified micro-organisms in the waste. However, this has proven to be a difficult definition for both generators, waste managers and regulators to interpret in practice, due to complex testing protocols and the heterogeneity of the waste stream.

Accordingly, the Canadian Council of Ministers of the Environment (CCME) developed a definition of biomedical waste based on type and source of waste, eliminating the need to determine whether the waste is infectious or not. This definition can be found in the document "Guidelines for the Management of Biomedical Waste in Canada" (CCME, 1992), a copy of which is attached. The Ministry has adopted the CCME definition for biomedical waste for interim application and is currently developing a regulatory framework based on that definition.

In the interim, the Ministry is recommending that biomedical waste as defined by the CCME be managed as special waste due to the difficulty in segregating the infectious and non-infectious components and taking into consideration the direction we intend to pursue.

In the future, we will develop a biomedical waste regulation, including the definition. Once developed, the draft regulation will be released for stakeholder input.

For the present, we have established high level disinfection as the minimum treatment requirement for non-incineration treatment technologies for managing biomedical waste. This level is evidenced by the inactivation (minimum 6 log reduction) of representative vegetative bacteria, fungi, viruses, parasites and mycobacteria as well as the inactivation (minimum 4 log reduction) of *Bacillus* spores (appropriate to technology).

.../2

Regarding the management of biomedical waste treatment residues, in general, it is our position that the treated residue generated by a facility approved for the treatment of non-anatomical biomedical waste can be managed as a solid non-hazardous waste. Such waste would be acceptable at any permitted solid waste management facility (i.e.: principally landfills and incinerators), subject to the agreement of the owner/operator of the facility. In addition to rendering the waste non-infectious, we are recommending that the treatment process or post-treatment handling address the elimination or control of the physical injury capability of the sharps component of the waste stream. This may be achieved by mechanical shredding, solidification or other means as approved by the Ministry and/or the receiving jurisdiction.

The management of the treated residues as solid non-hazardous waste in the manner described above is also contingent on the waste not exhibiting any other characteristics of a special waste, as defined in the BC Special Waste Regulation. Upon satisfaction that all requirements have been satisfied, the Ministry will issue a formal delisting letter.

Please be advised that approval of technology/equipment for the treatment of biomedical waste is normally granted only for a specific application of the technology at a specific site after testing results sufficient to satisfy the Ministry's concerns have been provided. Initially, these results may be previously generated (existing) data. However, we may also require both commissioning as well as ongoing operational testing to confirm the data.

I trust this clarifies the Ministry's legislative requirements for the treatment of biomedical waste and the management of the treated residual. If you have any further questions, please call Rob Dalrymple of my staff at 356-9973.

Yours truly,

R.J. Driedger, P. Eng.
Director
Municipal Waste Reduction Branch

cc: Larry Purcheson, Moody Industrial Sales Inc.

Infection Control Quality Assurance Services

TEL.: (306) 966 - 5143
FAX: (306) 966 - 5142

April 26, 2001

BIOMED RECOVERY & DISPOSAL
P.O. Box 334
Aberdeen, Saskatchewan
S0K 0A0
FAX: (306) 253 - 4338

Dear Mr. DiFehr & Mr. Willett:

I am pleased to inform you that "HYDRO-CLAVE" is **properly** functioning under the current operating cycle on the basis of biological monitoring of the spore-test strips. The biological indicators *(Bacillus subtilis & Bacillus stearothermophilus)* were incubated aerobically at 35°C for 7 days.

Sterilizer	Sterilizer tested	Spore strip received	Spore strip tested	Result
Hydroclave:	April 19, 2001 (20 min. cycle)	April 19, 2001	April 19, 2001	**Negative**
Control:	----------	----------	April 19, 2001	Positive

[Comment]: The negative result indicates that the operating cycle of the Hydroclave is is **effective**. Therefore, further testing is **not required** until next month.

If you have any questions regarding the test results, please do not hesitate to contact me. Thank you very much for utilizing our sterilizer monitoring service program. I hope that you have found that our program is useful and convenient.

Respectfully submitted,

K. Komiyama

Dr. Kunio Komiyama
Infection Control Officer, College of Dentistry

CC. Public Health Inspector
Disease Control Program, SDH

The College of Dentistry at the University of Saskatchewan disclaims any and all liability in sterilizer function. Periodic monitoring of office sterilizer function is a form of quality assurance.

Responsibility for lapses in sterilizer function rests with your professional office, or the manufacturer of your equipment, not the College of Dentistry at the University of Saskatchewan.

TATA MEMORIAL CENTRE

TATA MEMORIAL HOSPITAL
AND
ADVANCED CENTRE FOR TREATMENT, RESEARCH & EDUCATION IN CANCER

Dr. Ketayun A. Dinshaw
DMRT (Lond.). FRCR (Lond.)
Director, Tata Memorial Centre
and
Professor, Dept. of Radiation Oncology

E. Borges Marg, Parel,
Mumbai - 400 012, India.
Phone : 2413 9318 / 2417 7000
Fax : 91-22-2416 8440 / 2414 6937
E-Mail : dinshaw.tmc@vsnl.com
Website : www.tatamemorialcentre.com

January 3, 2005

TO WHOM IT MAY CONCERN

This is to certify that the Hydroclave was commissioned at the Tata Memorial Hospital in September 1999 – as an integral part of a total Hospital Infectious Waste Management System.

The total quantity of infectious waste treated annually has progressively increased as follows:

- 2000 - 46,317 Kg.
- 2001 - 65,695 Kg.
- 2002 - 63,743 Kg.
- 2003 - 69,778 Kg
- 2004 - 67,882 Kg.

The waste generated and treated include sharp containers, infectious plastic wastes from patient care, operating theatres, body fluids and laboratories. Anatomic body parts and cytotoxic drug vials are not treated in the Hydroclave.

The sterility testing and cycle validation is done using spore strips of the biological indicators Bacillus Stearothermophilus once monthly as per guidelines. 155 cycles have been validated with spore strips of Bacillus stearothermophilus. This testing has been certified by our CSSD. Todate all the cycles tested have been validated by a log 6 reduction in bacterial counts and bioburden.

It has been estimated that the costing works out to Rs.14.86 per Kg. taking into account-

- Depreciation over 5 years
- Annual Maintenance Charges
- Process cost of electricity steam & water
- Manpower cost i.e technical and labour
- Consumables i.e bags and sharp containers

There is a considerable advantage of sterilization and shredding with a volume and weight reduction of the total waste mass by 75-80% - initially filling two tonne dumpsters per day to presently a single one tonne dumpster per week.

The overall performance of the Hydroclave System has been satisfactory in the last 5 years with a downtime of 5.2% calculated over 5 years.

Dinshaw

K.A. Dinshaw.

HINDALCO

HINDALCO HOSPITAL

RENUKOOT
SONBHADRA (U.P.) INDIA
PIN CODE : 231 217
PHONE : (05446) 52079
FAX : (05446) 52107/52427

Ref. .....

Date : .....

Dec 15, 2004

Whom so ever it may concern

PERFORMANCE REPORT OF HYDROCLAVE

This is to certify that the Hydroclave unit H-15 was installed at Hindalco Hospital, Renukoot last year in October 2003 by Hydroclave systems India Pvt. ltd. for Biomedical Waste Management.

The Hydroclave equipment has been working satisfactorily & uninterruptedly since the day of installation. The end product is periodically tested for spores' level, which is in the desired range.

The periodic preventive maintenance schedule is strictly followed with rewarding results leading to ZERO BREAKDOWN level.

Dr Anil Jain
Chief of Medical Services

HINDALCO

HINDALCO HOSPITAL

RENUKOOT
SONBHADRA (U.P.) INDIA
PIN CODE : 231 217
PHONE : (05446) 52079
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The periodic preventive maintenance schedule is strictly followed with rewarding results leading to ZERO BREAKDOWN level.

Dr Anil Jain
Chief of Medical Services

The Ottawa Hospital | L'Hôpital d'Ottawa

Manager, Environmental Services
The Ottawa Hospital
1053 Carling Ave
M-04 Old Services Building
Ottawa, ON K1Y 4E9

September 25, 2003

To Whom it May Concern,

Re: Hydroclave Systems Incorporated

The Ottawa Hospital purchased two H-15 Hydroclaves with shredders in the fall 2001. The systems were installed, tested and training provided to staff in a professional and timely manner. Since their installation, we have had an excellent working relationship with Hydroclave who are available within 12 hours of any urgent service calls. Hydroclave Systems Inc. have provided superior service. They are always willing to work with The Ottawa Hospital to accommodate our needs for service, products, and even modifications to our unit to ensure that our waste treatment system runs efficiently and economically.

Having worked with and tested typical autoclaves for sterilizing medical waste, I am convinced that for small-scale operations such as a hospital, only Hydroclave technology will consistently meet the 6 log 10 reduction in *B. Stearothermophilus* required by the Ontario Ministry of the Environment and most infection control standards. The environmental benefits and low economic cost of using Hydroclaves were easy selling points when it came to convincing my Senior Management to replace our autoclaves with Hydroclaves.

I would recommend Hydroclave Systems Inc. to anyone who needs to decontaminate medical or food waste products safely, efficiently, and economically. They can provide the services you need to get your entire program off the ground. If you would like to discuss Hydroclave or The Ottawa Hospital's medical waste management program, please don't hesitate to contact me at (613) 798-5555 x 16345 or by email kfleming@ottawahospital.on.ca

Sincerely,

Katherine Fleming
Manager, Environmental Services
The Ottawa Hospital

Defence Research and Development Canada
DRDC Suffield
PO Box 4000 Station Main
Medicine Hat, Alberta
T1A 8K6

Recherche et développement pour la défense Canada
RDDC Suffield
CP 4000 Succ. Main
Medicine Hat Alberta
T1A 8K6

www.suffield.drdc-rddc.gc.ca

3776-CON (CBDS)

27 August 2004

Ms Connie MacLeod
Hydroclave Systems Corp
672 Norris Court
Kingston, ON K7P 2R9

Dear Ms MacLeod:

This letter report is an informal publication of DRDC Suffield and is for distribution only to the client for whom it was written.

Efficacy testing of the hydroclave for the CB Forensic Reference Laboratory was carried out to ensure it provided at least a 6-log reduction of test spores under normal operating conditions.

The testing was carried out as follows. Approximately 250 g of *Bacillus globigii* spores (Lot 19076-03267, Date of Mfg 19 July 1996, Dugway Proving Ground, Utah, USA) was mixed into a plastic container with 10L tap water using a paint mixer attachment on an electric drill. Mixture was poured down the mechanical room sink drain. The container was then rinsed with a further 30 L of tap water. A 1 L container with 908 ml full strength Microchem and 94 ml full strength household Javex bleach was also poured down the sink and the 1L container rinsed 4x with 1 L to rinse out the container and the sink. This 45 L of fill converts to a value of 10 imperial gallons. The tank was further filled with approximately 60 Imperial Gallons tap water. This was done by adding water to the tank using the tap on the mechanical room sink and monitoring the volume using the water meter where the water enters the basement of the lab. The meter was metric so 0.2727 cubic meters were added to provide 60 gallons to make a total of 70 gallons in the holding tank. Imperial gallons were used in this procedure since the volume specifications of the hydroclave are in imperial gallons. It must be noted that there is no way of directly measuring the volume in the holding tank. We also learned afterwards that additional water was being added without our knowledge so that our pre-run spore concentrations were lower than anticipated but this did not affect the final outcome of the tests.

The hydroclave was filled with 70 gallons of the BG spore mixture from the holding tank. The mixture in the tank was stirred using the hydroclaves mixer for 5 minutes before a pre-sterilization control sample was collected from a sampling port on the hydroclave.

The hydroclave sterilization cycle (programmed by the manufacturer) was then initiated. At the completion of the cycle the process was halted to allow collection of the post-sterilization sample. The sampling port was first disinfected with 10% bleach. The sampling port was then flushed with 1L of the sterilized material to remove any remaining bleach or spores from the pre-sterilization sample. Immediately afterwards the post-sterilization sample was collected.

This procedure was repeated for a total of three sterilization cycles carried out October 20-21, 2003.

Canada
DEFENCE R&D DEFENSE

Pre-sterilization samples were serially diluted by factors of 10^5. 10^6, 10^7 and 10^8 and 0.1 mL plated onto either TSA+ 5% Sheep blood plates or Nutrient agar plates using 10 plates per dilution. Post-sterilization samples were not diluted and used neat and plated as above. After reading the result of the first plating of the post-sterilization samples, an additional 20 plates were plated with 0.5 mL for each of the 3 post-sterilization samples. All plates were incubated overnight at 37°C then counted.

The results were as follows:

Pre-sterilization plate counts from 10^6 dilution:

Run 1: 26, 46, 37, 48, 13, 57, 35, 58, 42. 48.
Run 2: 28, 41, 84, 82, 71, 67, 58, 79, 78, 65.
Run 3: 18, 11, 30, 34, 27, 12, 34, 36, 32, 21.

Post-sterilization results plate counts:

Run 1:
0.1 plated: 1,1,0,0,0,0,0,0,0,0
0.5 plated: 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0

Run 2:
0.1 plated: 1,3,3,0,0,0,0,0,0,0
0.2 plated: 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0

Run 3:
0.1 plated: 1,0,0,0,0,0,0,0,0,0
0.5 plated: 1,1,1,1,1,2,3,3,0,0,0,0,0,0,0,0,0,0,0,0

Based on these counts the pre and post sterilization spore concentrations in the Hydroclave tank were as follows:

Run 1:	Pre: 4.1×10^7	Post: 9.5×10^{-2}
Run 2:	Pre: 6.5×10^7	Post: 3.3×10^{-1}
Run 3:	Pre: 2.5×10^7	Post: 6.6×10^{-1}
Mean:	Pre: 4.4×10^7	Post: 3.6×10^{-1}

By dividing the post-run concentration by the pre-run concentration we can calculate the log reduction as follows:

Run 1:	$9.5 \times 10^{-2} / 4.1 \times 10^7 = 2.3 \times 10^{-9}$
Run 2:	$3.3 \times 10^{-1} / 6.5 \times 10^7 = 5.1 \times 10^{-8}$
Run 3:	$6.6 \times 10^{-1} / 2.5 \times 10^7 = 2.6 \times 10^{-8}$
Mean:	$3.6 \times 10^{-1} / 4.4 \times 10^7 = 8.2 \times 10^{-9}$

These results show that the Hydroclave exceeded the minimum requirement of a 6-log reduction in all test runs.

Yours truly,

Bill Kournikakis
Chemical and Biological Defence Section
for Director General
Tel: 403-544-4631
Fax: 403-544-3388
Email: Bill.Kournikakis@drdc-rddc.gc.ca

cc:

DRDC Suffield - DG, Dr R.G. Angus
DRDC Suffield - HCBDS, Dr J. Lavigne

A. LANFRANCO and ASSOCIATES INC.

ENVIRONMENTAL CONSULTANTS

February 20, 2002

URS Norcol Dames & Moore
P.O. Box 11507
650 West Georgia Street, Suite 1900
Vancouver, B.C.
V6B 4N7

ATTENTION: **Mr. Rob Beleutz**

Dear Rob:

REFERENCE: **ORGANIC TEST SURVEY REPORT**

Please accept the following letter report as our formal submission of results for the stack tests conducted at the Hydroclave at Hospital Sterilization Services in Port Coquitlam on February 5, 2002.

Test Methodology

As discussed with and advised by the GVRD, triplicate simultaneous emission samples were collected for VOCs over one 40 minute period. The samples were collected for two lists of volatile compounds.

One list of predominantly chlorinated /brominated substances was monitored with Tenax tubes packed in a four inch by one quarter inch stainless steel tube; while the other VOC list which includes mostly aliphatic hydrocarbons was monitored with charcoal tubes.

Each sample (charcoal or Tenax) was collected over 40 minutes using personal sampling pumps at rates of about 280 ml/min for Tenax and about 410 ml/min for charcoal tube sampling. The pumps were calibrated at Cantest and A. Lanfranco and Associates inc. prior to sampling. Calibrations were done with a blank tube to simulate pressure drop during normal sampling.

After each test the Tenax and charcoal tubes were capped and delivered directly to Cantest Laboratories where analysis was conducted on February 8, 2002. Samples were maintained at 4 °C between sampling and analysis.

Analysis

Analysis of the charcoal tubes was conducted with WCB Method 3302, using desorption in CS_2 and subsequent GC-FID analysis.

Unit 101 - 20120 - 64th Avenue, Langley, B.C. V2Y 1M8 - (604) 533-2582 - Fax 530-4205 - Email lanfranco@telus.net

Analysis of the Tenax tubes was conducted with a modified US EPA Method 624/8240/8260, involving thermal desorption into a purge and trap apparatus and subsequent GC/MS analysis.

Results and Discussion

In addition to the VOC data in this report; we include flowrate data from fan ratings of this Fan (F1) at 3200 cfm.

The attached analytical report presents the triplicate test data for each sample type. Cantest ID samples ending in 154, 155, 156, and 157 are charcoal tube samples, where the only compound found in all samples was acetone. Trace pentane was found in one tube also. Significantly more acetone was found in sample 154 (12.4 mg/m^3) compared to the other two tests (0.2 and 0.1 mg/m^3).

The Tenax tube analysis of samples ending in 158, 159 160, and Blank 161; showed non-detectable levels of all species of interest.

The test data suggests that no significant organic emissions are present in this exhaust during the condition tested.

The blank tubes showed no detection of analytes and sampling was conducted without difficulty.

The results are therefore presented with confidence, although some suspicion surrounds the elevated acetone value presented for sample 154.

Please call me if you have any questions.

Sincerely,

A. Lanfranco & Associates Inc.

A. Lanfranco
President

Analysis Report

CANTEST

CANTEST LTD
Professional Analytical Services
4606 Canada Way Burnaby, B.C. V5G 1K5
FAX 604 731 2386
TEL 604 734 7276
1 800 665 8566

REPORT ON: Analysis of Air Samples

REPORTED TO: A. Lanfranco & Associates
Suite 101
20120 - 64th Avenue
Langley, B.C.
V2Y 1M8

Att'n: Mr. Al Lanfranco

PROJECT NAME: URS - Pt. Coquitlam Hydroclave

NUMBER OF SAMPLES: 8

REPORT DATE: February 13, 2002

DATE SUBMITTED: February 5, 2002

GROUP NUMBER: 30205033

SAMPLE TYPE: Air in Charcoal and Tenax Tubes

NOTE: Test results contained in this report refer only to the testing of samples submitted.

TEST METHODS:

Volatile Organic Compounds in Air - analysis was performed using procedures based on WCB Method 3312. The procedure involves sampling using charcoal tubes, desorption of analytes from the charcoal using carbon disulphide, and analysis using gas chromatography with flame ionization detection.

Volatile Organic Compounds in Gaseous Samples - analysis was performed using a modification of U.S. EPA Methods 624/8240/8260, involving injection of a gas sample into a Purge and Trap apparatus and analysis using GC/MS.

TEST RESULTS:

(See following pages)

CANTEST LTD.

Walter Brandl, B.Sc.
Manager, Environmental Services

REPORTED TO: A. Lanfranco & Associates

REPORT DATE: February 13, 2002

GROUP NUMBER: 30205033

CANTEST

Volatile Organics in Air

CLIENT SAMPLE IDENTIFICATION:	1 Vent Stack	2 Vent Stack	3 Vent Stack	4 Blank		
DATE SAMPLED:	Feb 5/02	Feb 5/02	Feb 5/02	Feb 5/02		
CANTEST ID:	202050154	202050155	202050156	202050157	DETECTION LIMIT	UNITS
Cyclohexane	-	-	-	<	2	ug
Cyclohexane	<	<	<	-	0.1	mg/cu. m
Cyclohexane	<	<	<	-	0.03	mL/cu. m
Pentane	-	-	-	<	2	ug
Pentane	0.5	<	<	-	0.1	mg/cu. m
Pentane	0.26	<	<	-	0.04	mL/cu. m
Limonene	<	<	<	-	0.1	mg/cu. m
Limonene	<	<	<	-	0.02	mL/cu. m
Limonene	-	-	-	<	2	ug
Acetone	-	-	-	<	2	ug
Acetone	12.4	0.2	0.1	-	0.1	mg/cu. m
Acetone	5.20	0.08	0.05	-	0.05	mL/cu. m
2-Propanol	-	-	-	<	2	ug
2-Propanol	<	<	<	-	0.1	mg/cu. m
2-Propanol	<	<	<	-	0.05	mL/cu. m
Ethanol	-	-	-	<	2	ug
Ethanol	<	<	<	-	0.1	mg/cu. m
Ethanol	<	<	<	-	0.06	mL/cu. m
Isobutyl Alcohol	-	-	-	<	2	ug
Isobutyl Alcohol	<	<	<	-	0.1	mg/cu. m
Isobutyl Alcohol	<	<	<	-	0.04	mL/cu. m
Trichlorotrifluoroethane	-	-	-	<	2	ug
Trichlorotrifluoroethane	<	<	<	-	0.1	mg/cu. m
Trichlorotrifluoroethane	<	<	<	-	0.02	mL/cu. m

ug = total micrograms
mL/cu. m = mL/cubic meter or ppm (v/v)
< = Less than detection limit

mg/cu. m = milligrams per cubic meter

REPORTED TO: A. Lanfranco & Associates

REPORT DATE: February 13, 2002

GROUP NUMBER: 30205033

CANTEST

Volatile Organic Compounds in Air

CLIENT SAMPLE IDENTIFICATION:	171 Vent Stack	210 Vent Stack	113 Vent Stack	134 Blank	
DATE SAMPLED:	Feb 5/02	Feb 5/02	Feb 5/02	Feb 5/02	
CANTEST ID:	202050158	202050159	202050160	202050161	
ANALYSIS DATE:	Feb 8/02	Feb 8/02	Feb 8/02	Feb 8/02	DETECTION LIMIT
Benzene	<	<	<	<	0.1
Bromodichloromethane	<	<	<	<	0.1
Bromoform	<	<	<	<	0.2
Bromomethane	<	<	<	<	0.8
2-Butanone	<	<	<	<	5
Carbon Tetrachloride	<	<	<	<	0.1
Chlorobenzene	<	<	<	<	0.1
Chloroethane	<	<	<	<	0.4
Chloroform	<	<	<	<	0.3
Chloromethane	<	<	<	<	0.4
Dibromochloromethane	<	<	<	<	0.1
1,2-Dibromoethane	<	<	<	<	0.1
Dibromomethane	<	<	<	<	0.2
Dichlorodifluoromethane	<	<	<	<	0.2
1,2-Dichlorobenzene	<	<	<	<	0.1
1,3-Dichlorobenzene	<	<	<	<	0.1
1,4-Dichlorobenzene	<	<	<	<	0.1
1,1-Dichloroethane	<	<	<	<	0.1
1,2-Dichloroethane	<	<	<	<	0.4
1,1-Dichloroethene	<	<	<	<	0.1
cis-1,2-Dichloroethene	<	<	<	<	0.1
trans-1,2-Dichloroethene	<	<	<	<	0.1
1,2-Dichloropropane	<	<	<	<	0.1
cis-1,3-Dichloropropene	<	<	<	<	0.1
trans-1,3-Dichloropropene	<	<	<	<	0.1
Ethylbenzene	<	<	<	<	0.1
2-Hexanone	<	<	<	<	5
4-Methyl-2-pentanone	<	<	<	<	2
Methylene Chloride	<	<	<	<	5
Styrene	<	<	<	<	0.1
1,1,2,2-Tetrachloroethane	<	<	<	<	0.2

(Continued on next page)

REPORTED TO: A. Lanfranco & Associates

REPORT DATE: February 13, 2002

GROUP NUMBER: 30205033

CANTEST

Volatile Organic Compounds in Air

CLIENT SAMPLE IDENTIFICATION:	171 Vent Stack	210 Vent Stack	113 Vent Stack	134 Blank	
DATE SAMPLED:	Feb 5/02	Feb 5/02	Feb 5/02	Feb 5/02	
CANTEST ID:	202050158	202050159	202050160	202050161	DETECTION LIMIT
ANALYSIS DATE:	Feb 8/02	Feb 8/02	Feb 8/02	Feb 8/02	
Tetrachloroethene	<	<	<	<	0.1
Toluene	<	<	<	<	0.1
1,1,1-Trichloroethane	<	<	<	<	0.1
1,1,2-Trichloroethane	<	<	<	<	0.1
Trichloroethene	<	<	<	<	0.1
Trichlorofluoromethane	<	<	<	<	0.2
Vinyl Chloride	<	<	<	<	0.2
Xylenes	<	<	<	<	0.1

Results expressed as milligrams per cubic meter (mg/cu. m)
< = Less than detection limit

CANTEST

Industrial Hygiene - PUMP SAMPLING DATA

NOTE. Please fill in ALL data in order for the sample results to be calculated. If you calibrate the pumps yourself you may use the lab use only area.

SAMPLED FOR: A. Lanfranco CLIENT: URS SAMPLED BY: JM DATE: Feb 5/02

LOCATION: Pt. Coquitlam Hydroelave

GROUP or W.O. No:

Sample Number	Location	Temp	Start Time	End Time	Elapsed Time	OPTIONAL DATA: Atm. Press	OPTIONAL DATA: Rel. Humidity	Pump No.	FOR LAB USE ONLY: Start Flow	FOR LAB USE ONLY: End Flow	FOR LAB USE ONLY: Avg. Flow	FOR LAB USE ONLY: Total Volume
1	Vent Stack		10:27	11:07	40			Gilian 764				
2	↓		↓	↓	↓			Gilian 762				
3	↓		↓	↓	↓			Airchek 52 4244				
4	Blank											

764 : 0.42 L/min
762 : 0.41 L/min

Auxiliary Sampling Information (as appropriate):

Impinger Solution Description: Date Prepared:

Filter Description: Lot Number:

Sorbent Tube Description: Charcoal Tubes Lot Number:

Other Comments: ~~Airchek 52 (4244) @ 450 L/min water~~

02/20/2002 WED 09:11 FAX 604 945 9627 IUTRON A_LANFRANCO&ASSOC 008

CANTEST
Industrial Hygiene - PUMP SAMPLING DATA

NOTE: Please fill in ALL data in order for the sample results to be calculated. If you calibrate the pumps yourself you may use the lab use only area.

SAMPLED FOR: AURS CLIENT: A. Lanfranco + Assoc. SAMPLED BY: JM DATE: Feb 5/02

LOCATION: Pt. Ogden Hydroclone

GROUP or W.O. No: _____

Sample Number	Location	Temp	Start Time	End Time	Elapsed Time	OPTIONAL DATA: Atm. Press.	OPTIONAL DATA: Rel. Humid.	Pump No.	FOR LAB USE ONLY: Start Flow	FOR LAB USE ONLY: End Flow	FOR LAB USE ONLY: Avg. Flow	FOR LAB USE ONLY: Total Volume
171	Vent Stacks		10:27	11:07	40			Gilian #765				
210	↓		↓	↓	↓			Pierceuses #4062				
113	↓		↓	↓	↓			Gilian #763				
134	Blank											
	↓											

Auxiliary Sampling Information (as appropriate):

763 = 0.285 L/min

765 = 0.276 L/min

Impinger Solution Description: _____ Date Prepared: _____

Filter Description: _____ Lot Number: _____

Sorbent Tube Description: Tenax Tubes Lot Number: _____

Other Comments: Airkat Sx (4062) 0.279 L/min Meter: 40

APPENDIX C

Other Relevant Approvals

New Nouveau Brunswick

APPROVAL TO OPERATE

I-4867

Pursuant to paragraph 5 (3) (a) of the *Air Quality Regulation - Clean Air Act*, and paragraph 8(1) of the *Water Quality Regulation - Clean Environment Act*, this Approval to Operate is hereby issued to:

Mr. Shredding Waste Management Ltd.

for the operation of the

Moncton Biomedical Waste Incinerator

Description of Source:	INCINERATION OF BIOMEDICAL AND PHARMACEUTICAL WASTE
Source Classification:	Air Quality Regulation Class 2 Fees for Industrial Approvals Class 4 Regulation - Clean Water Act
Parcel Identifier:	70267919
Mailing Address:	P.O. Box 927 Moncton, NB E1C 8N8
Conditions of Approval:	See attached Schedule "A" of this Approval
Supersedes Approval:	I-2606
Valid From:	June 07, 2005
Valid To:	June 06, 2010

Recommended by: Mark Pellyman
Environmental Management Division

Issued by: _____
Minister of the Environment and Local Government

June 7, 2005
Date

Minister
Environment and
Local Government

Ministre
Environnement et
Gouvernements locaux

New Nouveau Brunswick

November 28, 2000
File: 6570-M2

Mr. Jean-Guy Richard
V.P. Operations
Mr. Shredding Waste Management (MSWM) Ltd.
PO Box 927
Moncton, NB
E1C 8N8

-15-

Dear Mr. Richard:

RE: Stack Emission Testing Results for the Year 2000

The report on stack emission testing that was completed at the biomedical waste incineration facility was received by this Department on November 14, 2000. I am pleased to see that the stack emissions were well below the limits set in the Approval to Operate. This demonstrates the commitment that your company has made in continuously improving the incinerators and the pollution control equipment at the facility. I am sure that MSWM Ltd. will continue to invest in state-of-the-art control equipment to ensure that the facility is able to maintain the stack emissions at levels well below the emission standards.

Sincerely,

Kim Jardine

Kim Jardine
Minister

Tel./Téléphone:
(506) 453-2558
Fax/Télécopieur:

P.O. Box 6000
Fredericton
New Brunswick

Case postale 6000
Fredericton
Nouveau-Brunswick

Bio-Medical Waste Disposal Services Inc.
and/or Ship to Shore Disposal Services Inc.
and/or 2469943 Nova Scotia Limited

FAX COVER SHEET

TO: Jean Guy Richard
Mr. Shredder
Fax: 1-506-858-0877

DATE: June 27, 2005

FROM: Art Scott
Fax: 481-9115

PAGES: 1 (Incl. Cover)

Dear Mr. Richard,

Re: Acceptance of bio-medical waste, pharmaceutical waste, cytotoxic waste

I am writing this letter to ask your company to seek approval from the New Brunswick Department of Environment and Labour and/or any other government agencies including Transport Canada to allow the above mentioned companies to export bio-medical waste, pharmaceutical waste, cytotoxic waste to your facility for incineration. The approximate volume of waste to be exported weekly is 1 (one) ton.

Kindest regards,

Art Scott
President
Ship to Shore Disposal Services Inc.

93 Gloria McClusky Drive, Dartmouth, NS B3B 2Z3. Phone: 902-481-9113. Fax: 902-481-9115. E-mail: [illegible]

Environment and Local Government | Environnement et Gouvernements locaux

New Nouveau Brunswick CANADA

July 5, 2005
File: 6570-M2

Mr. Jean-Guy Richard, Vice President
Mr. Shredding Waste Management Ltd.
PO Box 927
Moncton, NB
E1C 8N8
Fax: (506) 858-0877

Dear Mr. Richard:

RE: Incineration of Biomedical Waste from Ship to Shore Disposal Services Inc.

As requested in your letter dated June 28, 2005, Mr. Shredding Waste Management Ltd. is hereby allowed to import approximately 1 tonne of biomedical waste per week from Ship to Shore Disposal Services Inc. (also known as Bio-Medical Waste Disposal Services Inc. and/or 2469943 Nova Scotia Limited), located in Dartmouth, Nova Scotia, for the purpose of incineration. All conditions of Approval number 1-4867, for the operation of the biomedical waste incineration facility, remain in effect.

If you require further clarification, please contact Mark Glynn of the Approvals Branch at (506) 453-4463.

Sincerely,

Perry Haines, M.Sc.E., P.Eng.
Director, Approvals Branch
Environment and Local Government

cc: Laurie Collette, ELG Region 3

P.O. Box 6000
Fredericton
New Brunswick
Canada E3B 5H1

Case postale 6000
Fredericton
Nouveau-Brunswick
Canada E3B 5H1

Transport Canada
Safety and Security

Transport Dangerous Goods Directorate
330 Sparks Street
Ottawa, Ontario K1A 0N5

Transports Canada
Sécurité et sûreté

Direction générale transport des marchandises dangereuses
330, rue Sparks
Ottawa (Ontario) K1A 0N5

ASD4069-4177

SEP 8 2003

Jean-Guy Richard
Vice-President, Operations
MSWM Ltd.
P.O. Box 927
Moncton, NB E1C 8N8

Dear Mr. Richard,

Thank you for your letter of June 26, 2003 requesting renewal of your Permit for Equivalent Level of Safety SU 4177 for the transportation of Infectious Substances included in Class 6.2.

We are pleased to inform you that your Permit will no longer be required. Due to the addition in Part 1, Section 1.3(f), Item 9 of the *Transportation of Dangerous Goods Regulations* which now references National Standard of Canada CAN/CGSB-43.125-99, *"Packaging of Infectious Substances, Diagnostic Specimens, Biological Products and Biomedical Waste for Transport"*, which describes different packaging options previously offered by the permit.

Should you have any questions, please contact Sue Miner, Permits Officer, (613) 998-6102.

Yours truly,

Marc Prévost
Chief
Permits and Approvals Division

APPENDIX D

Project Information Bulletin

PROJECT INFORMATION SHEET
BIO-MEDICAL WASTE DISPOSAL SERVICE INC.
PROPOSED BIOMEDICAL WASTE TREATMENT AND TRANSFER FACILITY
BURNSIDE INDUSTRIAL PARK, DARTMOUTH, NS

Introduction

Ship to Shore Disposal Service Inc. (Ship to Shore) is currently operating a commercial waste treatment facility on Gloria McCluskey Drive in the Burnside Industrial Park in Dartmouth, Nova Scotia (see Figure 1). The facility, which treats international food waste, is operating under an approval from the Nova Scotia Department of the Environment and Labour (NSDEL) (Approval No. 2004-038723, issued on February 27, 2004). The treatment method consists of sterilization of the waste at a temperature between 121 and 132 °C (depending on the treatment time) and 15 psi pressure in a hydroclave unit (see process description below). Once treated, the residual solid waste is transported to an approved landfill for final disposal.

Bio-Medical Waste Disposal Service Inc., an affiliate of Ship to Shore, wishes to expand the treatment process and capacity at the existing facility on Gloria McCluskey Drive to allow for treatment of bio-medical waste from a number of facilities such as hospitals, dentist offices, and veterinary hospitals. Depending on the volume of waste to be treated (*i.e.*, if a large contract were awarded), the facility would expand to the adjacent property in order to accommodate construction and operation of two additional hydroclave units. It is understood that biomedical waste is considered a waste dangerous good under the Dangerous Goods Management Regulations; therefore, Bio-Medical Waste Disposal Service Inc. is required to register this project as a Class I Undertaking pursuant to the Environmental Assessment Regulations under the Nova Scotia *Environment Act.*

Process Description

The proposed process utilizes a hydroclave unit to sterilize the waste. A hydroclave is a double walled vessel in which the inner wall provides containment for the waste and the outer wall forms a steam chamber surrounding the inner vessel. The heat from the steam raises the temperature inside the vessel and causes the liquids/moisture in the waste to vaporize. The pressure, high temperature and steam result in the complete sterilization of the waste. The residual solids are then shredded and compacted prior to transportation and disposal at an approved facility.

The biomedical waste treatment process will follow the same basic and proven process as that which is currently underway. The process will begin with collection of the waste from the various facilities/institutions and transportation to the treatment and transfer facility via trucks, cube vans, and/or secure refrigerated vehicles, where required. The waste is stored indoors until it is processed. Red-bag waste will be stored on-site in a refrigerated area for subsequent transportation to an approved incineration facility in New Brunswick. Bagged waste (*i.e.*, yellow bags and containers) are loaded

directly into the hydroclave unit by staff fully trained in applicable procedures. The waste in the inner vessel is rotated, breaking it into smaller pieces. Steam then fills the outer wall chamber (or jacket) heating the inner vessel and contents. The temperature and pressure are maintained at the required levels to ensure complete sterilization (e.g., 121 °C and 15 psi pressure for 30 minutes). The moisture content in the waste is vaporized, reducing the volume by as much as 40%, depending upon the moisture content of the waste. The vent is open to depressurize the unit with vapours directed to a chiller where the sterile liquid is condensed and routed to the municipal sewer system. The mixing continues in the heated vessel until the waste is dry. Once dry, the waste is removed from the hydroclave by reversing the rotation of the mixer, pushing the dry, sterile waste out the loading door to the conveyor leading to the shredder. The dry sterilized waste is put through a shredder which further breaks down the waste to ¼ in and then compacted and transported to an approved disposal facility.

Specific Project details include:

- Waste to be processed includes biomedical waste from hospitals, dentist offices, and veterinary hospitals.
- The existing facility processes (approximately) 800 tonnes of waste per year.
- It is estimated that the expanded facility could process approximately 3,000 tonnes of waste per year.
- Emissions associated with the waste include liquid, solid and emissions. Specifically these emissions include sterile condensate from the steam which is likely to be discharged directly to the municipal sewer system (as per current and similar operations), air emissions when unit is opened and unloaded (*i.e.*, VOCs), and the residual (sterilized) solid waste which is transported and disposed of at an approved facility.
- The operation schedule for the existing facility is 8 hours/day, 5 days per week, and 52 weeks per year. The anticipated operation schedule for the expanded facility is 10 hours per day, 5-6 days per week, and 52 weeks per year.
- To date, there have been no complaints regarding noise, odours or other emissions from the facility currently employing this technology.
- There are a number of industrial, commercial and institutional facilities operating in the area including, Miller Waste's composting facility, Miller Tires, Maritimes and Northeast Pipeline's pressure reduction station and odourant injection station, and the Correctional facility.
- Drainage and surface runoff collection and controls will be in place for the construction of the new facility.

Proposed Scope of the Environmental Assessment

The environmental assessment registration will evaluate potential environmental effects of the project and identify appropriate mitigation and monitoring to minimize these effects. The assessment will focus on those valued environmental components and socio-economic components of most concern and relevance. Due to limited nature and extent of the proposed Project (*i.e.*, limited potential for

interaction with the biophysical environment), the proposed environmental components to be evaluated include:

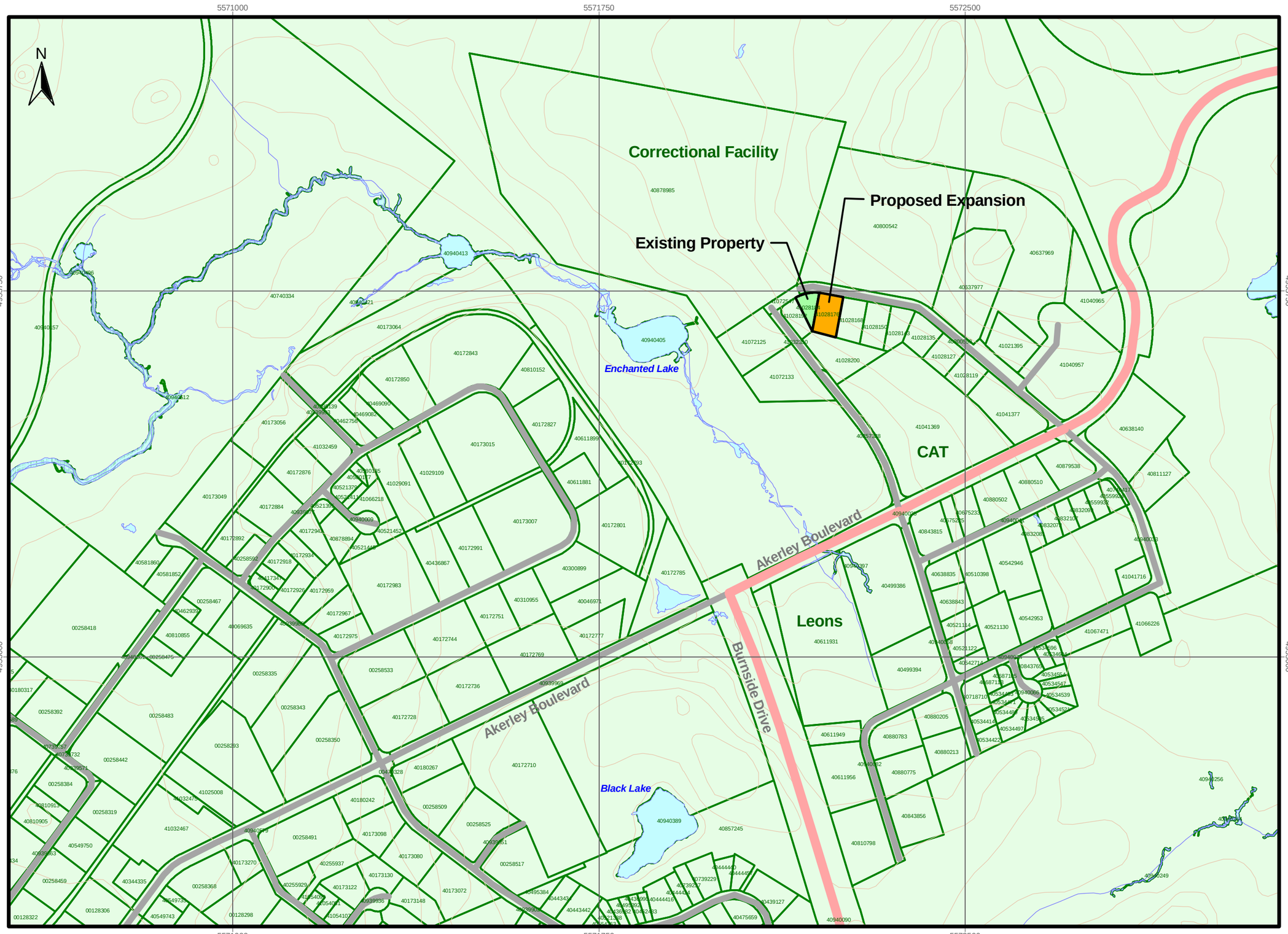
- atmospheric environment including air quality and noise; and
- socio-economic environment including a discussion of adjacent land use, transportation, and local economy.

Due to the location of the proposed Project (*i.e.*, in a large industrial park), it is proposed that public consultation be limited to direct contact and/or distribution of a project information bulletin to neighboring facilities/businesses.

Biomedical Waste
Disposal Services

Figure 1

Project Location



Map Features

Properties
- Existing Property
- Proposed Expansion

Road Networks
- Major Road
- Minor Road

- Watercourse
- Elevation Contour (m)
- Waterbody
- Property Boundary

0 100 200 300 400
Metres

Map Parameters
Projection: MTM, ATS77, Zone 5
Date: March 24, 2005
Project: NSD19482

Jacques Whitford