



# **AGNICO EAGLE**

**MELIADINE GOLD PROJECT**

## **Incineration Management Plan**

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**JANUARY 2024  
VERSION 8\_NWB**

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## EXECUTIVE SUMMARY

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Agnico Eagle Mines Limited (Agnico Eagle) is operating the Meliadine Gold Mine (Mine), located approximately 25 kilometres (km) north of Rankin Inlet, and 80 km southwest of Chesterfield Inlet in the Kivalliq Region of Nunavut.

This document presents the Incineration Management Plan, prepared in accordance with best management practices, Environment and Climate Change Canada's *Technical Document for Batch Waste Incineration*, and guidelines issued by the Nunavut Impact Review Board for the Mine.

Solid waste incinerators and waste oil burners are regulated in Nunavut under the *Nunavut Public Health Act*, the *Nunavut Environmental Protection Act*, and the federal *Environmental Protection Act*. Performance limits for the incinerator at the Mine will be in accordance with the emission guidelines set out by the Canadian Council of Ministers of the Environment. Ash produced from the incineration process will be disposed of in accordance with the *Nunavut Environmental Guideline for Industrial Waste Discharges*.

The Mine is operating its incinerator based on Environment and Climate Change Canada (ECCC)'s *Technical Document for Batch Waste Incineration*. In addition to incinerator technology, the implementation of a waste segregation program is limiting emissions (e.g., dioxins and furans, mercury) from the incinerator.

A typical modern controlled-air, batch, dual chamber incinerator has been installed model - ECO 1.75TN 1PVC100L 16-1MS. Critical process parameters, such as temperature, combustion air flow, and burner are computer-controlled to maintain optimal combustion conditions. The incinerator capacity is approximately 1,500 kilograms per day to accommodate predicted volumes of waste to be generated at the site. It is located in the waste management building<sup>1</sup> and operated by appropriately trained personnel.

Monitoring and testing is planned for incinerator stack emissions, along with the waste oil/fuel to be burned in the incinerator, and the incinerator ash. To demonstrate conformity with performance limits, an annual incineration management report will be prepared and submitted as part of annual reporting to authorizing agencies. The quantity and type of materials incinerated on-site during operation, together with results from periodic stack emission and ash monitoring, will be included in the annual report. A report will also be provided, if necessary, to the National Pollutant Release Inventory (NPRI). Finally, Agnico Eagle is committed to reporting greenhouse gas emissions in support of Canada's Voluntary Challenge Registry.

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<sup>1</sup> Also known as the incinerator building.

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## DOCUMENT CONTROL

Version	Date	Section	Page	Revision	Author
1	October 2012			First draft of the Incineration Management Plan	John Witteman, Env. Consultant, Agnico Eagle
2	March 2013			DEIS re-submission; rebranding	
3	April 2014	7.4.2	15	Revision made to address review comments and commitments	John Witteman, Env. Consultant, Agnico Eagle
4	April 2015			First version of Supporting Documents for Type A Water Licence Application, submitted to Nunavut Water Board for review	John Witteman, Env. Consultant, Agnico Eagle
5	February 2018			Reviewed internally	Agnico Eagle Environment Dept.
6	February 2019			Reviewed internally (added changes that the construction phase brought and review of the grammatical tense)	Agnico Eagle Environment Dept.
7	February 2022	All		General Update	Agnico Eagle Environment Department
8_NWB	January 2024	A yellow arrow in the right-hand margin indicates where updates have been made		Submitted to Nunavut Water Board as part of the Meliadine Water Licence Amendment.	Permitting Department

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**ACRONYMS**

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Agnico Eagle	Agnico Eagle Mines Limited
CCME	Canadian Council of Ministers of the Environment
CEPA	Canadian Environmental Protection Act
CIRNAC	Crown-Indigenous Relations and Northern Affairs Canada
CWS	Canada-Wide Standards
ECCC	Environment and Climate Change Canada
GHGRP	Greenhouse Gas Reporting Program
GN	Government of Nunavut
IMP	Incineration Management Plan
IOL	Inuit Owned Lands
KivIA	Kivalliq Inuit Association
Mine	Meliadine Gold Mine
NIRB	Nunavut Impact Review Board
NPRI	National Pollutant Release Inventory
NWB	Nunavut Water Board

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## SECTION 1 • INTRODUCTION

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Agnico Eagle Mines Limited (Agnico Eagle) is operating the Meliadine Gold Mine(Mine), located approximately 25 kilometres (km) north of Rankin Inlet, Nunavut, and 80 km southwest of Chesterfield Inlet in the Kivalliq Region of Nunavut.

The Mine plan includes open pit and underground mining of the Tiriganiaq gold deposit. The Application to amend the Water Licence is to complete licensing of components approved under Project Certificate No.006, which includes open pit mining at the Pump, F Zone, Wesmeg, and Discovery deposits.

Mining facilities on surface includes a plant site and accommodation buildings; two ore stockpiles; a temporary overburden stockpile; a tailings storage facility (TSF); two waste rock storage facilities (WRSFs); a water management system that includes collection ponds, water diversion channels, and retention dikes/berms; and a series of water treatments plants.

The purpose of the Plan is to provide consolidated information on the specifications, operations, management, monitoring, and reporting of the incinerator process proposed for the Mine. This Plan will be reviewed and updated on a regular basis to reflect changes to the Mine.

### 1.1 Concordance

This Plan has been developed to be consistent with the guidance provided in the Environment and Climate Change Canada's (ECCC) Technical Document for Batch Waste Incineration (EC, 2018).

### 1.2 Linkages to Other Management Plans

Documents which support this Plan include the:

- Landfill and Waste Management Plan;
- Hazardous Materials Management Plan;
- Interim Closure and Reclamation Plan; and
- Occupational Health and Safety Plan.

The Incineration Management Plan is part of the Environmental Management and Protection Plan, which provides overarching environmental direction for the Mine.

### 1.3 Objectives

At the Mine site, all wastes are safely managed from the time they are produced to their final disposal. All wastes are segregated at the mine site and are predominately landfilled, incinerated, or recycled. Used oil burning will be maximized as much as possible using the second chamber of the incinerator.



Remaining wastes, including hazardous waste<sup>2</sup>, are packaged for shipment to a certified waste management facility for treatment, recycling, and/or disposal.

Incineration is an essential part of waste management at the mine site. The incineration of acceptable solid waste from the accommodation complex, kitchen, lunch rooms, shops, warehouses, and offices diverts waste from directly reporting to the on-site landfill. It has the advantage of eliminating putrescible waste that could potentially attract wildlife to the landfill, thereby reducing possible dangerous interactions between humans and wildlife.

The objectives of this Plan are summarized as follows:

- 1) To understand the quantity and composition of the waste generated at the mine site, and separate waste acceptable for incineration from waste that is not;
- 2) To operate the batch waste incinerator based on the characteristics and quantity of waste, and to locate it in an appropriate building away from other site infrastructure;
- 3) To properly maintain the incinerator's functionality;
- 4) To operate the incinerator for optimal combustion, and avoid the formation of dioxins and furans in the combustion process;
- 5) To safely handle and dispose of incinerator residues; and
- 6) To establish a record keeping system for managing the facility and for future reporting.

As a component of the Mine Environmental Management System, the Plan will be updated to ensure that site experience is reflected in the Plan and subsequently communicated to all parties. The Mine Environment Superintendent or designate is responsible for managing and implementing the Incineration Management Plan.

#### **1.4 Incinerator Location**

The incinerator is located in its own building on the south end of the industrial pad, down-wind of other mine infrastructure.

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<sup>2</sup> Please refer to the Hazardous Materials Management Plan for further information on the handling and management of hazardous waste.

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## SECTION 2 • REGULATORY SETTING

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Solid waste incinerators and waste oil burners are regulated in Nunavut under the *Nunavut Public Health Act*, the *Nunavut Environmental Protection Act*, and the federal *Environmental Protection Act*. Various regulations and guidelines under these Acts, as well as guidelines developed by the Canada Council of Ministers of the Environment (CCME), were reviewed in preparing the Plan. They are as follows:

- *Canadian Environmental Protection Act (CEPA)*
  - Schedule 1: List of Toxic Substances
  - *Interprovincial Movement of Hazardous Waste Regulations*
  - *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations*
- ECCC Technical Document for Batch Waste Incineration (EC, 2018)
- Canada-Wide Standard for Dioxins and Furans (CCME, 2001a)
- Canada-Wide Standard for Mercury (CCME, 2000)
- Northwest Territories *Environmental Protection Act*
  - *Used Oil and Waste Fuel Management Regulations*
- Nunavut *Environmental Protection Act*
  - Environmental Guideline for Industrial Waste Discharges into Municipal Solid Waste and Sewage Treatment Facilities (GN, 2011b)
  - Environmental Guideline for the Burning and Incineration of Solid Waste (GN, 2012)
  - Environmental Guideline for Ambient Air Quality (GN, 2011)
  - Environmental Guideline for Mercury-Containing Products and Waste Mercury (GN, 2010)
- Nunavut *Public Health Act*

Provincial and/or territorial regulations that pertain to emissions from incinerators were not found for Nunavut or the Northwest Territories. Therefore, performance limits for the incinerator at the Mine will be in accordance with the emission guidelines set out by the CCME: Canada-Wide Standard for Dioxins and Furans (CCME, 2001a), and Canada-Wide Standards for Mercury Emissions (CCME 2000).

The management of used oil is regulated in the Northwest Territories through the *Used Oil and Waste Fuel Management Regulations* (NWT, 2012; Reg. 064-2003). In the absence of Nunavut guidelines/regulations pertaining to used oil and waste fuel, the Northwest Territories regulations will be followed for the Mine.

Ash produced from the incineration process will be disposed of in accordance with the Nunavut Environmental Guideline for Industrial Waste Discharges (GN, 2014).

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## SECTION 3 • BACKGROUND INFORMATION

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### 3.1 Dioxins and Furans

Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans, commonly known as dioxins and furans, are toxic, persistent, and bioaccumulative chemicals. Their presence in the environment results predominantly from human activity. The biggest source of dioxins and furans in Canada is the large-scale burning of municipal and medical waste. Other major sources include:

- the production of iron and steel;
- backyard burning of household waste, especially plastics;
- fuel burning, including diesel fuel and fuel for agricultural purposes and home heating;
- wood burning, especially if the wood has been chemically treated;
- electrical power generation; and
- tobacco smoke.

Due to their environmental persistence and ability to accumulate in biological tissues, dioxins and furans are slated for virtual elimination under the CEPA, the Environment Canada Toxic Substances Management Policy (EC, 2004) and the CCME *Policy Statement for the Management of Toxic Substances* (CCME, 1998).

### 3.2 Mercury

Mercury is a naturally occurring substance, which can be transformed through biological processes to methyl mercury, a persistent substance which bioaccumulates in the food chain and is particularly toxic to humans and wildlife. Mercury contamination originates from natural and anthropogenic sources, the latter including combustion of waste. Under a variety of regional, national, bi-national, and internal programs, treaties and agreements, mercury is being targeted for emissions reductions consistent with the CCME *Policy Statement for the Management of Toxic Substances* (CCME, 1998), which identifies that mercury shall be managed through its lifecycle to minimize release.

### 3.3 Used Oil and Waste Fuel

The following definitions are provided in the *Used Oil and Waste Fuel Management Regulations*.

**Used Oil:** Any oil, including lubrication oil, hydraulic fluids, metal working fluid, and insulating fluid, that is unsuitable for its intended purpose due to the presence of impurities or the loss of original properties, but does not include waste oil derived from animal or vegetable fat, a petroleum product spilled on land or water, or waste from a petroleum refining operation.

**Waste Fuel:** A flammable or combustible petroleum hydrocarbon, with or without additives, that is unsuitable for its intended purpose due to the presence of contaminants or the loss of original properties, and includes gasoline, diesel fuel, aviation fuel, kerosene, naphtha, and fuel oil, but does not include paint, solvent, or propane.

## SECTION 4 • PERFORMANCE LIMITS

### 4.1 Incinerator Selection

The Mine selected its incinerator based on Environment and Climate Change Canada's *Technical Document for Batch Waste Incineration*. The incinerator for the Mine is a camp waste incinerator (model no. ECO 1.75TN 1PVC100L 16-1MS) from Eco-Waste Solutions. The incinerator complies with the guidelines listed in Table 4-1, where the maximum emissions are expressed as a concentration in the exhaust gas exiting the facility's stack. The specifications of the incinerator are available in Appendix A. In addition to incinerator technology, the implementation of a waste segregation program limits emissions of dioxins and furans, and mercury from the incinerator.

Table 4-1 Emission Regulations for Solid Waste Incinerators

Emissions	Sector	Guideline (max) <sup>(a)</sup>	Units	Reference
Dioxins and Furans	Municipal Solid Waste <sup>(b)</sup>	80	pg I-TEQ/Rm <sup>3</sup>	CCME 2001a
Dioxins and Furans	Sewage Sludge Incineration	80	pg I-TEQ/Rm <sup>3</sup>	CCME 2001a
Mercury	Municipal Waste	20	µg/Rm <sup>3</sup>	CCME 2000
Mercury	Sewage Sludge Incineration	70	µg/Rm <sup>3</sup>	CCME 2000

<sup>(a)</sup> Stack concentrations are corrected for 11% oxygen.

<sup>(b)</sup> According to the Canada-Wide Standards (CWS), "municipal solid waste" includes any waste that might be disposed of in a non-secure landfill site if not incinerated (i.e., non-hazardous wastes regardless of origin), but does not include "clean" wood waste.

Compliance to these performance limits are confirmed with annual stack testing.

### 4.2 Used Oil and Waste Fuel

Agnico Eagle manages used oil and waste fuel according to the *Used Oil and Waste Fuel Management Regulations* (NWT, 2012) as presented in Table 4-2.

Table 4-2 Summary of Used Oil and Waste Fuel Regulations

Activity	Summary of Regulations
Registration	<ul style="list-style-type: none"> <li>Waste oil burner shall be registered with the Chief Environmental Protection Officer.</li> </ul>
Disposal	<ul style="list-style-type: none"> <li>Used oil/waste fuel will not be disposed of directly into the environment.</li> </ul>
Storage	<ul style="list-style-type: none"> <li>Used oil/waste fuel will be stored in specifically designed container for hydrocarbons to minimize the risk of spills;</li> <li>Used oil/waste fuel containers will be periodically inspected for leaks or potential leaks; and</li> <li>Used oil/waste fuel will be stored as per the Hazardous Materials Management Plan.</li> </ul>
Sampling and Analysis	<ul style="list-style-type: none"> <li>A sample of one month's feedstock of used oil/waste fuel is required to be tested at least once a year;</li> <li>Used oil/waste fuel will be tested for: <ul style="list-style-type: none"> <li>Flash point; and</li> <li>Existence and amount of each impurity Listed in Table 5-3.</li> </ul> </li> </ul>
Burning	<ul style="list-style-type: none"> <li>Used oil/waste fuel will not be openly burned;</li> <li>Used oil will not be burned in accommodation areas;</li> <li>Used oil with a flash point of less than 37.7°C will not be burned or blended with another used oil/waste fuel;</li> <li>Used oil that exceeds guidelines will not be burned; and</li> <li>A 14-day notice will be given for the burning of waste fuel.</li> </ul>
Records	<ul style="list-style-type: none"> <li>The following will be recorded in association with the incineration of used oil/waste fuel: <ul style="list-style-type: none"> <li>Volume of used oil/waste fuel generated;</li> <li>Volume of used oil/waste fuel incinerated/consumed;</li> <li>Name and address of person in charge, management or control of the used oil;</li> <li>Location of production of used oil/waste fuel;</li> <li>A summary of maintenance performed on used oil/waste fuel burners or processing equipment; and</li> <li>Volume and nature of the products produced from the used oil.</li> </ul> </li> </ul>

Table 4-3 summarizes the maximum level of contaminants in used oil that can be incinerated as stipulated in the *Used Oil and Waste Fuel Management Regulations* (NWT, 2012). Under the regulations blending of used oil that exceeds one of more of the criteria listed in Table 4-3 is not allowed.

Table 4-3 Used Oil Impurity Limit

Impurity	Maximum Level Allowed in Used Oil (ppm)
Cadmium	2
Chromium	10
Lead	100
Total Organic Halogens (as Chlorine)	1,000
Polychlorinated Biphenyls	2

### 4.3 Incinerator Ash

Provided the materials that go into the incinerator are controlled to exclude all hazardous materials, the incinerator ash should be non-hazardous. Even small quantities of hazardous waste, such as batteries, should not be mixed with waste to be incinerated. The purpose of sampling ash is to determine its acceptability for disposal in the landfill, pursuant to the GN Environmental Guidelines for Industrial Discharge (GN, 2011b). No sampling frequency is specified in those guidelines. To ensure compliance with the Guideline parameters, ash will be sampled quarterly by Agnico-Eagle. Should an exceedance be measured, an investigation will be undertaken to identify the cause and eliminate the source for this exceedance. Agnico-Eagle may increase the testing frequency of the ash following the exceedance. If deemed necessary, the ash will be packaged in drums to be sent to a certified waste management facility for appropriate treatment, recycling, and/or disposal.

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## SECTION 5 • INCINERATOR SPECIFICATIONS AND OPERATION

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The Mine has selected a dual chamber, high-temperature incinerator as the primary incinerator. The technical specifications are included in Appendix A. The incinerator is housed inside a separate building with sufficient floor space to manage all Mine wastes in one convenient location.

### 5.1 Incinerator Specifications

Typical modern, controlled-air, batch, dual chamber incinerators are design using the principles of pyrolysis (starved-air burning condition) in the primary chamber and complete oxidation (high temperature, excess oxygen, and sufficient combustion time) in the secondary chamber. The incineration system is a two-stage process. In the first stage, waste is converted to gas in the primary chamber at approximately 650 to 850 degrees Celsius (°C). This process is self fueling until the volume is reduced by 90 %. Gasses from the primary chamber enter the secondary chamber of oxygen-rich and turbulent conditions, which is typically at a higher temperature – around 1,000°C. Combustion is complete after a retention time of about two seconds. The temperature of combustion gases exiting the stack is anticipated to exceed 700°C and to flash cool in the ambient air, thereby leaving little opportunity for the *de novo* synthesis of dioxins/furans. Heat capture is not used on the exhaust gases.

Critical process parameters, such as temperature, air flow, and burner output is computer-controlled to maintain optimal combustion conditions.

For an incinerator capacity suitable for the predicted volumes of waste to be generated at the Mine, the total particulate matter generated is expected to be extremely low. Therefore, dust collection technologies, such as baghouse filters, will not be necessary, as very minor amount of fly ash will be generated. Ash residues generated in the primary chamber are manually removed on a daily basis using a shovel emptied into a metal bin.

#### 5.1.1 Operation Procedures

General operating procedures for the incinerator include:

1. Sort the waste on the basis of origin and heating value. Food waste and waste that has been in contact with food will have priority for incineration.
2. Mix the waste to ensure a calorific value within the incinerator's specification and to achieve good combustion inside the primary chamber.
3. Observe the start of the burn cycle to ensure the incinerator is operating correctly.
4. The door to the incinerator is only opened after the burn cycle is complete and the unit cooled.
5. The ash is removed from the incinerator before it is charged with the next load of waste to be incinerated.
6. The ash is placed in bins digitated for ash.

7. The ash is disposed of in the on-site landfill. If the concentration of trace metals exceeds the Government of Nunavut's *Environmental Guideline for Industrial Waste Discharges* (GN, 2014), ash will be either packaged and sent to an approved disposal facility or buried in the dry stack tailings.

The system has a sizable front door for easy access to manually load/feed waste into the unit with a front-end loader. The proposed waste streams are layered wherever possible during loading to ensure proper combustion.

#### 5.1.2 Emissions

The incinerator is designed to meet performance limits described in Section 4.1. Good engineering practices will be used to ensure required incineration temperatures and dispersion of gases meet applicable air quality standards/guidelines.

The incinerator stack design incorporates appropriate sampling ports, with caps where necessary, at appropriate locations to allow for stack testing to be undertaken during incinerator operation.

#### 5.1.3 Dust/Odour Control Measures

Modern incinerators are commonly designed such that the non-turbulent atmosphere in the primary burn chamber reduces the formation of particulate matter. Therefore, the need for additional dust and/or odour control measures is not anticipated. Organic/putrescible wastes will be given incineration priority to limit odours.

#### 5.1.4 Staffing and Equipment

The computerized incinerator typically requires one operator to interact with the equipment for approximately 1 to 1.5 hour per day, largely for ash removal, loading, and start-up. Operators are not typically required to be in attendance during the rest of the operation, as it is normally a fully automated process. The incinerator is designed, installed and operated so that the operators are not exposed to high temperatures during loading or ash removal due to complete cool down after the burn cycle. Also, the waste is not allowed to combust until the chamber is sealed thus isolating the worker from smoke and high temperatures.

#### 5.1.5 Inspections

Weekly inspections will be undertaken of the incinerator building for cleanliness and the proper management of wastes delivered to the facility. The Environment Department will carry out the inspections. Weekly preventive maintenances are done including the review of the incinerator's operating parameters to ensure effective operation.

## 5.2 Used Oil and Waste Fuel

The incinerator is able to efficiently burn used oil and waste fuel. A quantity of about 365,000 litres of used oil and waste fuel may be incinerated per year. The quantity of waste fuel is expected to be small



and will be dependent on the adherence to standard operating procedures. The goal is to avoid practices that could result in waste fuel. The principal sources of the used oil will be from oil changes on the mining equipment and light vehicles, as well as oil changes to mechanical gearboxes within the mill. Typical used oil and waste fuel furnaces include a storage tank and a filter to recover sludge prior to burning. Sludge collected in the filters will be drummed and shipped, as needed, to a certified waste management facility for treatment, recycling, and/or disposal.

### **5.3 Shipboard Incinerator**

Refer to the Shipping Management Plan.

### **5.4 Closure Plan**

In accordance with the Interim Closure and Reclamation Plan, salvageable buildings and surface structures, including the incinerator and waste management building, will be dismantled and demobilized from the site.

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## SECTION 6 • WASTE MANAGEMENT

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One method of waste reduction is by implementing purchasing policies that focus on reduced packaging. Reduce, reuse, and recycle initiatives as well as the waste segregation program at the Mine as per the Landfill and Waste Management Plan minimizes the quantity of waste incinerated or directed to the landfill.

### 6.1 Approach

A waste segregation program is implemented at the site. This allows materials that are unsuitable for incineration to be either landfilled on-site or shipped off-site to a certified waste management facility for treatment, recycling, and/or disposal.

### 6.2 Acceptable Waste for Incineration

Acceptable wastes for incineration will include the following:

- organic matter including food;
- food containers and wrappings, including plastics that are contaminated by food;
- medical waste from the Health Care Station;
- paper, cardboard, and the like;
- hydrocarbon spill absorbents;
- plastic and Styrofoam except plastic containing chlorine;
- dead animals; and
- used oils and waste fuel.

### 6.3 Unacceptable Waste for Incineration

Materials that are not listed above would be unacceptable for incineration. These materials include, but are not limited to:

- chlorinated plastics;
- inert materials, such as concrete, bricks, ceramics, ash, asbestos, drywall;
- bulky materials such as machinery parts or large metal goods such as appliances;
- radioactive materials, such as smoke detectors and laboratory wastes;
- potentially explosive materials, such as propane tanks, other pressurized vessels, unused or ineffective explosives;
- hazardous materials such as organic chemicals (pesticides), other toxic substances (arsenic, cyanide);
- electronics;
- batteries;
- vehicles and machinery;
- fluorescent light bulbs;

- whole tires;
- paint and solvents;
- any materials containing mercury, lead, and cadmium;
- used oil or waste fuel that exceeds the maximum impurity limits for parameters listed in Table 4-3;
- waste oil and waste fuel with a flash point of less than 37.7°C; and
- propane.

## 6.4 Waste Volumes

### 6.4.1 Solid Waste and Incinerator Ash

The number of people working on-site and the activities occurring at the time have a direct bearing on the volume of waste destined for the landfill, the incinerator, and the amount removed from waste streams for reuse and recycling.

It has been assumed that each person will produce 1 tonne of refuse per year<sup>3</sup>. Mean camp populations of 680 during operation and 50 during closure have been estimated. Fifty percent of the refuse by weight can be incinerated, approximately 30% of incinerated material by mass is converted into ash, thereby reducing the mass of waste by approximately 70 %. Table 6-1 estimates the annual tonnes of ash resulting from incineration for each project phase, based on the number of people on site, and cumulatively over the life of mine.

Table 6-1 Estimation of Ash over the Life of the Mine

Project Phase	Workers On-Site	Annual Tonnes of Waste Incinerated	Annual Tonnes of Ash	Numbers of Years	Cumulative Tonnes of Ash
Construction	200	100	30	4	120
Operation	680	340	102	8	816
Closure	50	25	7.5	3	22.5
<b>Total</b>					<b>958.5</b>

<sup>3</sup> Environment and Climate Change Canada's "State of the Environment InfoBase", Environmental Indicator Series 2003 (<http://www.ec.gc.ca>), indicates that the per capita non-hazardous solid waste generation in 2000 for Canada was almost 1 tonne per person per year.

#### 6.4.2 Used Oil and Waste Fuel

Approximately 365,000 litres of used oil is anticipated to be used in the incinerator for burning the waste. This is based on the maximum capacity of the incinerator burn rate which is approximately 1000 litres/day. The quantity of waste fuel is expected to be small but may vary between years.

### 6.5 Waste Incineration Rate

Due to the predicted volumes of waste to be generated at the site, the incinerator will have an approximate incineration capacity of 1,750 kilogram per day. If this cannot be achieved due to a lower volume of waste, the primary chamber could be used as storage of wastes until the desired volume is reached. These wastes will primarily associate with food and small amount of medical waste. The batch cycle will be 6 to 10 hours for the burn cycle, followed by a cool-down of 6 to 8 hours.

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**SECTION 7 • MONITORING AND TESTING**

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The following presents the monitoring and testing plan for the incinerator.

**7.1 Incinerator Emissions Testing**

The incinerator stack design incorporates appropriate sampling ports at appropriate locations, in a right angle configuration, to allow for stack testing to be undertaken during incinerator operation. Table 7-1 summarizes the frequency of testing that will be completed as per relevant guidelines (see also CCME, 2001b). Details of the monitoring program are outlined in Appendix B.

Table 7-1 Summary of Incinerator Emissions Testing

	Frequency	Number of Test Required	Reference
Dioxins and Furans	Annual	3	CCME 2001a
Mercury	Annual	3	CCME 2000

**7.2 Used Oil/Waste Fuel Testing**

A sample of used oil/waste fuel feedstock will be collected each month with one of the monthly samples being tested each year. Used oil/waste fuel not meeting impurity limits or having a flash point less than 37.7°C will be drummed and shipped to a certified management facility for re-refining, treatment, recycling, and/or disposal.

**7.3 Ash Testing**

An ash testing protocol is implemented on site to ensure that the incinerator ash is suitable for disposal in the landfill. Ash is disposed of and then covered immediately to prevent mobilization.

Ash samples are collected and tested quarterly and compared to the regulatory requirements as outlined in Table 7-2.

If monitoring indicates the ash is above the guidelines and not suitable for landfilling, an investigation will be undertaken to identify the cause and eliminate the source for the exceedance. If deemed necessary, the ash will be packaged in drums and sent to a certified waste management facility for treatment, recycling, and/or disposal.

Table 7-2 Environmental Guideline for Industrial Waste Discharges into Municipal Solid Waste and Sewage Treatment Facilities

Parameter	Maximum Concentration (mg/L)
Arsenic	2.5
Barium	100
Cadmium	0.5
Chromium	5
Lead	5
Mercury	0.1
Selenium	1
Silver	5
Zinc	5

## SECTION 8 • REPORTING

As part of the annual reporting, results from periodic stack emissions and ash monitoring, will be provided.

### 8.1 National Pollutant Release Inventory

The National Pollutant Release Inventory (NPRI) is a Canadian database containing information on the annual on-site release of specific substances to the air, water, and land from industrial and institutional sources (EC, 2012). The NPRI provides a list of tracked substances and requirements for reporting incinerator emissions. Table 8-1 lists the substances under the NPRI that the Mine expects to report annually. In addition, there are certain substances, as indicated in Table 8-1 that may require reporting depending on the quantity of incinerator emissions. Whether or not reporting is necessary will depend on results of periodic stack emission testing data and the quantity of annual emission calculated with emissions factors.

Table 8-1 National Pollutant Release Inventory Incineration Reportable Substance List

Substance	Note
Hexachlorobenzene	Required to report
Dioxins and Furans	
Carbon Monoxide	Required to report if released to air from facility in a quantity of 20 tonnes or more per annum
Oxides of Nitrogen	
Sulphur Dioxide	
Total Particulate Matter with diameter <100 microns	
Particulate matter with diameter less than or equal to 10 microns (PM <sub>10</sub> )	Required to report if released to air from facility in a quantity of 0.5 tonne or more per annum
Particulate matter with diameter less than or equal to 2.5 microns (PM <sub>2.5</sub> )	Required to report if released to air from facility in a quantity of 0.3 tonne or more per annum

### 8.2 Greenhouse Gas Emissions and Global Warming

Agnico Eagle is committed to reporting greenhouse gas emissions in support of Canada's Greenhouse Gas Reporting Program.

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**SECTION 9 • PLAN REVIEW AND ADAPTIVE MANAGEMENT**

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The Plan is updated regularly to reflect the operating conditions at the Mine during construction, operation, and closure. The Plan is reviewed annually and an updated version will be produced every two years of operation at a minimum.

The up-to-date Plan is made available by Agnico Eagle at all times for review by the Government of Nunavut (GN), Kivalliq Inuit Association (KivIA), Nunavut Water Board (NWB), and Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC).



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**APPENDIX A • TECHNICAL SPECIFICATIONS OF THE INCINERATOR**

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## Vendor Document Status

### AGNICO EAGLE

- 1 ☐ Proceed to next submission and status.
- 2 ☐ Proceed with exceptions as noted to next submission and status.
- 3 ☐ Do not proceed.  
Revise as noted and resubmit next submission and status.
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Agnico Eagle  
No.

6515-S-265-008-154-MNL-0002 R: Sub002

**DOCUMENT FOR INFORMATION**

Bolts and torques for breech and stack  
installation pg.33 & pg.35  
Capacity typo corrected pg.47  
Table of content added  
Parts list added pg.123-128  
Stack erection revised pg.35&36

# **Meliadine Incinerator ECO 1.75TN 1PVC100L 16-1MS**

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<b>Reference</b>	ECO 1.75TN 1PVC100L

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# **SECTION 1**

## **HEALTH & SAFETY PRECAUTIONS**

## Health and Safety Precautions

This machine has a number of energy sources:

- e.g. Electricity
- Heavy mechanical parts which may move due to gravity
- High Temperature
- Explosive Gases
- Flammable Liquids



- **THE INCINERATOR HAS THE POWER TO CAUSE SERIOUS INJURY OR DEATH**
- **KEEP CLEAR OF ANY MOVING PARTS AT ALL TIMES**
- **BEFORE STARTING THE CYCLE ENSURE THAT ALL PERSONNEL ARE CLEAR OF THE INCINERATOR**
- **DO NOT ATTEMPT TO START OR OPERATE THIS EQUIPMENT UNTIL THIS MANUAL IS READ THOROUGHLY AND IS UNDERSTOOD.**
- **RESPONSIBILITY FOR THE SAFE OPERATION AND MAINTENANCE OF THE EQUIPMENT SUPPLIED RESTS SOLELY ON THOSE OPERATING IT.**



**OBEY THE FOLLOWING SAFETY INSTRUCTIONS:**



**A qualified person is a person whom the owner of the equipment deems as having the required experience, training and skills to perform the required work.**

1. Keep the electrical panel doors closed at all times except when doing electrical troubleshooting.
2. Allow only qualified people to perform maintenance and troubleshooting on the machine.
3. Open and lockout the Main Disconnect Switch on the electrical control panel while working on the machine.
4. Do not bypass or tie down any of the door safety switches.
5. Do not open any of the doors while the Primary or Secondary Chambers are above 90°C
6. Do not enter the chamber unless the Emergency Stop Button is pushed in
7. When opening or closing the chamber door keep clear of the door and ensure that the path for the door is clear.
8. Secure the chamber door when it is open so it cannot move accidentally.
9. Immediately correct any fuel leaks.
10. Do not fill the Primary Chamber more than  $\frac{3}{4}$  full. Overfilling can result in poor burning and damage to the oxidizer.
11. Use proper tools, wear goggles, dust mask and gloves while loading and cleaning the oxidizer.
12. This unit is a confined space. Follow the safety rules for working in a confined space.
13. Ensure that all personnel who are going to operate or work on the machine read and understand the above points and are trained in the operation and maintenance of the machine.

## **SECTION 2**

# **GENERAL DESCRIPTION**

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## General Description - Thermal Oxidation Concept

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The **ECO 1.75 TN 1PVC100L Incinerator system** consists of a **Primary Chamber** and a **Secondary Chamber** (also known as the Afterburner). Both chambers are vessels constructed of steel with a special insulating liner known as refractory.

The **Primary Chamber** has **Hydraulic Roof Lifters** installed for loading of the waste material from the top of the **Primary Chamber** and the front door is used for the removal of residual ash.

The waste material is loaded into the **Primary Chamber** until it is  $\frac{3}{4}$  full. Once  $\frac{3}{4}$  full the **Primary Chamber** is sealed and the combustion cycle begins. This type of system is known as *batch-fed* processing.

### Primary Chamber

In the first stage, a burner is used to elevate the temperature of the **Primary Chamber** to ignite the waste. Once the **Primary Chamber** reaches a temperature of approximately 650-850°C, the burn process becomes self-fuelling and the burner will shut off. To save fuel and control temperatures, only when the energy contained within the waste is depleted, will the burner periodically turn on. At these operating temperatures, waste is allowed to fully combust and is rendered sterile.

The **Primary Chamber** operates under *controlled temperature* conditions. The amount of heat released, from the burning of the waste, is controlled by limiting the air into the **Primary Chamber** to less than what is required to complete combustion. This is described as *starved air* conditions. With controlled air and temperature the waste is dried, heated and burned thereby releasing moisture and volatile components. The non-volatile, combustible portion of the waste is burned in the **Primary Chamber** to provide heat while the non-combustible portion accumulates as ash.

In the end, the waste volume is reduced by over 90%. Independent tests have shown that the residual ash is non-hazardous, non-leaching and essentially inert. After enduring the combustion process, metals and glass remain intact. Preservation of metals and glass not only protects the refractory lining from damage caused by melted and fused metals and glass, but also allows for post-combustion recycling where possible.

Remaining in the **Primary Chamber** are non-combustibles, such as metal and glass, and carbonaceous residue. The incoming air, subjecting the non-combustibles to high temperatures, further burns the carbonaceous residue. The result is an oxidized ash product.

Controlling the gas velocity through the system is an important factor in limiting pollution. The gases flowing from the **Primary Chamber** are a result of the interaction of the air with the waste during the controlled burning process. Both the quantity and velocity of the gas product vary according to chamber temperature conditions and the type of waste being burned. The integrated controls for the **Primary** and **Secondary Chamber** act to minimize peaking activity thus controlling pollution automatically.

The combustion gases released in the **Primary Chamber** then pass into the **Secondary Chamber** through a turbulent mixing zone where ignition takes place and additional combustion air is provided to complete the burning process.

## Secondary Chamber

As waste burns in the **Primary Chamber**, gases containing the products of combustion enter the high temperature zone of the **Secondary Chamber** for cleansing. The **Secondary Chamber** is sized to retain the incoming gases for a minimum of 2 seconds at 1000°C. This chamber utilizes a high output, fully modulating dual fuel (diesel & waste oil) burner to maintain the required temperature (even in the absence of energy input from the first stage which is important when processing wet or low energy waste). This stage employs a large blower, tightly controlled by the control system using a variable frequency drive on the motor. The blower creates the turbulence required to mix the gases and oxygenate them. This fosters the high efficiency combustion required to break hydrocarbon chains into carbon dioxide and water vapour.

The **Secondary Chamber Blower** air is introduced into the **Secondary Chamber** by an air ring manifold that surrounds the **Secondary Chamber**. The manifold has small air jets called tweeters that open into the **Secondary Chamber** at the side walls and create a powerful vortex of excess air to mix the incoming gases and ensure complete combustion. The flow of air is tightly managed by the control system using a Variable Frequency Drive (VFD) by controlling the speed of the fan and modulating motors on the blower inlet dampers.

The **Secondary Chamber Blower** is extremely important as it creates the turbulence required to mix the gases and oxygenate them. This fosters the high efficiency combustion required to break hydrocarbon chains into carbon dioxide and water vapour. It also acts to cool the **Primary Chamber** and prevent temperature overruns.

The **Secondary Chamber** burner is a high output burner and its output is self modulated over a broad range for very precise temperature control.

The **Secondary Chamber** is sized to allow two seconds of retention time. This is the time that the gases from the **Primary Chamber** are retained in the **Secondary Chamber** before they exit to the next stage. Two seconds of retention is considered to be ideal to destroy any harmful organic hydrocarbons produced from the **Primary Chamber**.

## Main Control Panel

There is one **Main Control Panel** that controls all of the interconnecting modules. The Operator has one simple **Human Machine Interface (HMI)** to start the equipment, view system status and change control settings if required. The system utilizes a PLC (programmable logic controller) to automate its functions. All critical process parameters such as temperature, combustion airflow and burner output are operated using EWS' patented system control program to maintain optimal combustion and air pollution abatement.

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## Protecting the Environment

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### Why Incinerate?

As society becomes more environmentally conscious, environmental regulations on the proper disposal of solid waste have become more stringent. As a result, incineration has become an environmentally responsible and socially acceptable alternative for handling waste at the point of need. However, incineration does not eliminate the need to landfill waste but it does reduce the amount of waste that must be placed in landfills.

Primary advantages of incineration are:

- It greatly reduces the weight and volume of waste material that must be disposed of in landfills
- It destroys organic materials that may be harmful or that may be degradable to harmful materials in landfills
- The incinerator sterilizes the waste; that is, the high temperatures in incinerators can destroy any pathogens that may be in infectious waste materials
- The incinerator destroys animal or human pathological wastes that the general public finds objectionable to handle or see.

### Environmental Concerns

The general public will not accept incineration as an option for treating waste of any kind, if they do not believe that it is safe environmentally. The primary concerns are about air pollutants produced by the incinerator and the toxicity of the residual ash. This section will present some of the terminology that is important to understanding these concerns. The remainder of the manual will describe how an incineration system can be operated and maintained in a way that keeps environmental releases at an acceptable level.

#### Air Pollutants of Concern

Particulate matter may be defined as fine liquid or solid matter such as dust, smoke, mist, or fumes found in the gaseous emissions from the incinerator. Particulate matter emissions may have a dark or light color. Particulate matter emissions can be described in terms of opacity. Opacity is the degree to which light is obscured by a polluted gas (a clear window has 0 percent opacity while black paper has 100 percent opacity). Opacity may be measured with the naked eye or using an opacity monitor. Particulate matter is a problem because it can cause or aggravate respiratory problems in humans. It also creates aesthetic problems since it is readily noticed and is a nuisance because of soiling of exposed surfaces on houses and cars.

Hydrochloric (HCl) acid is generated when polyvinyl chloride (PVC) plastic (usually clear plastic) material is burned in the incinerator. The appearance of a white plume or cloud a short distance above the stack indicates that HCl is condensing. The major concerns about HCl are that it causes respiratory problems in humans, contributes to acid rain problems, and causes material damage to metals and concrete.

Toxic metals include cadmium, arsenic, beryllium, chromium, nickel, lead, and mercury. These metals may be found in municipal wastes. These metals are known to be hazardous to human health.

Organic compounds are compounds that contain primarily carbon and hydrogen and may also contain other elements such as oxygen, nitrogen, and chlorine in smaller amounts. Some organic compounds are known to cause or are suspected of causing cancer and are considered hazardous air pollutants. The public's primary concern is related to dioxin and furan emissions, but other organic compounds such as benzene and vinyl chloride may be emitted.

Carbon Monoxide (CO) also is generated during combustion if the combustor is not operated properly. (Your automobile generates some amount of CO.) CO is toxic to humans if concentrations are high enough, and it also is an indicator of combustion quality.

### **Solid Waste Ash Quality**

One of the major objectives of incineration is to generate a high quality ash for land disposal. All pathogens should be destroyed, and almost all organic material should be completely burned. Ideally, no large chunks of unburned waste material (other than metals or glass) should remain in the waste. A measure of ash quality is "burnout," which is the percentage of organic material remaining in the waste. For example, a burnout of 95 percent means that the ash can contain only 5 percent organics. Adequately burned and quenched ash may be disposed of in a sanitary (municipal) landfill. The ash should be stored in covered containers or kept wet prior to transport to the landfill to prevent 'fugitive \ emissions.' Individual landfills may have requirements that must be followed in order for your waste to be accepted. You should familiarize yourself with these requirements to prevent refusal of the waste.

### **The Operator – Your Role**

It is the operator's role and responsibility to protect the environment by:

- 1 Complying with all emission limits and operating practices specified in the permit to operate.
- 2 Minimizing emissions of particulate matter, HCl, toxic metals, carbon monoxide, and organic compounds through proper incineration;
- 3 Operating the incinerator to generate high quality ash that is sterile and can be disposed of in landfills;
- 4 Minimizing particulate matter emissions from ash handling;
- 5 Disposing of ash properly by sending it to appropriate disposal sites; and
- 6 Performing the regular maintenance inspections to catch any operational problems early.

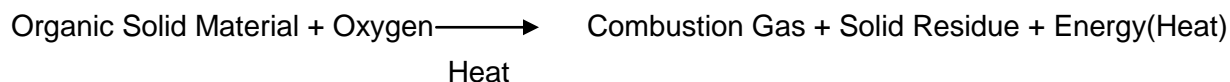
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## Basic Combustion Principles

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### The Combustion Process

Combustion of Municipal Solid Waste (MSW) is a chemical reaction. In the incinerator, organic materials and oxygen react rapidly and violently to produce combustion gases and energy in the form of heat and light.



For the reaction to begin and to keep going, all three elements - organic material, oxygen, and heat-must be present. The organic material used in the reaction comes from two sources, waste and auxiliary fuel. Some organic material is contained in most solid waste types. Depending on the fraction of organics and the specific organic composition, the waste may be adequate to sustain combustion. Auxiliary fuel may be used to maintain combustion if the waste material does not contain enough organic material to maintain high temperatures. The combustion reaction between the organic material and oxygen that causes the organics to burn will occur only after the temperature of the organic material is raised to the point that combustion can begin.

Energy in the form of heat is required to raise the temperatures of the incinerator chamber and organic material and O<sub>2</sub>. This energy usually is supplied by the auxiliary fuel burners.

### Rate of Combustion Air

The oxygen needed for the combustion reaction is supplied by the ambient combustion air. Combustion air is supplied to the combustion chambers through air ports by natural draft. In general, this air contains about 21 percent oxygen (O<sub>2</sub>) and 79 percent nitrogen (N<sub>2</sub>), so about 21 percent of the total combustion air fed to the incinerator is oxygen that is available to react with the organic material in the waste and fuel. The nitrogen passes through the chamber mostly unreacted; some nitrogen oxides are formed.

### Oxygen Reaction

Solid waste contains two types of organic materials

1. Volatile Matter
2. Fixed Carbon

These two types of materials are involved in distinct types of combustion reactions, and the operating variables that control the two types of reaction are different.

Volatile matter is that portion of the waste that is vaporized (or evaporated) when the waste is heated. Combustion occurs after the material becomes a gas. The combustion variables that influence this reaction are gas temperature, residence time, and mixing.

- A minimum temperature is needed to start and sustain the chemical reaction.
- Residence time is the length of time, generally measured in seconds that the combustion gas spends in the high temperature combustion chamber. The residence time must be long enough for the reaction to be completed before it leaves the high temperature zone.
- Turbulent mixing of the volatile matter and combustion air is required to ensure that the organic material and oxygen are well mixed.

Fixed carbon is the nonvolatile organic portion of the waste. The combustion reaction is a solid-phase reaction that occurs primarily in the waste bed (although some materials may burn in suspension). Key operating parameters are bed temperature, solids retention time, and mechanical turbulence in the bed.

- The solids retention time is the length of time that the waste bed remains in the Primary Chamber.
- Mechanical turbulence of the bed is needed to expose all the solid waste to oxygen for complete burnout. Without mechanical turbulence, the ash formed during combustion can cover the unburned waste and prevent the oxygen necessary for combustion from contacting the waste.

Products of complete combustion are:

- Carbon dioxide
- Water

One example of volatile waste is backyard charcoal grill with starting fluid. The starting fluid is highly volatile. When put on the charcoal and ignited with a match, it rapidly volatilizes and burns. The charcoal contains less volatile matter and primarily burns slowly as a fixed carbon bed.

### Operating Factors Related to Combustion

The three operating factors that have the greatest effects on the combustion reaction are:

- Combustion airflow rate and distribution,
- Operating temperatures, and
- Waste feed rate and characteristics.

These three factors are all related. Controlling them controls the combustion reaction.

### Stoichiometric Air

In the chemical reaction between organic materials and oxygen, the amount of oxygen required under ideal or "perfect" conditions to burn all of the organic materials with no oxygen left over is called the stoichiometric (or theoretical) oxygen level. The amount of combustion air associated with that oxygen level is called the stoichiometric air level. At stoichiometric air level the combustion gas would contain no oxygen because it would all be used in the combustion reaction.



### Substoichiometric Air

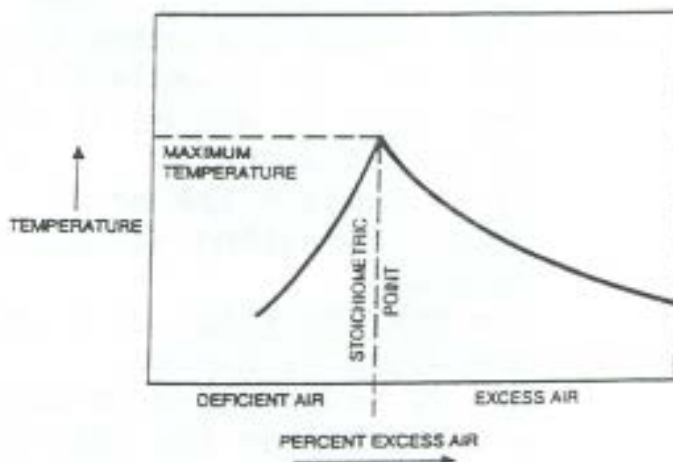
Airflows less than those required at stoichiometric levels are called deficient air or substoichiometric starved-air levels. Under starved-air conditions, the combustion gas would again contain no oxygen, but organics also would remain because combustion is not complete.

### Excess Air

Air flows greater than those required at stoichiometric levels are called excess-air levels. Typically an incinerator operates with an overall 140 to 200 percent excess air level. That is, the incinerator operates with one and one-half to two times more air than required at stoichiometric levels. Excess air is used to assure that enough oxygen is available for complete combustion.

### Control of Temperature as a Function of Air Level

Maximum combustion temperatures are always attained at stoichiometric conditions. As the amount of excess air is increased above the stoichiometric point, the temperature in the incinerator drops because energy is used to heat the combustion air. If the amount of combustion air is too great, the temperature drops below "good combustion temperature," and undesirable combustion products are generated as a result of incomplete combustion. As the amount of excess air is decreased, the combustion temperature increases until it becomes maximum at the stoichiometric point. Below the stoichiometric point, the temperature decreases because complete combustion has not occurred.



CONTROL OF TEMPERATURE AS A FUNCTION OF EXCESS AIR

The relationship of how combustion air level can affect temperature has just been shown. Temperature also plays an important role in the combustion of waste. Temperatures need to be maintained at levels high enough to ensure pathogen destruction and to sustain the combustion reaction. However, temperatures that are too high also cause problems. Continuous exposure of the combustor refractory to high temperatures is generally not desirable because it can cause the ash to fuse and can cause damage to the refractory.

## Waste Characteristics

The primary characteristics of the waste that affect the combustion reaction are:

- The heating value
- The moisture content
- The chlorine content

Different wastes have different heating values and moisture contents. They will affect the combustion process.

The HEATING VALUE of a waste is a measure of the energy released when the waste is burned. It is measured in units of Btu/lb (J/kg). A heating value of about 5,000 Btu/lb ( $11.6 \times 10^6$  J/kg) or greater is needed to sustain combustion. Wastes with lower heating values can be burned but they will not maintain adequate temperature without the addition of auxiliary fuel. The heating value of the waste can be used to calculate total heat input to the incinerator where:

$$\text{Heat Input (Btu/h)} = \text{Feed Rate (lb/h)} \times \text{Heating Value (Btu/lb)}$$

Heat input to the incinerator will affect temperature. More heat input yields higher temperature. Heat input also will affect air requirements; more air is required (1 SCF/100 Btu).

MOISTURE is evaporated from the waste as the temperature of the waste is raised in the combustion chamber. It passes through the incinerator, unchanged, as water vapor. Evaporation of moisture uses energy and reduces the temperature in the combustion chamber.

CHLORINE in plastics or solvents in the waste feed will react to form hydrochloric acid (HCl). This HCl can be an emission problem. It can create corrosion problems of the equipment downstream from the incinerator.

The heating value (Btu value) and moisture varies widely. Compare plastics (high Btu, no moisture) to beddings, shavings, etc. to anatomical.

## Summary of Key Operation Factors Affecting Combustion

- 1 Key factors are interrelated.
- 2 Air quality/distribution
- 3 Sufficient air for complete reaction
- 4 Distributed to promote mixing
- 5 Mixing
- 6 Assure contact of oxygen and organics
- 7 Temperature
- 8 High enough to sustain combustion
- 9 High enough to have complete reaction
- 10 Residence/retention time
- 11 Sufficient time to allow reaction to complete

## Waste Characteristics are also important

- 12 Heating value
- 13 Measure of energy released

- 14 Heat input determines air required
- 15 Moisture content
- 16 Requires energy to vaporize water
- 17 Chlorine content
- 18 Affects HCl emissions

This summarizes the key parameters affecting combustion.

## **Products of Combustion Reaction**

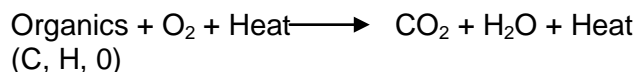
### **Complete Combustion**

The primary products of waste incineration are:

- Combustion gases
- Solid residue (ash)
- Energy

The primary objectives of the combustion process are to generate an ash residue that is sterile (free of pathogens) and does not contain unburned, recognizable wastes; and to minimize air pollutants in the combustion gas stream.

The organic materials that enter the incinerator with the waste and fuel are primarily made up of carbon, hydrogen, and oxygen. Ideally, these organic materials react with oxygen in the combustion gas to form carbon dioxide and water vapor. The chemical reaction for this ideal situation is



This ideal reaction represents complete combustion.

### **Incomplete Combustion**

However, this ideal reaction does not occur in operating waste combustion systems. Factors that lead to a less than ideal reaction are poor mixing, too little combustion air, and low temperatures. Under those conditions products of incomplete combustion are emitted with the stack gases. The most common product of incomplete combustion is CO. Another product of incomplete combustion that often is emitted under poor mixing conditions or high temperature, low excess air conditions, is elemental carbon (or soot). The soot particles are very fine and generally result in high opacity at the combustion stack. Other products of incomplete combustion that cause concern because of their health impacts are hazardous organic compounds such as benzene, dioxins, and furans. Although these compounds are not found in the waste, under incomplete combustion conditions they can be formed as intermediate combustion products.

The waste feed also includes inorganic materials; generally, they are not involved in the combustion reaction. The inorganic materials in the waste feed (ash) are either retained in the ash or are emitted as particulate matter in the combustion gas. Air velocities in the combustion bed are controlled to reduce the amount of inorganic material entrained (picked up by) the combustion gas and emitted with the combustion gas. If combustion is not complete, organics

will remain in ash; this is typical...it is atypical to have 100 percent combustion of ash bed. Under poor conditions (low temperature, low turbulence in ash bed) may have pathogens remaining in ash; i.e., may not sterilize ash.

### **Combustion Indicators**

The information presented in the above section suggests that the following indicators can be used to monitor combustion quality.

#### **Opacity**

The opacity of the combustion gas stream is a measure of the degree to which the stack gas plume blocks light.

- High opacities indicate high emissions.
- Opacity is primarily caused by noncombustible ash or uncombusted carbon (soot) in the flue gas.
- High opacities can indicate poor mixing or low levels of combustion air.
- High opacities also may be generated by high levels of HCl emissions or poor burner operation in the secondary chamber.

If a large amount of water vapor is present in the combustion gas, the water can condense when it cools as it leaves the stack forming a dense white "steam plume." This is not an indicator of poor combustion and should not be confused with a black or white smoke plume caused by soot or acid gases. Opacity can be visually determined by a person or measured by an instrument.

Other indicators which provide information about combustion conditions are measurements of the combustion gas oxygen and CO levels. However, these measurements require instruments and most facilities do not have those instruments.

#### **Ash Quality**

Visual appearance of ash can be an indicator of combustion problems. If an incinerator is operating properly, little organic material will remain in the ash. Whitish gray ash indicates better burnout and less carbon than black. The extent of organics combustion can be measured by the quantity of combustible materials remaining in the ash. Noted increases in combustibles in the ash indicate a combustion problem which may include bed temperatures that are too low, improper distribution of combustion air in the bed, or insufficient waste retention times.

## **SECTION 3**

### **PHOTOS OF THE INCINERATOR**

**NOTE** some of these are sample photos and may not depict the actual Incinerator components

### Primary (right) & Secondary (left) Chambers

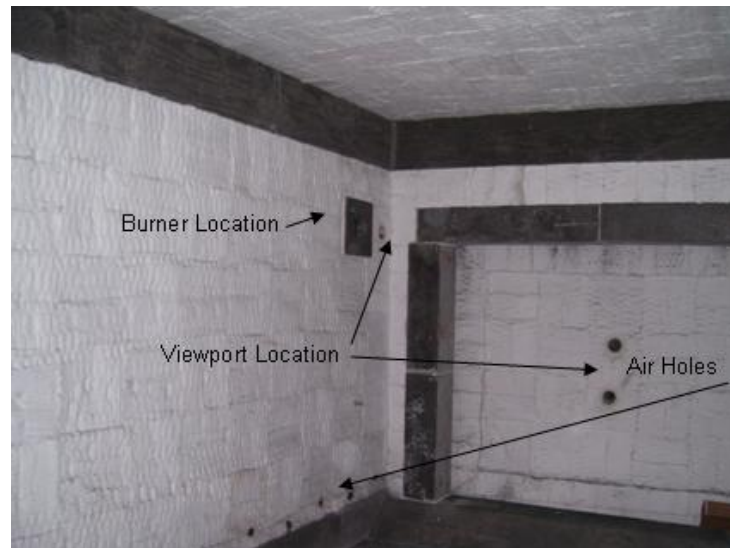


**NOTE** Stack sections and breech have not been installed.

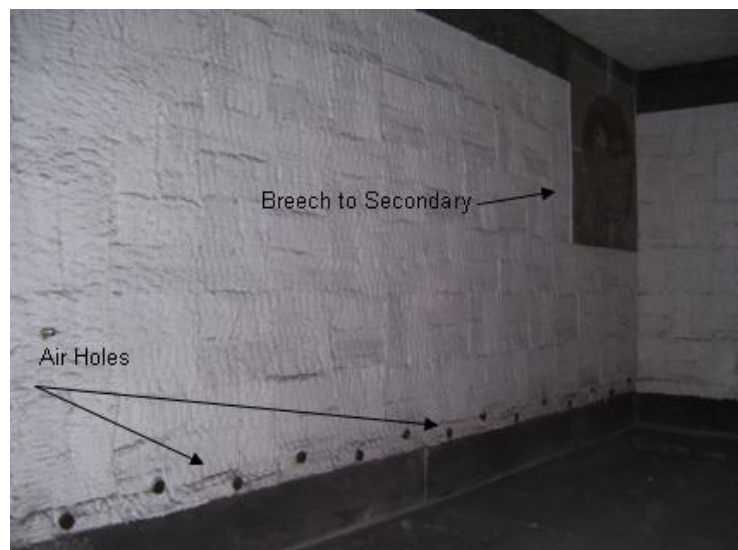
### Primary Chamber Access Door View



**Primary Chamber Interior View (sample picture)**



Floor and grate detail





### Secondary Chamber Door View



### Secondary Chamber / T-section View





## Primary Chamber Blower



## Secondary Chamber Blower

Adjustable Damper and Modutrol Motor



### Primary Chamber Burner



**NOTE** Burner is shown without cover installed.

### Diesel Tank (4,500lt)



## Secondary Chamber Burner



## Waste Oil Tank (5,000lt)



## Main Control Panel



## Thermocouple, Viewport and Limit Switch



## **T-Stack and Stack Sections**



## **Spark Arrestor**





## **SECTION 4**

# **ASSEMBLY & INSTALLATION INSTRUCTIONS**

## General Assembly and Installation Overview

The incinerator is factory pre-assembled to ensure proper fit then shipped disassembled. On-site assembly by certified trade's people is required. Trades people (Riggers, Mechanical Contractors, Millwrights, Electricians, Gas Fitters, etc) are to be arranged by Purchaser and/or Contractor.

This is a **general overview**, therefore, project specific details must still be considered. Please refer to relevant data and drawings supplied by EWS.

### Purchaser/Contractor Responsibilities

These responsibilities include, but are not limited to, the following:

1. Ensure all concrete and structural steelwork, as may be required, is adequate to support the incinerator and associated equipment. The Purchaser/Contractor is responsible for all concrete design such as slab thickness, footing depths and dimensions and any placement reinforcement so as to be consistent with all applicable building codes.
2. Supply of any anchor bolts when applicable.
3. Provide all utility services to the equipment including fuel, electrical, water, air, etc, as may be required.
4. Provide adequate air makeup to the incinerator room through forced air circulation blowers, air intakes and/or opened louvers to avoid the creation of negative pressures within the building.
5. Observe caution in the selection of materials and coating of building walls or other structural components to the incinerator area giving due consideration to high-localized temperatures of the incinerator.
6. Provide all external thermal insulation when required on steam piping, water piping, etc.

**NOTE** External thermal insulation should never be applied to any surface of the incinerator or refractory lined stacks and breeching. If applied to these surfaces, structural damage may result.

7. Provide proper roof thimbles, clearances, flashing and counter flashing around all roof penetrations, including the incinerator stack.
8. Guying of all stacks (if required) is to be done by the Purchaser/Contractor. Guying should be at three points at 120° apart or four points at 90° apart. The Purchaser/Contractor provides design of guying and guying connection points to the stacks. Torque draw band bolts to 35 lbs. during stack assembly.

9. Provide proper protection of all equipment from damage, vandalism and weather, while on-site and/or when installation is in progress.
10. Provide all touch up painting and cleanup of equipment after erection.
11. Inspect and field weld miscellaneous flanges, when applicable.
12. Supply all main fuel line regulators at connection points to the Incinerator. Fuel lines should be sized for maximum pressures and instantaneous fuel flow at cold starting. Pressures should be based under flow conditions, not static. Static pressure should never exceed the design pressure of the pressure regulator. Gas volume includes burner pilot requirements.
13. General Arrangement drawings are normally provided by EWS. As soon as possible after acknowledgement of a Purchaser/Contractor's order, it is the responsibility of the Purchaser/Contractor to provide EWS with all applicable sketches, layouts, building drawings, roof and floor elevations and other pertinent information to allow preparation of the General Arrangement drawings. With this information, the Purchaser/Contractor's will provide desired orientation of the chambers.
14. The Purchaser/Contractor must recognize the importance of proper waste material descriptions concerning physical and chemical properties. Changes in waste composition to be incinerated should be made known to EWS, as soon as possible.
15. It is the Purchaser/Contractor's responsibility to obtain all construction, operating and environmental/air emissions permits as may be required in the area of jurisdiction for the incinerator equipment. EWS will assist in supplying all technical information required for these permits to the Purchaser/Contractor.
16. The Purchaser/Contractor must be aware that certain components will be broken down for shipment purposes and reassembly will be required in the field by the Purchaser/Contractor.
17. Locating and mounting the incinerator in a confined area should be avoided. The Purchaser/Contractor should maintain ample space around all equipment for maintenance, cleaning and safety considerations. A rule of thumb would be to provide a minimum of six feet from all major equipment surfaces and edges. Always allow proper space for the swing radius of loading doors, cleanout doors and electrical panel doors. If space limitations exist, it is the Purchaser/Contractor's responsibility to make EWS aware of these dimensional restraints so that modifications may be considered.
18. Do not scale drawings: If certain dimensions are required which are not shown on drawings, the Purchaser/Contractor should contact EWS Project Manager. EWS will not be responsible for any dimensional conflicts resulting from dimensions not shown on a certified drawing. Do not use general sales literature or other general equipment submittals for construction unless so indicated. EWS reserves the right to change equipment dimensions as required for design purposes.
19. All drawing dimensions are typically subject to 1/4" tolerances.



20. If the refractory is shipped in the green condition, the refractory has not been heat cured. This curing process must be accomplished in the field after final erection and assembly. It is understood that the Purchaser/Contractor will provide all required utilities for this curing process and initial equipment operation for adjustments at no expense to EWS including but not limited to fuel, electrical, water, etc.
21. Due to the physical size of the incinerator, the unit is shipped partially dismantled and will, therefore, require reassembly in the field. Consult EWS for maximum component weights so that properly sized cranes are available at the site for unloading and erecting. Purchaser/Contractor may, also therefore, have to reinstall electrical components and control connections, burners, blowers, lifters, etc. These connections are normally of the flexible type with leads marked.
22. Lifting lugs are provided on chambers, stacks, and major accessories. These lugs should be used in setting the pieces into position. Do not attach lifting chains or cables to piping, control panel or mounting flanges as they may be damaged. Avoid dragging lifting gear across painted surfaces as this will cause damage to the high temperature paint. When placing the incinerator into position be extremely careful not to subject the refractory to mechanical shock as this may result in refractory damage.

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### Step by Step Assembly and Installation Instructions

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The following **sequence** applies specifically to the Meliadine Waste Incinerator.

#### Trades-people required for the following steps:

Forklift Operator, Crane Operator, Riggers, Electrician and Mechanical Contractors (pipe and gas fitter)

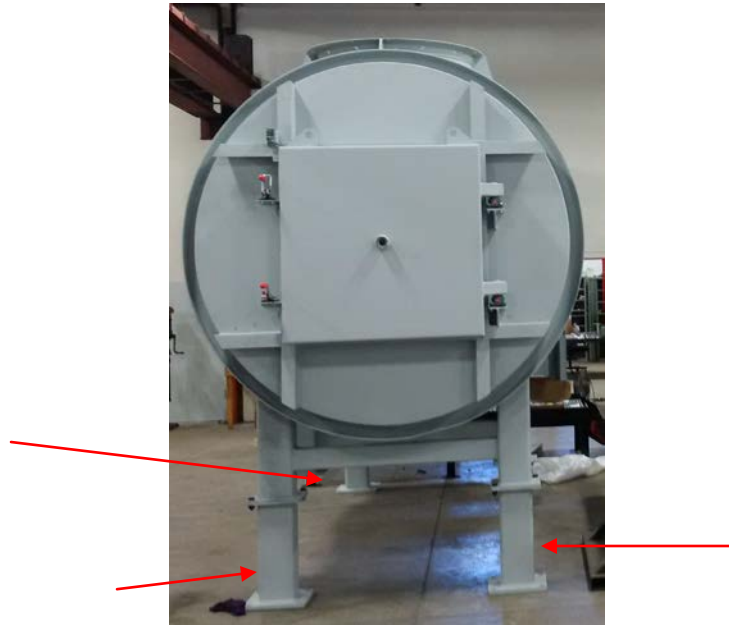
**Please refer to the supplied drawings and data.**

**Foundation Drawing:** Anchor Bolt and Loading Diagram ECO1.75TN1PVC100L-00D rev.0

1. The incinerator and related components must be installed on a level concrete pad. It is recommended that appropriate consultation with civil engineers and/or architects is taken before designing an appropriate foundation for the equipment.
2. Please refer to General Arrangement Drawing ECO1.75TN1PVC100L-00A rev.1 and its Bill of Materials.

#### Place the Primary Chamber and Secondary Chamber on the Foundation

3. Locate leg extension for the Secondary Chamber and put into position.
4. Once the leg extensions have been put into place, using a crane, lift the **Secondary Chamber** into position and connect the leg extensions.



**Leg extensions**

5. Position the Secondary Chamber (item 2) beside the Primary Chamber (Item 1) on the level concrete pad. Ensure that the breach openings on each Chamber are facing each other.
6. Shim with steel shim plates to ensure the Secondary Chamber is level. This is required to prevent rocking, or any movement of the **Secondary Chamber**.



### Connecting the Breech to the Secondary Chamber

1. Install the **Secondary Breech Gasket**, by spraying the gasket adhesive on the Breech connecting flange and on the gasket material. Line up holes of the **Secondary Breech Gasket** to line up with the flange bolt holes. Press **Secondary Breech Gasket** onto flange securely.



**Gasket adhesive spray being applied**

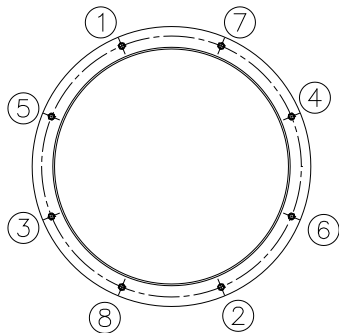


**Correctly Installed Gasket**

2. Raise the **Breech** (Item 7) with forklift and slings, once the **Breech** is 8 to 13 cm from the flange, use alignment bars to help with the final alignment of the two (2) breech flanges, as shown below.



3. Once breech flanges are aligned and together bolt flanges together using the numerical order described in the pattern below using hardware provided.



**Correctly installed Breach on Secondary Chamber**

### **Position the Primary Chamber**

1. Install the **Primary Breach Gasket**, by spraying the gasket adhesive on the Breach connecting flange and on the gasket material. Line up holes of the **Primary Breach Gasket** to line up with the flange bolt holes. Press **Primary Breach Gasket** onto flange securely.



**Gasket NOT installed**

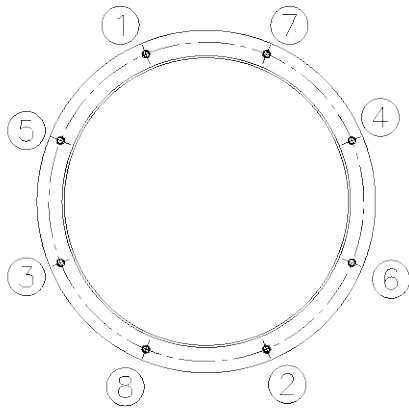


**Correctly Installed Gasket**

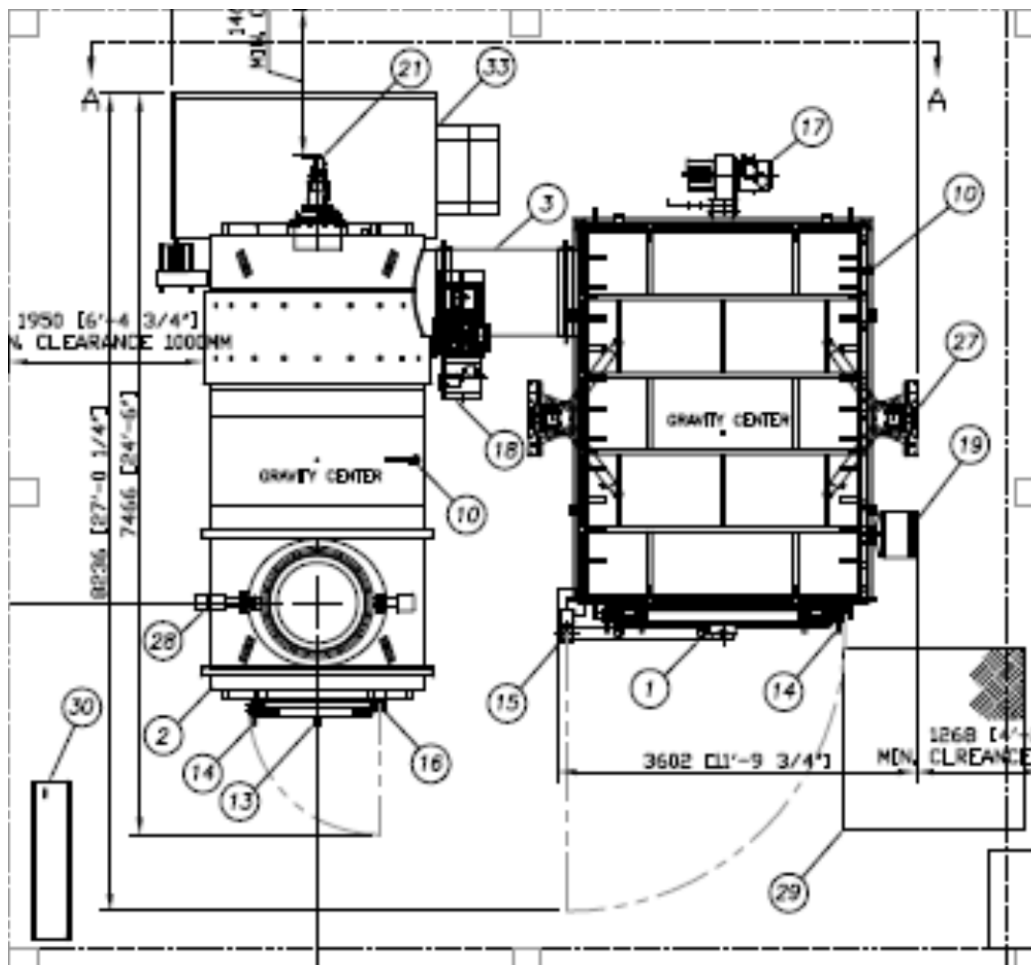
2. While constantly checking alignment of the **Breach** move **Primary Chamber** along the floor using the forklift and skates until the flanges are aligned.

**NOTE** Do NOT pull the Primary Chamber closer to the Secondary Chamber with the flange bolts. Doing so will bow the steep plate, in turn damaging the breach refractory.

3. Once breach flanges are aligned bolt flanges together, shim and level the Primary Chamber with steel shim plates. Support pads should be shimmed as required to prevent rocking, or any movement of the Primary Chamber.
4. Using the numerical order described in the pattern below using hardware provided.



**Correctly Installed Breech on Primary Chamber**





**NOTE** The diagram above shows the burners and blowers already attached to the Primary and Secondary Chambers. When positioning the Primary Chamber, Breech and Secondary Chamber, these items will not be attached.

### Installing the Stack

Install stack gaskets between stack sections.



Install refractory-lined *T-Stack Section* on top of the *Secondary Chamber* using the hardware provided. Then install the next four *Stack Sections* and the *spark arrestor* as per the drawing using hardware provided.



**T-Stack and Stack Sections**

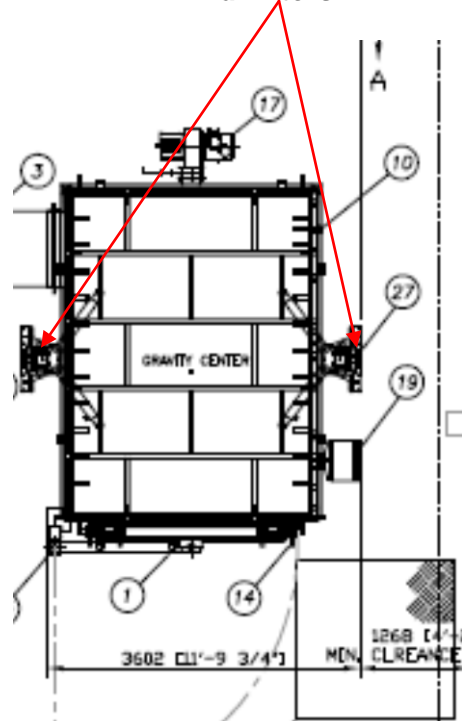


This is a Sample Photo only of Erection of the Stack Sections

### Installing the Lid Lifters

1. Place the lid lifters (item 27) on either end of the Primary Chamber. The slave column, the one without the hydraulic power pack, is to be located in between the chambers.

#### Lid Lifters

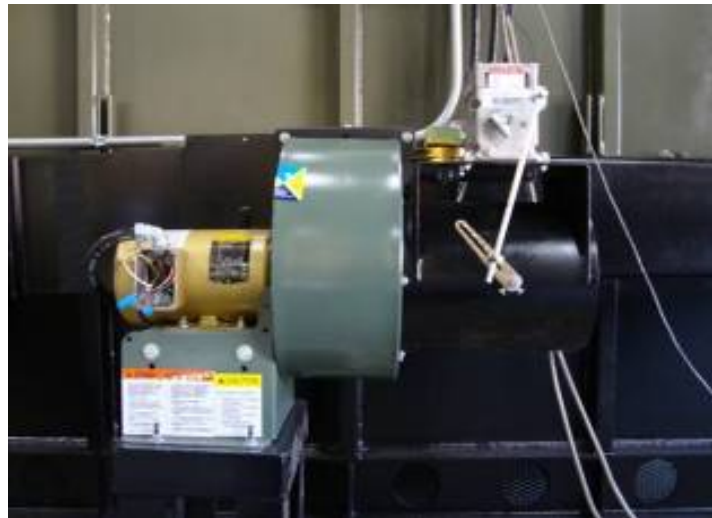


2. Once lifters are in place, shim and level, do not exceed 2.54 cm under the column. Anchor the columns to the floor.
3. Install the pre-assembled hydraulic pump on the master column reinforcement and connect the hydraulic hose and piping.
4. Install the limit switches, proximity switches and solenoid valves with the hardware provided.
5. Install the control stations for the lid lifters (attached to junction box at the master column). Location determined by customer.

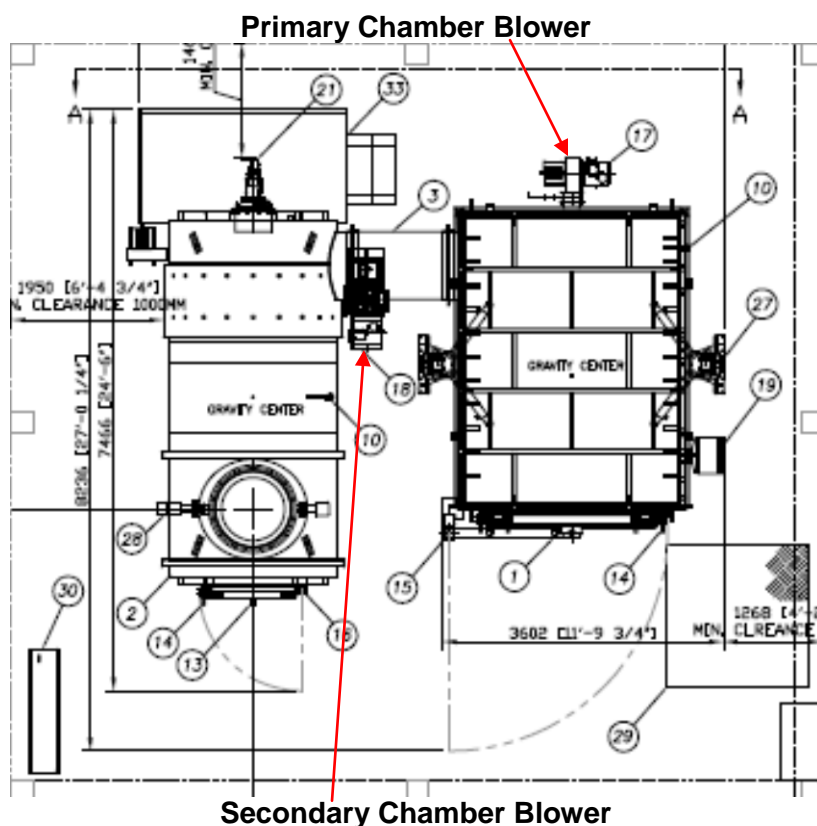
**For further detail consult the OEM manual of this lifter in 6515-S-265-008-280-EDS-0015\_Sub002.pages175to190**

### **Assembling and Installing the Primary Chamber Blower**

1. Place the **Primary Blower** mounting frame where the **Primary Blower** is to be installed.
2. Install **Primary Blower**, shim and level as required with steel shim plates until the flanges are align. Support pads should be shimmed as required to prevent rocking.
3. Bolt together using bolts provided after alignment of all bolt holes







### Assembling and Installing the Secondary Chamber Blower

1. Place the **Secondary Blower** mounting frame where the **Secondary Blower** is to be installed.
2. Install **Secondary Blower**, shim and level as required with steel shim plates until the connecting flanges are level.
3. Bolt together using bolts provided after alignment of all bolt holes.

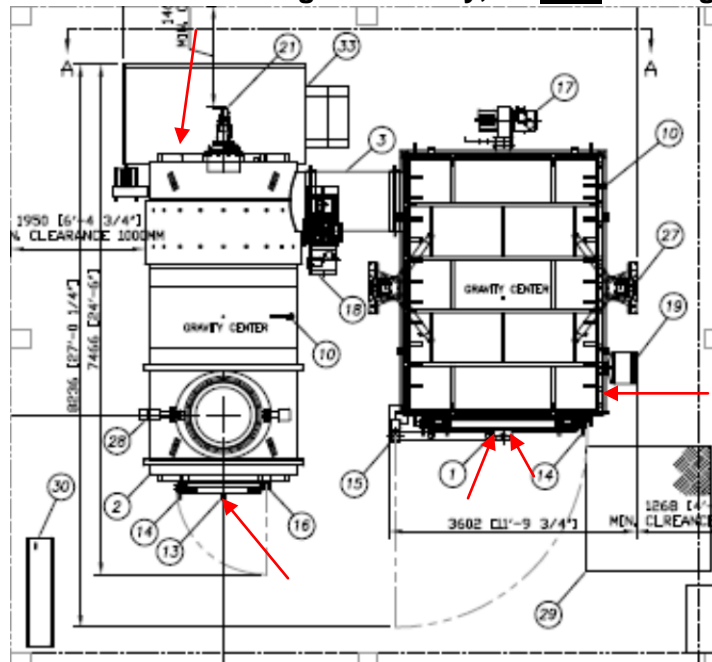


Secondary Chamber Blower

## Installing the View Ports

1. Install four (5) 2" threaded **Viewports** at **positions indicated in red** below on **Primary Chamber** door, the left hand side of the **Primary Chamber Burner**, the **Secondary Chamber** door and the right hand side of the **Secondary Chamber Burner**.

**NOTE** The viewports should be hand tightened only, do **NOT** over tighten.

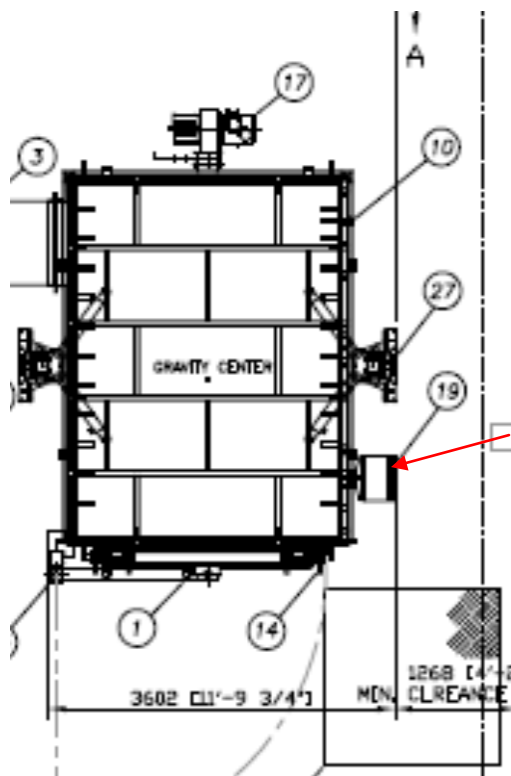


## Installing the Primary Chamber Burner

1. Install the **Primary Burner** and burner gasket in the burner port located on the right side of the **Primary Chamber**.
2. Bolt together using provided hardware after alignment of all bolt holes.



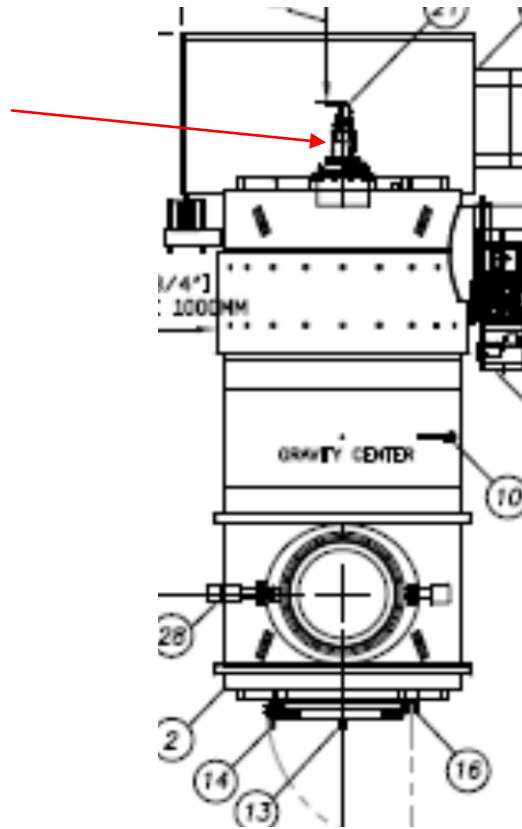
Primary Burner shown without red cover installed.



### Installing the Secondary Chamber Dual Burner

1. Install the **Secondary Chamber Burner** and gasket in secondary burner ports using the hardware provided. The fuel train is pre-assembled and the final installation to follow the P&ID drawing





It is the customer's responsibility to conform to any local codes when installing the Waste Oil System.



## **Positioning and Installing the Diesel Tank**

The Fuel Tanks are to be installed at ground level as per the site layout. Locations are to be determined by the customer to satisfy all local codes. Interconnecting piping and filters for each burner have been shipped with the equipment

## **Fuel Connections**

**Reference: General Arrangement ECO1.75TN1PVC100L-00A rev.1 and P&ID ECO1.75TN1PVC100L-00B rev.1 drawings**

NOTE All fuel connections to be done by a certified technician and should satisfy all local codes (all lines to be pressure tested), including the distance between the incinerator system and the fuel tanks. If not properly installed and maintained, the waste oil tank (see image) can become a serious threat to the environment. Ensure the installation follows all local regulations and environmental protection measures.

Even though the tank is double walled, it is highly recommended that the installation site of the storage tank be equipped with a secondary containment system consisting of the following: dikes, berms, or retaining walls and a floor. The floor should cover the entire area within the dike, berm or retaining wall.

## **WASTE OIL PIPING TRAIN**

The Waste Oil piping train consists of:

1. Pump skid.
2. Interconnecting piping.
3. Fuel train to dual burner.

When installing the waste oil piping train check to ensure that:

- Piping is clean.
- That the pipe has been reamed and free of burrs
- The work is done to trade standards

To perform the installation a ( $\frac{1}{2}$ " and 1") pipe threader is needed.

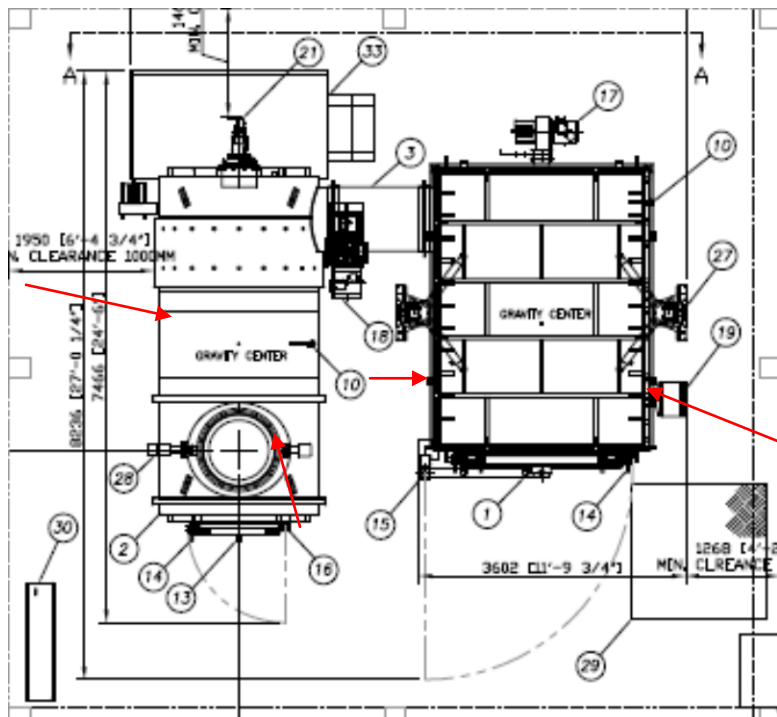
Note: When the pipe installation is complete flush out the line to remove any sediment and dirt that may have contaminated the pipes.

This incinerator system includes two (2) waste oil totes and their correspondent containment, as well as spill kits according to the volume, these items are to be deployed by the customer according with their waste management plan.

Also, two (2) ash bins are included for the storage of the ash removed from the incinerator.

## Installing the Thermocouples

1. Install the four (4)  $\frac{3}{4}$ " threaded **Thermocouples** at the positions indicated in red below: two (2) in the **Primary Chamber**, one (1) on **Secondary Chamber** and one (1) on **T-Stack**



## Installing the Weigh Scale

The weigh scale is to be installed closer to the loading point (to be determined by customer) and anchor it (note: the loading of this incinerator is intended to be through the roof when the lid is in the open position).

## Electrical Connections

**Reference:** Electrical Drawings ECO1.75TN1PVC100L-10A / B/ C/ D rev.0 (17drawings)

**NOTE** All electrical connections, terminations and conduit installation to be done by a certified electrician and should satisfy all local codes.

1. The **Main Control Panel** should be installed at a minimum of 8' from the Incinerator system.
2. Wiring is necessary (customer's scope) from the power source to the **Main Control Panel** and between the **Main Control Panel** and the **Junction Boxes** on the incinerator and all Teck Cable from the junction boxes to the components.
3. The **Thermocouples** must be wired directly to the thermocouple input card on the **PLC** with the thermocouple wire provided, without splicing the wire. Interconnecting cable has been shipped with the equipment

4. Connect terminal wires. Connect main electrical feed through conduit connection in the bottom of the panel enclosure to the line terminals on the disconnect switch.
5. Run cables to scale and tank

### **Start Up and Commissioning EWS Field Services**



**Do not attempt to place the equipment into operation until an EWS Service Technician has inspected all equipment and interlocks.**

1. Upon completion of mechanical erection, interconnection of equipment and provisions of utilities as described above, arrangements should be made with the EWS field service department for scheduling of a service technician for initial start-up.
2. An EWS representative must perform start-up of all incinerator systems unless specifically arranged otherwise in writing by EWS.
3. Attempts to start-up incinerator systems by the buyer without prior written approval may result in revocation of all expressed or implied warranties.

# **SECTION 5**

## **OPERATING INSTRUCTIONS**



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## Important Information

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Proper operating and maintenance procedures must be followed in order for the ECO Model Incinerator system to perform at maximum efficiency.



**Do not attempt to start or operate this equipment until this Operator Manual is read thoroughly and is understood.**

The equipment has been designed with many safety features, however, like all thermal processes; this equipment is not free from the inherent hazards of high temperature processes.



**Safety procedures and precautions must be followed at ALL times during operation.**

There are safety procedures outlined in this Manual, however, no amount of written instruction can replace good judgment and safe operating practices.



**Responsibility for the safe operation and maintenance of the equipment supplied rests solely on those operating it.**

There are many engineered features incorporated into the ECO Model Incinerator system to free the operator of repetitive chores. They do not, however, relieve the operator of maintenance responsibilities. In order to maximize the operating life of the equipment, it is strongly recommended that the maintenance procedures, outlined in Section 6, be followed diligently. It is advisable to keep an equipment log for recording maintenance activities along with unusual operation.

### **NOTE**

**In the event that the equipment is not operating in the normal manner, contact Eco Waste Solutions immediately at (905) 634-7022 and ask for Customer Service Manager. It is important to report problems as soon as they are noticed to minimize damage that faulty operation could cause.**

## Design Specification Criteria

The **ECO 1.75 TN 1PVC100L incinerator systems** was designed specifically for the **Meliadine Mine**. Based on information provided, the EWS team designed an incinerator with the following criteria in mind.

### Waste Description and Assumptions

#### Solid waste:

- Food waste (food, food packaging and containers, plastic and paper waste from food preparation) - 50%
- Domestic waste (paper, plastics, bottles, newsprint, cans, cardboard) - 40% Packaging (cardboard boxes, paper, plastic containers, plastic film, Styrofoam, poly-weave bags) - 10%
- Absorbents (Rags, wipes, spill cleanup materials) - negligible
- Medical waste (bandages, dressings, gloves, swabs, syringes, sharps) - Negligible

#### Waste Oil:

- Used Oils (hydraulic, transmission, motor, crankcase, gear box, synthetic and brake fluids)

The waste is expected to be bagged or stored in skips/bins around the mine operation and then brought to the incinerator building by truck. The waste oils will be brought to the incinerator by totes (handling by forklift or pallet jack).

### Waste Quantity

The incinerator is designed to process and treat the waste generated on site, up to 1,750 kg per day. Therefore the ECO 1.75TN 1PVC100L incinerator system was selected, as it will process up to 1,750 kg of camp waste per day in a single batch.

### Incinerator Design Parameters

Incinerator Design Parameters	Unit	Details
Secondary Chamber Operating Temperature	°C	1000
Secondary Chamber Retention Time	s	2 (minimum)
Incineration capacity	Kg/day	<del>1700</del> <span style="border: 1px solid red; padding: 2px;">1750</span>
Charge per cycle	Kg	1700
Burn Cycle Duration for entire load	h	less than 10
Cool Down Cycle Duration	h	8 to 12

#### NOTE

This incinerator was only designed for the type of waste and amount of waste mentioned above. It is important that the waste quantities and characteristics described above are processed in the incinerator. Otherwise, the incinerator system will not operate properly.

It is also important to note that some waste-streams are unacceptable and **SHOULD NOT** be processed in the incinerator.

### Unacceptable Waste-streams

The following is a list of some of the waste streams that should not be processed in this system.

#### Waste Materials Not Suitable for Processing in Eco Waste Solutions Technology

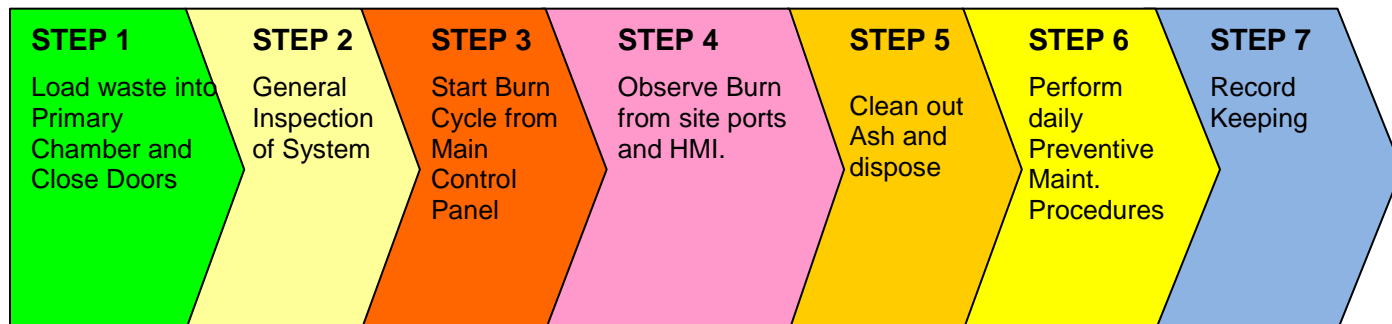
Solid Waste	Description	Origin
Bulky Materials	Automotive or heavy equipment parts such as engine blocks and transmissions	From vehicles and equipment maintenance shop
Non-Combustible Materials	Drywall, asbestos, bricks, concrete, soils	Construction activity
Radioactive Materials	Smoke detectors, laboratory wastes	From Buildings, laboratories
Potentially Explosive Materials	Large propane tanks, other pressurized vessels. Actual explosives	From warehouse, plant and production facilities
Heavy Metals	Items containing lead, mercury, cadmium, for example: batteries, electronic devices, fittings, old pipe work, fluorescent light bulbs, electrical switches, thermometers, PVC plastics, aluminum solder, photovoltaic cells	From maintenance activities, operations and construction activities
Liquid Waste	Description	Origin
High Alkaline or High Acid Materials	By-products of industrial processes, unrefined fuels	From warehouse, plant and production facilities
Solvents	Solvents such as acetone, xylene, methanol	From vehicles and equipment maintenance shop

#### Important Notes:

1. These lists are guides and should not be assumed to be an exhaustive list of materials
2. A waste and procurement audit is highly recommended and encouraged to ensure that all sources of heavy metals (especially mercury) are identified and diverted from the incinerator

## General Operating Overview

The operation of the **ECO 1.75TN 1PVC100L Incinerator** package follows 7 general steps that take place over a 24-hour period.



Although all 7 steps are critical in the general operation of the incinerator system, this section of the manual focuses on **Step 1**, **Step 3** and **Step 4** and how to start the system and monitor it during operation.

It is assumed, at this point, that the waste material is properly loaded with the weight, density and type the incinerator is designed for, as outlined on page 5 of this section.

It is also assumed that the waste is loaded after the ash has been removed from the previous burn cycle and any daily maintenance routines have been completed.

This section will also cover **Step 7** on how to use the historical charts, store incinerator data, and access incinerator historical information for record keeping purposes.

## Monitoring and Data Acquisition System

### Overview

The **Human Machine Interface (HMI)** system automatically monitors the entire process and all system inputs are recorded and logged for record-keeping purposes and also allows for historical trending of key operating conditions.

The integrated **Human Machine Interface (HMI)** in the Main Control Panel monitors and records the following:

1. Temperature sensors
2. Differential pressure sensor with transmitter (draft)
3. Monitoring of burner functions
4. Auxiliary burner operation and fan amperage monitoring via current transducer
5. Door position interlock monitoring
6. High temperature limit and interlock
7. Low Fuel level limit and interlock
8. Air proving switch interlocks
9. Waste loading records

All data can be transferred to storage by using USB port (to transfer to PC to print)

## HMI Operator Interface

### Main Control Panel Components



Number	Name	Purpose
1	Main Disconnect Switch	Isolates the incinerator from its source of electric power.
2	Human Machine (Operator) Interface	Displays various screens reflecting system performance.
3	Control Power ON	<ol style="list-style-type: none"> <li>Green light indicates the control power in the panel is on.</li> <li>Pushing it if the <b>Emergency-Stop</b> is out will turn on the control power.</li> </ol>
4	Emergency Stop Pushbutton	When pushed, shuts down the system and disables any possibility of starting it.
5	Communications Port	Allows for communication to/from the PLC
6	Start Switch	Activates the system

## The Human Machine Interface (HMI)

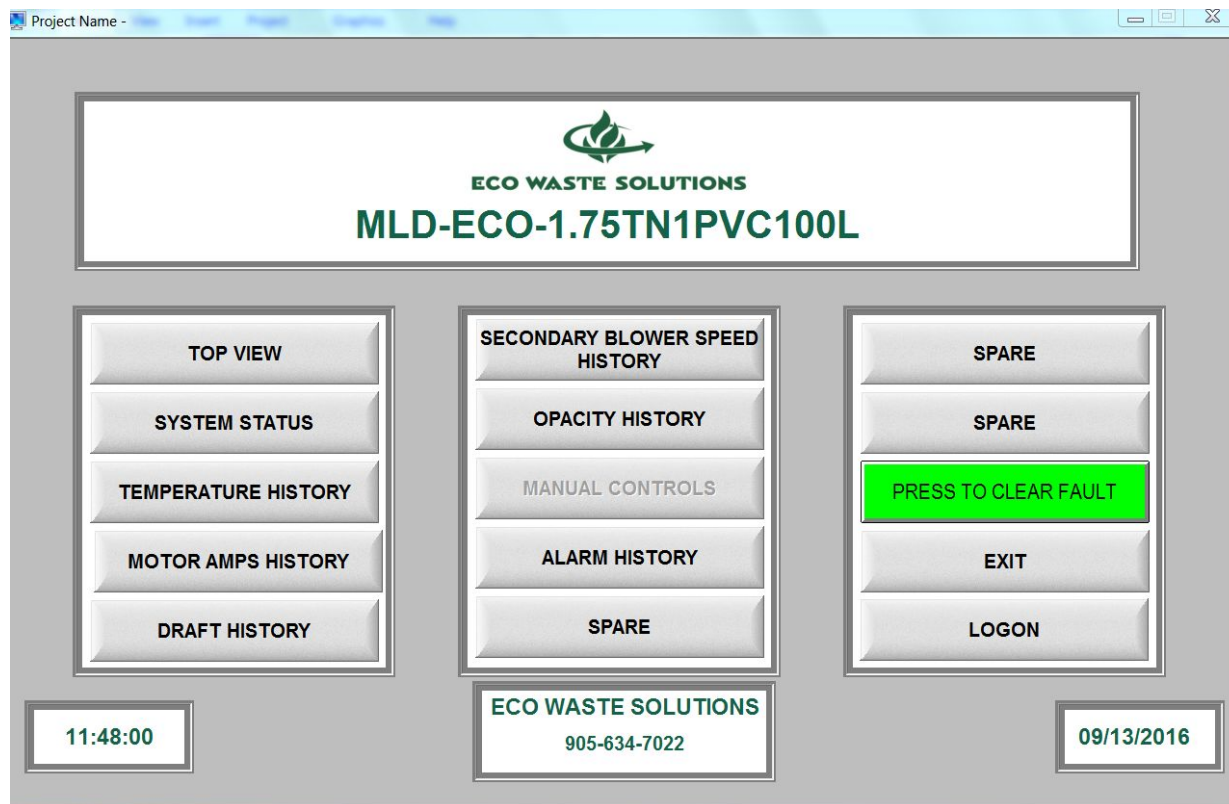
The **Human Machine Interface (HMI)** controls the operation of the incinerator directly from the **Main Control Panel**.

The **Main Menu** screen displays all the available options for viewing the system in operation.

The **Human Machine Interface (HMI)** has a touch-screen and items can be selected by touching them on the screen.

### Main Menu

The first screen the operator will view is the **Main Menu** (see below).



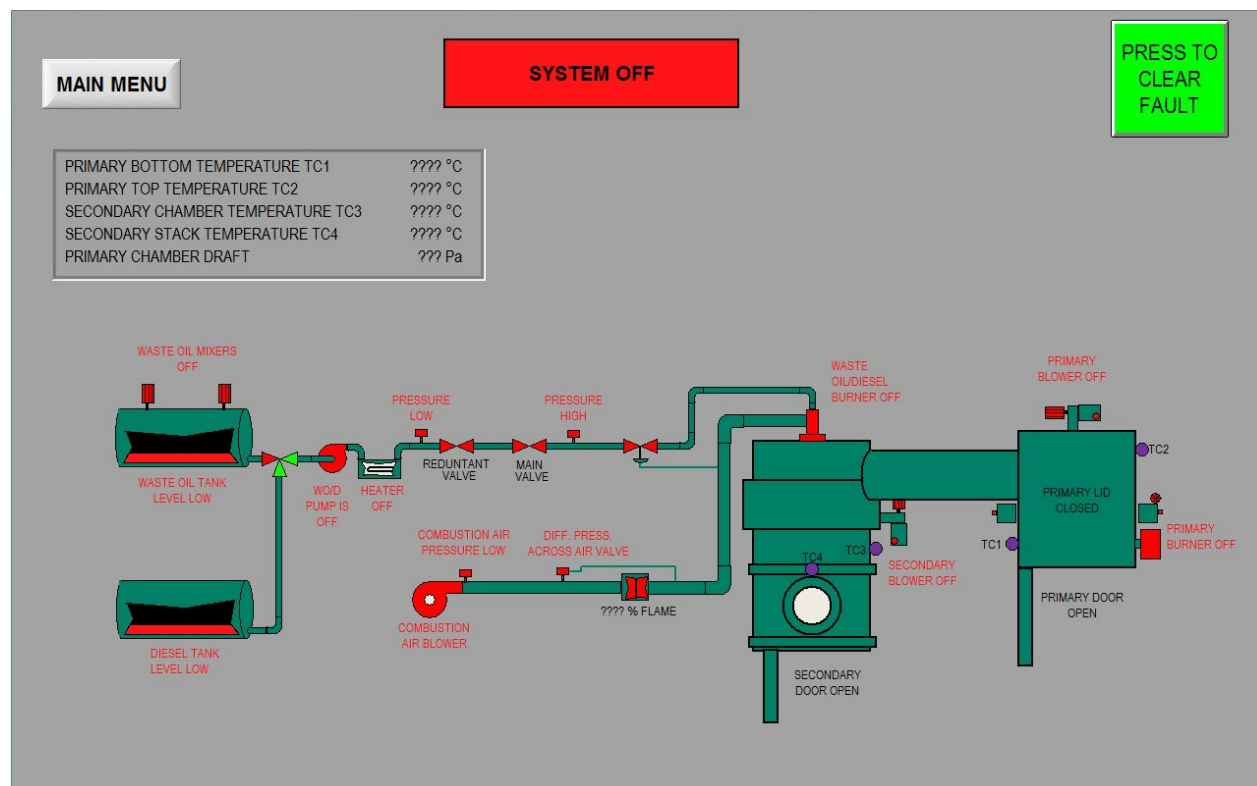
## Top View

When the **Top View** button is selected, an overview of the incinerator and related components is displayed. This shows key temperatures, flows, and other indicators of what is happening in the process in a real-time basis.

### NOTE

The system will not start if there are alarms or faults present. Clear and/or acknowledge faults.

At any time, touch **Main Menu** to go back to the main screen.



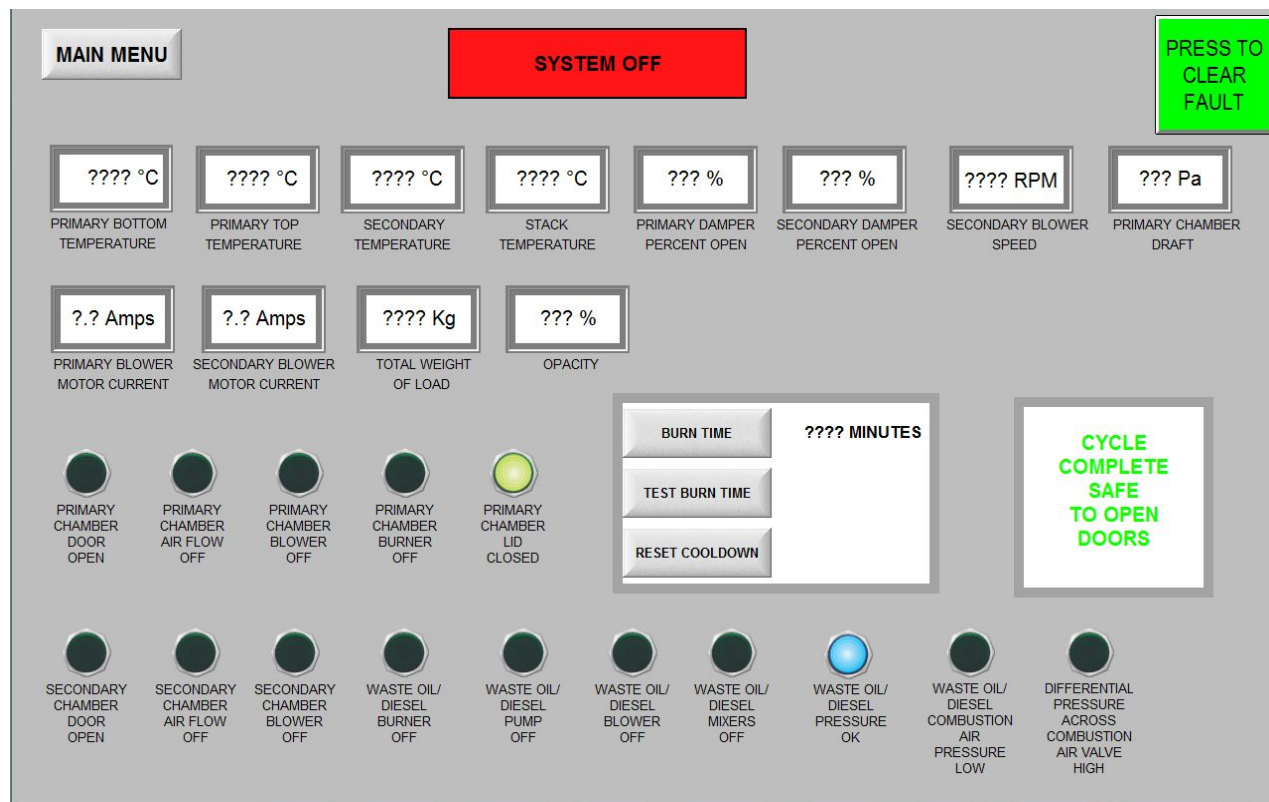


## System Status

When the **System Status** button is selected from the **Main Menu**, a screen will display the status of all the operating parameters of the incinerator, such as the temperatures and the time remaining in the cycle, as well as displaying other informational items such as status of the door, lid lifter, blowers, etc.

The operator can change the burn time of the cycle by selecting “BURN TIME” and entering a time (in minutes). The operator may do this over time to either prolong the burn time, or decrease the burn time depending on the waste mixture; for example a very wet batch of garbage will take more time to burn than a dryer batch of waste.

At any time, touch **Main Menu** to go back to the main screen.





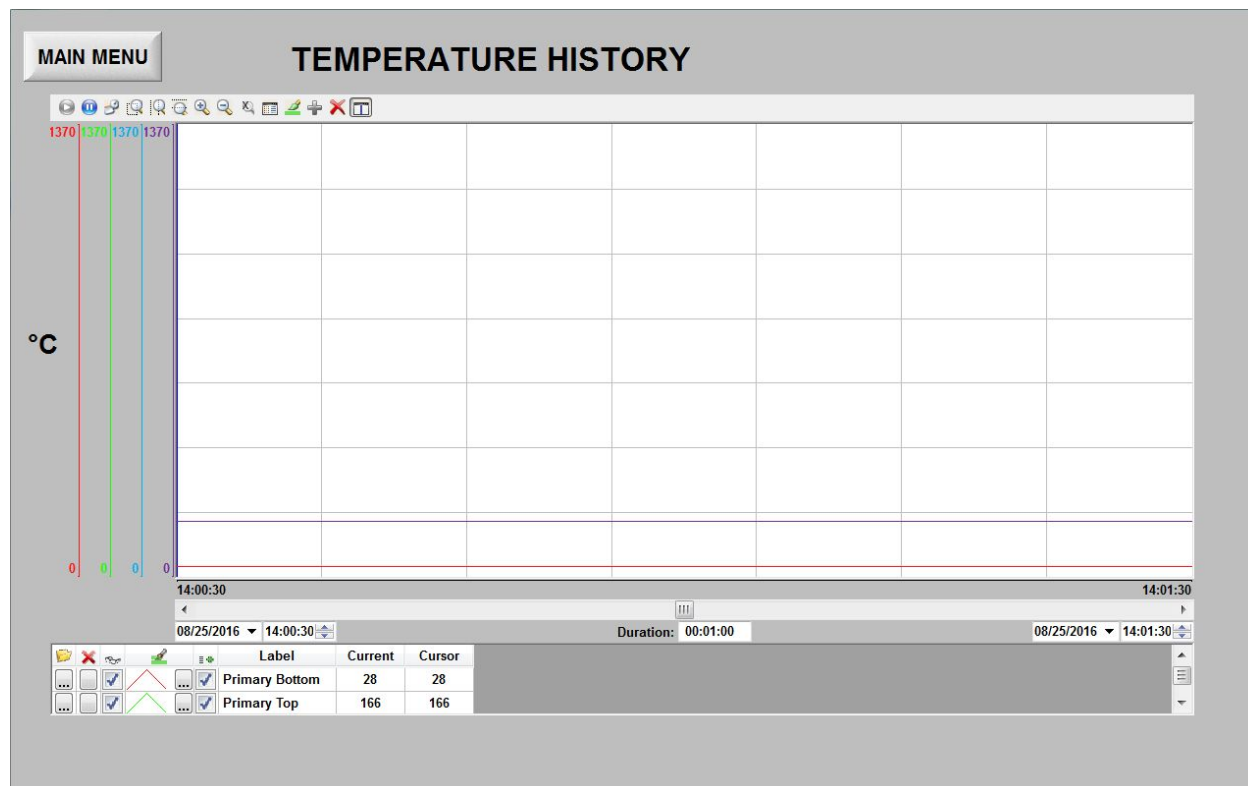
## Overview of Historical Charts

The **Human Machine Interface (HMI)** monitors and records (every minute) critical operating parameters of the incinerator system like the temperature, motors, draft, load weights and alarms. Each operating parameter has its own graphic display for the operator to view, at any given time. Each display can easily be selected from the **Main Menu** of the **Human Machine Interface (HMI)**. The display will show the specific data collected from previous burn cycles.

This **Incinerator Data** is important for regulatory purposes and for general operating purposes. Also, the incinerator data is to be downloaded on a weekly basis to USB key for record-keeping purposes.

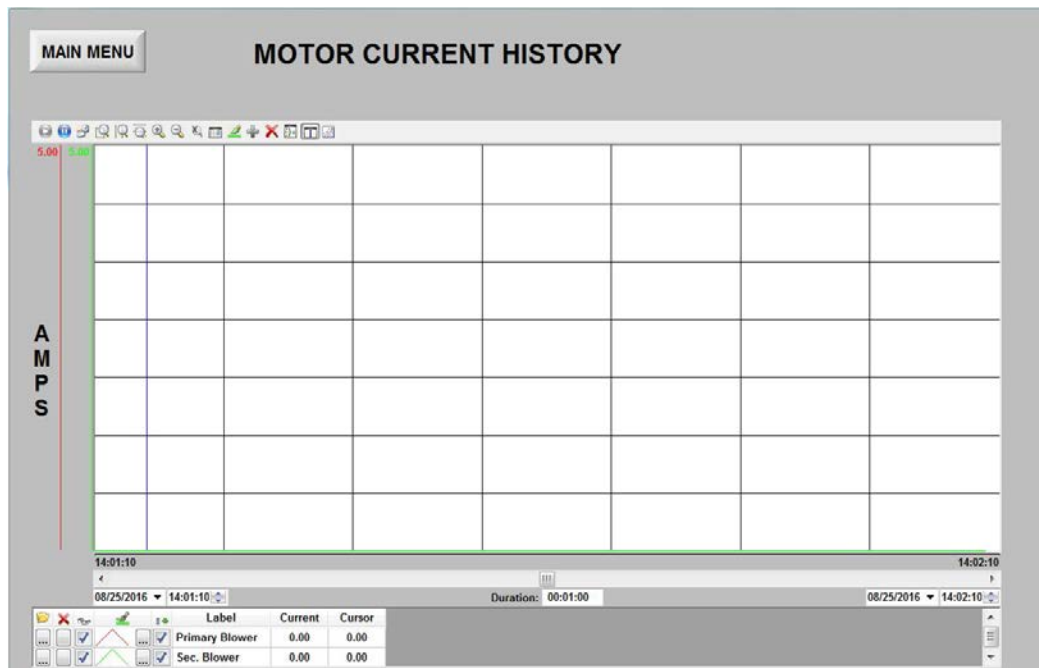
## Temperature History

For example, when the **Temperature History** button is selected, the screen will display the trend in temperature during the operation of the system, include date & time of occurrence of that specific temperature.



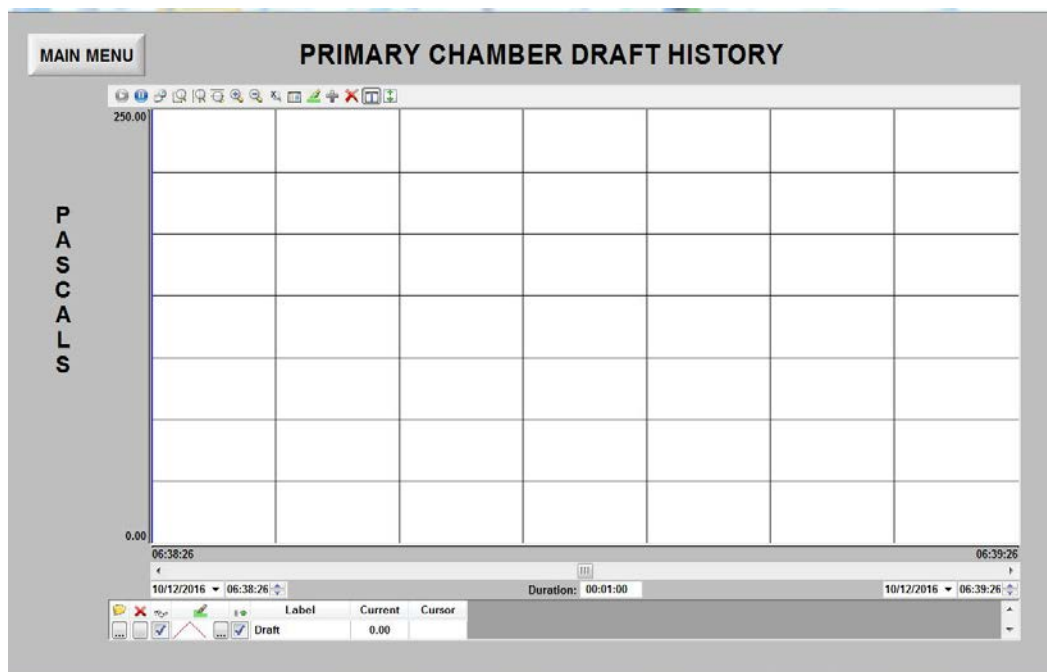
## Motor Currents History

When the **Motor Currents History** is selected a screen will display the motor currents from the Primary Burner and the Secondary Burner, in AMPS, during the operation of the system, including date & time of occurrence of that specific motor current.



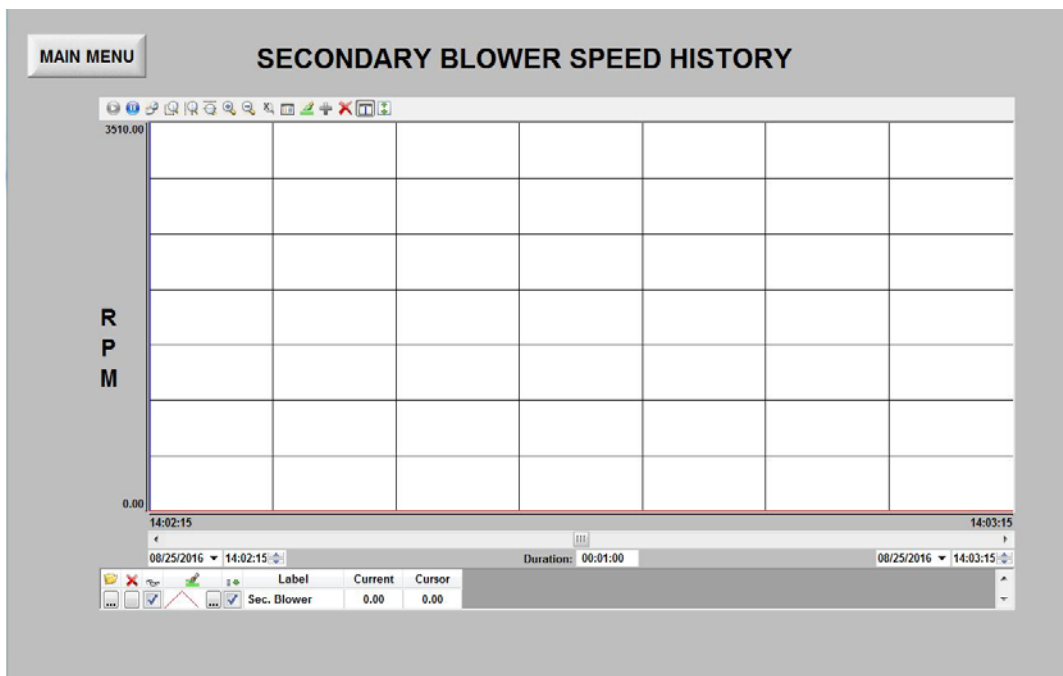
## Draft History

When the **Draft History** button is selected a screen will display the draft during the operation of the system, include date & time of occurrence of that specific draft trend.



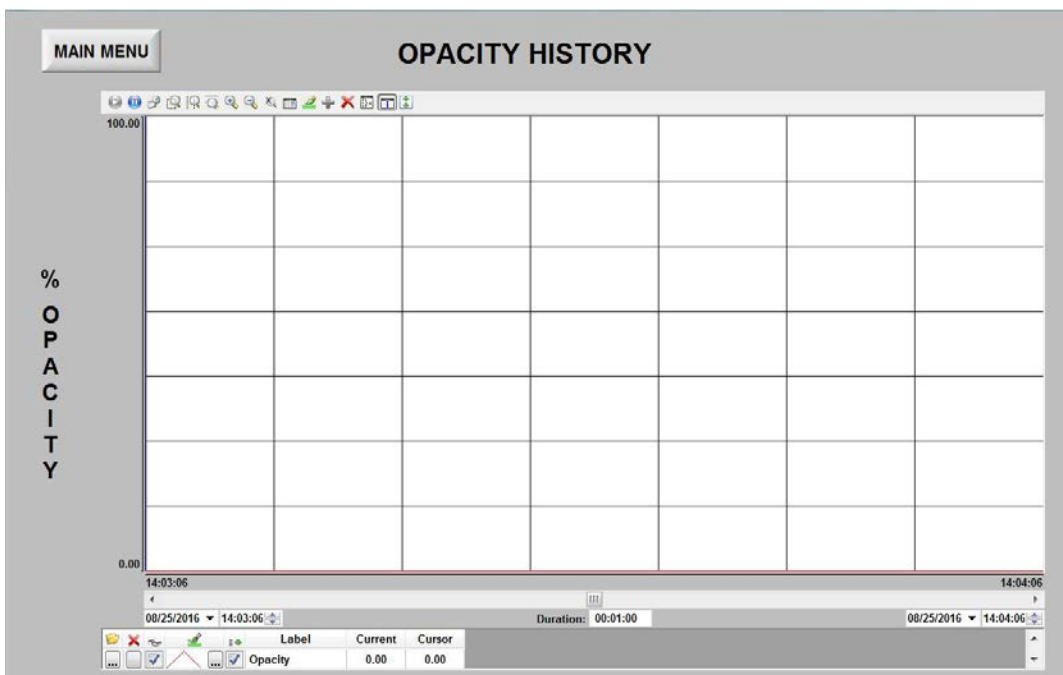
## Secondary Blower Speed History

When the **Secondary Blower Speed History** button is selected a screen will display the RPM during the operation of the system, include date & time of occurrence of that specific speed.



## Opacity History

When the **Opacity History** button is selected a screen will display the Opacity during the operation of the system, include date & time of occurrence of that specific reading.



## Alarm History

When the **Alarm History** button is selected a screen will display the last 128 faults with the date & time of occurrence.

The operator can press the **CLEAR ALARM HISTORY** to clear all of the faults, if they wish to. This does not affect the record-keeping feature of the system.

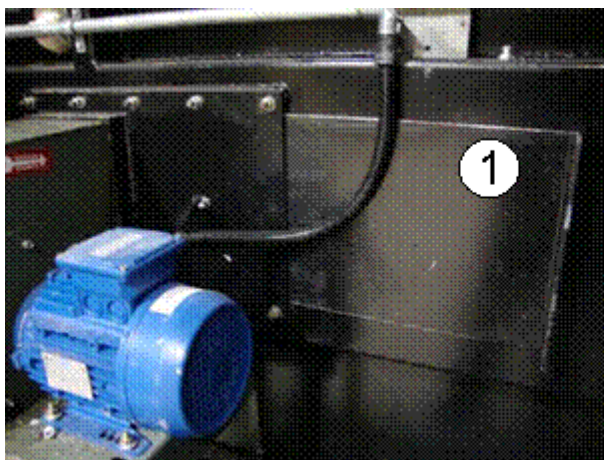
At any time, touch **Main Menu** to go back to the main screen.



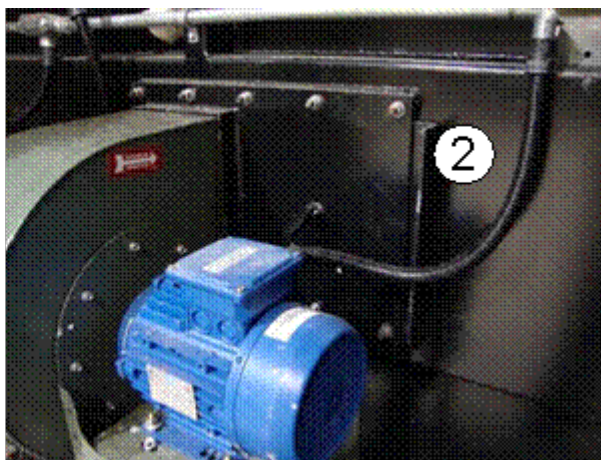
## Standard Daily Operating Procedures

### Incinerator Daily Start up

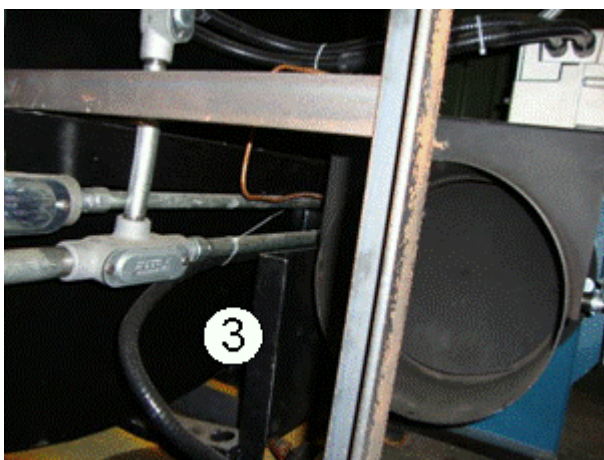
1. Ensure that manual slide gates for each blower are in the open position for free airflow into the **Primary and Secondary Chambers**.



1. **Primary Chamber Blower** Manual Slide Gate Open



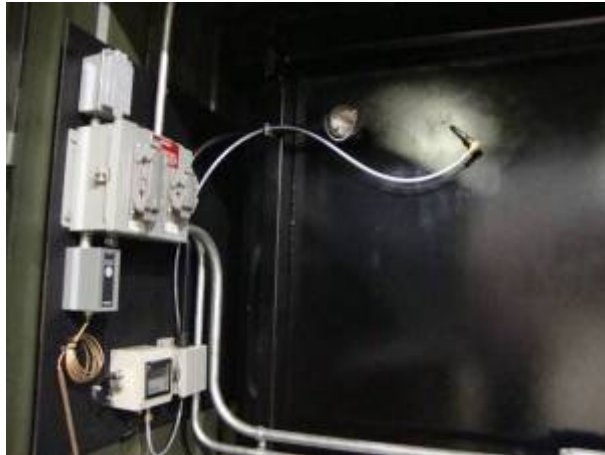
2. **Primary Chamber Blower** Manual Slide Gate Closed



3. **Secondary Chamber Blower** Manual Slide Gate Open

2. Visually inspect the burner hoses to ensure that there are no fuel leaks. Check to see if lines are brittle or cracked, check for any oil spills near the burner, which would indicate a leak.

3. Ensure the draft gauge hose connection is tight and sealed. This is a clear flexible tubing located in the **Primary Chamber** (see photo below).



Sample picture

4. Unlatch all clamps on the **Primary Chamber** door, open and secure in the open position



5. Ensure the Primary Chamber floor is cool (less than 90°C). Remove all the ash from the previous burn and store ash in ash bins.
6. Lock the **Primary Chamber** Front Loading Door and ensure all latches are properly engaged.



**If the floor is too hot the waste may spontaneously catch on fire during loading.**



## High Output dual Burner Secondary Chamber Start-up

### SYSTEM CHECK



**Filter & Pump.(sample image)**

Do a walk around the Waste Oil System, ensuring that there are no leaks, all ball valves are in the proper and fully open position for either Diesel or Waste Oil according to the fuel to be used for this specific cycle

Ensure that the correspondent storage tank has enough fuel for the entire cycle.

Using Waste Oil: 800 L minimum of Waste Oil and 300 L minimum of Diesel (the Primary Chamber operated with Diesel only)

Using Diesel Only: 1100 L of Diesel minimum

Both the Waste Oil and Diesel Tanks require at least 150L stored at all time to keep the level sensor closed.

Clean the filter if necessary.

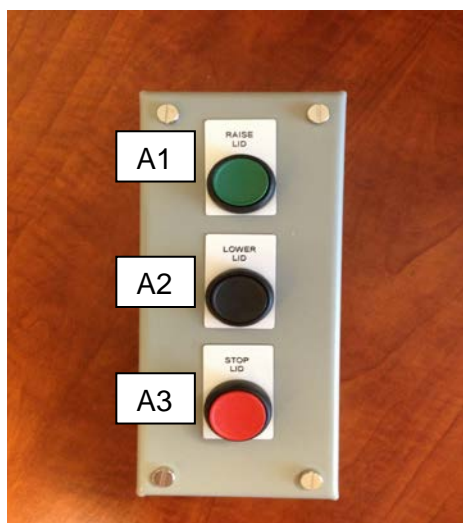
Check that all of the ball valves on the burner fuel oil train are fully open

Check that the Incinerator is not in cool down and the Primary temperature is 90°C or less.

### Loading Procedure

#### Operator Stations for Lid Lifter

The Primary Chamber of the ECO 1.75TN 1PVC100L Waste Incinerator has a lid lifter to allow the roof of the chamber to be opened for quick loading of the waste.



Number	Name	Purpose
A1	Raise Lid	Raises the Lid on the Primary Chamber
A2	Lower Lid	Lowens the Lid on the Primary Chamber
A3	Stop Lid	Stops the lid during raising or lowering.

Once the roof is opened, the chamber can be loaded by the operator with the waste going to the incinerator.

### Operating the Integrated Weigh Scale

- The Operator has two options for managing the waste quantity prior to loading the selected Primary Chamber:
  - Option 1: The operator will use the hoppers (previously tarred) to load waste onto the weigh scale.
  - Option 2: The operator may load waste/garbage (in bags/boxes) on the weigh scale directly.
- Regardless of the option selected above, once the waste is on the weigh scale the Operator has to push the RECORD WEIGHT (black button) on the Weigh Scale Push-Button Station. By pressing this button, the weight value of that particular load of waste is sent to the PLC and the weight is recorded. At this time, the MAXIMUM WEIGHT (green button) will flash green once to show that the weight has been logged.
- Then, the operator must take the waste and load it into the Primary Chamber. The hopper is to be raised just past the top edge of the Primary Chamber (using proper lifting equipment by others).
- Once the hopper clears the edge of the Primary Chamber, the hopper's content can be dumped inside the chamber.
- The empty hopper can now be pulled from the edge of the chamber and then lowered.
- The operator returns to the weigh scale with some more waste and repeats Steps 2 to 6. This entire procedure is repeated until the maximum load weight for the Primary Chamber is reached. The PLC will indicate this to the operator when the MAXIMUM WEIGHT (green light) comes on and remains on. This indicates that the maximum weight permitted, in this case, the incinerator is designed for a maximum of 1,750Kg of waste material.



**NOTE**

No more waste should be loaded into the Primary Chamber after the load has reached the maximum weight.

7. The Primary Chamber is loaded, and the incinerator is ready to start.

Tips for loading: To decrease burn time and allow for more uniform burn.

- a. Load the less dense waste first
- b. Load dry waste first. Placing wet waste near the top of the Primary Chamber allows moisture to evaporate early in the cycle.

**NOTE**

Do not load waste greater than 90 Kg using the top loading system. This waste is to be loaded from the front of the unit. Loading waste over 90 Kg from the top will cause refractory floor to fracture.

**NOTE**

Do not throw the waste towards the sides of the Primary Chamber. Doing so will damage the ceramic blanket refractory.

**NOTE**

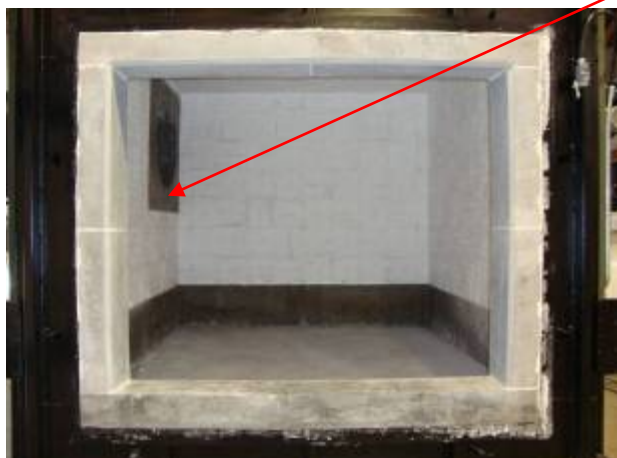
Load only the waste stream that the system has been designed for. DO NOT load a lot of high BTU rated waste for one burn (e.g. do not load more than three (3) gallons of bacon grease, kitchen grease or cooking oil). Doing so will result in excessive temperatures in the system reducing the life of the refractory.

**NOTE**

Do not load the Primary Chamber above its rated capacity by weight.

**NOTE**

Do not load the Primary Chamber such that the Breech and Burner section is blocked in any way.



**Breech Opening**



**Burner port**

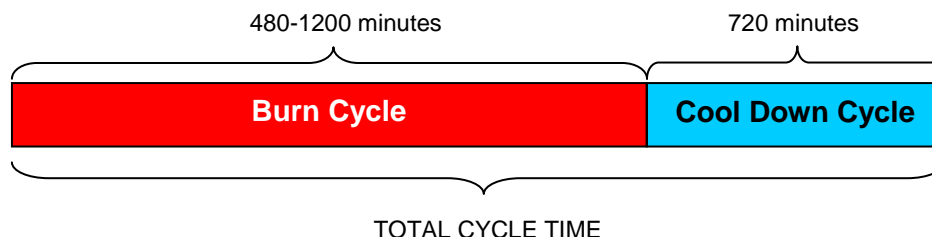
8. Inspect the lid ledge of the Primary Chamber and remove any debris that will prevent a tight seal with the lid.
9. Close the **Primary Chamber** lid by pressing the close button on the Lid Lifter Station. The lid will initially raise, after 0.5 seconds the safety pawls will pull out. Two seconds after sensing that the safety pawls are out the lid will lower.
10. The lid will keep lowering until either the down limit switch is activated or the stop button is pressed.
11. If the stop button was pushed just press the close button to resume lowering. The lid will raise then lower again. When the lid is stopped by either the lower limit switch or the stop button the safety pawls will be released back in.
12. Proceed to the **Main Control Panel**.

**NOTE**

The burn time will be set to the previous burn, if you wish to change the set time, proceed to the Primary Status screen and click on the **BURN TIME** button. The minimum number of minutes you can enter is 480 (8 hours). When you have finished, the time will be displayed in minutes beside the **BURN TIME** button

**NOTE**

The burn time value (in minutes) determines the length of the burn cycle before cool down cycle starts.



13. Check that the PRIMARY DOOR AND LID are closed on the **Human Machine Interface (HMI)** screens.
14. Check that no alarms are displayed on the **Human Machine Interface (HMI)**
15. Check that the EMERGENCY STOP BUTTON is out.
16. Check the GREEN CONTROL POWER BUTTON is lit up. Press this button to power on the control panel
17. On the **Main Control Panel** turn the **SELECTOR SWITCH** to the right to start the cycle. The following steps will automatically take place, controlled by the **Main Control Panel**:
  - I. The **Primary Blower and Secondary Blower** will purge the system for 2 minutes.
  - II. The **Secondary Burner** will purge for safety, and upon completion will ignite.
  - III. Once the **Secondary Chamber** temperature reaches 1000°C, the **Primary Burner** on both Primary Chambers will purge for safety and upon completion will ignite.

- IV. The burn time will start counting down when the temperature in the **Primary Chamber** reaches 427°C.

**NOTE**

**The Main Control Panel System will maintain proper operating conditions and will provide continuous monitoring capability**

After the burn cycle is completed the system will enter the cool-down cycle when the following things will occur:

- Primary Chamber & Secondary Chamber burners OFF
- Secondary Chamber Blower OFF
- Primary Modutrol 100% open
- Primary Blower ON

Once fully cooled and the temperature is below 90°C, proceed to the **Primary Chamber Clean Out Procedures**.

**Primary Chamber Clean Out Procedures**

**Operators responsible for loading and cleaning out incinerators should wear appropriate protective equipment, including eye protection, dust masks, heavy gloves and safety shoes with puncture-proof toes and soles to avoid injury.**

**Although the ash from the system is considered sterile and will not contain microorganisms, it may contain a quantity of sharp objects, such as broken glass and other sharps which may not be fully destroyed in the burning process, and may thus still pose a hazard to persons who clean out the ash and residues. Also removing the ash does create dust particles in the air. Dust should not be inhaled. The operator must wear dust protection safety gear.**

Please follow these steps when the cycle is complete:

1. When the internal temperature of the **Primary Chamber** has cooled to less than 40°C, lock out the power to the system on the **Main Control Panel** by moving the main disconnect to the “OFF” position.
2. Unlock all door latches on the access door to the **Primary Chamber**.
3. While standing in front of the **Primary Chamber** door, slowly open the door to allow clear entry. Secure **Primary Chamber** Door in the OPEN position.
4. With the **Primary Chamber** Door secured in the open position, raise the lid to fully opened
5. Clean the **Primary Chamber** by using ash handling tool(s) and proper safety equipment (not provided).
6. Inspect the interior of the **Primary Chamber** for wear and inspect around the door seals to ensure the door will maintain a tight seal upon closure.
7. Check the air inlet holes and remove any obstructions if necessary.

8. Inspect the door seals to ensure there are no gaps between the door gasket and the door jamb.
9. Close the **Primary Chamber** access door by clamping each latch until it is tight.
10. Clean the inspection **View Port** (glass) with a mild soap and water. To clean the view port, unscrew it by hand and re-tighten by hand.

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### In Case of Emergency



1. Go to manual Slide Gates on the **Primary Chamber**, located just after the blower and close them all the way. This will help to put the fire in the **Primary Chamber** out.
2. Check alarms to see what the problem is.
3. Do not open the door of the **Primary Chamber** unless the temperature inside the chamber is below 90°C.
4. Call a certified technician to fix the problem and/or consult with **Eco Waste Solutions Customer Service Department at 905.634.7022, toll free 1-866-326-2876.**

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### Start Up After Power Failure

1. Once the power is restored turn breaker (main disconnect) back on.
2. The **Human Machine Interface (HMI)** and PLC will begin a boot up procedure.
3. Wait until the **Human Machine Interface (HMI)** on the **Main Control Panel** has booted up before turning the control power to the panel back on by pressing the Control Power ON button.
4. When the power is restored to the **Main Control Panel**, the button should illuminate.
5. If the system was interrupted during a burn cycle, restart the system by turning the selector switch on the main panel to the right to start the cycle . If the system was interrupted during cool-down cycle, it will resume the cycle where it left off.

## Dealing with Warning and Faults

### Troubleshooting

The burn cycle will not start if one of the following conditions exists:

1. The system is in the “cool-down” part of the cycle. Wait until the “cool down” cycle is complete.
2. There is a fault in the system as indicated on the **HMI**
3. Loss of power due to any one or more of the following:
  - The main disconnect (see image) is off or there is no electrical power. Turn on the disconnect switch or check why there is no power.



**Power is OFF in this position**



**Power is ON in this position**

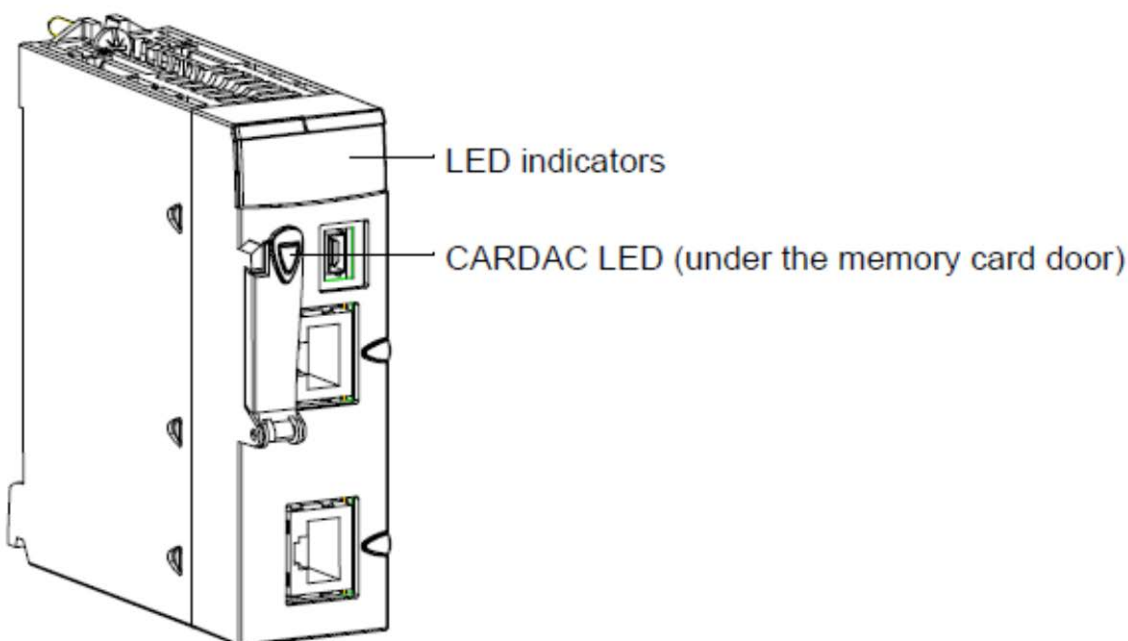
- An open breaker. Check the breakers and replace any that are defective.
- The EMERGENCY STOP is pushed in. Twist the EMERGENCY STOP button to unlock, and then push the CONTROL POWER ON button. The CONTROL POWER BUTTON should now be illuminated.



4. If on the Main Control Panel HMI the **Primary Chamber** door is not closed, the door has not been shut properly. Adjust the limit switch lever arm if necessary. Check the limit switch and that the wiring is in working order.
5. If on the Main Control Panel HMI the **Primary Chamber** roof lid is not closed, the lid has not been shut properly. Adjust the limit switch lever arm if necessary. Check the limit switch and that the wiring is in working order.
6. If on the Main Control Panel HMI the **Secondary Chamber** door is not closed, the door has not been shut properly. Adjust the limit switch lever arm, if necessary. Check the limit switch and that the wiring is in working order.
7. If fuel tank is low, system will not start. Tank on the **HMI** will be red, indicating the level is low and needs to be filled.

### PLC Processor Problem

There are several LEDs available on the front panel of each Modicon M340 module or processor, enabling rapid diagnosis of the PLC status:

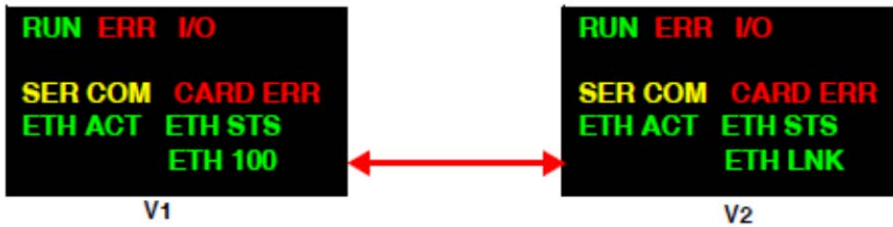


These LEDs provide information on:

- PLC functioning
- the memory card
- communication with the modules
- serial communication
- communication on the CANopen network
- communication on the Ethernet network

The following diagram shows the diagnostic LEDs on the BMX P34 2020 processor. Note that two displays exist, depending on whether you are using firmware V1 or V2

(or greater) of the processor.



The colors and blink patterns of the LEDs indicate the status and operating conditions of Ethernet communications on the module:

Label	Pattern	Indication
RUN (green): operational state	on	<ul style="list-style-type: none"> <li>PLC hardware and PLC program operations are normal.</li> <li>Module is in RUN state.</li> </ul>
	flashing	<ul style="list-style-type: none"> <li>PLC is in STOP mode or a blocking error in the application has been detected.</li> <li>Processor is configured but not in RUN state.</li> </ul>
	off	PLC is not configured (application is absent, invalid, or incompatible).
ERR (red): detected error	on	Processor, system, or configuration detected error
	flashing	<ul style="list-style-type: none"> <li>PLC is not configured (application is absent, invalid, or incompatible).</li> <li>PLC is in STOP mode or a blocking error in the application has been detected.</li> </ul>
	off	Normal (no detected errors)
ETH STS (green): Ethernet communication status	on	Communication OK
	2 flashes	Invalid MAC address
	3 flashes	Link not connected
	4 flashes	Duplicate IP address
	5 flashes	Waiting for a server IP address
	6 flashes	Secure and safe mode (with default IP address)
	7 flashes	Configuration conflict between rotary switches and internal configuration
CARDERR (red): memory card detected error	on	<ul style="list-style-type: none"> <li>Memory card is missing.</li> <li>Memory card not usable (bad format, unrecognized type).</li> <li>Memory card content is inconsistent with internal RAM application.</li> </ul>
	off	<ul style="list-style-type: none"> <li>Memory card is valid and recognized.</li> <li>Application on card is consistent with the internal RAM application.</li> </ul>
I/O (red): input/output status	on	<ul style="list-style-type: none"> <li>Error detected on a configured module or CPU channel</li> <li>Configuration mismatch with the application (module missing...)</li> </ul>
	off	Normal (no detected errors)



SER COM (yellow): serial data status	flashing	Data exchange (send/receive) on the serial connection in progress
	off	No data exchange on the serial connection
CAN RUN (green): CANopen operations	on	CANopen network operational
	rapid flashing (note 1)	Automatic detection of data flow or LSS services in progress (alternates with CAN ERR).
	slow flashing (note 2)	CANopen network is pre-operational.
	1 flash	CANopen network is stopped.
	3 flashes	Downloading CANopen firmware.
CAN ERR (red): CANopen detected error	on	CANopen bus is stopped.
	rapid flashing (note 1)	Automatic detection of data flow or LSS services in progress (alternates with CAN RUN).
	slow flashing (note 2)	CANopen configuration is not valid.
	1 flash	At least one error counter has reached or exceeded alert level.
	2 flashes	A guard event (NMT slave or NMT master) or a heartbeat event has occurred.
	3 flashes	The SYNC message was not received before the end of the communication cycle period.
	off	No error detected on CANopen.
CARDAC (green): memory card access <b>Note:</b> This LED is located under the memory card door (see <i>The Module</i> , p. 20).	on	Access to the card is enabled.
	flashing	Activity on the card: during each access, the card LED is set to OFF, then back to ON.
	off	Access to the card is disabled. You can remove the card after you disable card access by setting system bit %S65 to 0.
Note 1: Rapid flashing is defined as ON for 50 ms and OFF for 50 ms.		
Note 2: Slow flashing is defined as ON for 200 ms and OFF for 200 ms.		

The following table describes the meaning of the ETH ACT and ETH 100 LEDs on the front panel for firmware V1 NOE and CPU modules.

Label	Pattern	Indication
ETH ACT (green): Ethernet communication (transmission/ reception activity)	on	Ethernet link detected: no communications activity.
	off	No Ethernet link detected.
	flashing	Ethernet link detected: receiving or sending packets.
ETH 100 (green): Ethernet transmission speed	on	Ethernet transmission at 100 Mbit/s (Fast Ethernet).
	off	Ethernet transmission at 10 Mbit/s (Ethernet) or no link detected.



The following table describes the meaning of the ETH ACT and ETH LNK LEDs on the front panel for firmware V2 NOE and CPU modules.

Label	Pattern	Indication
ETH ACT (green): Ethernet communication (transmission/reception) activity	on	Communications activity detected.
	off	No communications activity detected.
ETH LNK (green): Ethernet link status	on	Ethernet link detected.
	off	No Ethernet link detected.

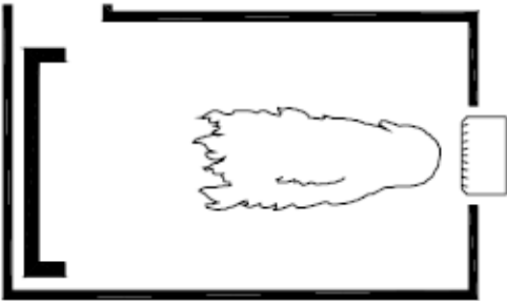
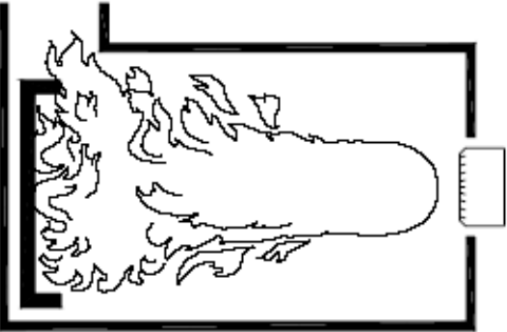

**Note:**

- Rapid flashing is defined as ON for 50 ms and OFF for 50 ms.
- Slow flashing is defined as ON for 200 ms and OFF for 200 ms.

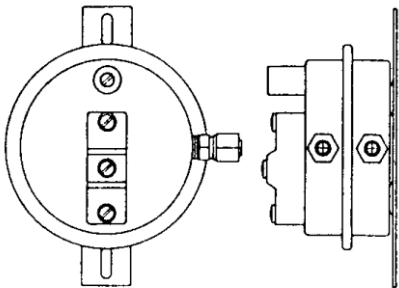
### Possible Problems, Causes and Solutions

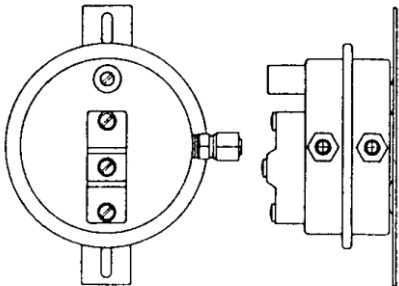
Problem	Causes	Solutions
Blower Fails to start	Over load tripped, blown fuse	Turn power off. Open Panel and reset overload. Check fuse and replace.
	Motor starters or contactor coil is burnt out	Locate contactor for Blower and visually observe if the contactor is pulled in. Use a volt meter to check for voltage across the coil. If there is voltage across the coil and the contactor is not pulled in, replace the contactor.
Secondary Burner won't ignite	Bad Electrodes	Refer to Section 6 of this manual.
	Low Oil Pressure	Adjust pressure setting on burner pump. Refer to Riello Manual in Section 10.
	Fuel Line Leak	Visually inspect the lines for the leak. Tighten any fittings that are near the leak.
	Door Switch not making contact Burner alarm has been tripped	Make sure main door is closed and latched shut. Make sure limit switch is hitting striker plate.
	Bad Thermocouple	Replace thermocouple .
Primary Burner won't ignite	Bad Electrode	Refer to Section 6 of this manual.
	Low Oil Pressure	Adjust pressure setting on burner pump. Refer to Riello Manual in Section 8.
	Fuel Line Leak	Visually inspect the lines for the leak. Tighten any fittings that are near the leak.
	Door Switch not making contact or broken	Make sure main door is closed and latched shut. Make sure limit switch is hitting striker plate.
	Secondary temperature not at 1000°C	Wait until Secondary temperature is at 1000°C and try again.
	Burner main switch is turned off	Turn switch on.
	Burner alarm has been tripped	Acknowledge burn alarm and then hit the reset button on control panel.

<b>Problem</b>	<b>Causes</b>	<b>Solutions</b>
Persistent Black Smoke	Insufficient air supply to Secondary Chamber to completely consume emissions	Check to ensure combustion air blower/damper assembly is operating properly.
	Secondary Chamber is not hot enough.	Check that the Secondary temperature is operating at required temperature set point.
	Secondary Chamber is not hot enough.	Too much draft, open barometric damper.
	Overloading or loading highly volatile material	Decrease load size on next batch (confirm by weighing), ensure the waste mix is correct.
	Burner failure	Check burner operation – if no flame or a poor flame is visible through the flame view port adjust air/fuel ratio.
	Operating at a too high Primary Chamber temperature	Check/decrease primary chamber combustion air.
Smoke coming out of Primary	Too much air	Check dampers on primary blower.
	Too much volatile material loaded	Decrease load size on next batch to ensure the waste mix is correct.
	Primary Chamber temperature too high	Waste loaded may not be a good mix of heat value.
	Low draft	Close barometric damper on stack's T-section
Too much fuel usage	Too much secondary combustion air	Check/reduce secondary combustion air.
	Too much air infiltration	Reduce air flow by adjusting the damper.
	Fuel leakage	Check fuel trains and burners for fuel leakage.
	Wet waste	Spread wet waste with other waste through several loads – do not charge all of the wet waste at one time.
	Excessive draft	Check/reduce draft – check door seals and other seals for leakage adjust damper.
	Burner setting too high	Check air/fuel mix.

Problem	Causes	Solutions
		Correct Maximum Flame Adjustment (Proper Oil and Air Pressure with correct supply of combustion air)
		Incorrect Flame Adjustment (Not enough Combustion Air)
		Incorrect Flame Adjustment (Air Pressure too high; too much air)
Incomplete burnout/poor ash quality	Build-up around air holes – clogged with ash from previous burn	Check around air holes and clean.
	Poor draft	Draft should be -0.2-0.06 KPa (or 0.8-0.25" W.C).
	Too much wet waste – overloading system	Spread wet waste with other waste through several loads – do not charge all of the wet waste at one time.
	Insufficient burn time	Allow longer burn time period.

### Possible Alarms (Faults)

#	ALARM (System Fault)	SOLUTION
1	The Primary Chamber top/bottom thermocouple is faulted	Refer to Section 6 of this manual for corrective maintenance procedures.
2	The Secondary Chamber thermocouple is faulted	Refer to Section 6 of this manual for corrective maintenance procedures.
3	The Secondary Stack Thermocouple is faulted	Refer to Section 6 of this manual for corrective maintenance procedures.
4	The primary burner is faulted	<p>The primary burner has failed to light when it received a signal to start. To reset the burner, press the reset button located on the Burner.</p> <p>If this does not start the burner, refer to Supplier Catalogue (Riello Burner) in Section 8</p>
5	The secondary burner is faulted	The secondary burner has failed to light when it received a signal to start. To reset the burner,
6	<p>The system has shut down due to primary blower low air flow.</p> 	<p>Visually examine the primary blower for any obstructions that may be causing low air flow.</p> <p>Check slide gate located between Primary chamber and blower, ensure it is open.</p> <p>Check damper assembly, ensuring modutrol crank arm is still connected and that butterfly damper is open, allowing air flow.</p> <p>Air proving switch may be defective. Refer to Section 6 of this manual.</p> <p>There are two ports on the air flow switch marked V and P. Ensure the inlet tube is attached to the port marked “P” for pressure. V stands for vacuum. Ensure the “V” port is open to atmosphere and is not blocked.</p> <p>If no air restriction is observed (i.e. blockage in the tube) change the air proving switch. Refer to Section 6 of this manual.</p>
7	The primary blower motor overload is tripped.	<p>Turn power off on Control panel by turning the Main Disconnect to the OFF position.</p> <p>Reset overload.</p>

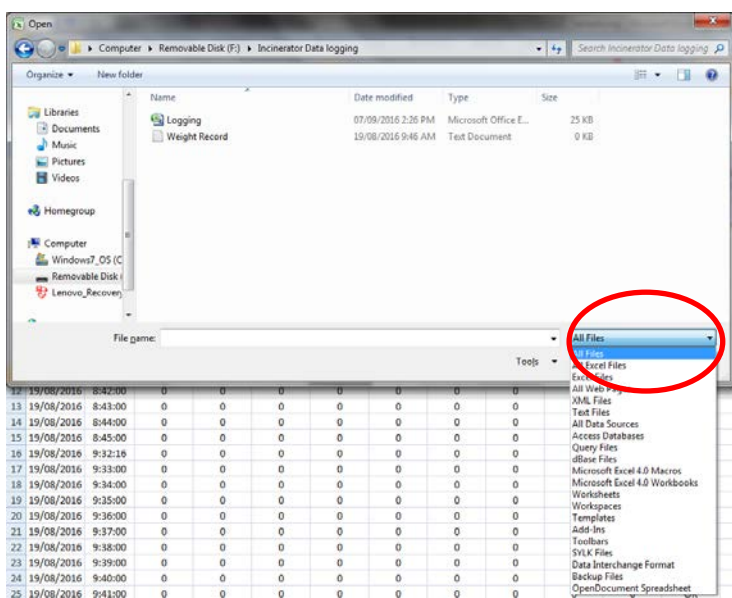
#	ALARM (System Fault)	SOLUTION
8	<p>The system has shut down due to secondary blower low air flow</p> 	<p>Visually examine the Secondary Blower for any obstructions that may be causing low air flow.</p> <p>Check slide gate located between Secondary chamber and blower, ensure it is open.</p> <p>Check damper assembly, ensuring Modutrol crank arm is still connected and that butterfly damper is open, allowing air flow.</p> <p>Air flow switch may be defective. Refer to Section 6 of this manual.</p> <p>There are two ports on the air flow switch marked V and P. Ensure the inlet tube is attached to the port marked "P" for pressure. V stands for vacuum. Ensure the "V" port is open to atmosphere and is not blocked.</p> <p>If no air restriction is observed (i.e. blockage in the tube) change the air proving switch. Refer to Section 6 of this manual.</p>
9	The Secondary blower variable frequency drive is faulted	<p>Push fault reset button on the HMI</p> <p>If fault persist check the error code on the variable frequency drive and check manual for troubleshooting alarm.</p>
10	The burner fuel level is low.	<p>Add fuel to the fuel tank and the alarm should reset itself.</p> <p>If alarm persists, replace the low level switch.</p>
11	Primary Chamber – lid lifter hydraulic pump overload.	<p>Turn power off on Control panel by turning the Main Disconnect to the OFF position.</p> <p>Reset overload.</p>
12	Primary Chamber – lid lifter stuck while rising.	<p>Check to see if anything is blocking the lifts or roof from raising</p> <p>Check the power pack fluid level to ensure enough hydraulic oil is available</p> <p>Check the limit switch is working</p>

#	ALARM (System Fault)	SOLUTION
13	Primary Chamber - lid lifter stuck while lowering.	<p>Check to see if anything is blocking the lifts or roof from lowering</p> <p>Check the power pack fluid level to ensure enough hydraulic oil is available</p> <p>Check the limit switch is working</p> <p>This can be caused by a burnt out solenoid valve. Check that the control valve is open.</p>
14	Primary Chamber - lid lifter left or right safety pawl failed to retract.	<p>Check the proximity switch that senses that the safety catch is out</p> <p>Check the solenoid valves (located on each column)</p>

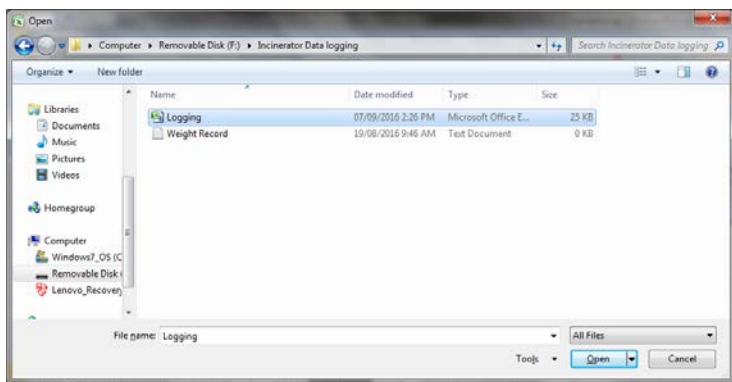
## Record Keeping

### Accessing Historical Information

1. It is recommended that a dedicated folder be set on the destination computer that is used for storing data from the Incinerator Package (e.g. "Incinerator Data")
2. Turn power off to the Main Control panel by turning the Main Disconnect to the OFF position.
3. Open the Main Control Panel door and remove the USB from the back of the HMI panel and insert the USB into the destination computer.
4. Open an Excel File, once opened go to File/Open locate the USB on your computer, in the bottom right corner choose "All Files".



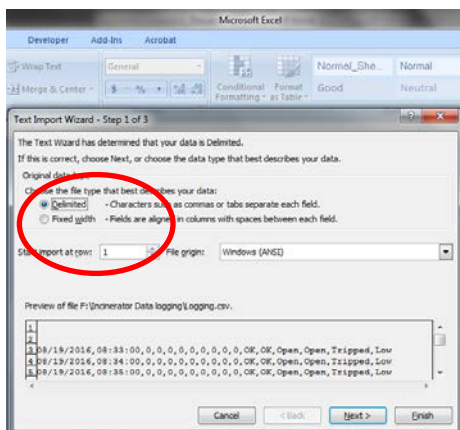
5. Click on the "logging" file and press open.



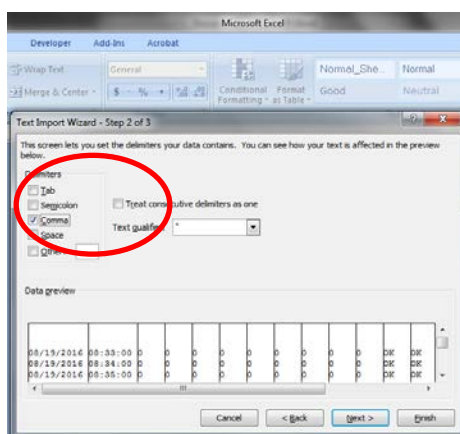
6. Excel will prompt you with a text import wizard, follow the next 3 steps to ensure the log files is displayed properly:



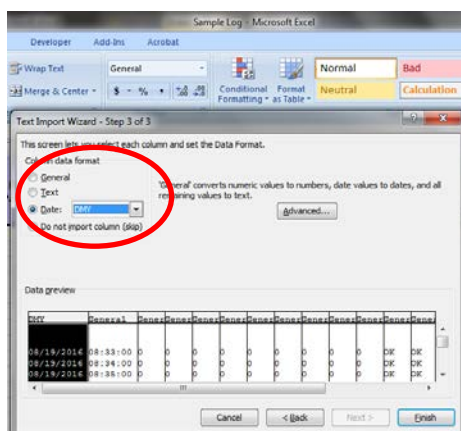
7. Steps 1 of 3 choose delimited – character such as commas or tabs separate each field, and choose Next:



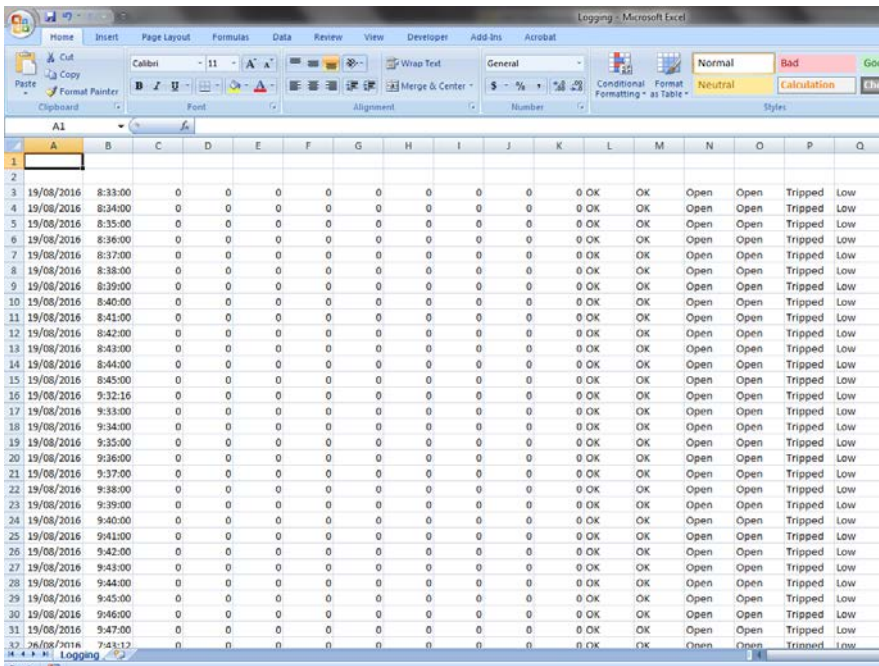
8. Steps 2 of 3 choose Comma as the delimiting item, and choose Next:



9. Steps 3 of 3 Column data format should be Date with DMY – character such as commas or tabs separate each field, choose Finish.

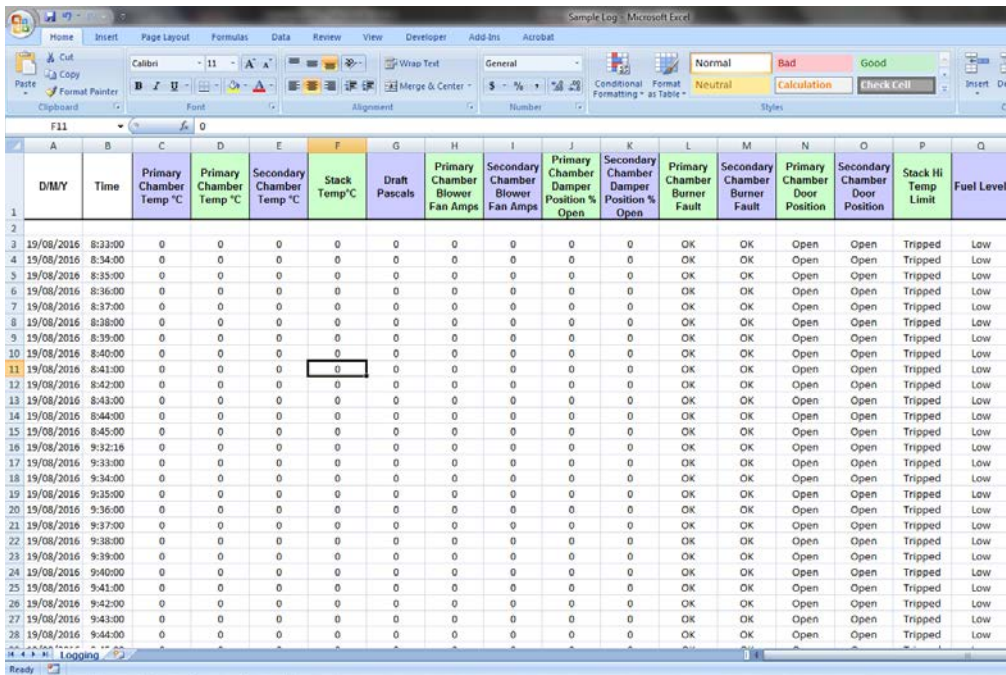


10. Once the data is open, it will look similar to the following:



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1																	
2																	
3	19/08/2016	8:33:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
4	19/08/2016	8:34:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
5	19/08/2016	8:35:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
6	19/08/2016	8:36:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
7	19/08/2016	8:37:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
8	19/08/2016	8:38:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
9	19/08/2016	8:39:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
10	19/08/2016	8:40:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
11	19/08/2016	8:41:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
12	19/08/2016	8:42:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
13	19/08/2016	8:43:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
14	19/08/2016	8:44:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
15	19/08/2016	8:45:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
16	19/08/2016	9:32:16	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
17	19/08/2016	9:33:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
18	19/08/2016	9:34:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
19	19/08/2016	9:35:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
20	19/08/2016	9:36:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
21	19/08/2016	9:37:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
22	19/08/2016	9:38:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
23	19/08/2016	9:39:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
24	19/08/2016	9:40:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
25	19/08/2016	9:41:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
26	19/08/2016	9:42:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
27	19/08/2016	9:43:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
28	19/08/2016	9:44:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
29	19/08/2016	9:45:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
30	19/08/2016	9:46:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
31	19/08/2016	9:47:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
32	19/08/2016	9:48:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low

11. From the electronic template file located on the USB for the manual copy the first row and paste into your log file:



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1																	
2																	
3	19/08/2016	8:33:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
4	19/08/2016	8:34:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
5	19/08/2016	8:35:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
6	19/08/2016	8:36:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
7	19/08/2016	8:37:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
8	19/08/2016	8:38:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
9	19/08/2016	8:39:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
10	19/08/2016	8:40:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
11	19/08/2016	8:41:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
12	19/08/2016	8:42:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
13	19/08/2016	8:43:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
14	19/08/2016	8:44:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
15	19/08/2016	8:45:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
16	19/08/2016	9:32:16	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
17	19/08/2016	9:33:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
18	19/08/2016	9:34:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
19	19/08/2016	9:35:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
20	19/08/2016	9:36:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
21	19/08/2016	9:37:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
22	19/08/2016	9:38:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
23	19/08/2016	9:39:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
24	19/08/2016	9:40:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
25	19/08/2016	9:41:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
26	19/08/2016	9:42:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
27	19/08/2016	9:43:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low
28	19/08/2016	9:44:00	0	0	0	0	0	0	0	0	0	OK	OK	Open	Open	Tripped	Low

12. Save your excel file with the date in the designated folder.

13. Reinstall the USB to the back of the HMI, close the Main Control Panel door and turn power back on to the system.

## **SECTION 6**

# **MAINTENANCE INSTRUCTIONS**

## Zero Mechanical State & Lock Out Procedures

Proper maintenance of the equipment is essential to ensure long term, reliable operation of the EWS Incinerator.

**NOTE** The warranty will become void if proper maintenance is not performed as instructed.

### Safety

During maintenance of the EWS mobile incinerator, it is very important to be aware of special hazards. Two safety programs are described in the following sections:

1. Zero Mechanical State
2. Power Lock Out Procedures



Failure to comply with these instructions during maintenance could result in injury or death. The responsibility for implementation of a comprehensive safety program rests with the operating staff and supervision. The safety procedures in this *Manual* should be considered only as a starting point for the safety program at site.



**ACCIDENTS CAN BE PREVENTED A CAREFUL WORKER IS THE BEST SAFETY DEVICE**

### Zero Mechanical State

Zero Mechanical State (ZMS) exists when the possibility of an unexpected mechanical movement has been eliminated. During maintenance, it is absolutely mandatory to totally deactivate the incinerator so that there is no possibility of an unexpected machine movement. Power lock-out, described in the next section, is commonly used for this purpose. Most machines are powered by electrical, hydraulic or pneumatic drives. Energy may be stored in a shutdown machine in various ways: Air pressure in a cylinder, hydraulic pressure fluid stored in pressurized hoses, or machine members whose weight can generate fluid pressure. Therefore, just cutting off the electrical power may not be enough to neutralize all power sources. Certain maintenance procedures at site should require ZMS condition as a matter of course.

### Zero Mechanical State (ZMS) Checklist:

1. Every electrical power source to the incinerator must be cut off and locked out (to prevent others who may not be aware of maintenance work from turning the power back on inadvertently).
2. Ensure that the mechanical potential energy of the incinerator is at its lowest practical value so that opening of pipe, tubing, hose or actuation of any valve will not produce an unexpected movement that could cause injury.

3. Check that there is no pressurized fluid (air, oil, gas or other) trapped in the incinerator lines, cylinders or other components. This will ensure that there will be no incinerator motion when a valve is actuated.
4. Secure loose or freely moving parts so that there is no possibility of accidental movement.

### **Power Lock Out Procedures**



Unexpected operation of electrical equipment started by automatic or manual remote control may cause injuries to persons who happen to be nearby. For this reason, when repair work is to be done on motors or other electrical equipment the circuit should be opened at the switch box and the switch pad locked in the OFF position. Tag the switch with a lock out tag indicating who must be contacted before the power is turned back on again.

**BECAUSE OF THE SEVERE CONSEQUENCES, INCLUDING DEATH, OF NOT PROPERLY LOCKING OUT ELECTRICITY SUPPLIES DURING MAINTENANCE, THE SUPERVISOR SHOULD ENSURE THAT THERE IS ONLY 1 KEY FOR THE LOCK USED TO LOCK OUT THE POWER SUPPLY.**

For identification, locks may be color coded to indicate different crews or shifts.

The Supervisor should maintain the master key and list of key numbers, and should keep an extra key to each lock for his department. The master key should not be loaned out under any circumstances.

No matter what method is used to lock out power to electricity, strict discipline and constant supervision should be employed during any equipment maintenance work.

### **Power Lock Out Checklist**

1. Alert the operator of the equipment.
2. Before starting the work on an engine or motor, line shaft or other power transmission equipment or power-driven machine, make sure it can not be set in motion without your knowledge.
3. Place your own padlock on the control switch, lever, or valve, even if someone has locked the control panel before you. You will not be protected unless you put your own padlock on it. (Another maintenance person could remove their lock and then someone else could start the equipment if they were not aware of maintenance work being done.)

When finished working at the end of your shift remove your own padlock. Never permit someone else to remove it for you. Be sure you are not exposing someone else to danger by removing your padlock

## Instruction Classification

Each component is associated with an identification number, see table below:

<b>System Component</b>	<b>Identification number</b>
Primary Blower	01-001
Secondary Blower	02-001
Primary Burner	01-002
Secondary Burner	02-002
Refractory	05-001
Air Compressor	03-001
Thermocouple	05-002
Main Control Panel	03-010
Paint	05-003
Electrical	05-004
Limit Switch	05-005
Lid Lifters	06-001

To differentiate if the instruction is weekly, monthly, quarterly or yearly, the above identification number will be followed by a letter:

Daily:	D
Weekly:	W
Monthly:	M
Quarterly:	Q
Yearly:	Y

For example, **01-001.Q.01** Primary blower assembly quarterly instruction number 1.



## i. Daily Instructions

### Primary Chamber Burner: (01-002.D)



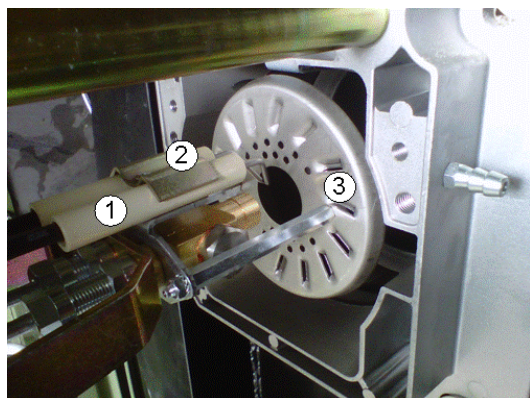
**Do not store flammable or hazardous materials in the vicinity of fuel burning appliances.**

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or death.

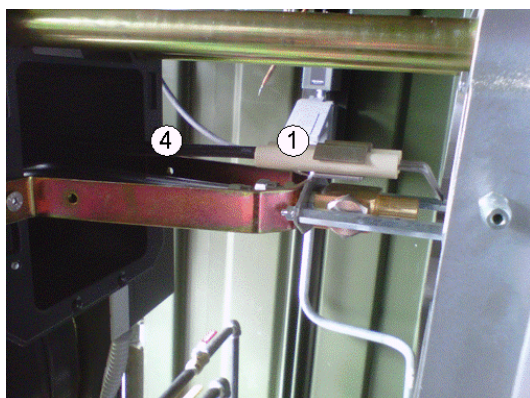
Burner shall be installed and maintained in accordance with manufacturer's requirements as outlined in the Burner manual, local codes and authorities having jurisdiction.

#### **INSTRUCTION 01-002.D.01: INSPECTING AND CLEANING ELECTRODES**

1. Remove the cover from the Burners as described in 01-002.W.01
2. Inspect the electrodes (PN: 3003796) for any soot build-up.



1. Electrode
2. U-bolt
3. Diffuser Disc

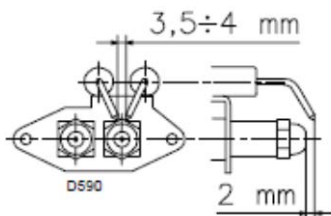


4. HT Leads

3. Clean/wipe down the ignition electrode with a cloth should there be a build-up of soot.

**NOTE** Do not use sand paper as this will increase the deposit of future soot.

- If electrodes are damaged remove the screws and u-bolt (see above photo) and install new electrodes. When reinstalling the electrodes make sure that they are positioned as shown below.



**Primary Burner**

Check the High Temperature (HT) Leads (PN: 3012995) for any heat damage. If HT Leads are severely damaged (ie, you can see the wire beneath the sheathing) then replace. (See CMI 6.3.3/01-002A)

#### **INSTRUCTION 01/02-002.D.02: INSPECTING THE FUEL LINES**

- Visually inspect all fuel lines to the Primary and Secondary Burner for any leaks.
- The Primary Burner have two oil lines, one feed and one return. the Secondary Burner has only a feed line
- If any leaks are observed tighten or replace the fitting where the leak is occurring

#### **INSTRUCTION 01-002.D.03: INSPECT AND CLEAN BURNER NOZZLES**

Primary Burner:

- Remove the burner cover as outlined in 01/02-002.W.01 REMOVAL OF BURNER COVERS
- Remove the centre retaining bolt.
- Slide burner out.
- Check nozzle. If there is carbon, remove the nozzle and clean.
- Reinstall or replace if necessary (PN: C5222433)

#### **Refractory: (05-001.D)**



**When working with the refractory make sure you use the proper tools; wear goggles, approved dust mask and gloves**

#### **INSTRUCTION 05-001.D.01: INSPECTING THE REFRACTORY**

Ensure power is locked out.



Please follow all instructions outlined in *Section 6.1 Zero Mechanical State & Lock Out Instructions*.

1. Open Primary Chamber door by unlatching all four clamps.
2. Tie-off door to open position to ensure that it will not close unintentionally.
3. Enter Primary Chamber and check the refractory for shrinkage, any gap between the modules greater than 2.5 cm should be patched with the blanket refractory
4. Check for any exposed metal between the modules, if metal is exposed make sure to patch area with blanket material (PN: 1" x 24" 8# 2600) or new module (PN: 6" Mod ZR) (CMI 6.3.2/05-001A & 6.3.2/05-001B)

## **ii. Weekly Instructions**

### **Primary & Secondary Chamber Blowers: (01-001.W & 02-001.W)**



**Do not attempt any maintenance on a fan unless the electrical supply has been completely disconnected and locked.**

Please follow all instructions outlined in *Section 6.1 Zero Mechanical State & Lock Out Instructions*.

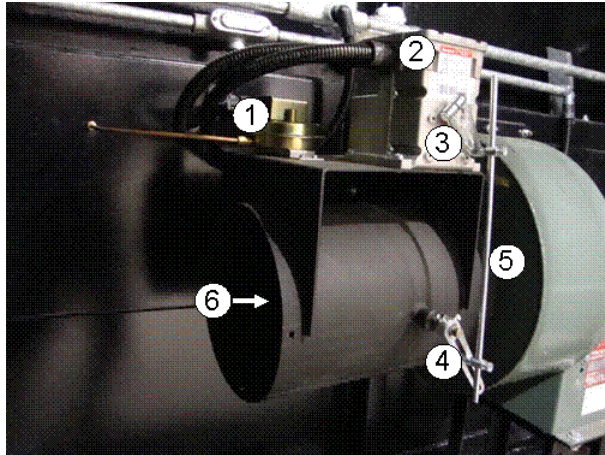
A fan can windmill despite removal of all electrical power therefore, take extra care when working with fans in the system.

The rotating assembly should be blocked securely before attempting maintenance of any kind.

#### **INSTRUCTION 01/02-001.W.01: DAMPER CRANK ARM**

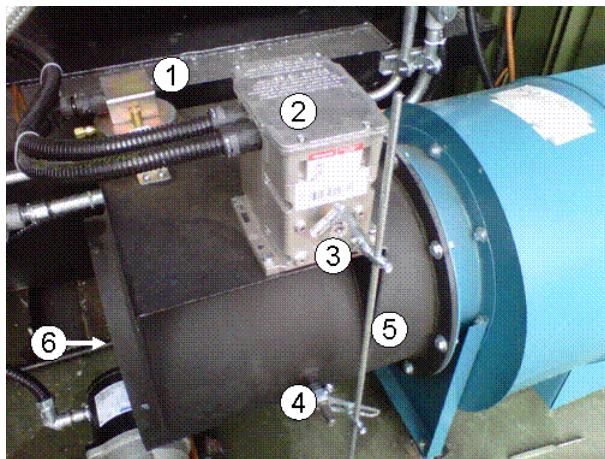
Check to see that the damper crank arm is connected to the damper and the rod.

Ensure mechanical linkage on damper is tight, if loose tighten with wrench.



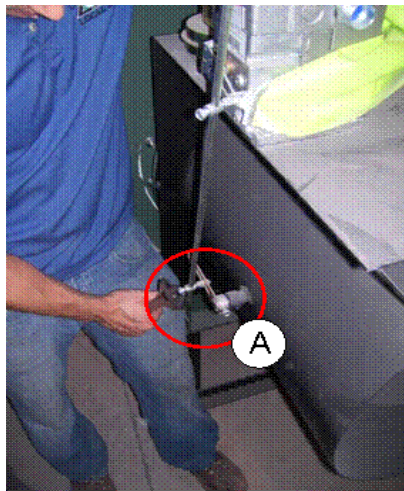
### PRIMARY BLOWER

1. Air Proving Switch
2. Modutrol Motor
3. Motor Crank Arm
4. Damper Crank Arm
5. Rod
6. Damper



### SECONDARY BLOWER

1. Air Proving Switch
2. Modutrol Motor
3. Motor Crank Arm
4. Damper Crank Arm
5. Rod
6. Damper

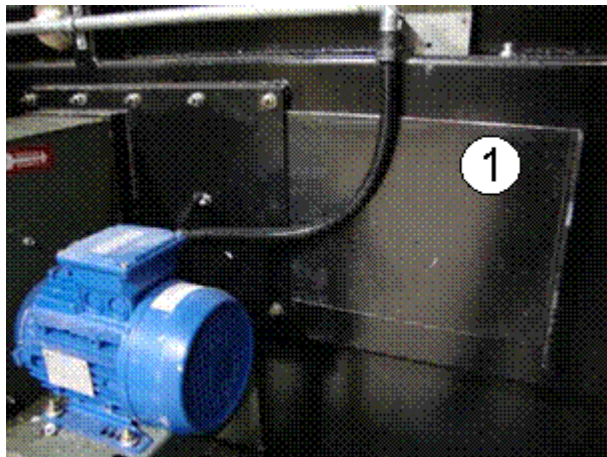


- A. Damper Crank arm and connection to Damper and Rod

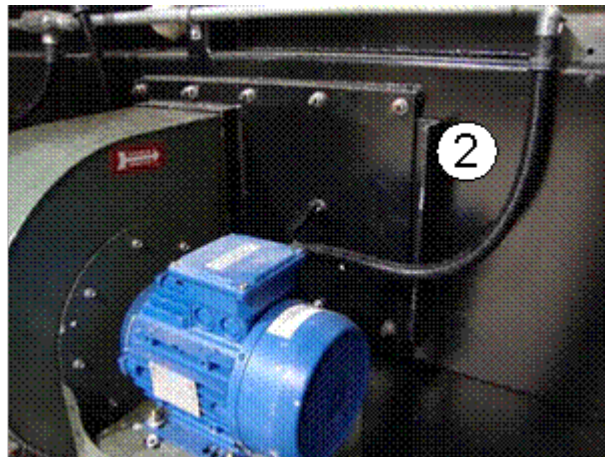
**INSTRUCTION 01/02-001.W.02: SLIDE GATES**

Check to see if slide gates move freely.

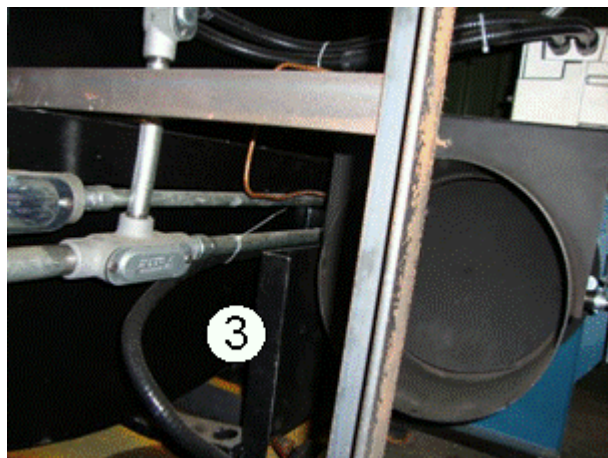
1. Move slide gate in and out to ensure free movement. If sticking, use lubricant to loosen. Lubricant should be rated for a high temperature (>150°F) application.
2. Gates must be opened to allow under fire air to enter the chamber. They should only be closed to reduce air in abnormal operating conditions.



1. Primary Chamber Slide Gate Open



2. Primary Chamber Slide Gate Closed



3. Secondary Chamber Slide gate Open

### Primary Chamber Burner: (01-002.W)



**Do not store flammable or hazardous materials in the vicinity of fuel burning appliances.**

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or death.

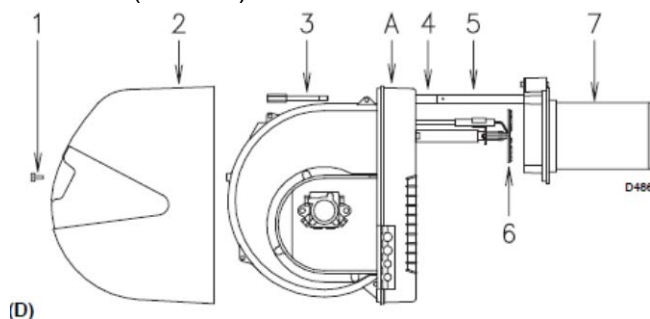
Burner shall be installed and maintained in accordance with manufacturer's requirements as outlined in the Burner manual, local codes and authorities having jurisdiction.

#### **INSTRUCTION 01/-002.W.01: REMOVAL OF BURNER COVER**

Switch off the electrical power. Please follow all instructions in *Section 6.1 Zero Mechanical State & Lock Out Instructions*. Cover must be removed to perform maintenance on the burner.

To remove the cover and to pull out the Primary or Secondary Burner, follow instructions below:

1. Loosen screw (Item #1, in the following diagrams) and withdraw the cover (Item #2, in the following diagrams)
2. Primary Burner has one screw to remove the cover. The Secondary Burner has four screws to remove the cover.
3. Remove bolt (Item #3) for the Primary Burner, or screws (Item #3) for the Secondary Burner.
4. Pull (Part A) backwards keeping it slightly raised to avoid damaging the diffuser disk (Item #6).



Primary Burner has 1 screw





**INSTRUCTION 01/02-002.W.02: CLEANING THE PHOTO ELECTRIC CELL**

1. Remove the cover from the Burners as described in Instruction 01-002.W.01.
2. Clean Photo Electric (P.E) cell with a wet cloth (Primary Burner PN: 3006216)
3. P.E. cell (Item #1) can be removed by pulling it outward forcefully. Ensure you take note of the position of the eye while removing, this will help when reinstalling.
4. Once cleaned insert P.E. cell back into position ensuring the eye is not facing directly into the chamber (where the flame will be) but on the same angle as before it was removed.
5. Replace burner cover.

Primary Burner PE Cell

**INSTRUCTION 01-002.W.03: CLEANING THE INSPECTION WINDOWS**

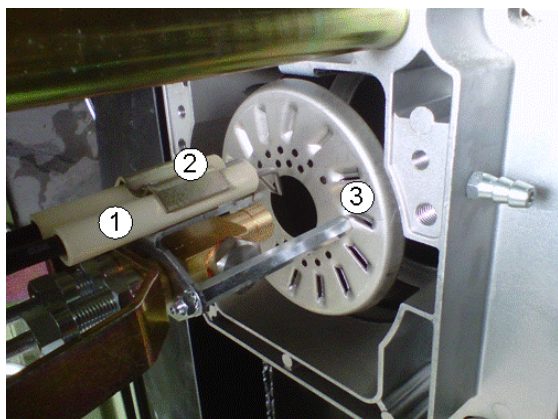
Clean the inspection windows with a wet cloth.



1. Primary Burner Inspection Window

**INSTRUCTION 01-002.W.04: INSPECTING THE DIFFUSER DISC ASSEMBLY**

1. Remove the cover from the Burners as described in 01-002.W.01.
2. Check the diffuser disc assembly (Primary Burner PN: 3003791) for any heat damage
3. If any heat damage, deformation or excess rust is noted, replace. (CMI 6.3.8/03-009K)



1. Electrode
2. U-bolt
3. Diffuser Disc

**Secondary Chamber High Output Dual Burner: (02-002.W)**

**Do not store flammable or hazardous materials in the vicinity of fuel burning appliances.**

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or death.

Burner shall be installed and maintained in accordance with manufacturer's requirements as outlined in the Burner manual, local codes and authorities having jurisdiction.

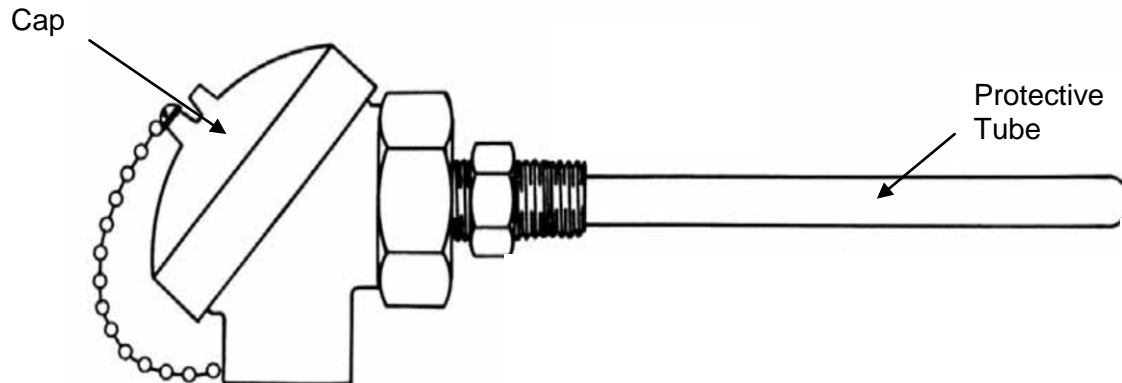
**INSTRUCTION 02-002.W.01: SECONDARY BURNER WEEEEKLY ROUTINE**

1. Clean flame sensors.
2. Clean the glass on the flame inspection window.
3. Clean spark ignitors.
4. Clean pilot assemblies.
5. Check spark ignitor lead connections.
6. Check turbulator ring.
7. Clean all filters and filter screens.
8. Lubricate all moving parts (i.e. bearings on doors, door latches & hinges, air and fuel valves, proportioning fuel valves, particularly the shafts on both air modulation valves)

9. Check all motors for bearing noise, loose fans, etc.
10. Inspect fuel lines for leaks

**Thermocouple: (05-002.W)**

 **When working with electrical components ensure lock out instructions are being followed.**



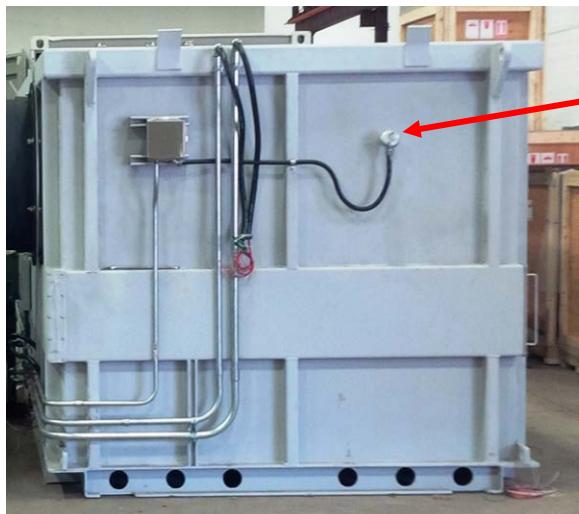
Thermocouple Assembly



Thermocouple Element

**INSTRUCTION 05-002.W.01: INSPECT THERMOCOUPLE FOR DAMAGE**

Turn main power to the system off - Remove thermocouple and visually inspect for damage. If damaged, see *CMI 6.3.1/05-002A*



1. Primary Chamber #1 Thermocouple



2. Two Secondary Thermocouples on Secondary Chamber body and beside the burner



3. Stack Thermocouple on Stack



## **i. Monthly Instructions**

### **Primary & Secondary Chamber Blowers: (01-001.M & 02-001.M)**



**Do not attempt any maintenance on a fan unless the electrical supply has been completely disconnected and locked. In many cases, a fan can windmill despite removal of all electrical power. The rotating assembly should be blocked securely before attempting maintenance of any kind.**

Please follow all instructions outlined in *Section 6.1 Zero Mechanical State & Lock Out Instructions*.

#### **INSTRUCTION 01/02-001.M.01: CHECK FAN WHEEL**



1. Check the fan wheel for any wear or corrosion, as either can cause catastrophic failures, if left in operation.
2. The wheel can be accessed one of two ways.
  - a. Remove the blower assembly from the unit and look down the outlet of the blower.
  - b. Remove the damper assembly from the inlet of the blower and inspect by looking through the inlet of the blower.
3. Check also for the build-up of material which can cause unbalance resulting in vibration, bearing wear and serious safety hazards.
4. Clean the wheel as required.
5. If replacement is necessary follow these steps:
  - a. Remove damper assembly from the unit
  - b. Remove the blower assembly
  - c. Remove the blower housing around the wheel
  - d. Loosen all set screws that are located on the wheel.
  - e. A puller may be required if the wheel hasn't been removed for some time.
  - f. Ensure the shaft "key" is installed on the shaft before installing the new wheel.
  - g. When installing a new wheel, the wheel should be positioned in the housing with the correct spacing between the edge of the inlet cone and the wheel. The wheel to cone clearance on the Primary Blower is 0.3175 cm.
  - h. Ensure that the wheel is installed securely before reassembling the blower assembly.
  - i. Install the blower assembly
  - j. Install the damper assembly

### Primary Chamber Burner: (01-002.M)



Do not store flammable or hazardous materials in the vicinity of fuel burning appliances. Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or death. Refer to the Burner manual for instructional or additional information.

#### **INSTRUCTION 01-002.M.01: CHECK FLEXIBLE OIL LINE**

1. Check flexible oil lines to make sure that they are still in good condition. This includes frayed, leaking, or worn swivel joints.
2. If any type of damage is observed replace the flexible oil lines see *CMI 6.3.3/01-002F & 6.3.3/02-0002F*



Primary Chamber Burner Flexible lines

#### **INSTRUCTION 01-002.M.02: INSPECT BURNER PUMP DELIVERY PRESSURE**

1. Remove the cover from the Burner as described in Instruction 01/02-002.W.01.
2. The pump delivery pressure must be between 180-210 psi, and can be viewed on the gauge shown below.



3. If the pressure is found to be unstable or if the pump is running noisily try the following:
  - a. Detach the flexible hose from the line filter (Shown below as #1).
  - b. At the tank pour fuel into the supply line.
  - c. If there is fuel coming in through the filter it means the filter is not clogged. If no fuel is coming through the filter remove and replace.



**Primary Chamber Burner Flexible lines**

4. If the pump is found to be responsible:
  - a. Loosen the bleed screw.
  - b. Turn on the burner
  - c. Once all the air has been bled out. Close the bleed screw.

If the pump is still not working after these steps replace the pump.

5. If the problem lies in the suction line, check to make sure that the filter is clean and that air is not entering the piping from a loose fitting or damaged line.

#### **INSTRUCTION 01-002.M.03: CLEAN BURNER OF DUST**

1. Remove the cover from the Burners as described in Instruction 01-002.W.01.
2. Check that no dust has accumulated inside the burner fan or on fan blades.
3. If any dust is visible take a clean soft cloth to the fan or the blades and wipe clean.

**INSTRUCTION 01-002.M.04: CHECK BURNER COMBUSTION HEAD**

1. Remove the cover from the Burners as described in Instruction 01-002.W.01.
2. Check that all parts of the combustion head are in good condition, free of all impurities, and that no deformation has been caused by operation at high temperatures.

**(Below is an example of burner in good condition)**



If damage is found, please refer to *CMI 6.3.3/01-002D* & *6.3.3/02-002D*

**Secondary Chamber High Output Dual Burner: (02-002.M)**

**Do not store flammable or hazardous materials in the vicinity of fuel burning appliances. Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or death. Refer to the Burner manual for instructional or additional information.**

**INSTRUCTION 02-002.M.01: SECONDARY BURNER IN-LINE HEATER**

1. Check all electrical connections.
2. Remove heater element from casing and inspect for build-up. Clean any deposits. When reinstalling always ensure the bundle will be restarted immersed. **NEVER** use the inline oil heater dry.

**INSTRUCTION 02-002.M.02: SECONDARY BURNER SOLENOID VALVES**

1. Examine solenoid valves for any deposits. Remove if necessary
2. Check electrical connections.

**Refractory: (05-001.M)**

**When working with the refractory make sure you use the proper tools; wear goggles, dust mask and gloves**

Please follow all instructions outlined in *Section 6.1 Zero Mechanical State & Lock Out Instructions*.

**INSTRUCTION 05-001.M.01: INSPECT REFRACTORY**

1. Ensure power is locked out.
2. Open Secondary Chamber door.
3. Fasten door open, ensuring it will not close by its own weight.
4. Enter Secondary Chamber and check the refractory for shrinkage, any gaps between the modules greater than 2.5 cm should be patched.
5. Fix gaps with supplied blanket by stuffing material into opening. (See *CMI 6.3.2/05-001A*)
6. Check for any exposed metal, if metal is exposed make sure to patch area with blanket material or new module. (See *CMI 6.3.2/05-001A & 6.3.2/05-001B*)
7. Pay special attention to areas where the junction boxes are located, as any excessive heat may melt the wires within the box.
8. From Secondary Chamber interior look up the stack while the cap is in closed position.
9. View the surface of the bottom of the stack cap flap with a flash light
10. Some cracking is normal, however if pieces are missing or have fallen out, (See *CMI 6.3.2/05-001E*)

**Lid Lifters: (06-001.M)**



**Controls are normally closed. Do not modify to by-pass or leave the controls open.**

**Always remain vigilant and avoid injury.**

**INSTRUCTION 06-001.M.01: CHECK HYDRAULIC FLUID**

Check the level of the hydraulic fluid. Fill if necessary.

1. Always use High temperature hydraulic oil Grade 32 to fill the tank.

## ii. Quarterly Instructions

### Primary & Secondary Chamber Blowers: (01-001.Q & 02-001.Q)



**Do not attempt any maintenance on a fan unless the electrical supply has been completely disconnected and locked. In many cases, a fan can windmill despite removal of all electrical power. The rotating assembly should be blocked securely before attempting maintenance of any kind.**

Please follow all instructions outlined in *Section 6.1 Zero Mechanical State & Lock Out Instructions*.

#### **INSTRUCTION 01/02-001.Q.01: LUBRICATE BEARINGS**

1. Lubricate the bearings, but do not over lubricate.
2. Bearings are completely filled with grease at the factory; they may run at an elevated temperature during initial operation. Surface temperatures may reach 180°F and grease may bleed from the bearing seals. This is normal and no attempt should be made to replace lost grease. Bearing surface temperatures will decrease when the internal grease quantity reaches a normal operating level.
3. Bearings should be lubricated with premium quality lithium-based grease conforming to NLGI Grade 2. Examples are:

Mobil - Mobilgrease XHP

Texaco - Premium RB

Chevron - Amolith #2

Shell - Alvania #2

4. Add grease to the bearing via the grease nipple while running the fan or rotating the shaft by hand. Be sure all guards are in place if lubrication is performed while the fan is operating. Add just enough grease to cause a slight purging at the seals. Do not over lubricate.





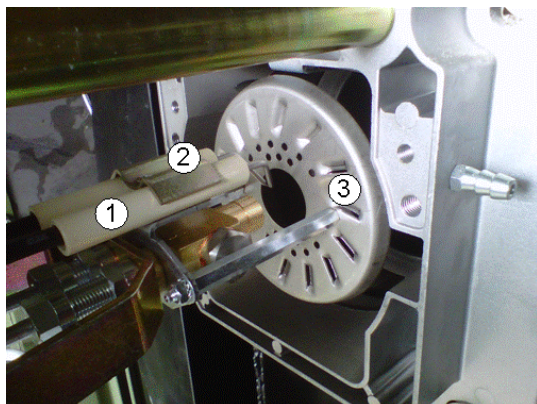
### Primary Chamber Burner: (01-002.Q)



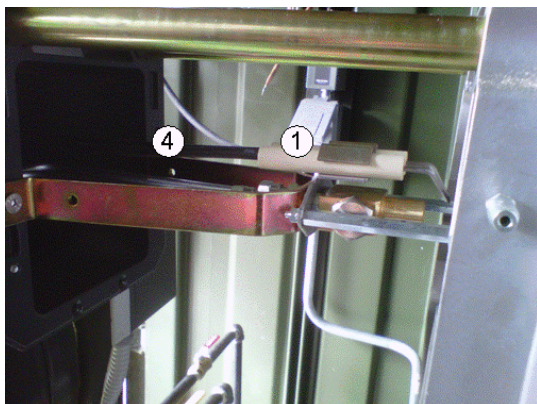
Do not store flammable or hazardous materials in the vicinity of fuel burning appliances. Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or death. Refer to the Burner manual for instructional or additional information.

#### **INSTRUCTION 01-002.Q.01: INSPECT COMPONENTS FOR HEAT DAMAGE**

1. Check all components for heat damage.
2. Look for excessive rust, deformation of all the parts including but not limited to the end cone and the diffuser disc.
3. Check to see that the High Temperature Leads (HT leads) are still intact and have not melted from any excessive heat coming back into the burner. If they are damaged replace with new HT Leads (PN: 3012995 Primary). See CMI 6.3.3/01.002A.
  - a. The HT leads are attached to the control box and the electrode via a squeeze fitting. Remove the leads from the electrode and control box by simply pulling them out.



1. Electrode
2. U-Bolt
3. Diffuser Disc



4. HT Leads



End cone

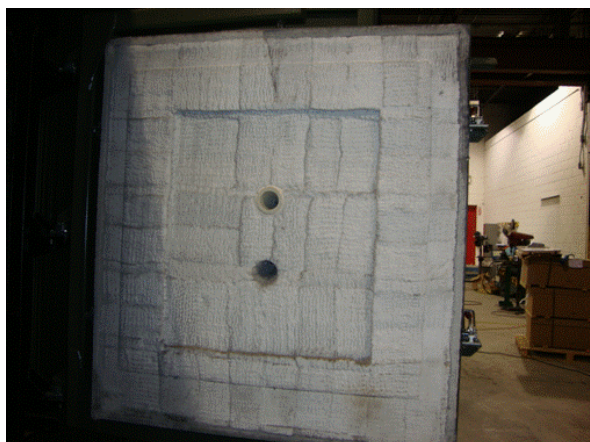
**Refractory: (05-001.Q)**

**When working with the refractory make sure you use the proper tools; wear goggles, dust mask and gloves**

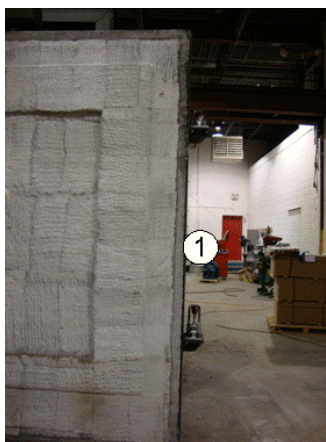
Please follow all instructions outlined in *Section 6.1 Zero Mechanical State & Lock Out Instructions*.

**INSTRUCTION 05-001.Q.01: INSPECT DOOR GASKETS**

1. Open Primary and Secondary Chamber doors.
2. Fasten doors open, ensuring the door will not close on its own.
3. Inspect door gasket for damage.
4. Replace any damaged segments of door gasket (PN: GSB 1.5") if necessary. Cut out the damaged section and replace with new door gasket. See *CMi 6.3.2/05-001C*.
5. Doors must close tightly and securely, ensuring a good seal.



Primary Door (refractory lined)



1. Primary Door Gasket



Secondary Door (refractory lined)

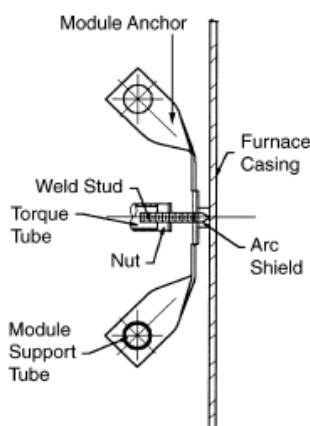


1. Secondary Door Gasket

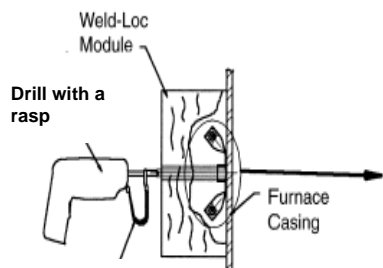


**INSTRUCTION 05-001.Q.02: INSPECT REFRACTORY FOR SHRINKAGE**

1. Ensure power is locked out.
  2. Open Primary and Secondary Chamber doors.
  3. Fasten doors open, ensuring they will not close on their own.
  4. Enter Primary and Secondary Chamber and check the refractory for shrinkage, anything greater than 2.54 cm should be patched.
  5. Check to make sure the anchoring of the modules is still strong and intact, if any modules seem loose replace complete module with new module.
- A. **REMOVAL:** Remove existing Module (physically pull away existing refractory from underlying Module Anchor).
- B. Remove welded stud from steel casing (cut with hack saw or other device between Module Anchor and Furnace Casing/Shell).



**Figure 1:** Side view of the Weld Loc Module



**Figure 2:** Stud Gun with rasp and Torque Tube.

- A. **INSTALLATION:** Once the new module (PN: 433026) is in place take the stud gun (PN: ECO-STUD) with rasp to the Torque Tube and drill into place.
- B. Once it has tightened the Torque Tube should come off with the drill.

### Paint: (05-003.Q)



Ensure proper ventilation and proper equipment is being used when using any paint product.

#### **INSTRUCTION 05-003.Q.01: INSPECT AND MAINTAIN EXTERIOR PAINT**

1. Maintain paint exterior to protect metal from heat and corrosion damage. This includes all components in the system including containers and incinerator components.
2. If discoloration is noted and painting needs to be performed, on areas where paint will be applied, you must do a light sanding before application.
3. Follow paint manufacturer's application instructions which will include surface preparation, priming and painting.
4. If components within the container need to be painted, for example the Primary Chamber or the Secondary Chamber, proceed as above. Use a type of paint that meets the following specifications:

#### **Paint Specifications:**

Incinerator Paint: This is the paint coated directly on the incinerator shell. This includes the following components:

1. Primary Chamber
2. Secondary Chamber
3. Breech Section
4. Hot Stack Section (Black)

Finish needs to be able to withstand temperatures in the 650-750°F (340-400°C) range.

Parts: There are no paint specifications for each individual component. This is left up to the discretion of the customer.

### iii. Yearly Instructions

#### Refractory: (05-001.Y)

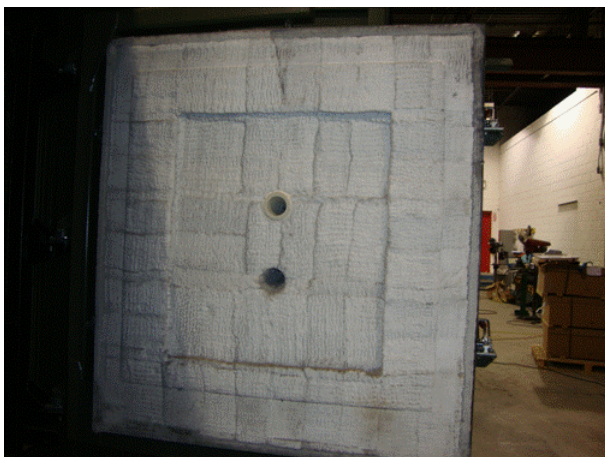


When working with the refractory make sure you use the proper tools; wear goggles, dust mask and gloves

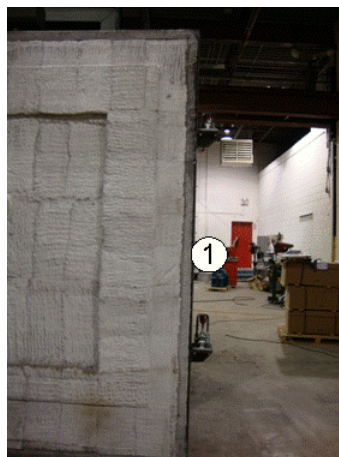
#### **INSTRUCTION 05-001.Y.01:**

#### **CHECK DOOR GASKET ALONG PRIMARY & SECONDARY CHAMBER DOORS**

1. If required replace the door gasket. The gasket can last over 2 years but will depend on the careful use by the operator when loading and unloading.
2. Remove the damaged section of door gasket from door and reinstall new gasket (PN: GSB 1.5")



**Primary Door (refractory lined)**



**Primary Door Gasket**



**Secondary Door (refractory lined)**



**Secondary Door Gasket**

Electrical: (05-004.Y)



**When working with electrical components ensure lock out instructions are being followed**

Please follow all instructions outlined in *Section 6.1 Zero Mechanical State & Lock Out Instructions*.

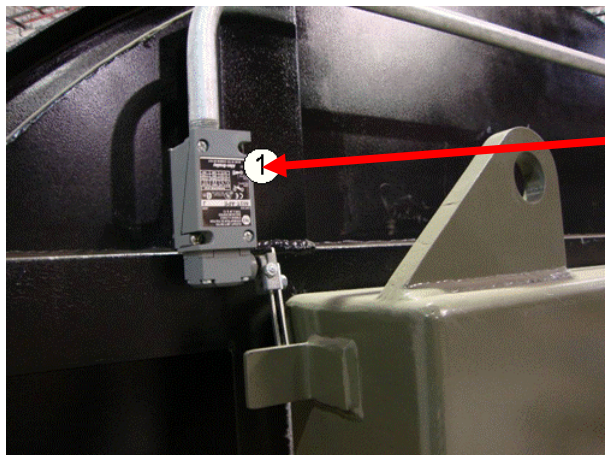
**INSTRUCTION 05-004.Y.01: CHECK LIMIT SWITCHES**

**NOTA** System must not be running or in cool down to perform this inspection.

1. Open Primary and Secondary Chamber doors and check top view screen on the HMI to ensure that it indicates door is open.
2. Close Primary and Secondary Chamber doors and check top view screen on the HMI to ensure that it indicates door is open.
3. All limit switches located on the unit are checked this way.
4. Replace limit switches (PN: 802T-APE) if necessary.



**Primary Chamber Limit Switch**



**Secondary Chamber Limit Switch**

1. See *CMI 6.3.1/05-005A*).
2. Check all other limit switches in the system.
  - a. Limit Switch located at upper limit of lid lifter Primary Chamber
  - b. Limit Switch located at lower limit of lid lifter Primary Chamber



## CORRECTIVE MAINTENANCE INSTRUCTIONS (CMI)

The following instructions relate to the replacement or correction (fixing) of components of the EWS Incinerator Package.

These Corrective Instructions are grouped in this section by the following:

- 6.3.1 General Corrective Maintenance Instructions
- 6.3.2 Refractory Corrective Maintenance Instructions
- 6.3.3 Primary & Secondary Burner Corrective Maintenance Instructions
- 6.3.4 Primary & Secondary Blower Corrective Maintenance Instructions
- 6.3.5 Waste Oil Burner Corrective Maintenance Instructions
- 6.3.6 Main Control Panel Corrective Maintenance Instructions

the following table is utilized to identify the components of the system that require corrective maintenance.

System Component	Identification number
<b>Primary Blower</b>	<b>01-001</b>
Air Proving Switch Replacement	6.3.4/01-001A
Damper Calibration	6.3.4/01-001B
Modutrol Resistor Replacement	6.3.4/01-001C
Damper Crank Arm Replacement	6.3.4/01-001D
Motor Replacement	6.3.4/01-001E
Modutrol Motor & Transformer Replacement	6.3.4/01-001F
<b>Secondary Blower</b>	<b>02-001</b>
Air Proving Switch Replacement	6.3.4/02-001A
Damper Calibration	6.3.4/02-001B
Modutrol Resistor Replacement	6.3.4/02-001C
Damper Crank Arm Replacement	6.3.4/02-001D
Motor Replacement	6.3.4/02-001E
Modutrol Motor & Transformer Replacement	6.3.4/02-001F
<b>Primary Burner</b>	<b>01-002</b>
Replacing Fuel Filter	6.3.1/01-002A
HT Lead & Electrode Replacement	6.3.3/01-002A
Diffuser Disc Replacement	6.3.3/01-002B
Nozzle Replacement	6.3.3/01-002C
End Cone Replacement	6.3.3/01-002D
Nozzle Assembly Repair or Replacement	6.3.3/01-002E
Burner Flexible Oil Line Replacement	6.3.3/01-002F
Low Level Switch Replacement	6.3.3/01-002G
Inspection Window Replacement	6.3.3/01-002H
Fuel Pump Replacement	6.3.3/01-002I
Control Box Replacement	6.3.3/01-002J
Oil Tube Replacement	6.3.3/01-002K
Burner PE Cell & UV Detector Replacement	6.3.3/01-002L
Burner Fan Motor Replacement	6.3.3/01-002M

<b>Refractory</b>		<b>05-001</b>	
	Wall Refractory: Gaps between the Modules		6.3.2/05-001A
	Wall Refractory: Replacement of the Modules		6.3.2/05-001B
	Door Gasket		6.3.2/05-001C
	Castable Refractory		6.3.2/05-001D
	Temporary Repair of Castable		6.3.2/05-001E
<b>Main Control Panel</b>		<b>03-010</b>	
	Main Control Panel		6.3.6/03-010A
	Reboot PLC		6.3.6/03-010B
<b>Limit Switch</b>		<b>05-005</b>	
	Limit Switch Replacement		6.3.1/05-005A

#### **iv. General Corrective Maintenance Instructions**

##### **LIMIT SWITCH REPLACEMENT (6.3.1/05-005A)**

1. Loosen the 2 screws holding the limit switch in place.
2. Remove limit switch, replace with a new one (PN: 802T-APE).
3. Take arm off of old body and mount to new.
4. Tighten the 2 screws holding the limit switch body.

##### **REPLACING THERMOCOUPLE (6.3.1/05-002A)**

The thermocouple will require routine replacement. The environment inside the incinerator will erode the protection tube to the point of failure. If the element is exposed to this environment it will be destroyed and will need to be replaced.

1. Unscrew thermocouple lid and remove wires.
2. Remove protection tube. To aid with this a vise and a pipe wrench will be needed.
3. Remove element and replace with new element (PN: TK-K08B-0100-S) and protection tube (PN: TA-A427A-K08B-010).







4. Reinstall on incinerator.
5. After installation turn power back on. Observe the temperature reading of the thermocouple you were just working on. If the wires were installed incorrectly the temperature will read the opposite temperature. (ie 20°C would read as -20°C). If this is the case open the thermocouple housing and switch the wires.

#### **REPLACING FUEL FILTER (6.3.1/01-002A AND 02-002A)**

The fuel filter will require routine replacement to ensure clean fuel delivery to the Primary and Secondary Chamber burners.

1. Close the ball valve on the supply line.



2. Unscrew the used filter. Use a bucket to catch the surplus fuel when you unscrew the filter.



3. Before installing the filter lubricate the seal on the new filter.
4. Install the new filter, and open the supply line ball valve.

#### **v. Refractory Corrective Maintenance Instructions**



**When working with the refractory make sure you use the proper tools; wear goggles, dust mask and gloves**

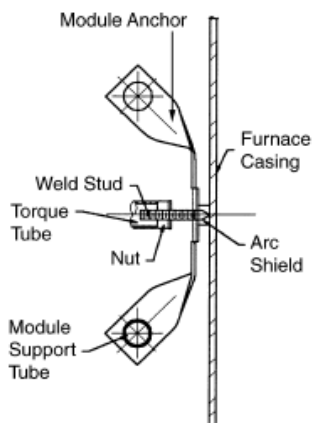
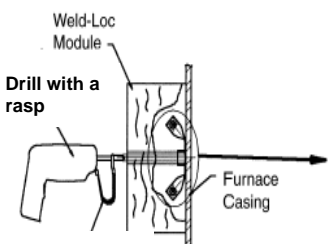
##### **WALL REFRACTORY: GAPS BETWEEN THE MODULES (6.3.2/05-001A)**

The ceramic block refractory will shrink over time exposing the exterior metal shell. These gaps need to be filled in with ceramic refractory blanket.

1. Identify gaps in the chamber that are larger than 1" in width between the modules or if you can see exterior shell.
2. With a Utility knife cut a length of ceramic blanket (PN: 1" x 24" 8# 2600) that will fit in the gap between the modules.
3. Stuff the blanket into the space with a straight edge or ruler.

### WALL REFRACTORY: REPLACEMENT OF MODULES (6.3.2/05-001B)

Excessive damage to a section of refractory may necessitate the replacement of modules in the incinerator. Such damage is largely due to mechanical wear. The following diagram walks through the removal and installation of new modules.

<p>A. <b>REMOVAL:</b> Remove existing Module (physically pull away existing refractory from underlying Module Anchor)</p> <p>B. Remove welded stud from steel casing (cut with hack saw or other device between Module Anchor and Furnace Casing/Shell)</p>	<p><b>Figure 1: Side view of the Weld Loc Module</b></p> 
<p><b>Figure 2: Stud Gun with rasp and Torque Tube (part of module assembly).</b></p> 	<p>C. <b>INSTALLATION:</b> Once the new module is in place take the stud gun (PN: Eco-Stud) with rasp to the Torque Tube and drill into place.</p> <p>D. Once it has tightened the Torque Tube should come off with the drill.</p>

### DOOR GASKET REFRACTORY (6.3.2/05-001C)

The door gasket will degrade over time and will need to be replaced over time. The bottom of the door will see more degradation due to the waste burning in that vicinity.

1. Identify the damaged section of gasket that will need to be removed
2. With a utility knife cut out the section that needs to be replaced.
3. A new piece of gasket (PN: GSB 1.5") will need to be cut the same length as the removed piece.
4. With contact cement coat the gasket on one side and the door section and install.

**CASTABLE REFRACTORY (6.3.2/05-001D)**

Operators will notice that the castable refractory will show signs of minor cracking. The minor cracking is normal. Large sections of castable should not separate from the rest of the monolithic cast. Such occurrences are largely due to a sudden impact from machinery or dropping of the units themselves. Mortar (PN: SM3000) is supplied to help with a temporary repair while a permanent repair is resolved. Such permanent repairs are a third level repair and have to be considered on a case by case basis.

**TEMPORARY REPAIR OF CASTABLE (6.3.2/05-001E)**

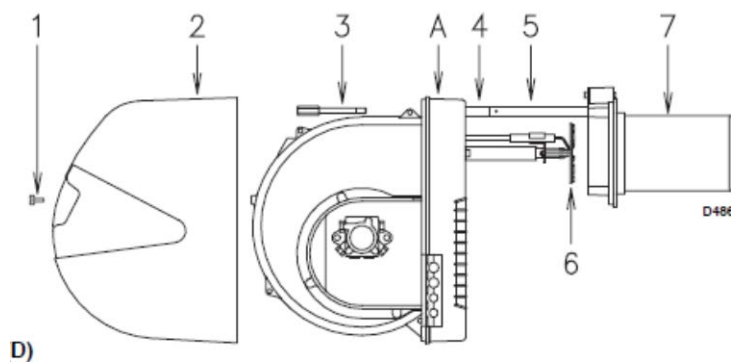
1. Find the pieces of castable refractory that have separated.
2. Clean both the pieces of refractory and the area where the separation occurred.
3. Spread an even amount of high temperature mortar on the pieces and the area of separation.
4. Put the pieces back where they originated and support as necessary for a minimum of an hour while the mortar cures.

## vi. Burner Corrective Maintenance Instructions

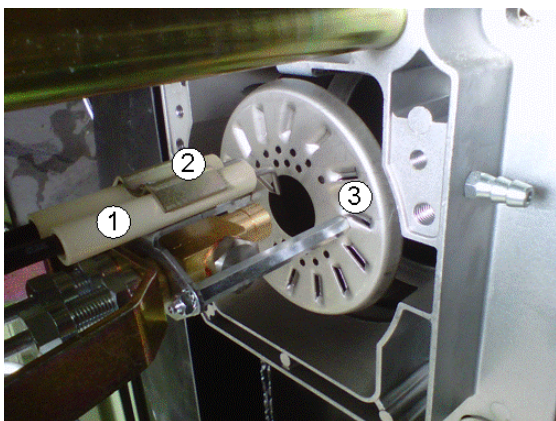


**Do not store flammable or hazardous materials in the vicinity of fuel burning appliances.**

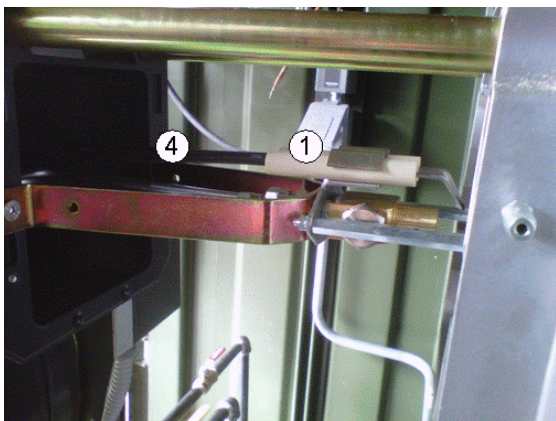
The Burners are pieces of equipment that will require routine corrective and preventive maintenance. Parts within this assembly will need to be repaired or replaced. The most common parts to be repaired or replaced are located at the front end of the burner where the parts are exposed to high temperatures.



**Front End Primary Burner**



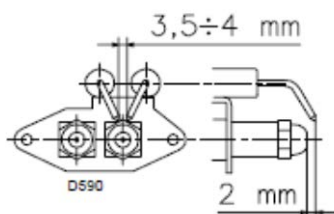
1. Electrode
2. U-bolt
3. Diffuser Disc



4. HT Leads

**HT LEAD & ELECTRODE REPLACEMENT (6.3.3/01-002A)**

1. In order to change out the HT leads (PN: 3012995) Primary Burner or Electrode (PN: 3003796) the U-Bolt will have to be removed
2. Remove the electrode by pulling the lead out of the white ceramic tube, replace and re-install.
3. To change the Leads the wire will need to be removed from the burner.
4. Pull the wire out of the burner housing through the rubber grommet.
5. The other end is connected to the back of the control box. Pull the wire straight out and the spring fitting will disengage.
6. Replace the lead with a new one reversing the above directions.
7. When reinstalling the electrodes make sure that they are positioned as shown below:



**Primary Burner**

**DIFFUSER DISC REPLACEMENT (6.3.3/01-002B)**

1. Identify the diffuser disc in the above pictures.
2. The disc assembly is secured to the nozzle housing by 2 hex nuts.
3. Remove these nuts and remove the assembly from the burner.
4. The disc is attached to the assembly with 2 screws.
5. Remove the screws and replace the disc.
  - Primary Chamber Burner diffuser disc PN: 3003791
6. Reassemble.

**NOZZLE REPLACEMENT (6.3.3/01-002C)**

1. Identify the nozzle at the very front end of the burner just behind the diffuser disc.
2. Remove the nozzle with a wrench.
3. Install the new nozzle.
  - Primary Chamber Burner nozzle PN: C5222433

**END CONE REPLACEMENT (6.3.3/01-002D)**

The end cone will need replacement when the flame becomes unstable from too much heat damage.

1. Loosen and remove the 4 hex bolts that hold the burner on the flange.
2. Remove the burner completely from the incinerator. This will require more than one operator because the burner is heavy.
3. There are two screws that hold the end cone on. Remove and save the screws for the new end cone.
4. Install the new End Cone with the old screws.
  - Primary Chamber burner end cone PN: 3003807
5. Reinstall the burner.

**NOZZLE ASSEMBLY REPAIR OR REPLACEMENT (6.3.3/01-002E)**

The nozzle assembly is subjected to high heat cycling. The heat cycling will eventually cause the seals and assembly to leak. The assembly will have to be replaced when this occurs. First identify the location of the nozzle assembly.

The parts (seals, nozzle assembly) needed for these replacements are all included under one part number.

- Primary Chamber Burner nozzle assembly: PN: 3003814

Remove all connections to the nozzle assembly and replace with the above parts.

**BURNER FLEXIBLE OIL LINE REPLACEMENT (6.3.3/01-002F)**

1. Turn the inline ball valve to the closed position to isolate the fuel supply from the burner. This valve is located down line from the burner.
2. Remove flexible lines.
3. Replace with new lines.
  - Primary Chamber Burner flexible oil line: PN: C5281160



4. Open ball valve.



Primary Chamber Burner Flexible lines  
(Item # 1 Above)

#### **LEVEL SWITCH REPLACEMENT (6.3.3/01-002G & 02-002G)**

The level switch is located in the Fuel Tank.

#### **NOTA**

**Tanks do not have to be emptied to replace.**

1. Unplug the level switch.
2. Disconnect the cord and remove the level switch.
3. Replace level switch (PN: FS301-01) and reconnect the cord.
4. Plug in the level switch.

#### **INSPECTION WINDOW REPLACEMENT (6.3.3/01-002H & 02-002H)**

To replace the inspection window simply remove the old inspection window and replace with a new one:

- Primary Burner inspection window PN: 3003763

#### **FUEL PUMP REPLACEMENT (6.3.3/01-002I)**

Identify the pump on the burner you wish to replace.

Remove all fuel connections to the pump with the appropriate wrench. Unbolt the pump from the main body of the burner and pull the pump away from the burner to remove.

Reinstall the new pump, and reattach all fuel connections.

- Primary Burner: PN: 3013027

**CONTROL BOX REPLACEMENT (6.3.3/01-002J & 02-002J)**

Identify the control box on the burner you wish to replace:

Ensuring the power is off unscrew the old control box and install the new one.

- Primary Burner: PN: 3012933

**OIL TUBE REPLACEMENT (6.3.3/01-002K)**

Oil tubes leak due to heat cycling which causes the fittings to fail or a loose fitting.

1. Identify the oil tubes on the Primary Burner and on the Secondary burner.
2. First try tightening the fittings to see if the leak stops. If the leak does not stop:
3. Remove the old oil tubes with a wrench and install the new ones:

- Primary Burner Tubes: PN: 3003821  
PN: 3003822

**BURNER PE CELL REPLACEMENT (6.3.3/01-002L)**

**Primary Burner:** If the PE cell has been damaged, then it will need to be replaced. The PE cell while removed needs to be unplugged from the control box. This is accomplished by pulling the connection towards you. With the new PE cell install the control box end first by pushing the connection hard. Reinstall the PE cell in the burner.

**BURNER FAN MOTOR REPLACEMENT (6.3.3/01-002M)**

Identify the malfunctioning motor in the affected burner:

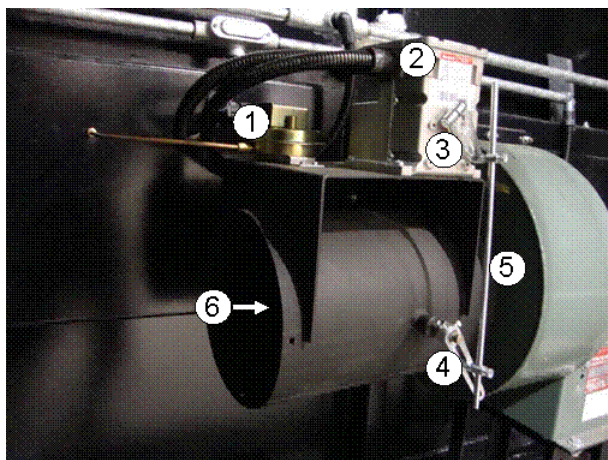
Unbolt and remove the malfunctioning motor from the housing. Disconnect all electrical connections. Reinstall the new motor exactly how the old motor was installed.

## vii. Primary & Secondary Blower Corrective Maintenance Instructions



**Do not attempt any maintenance on a fan unless the electrical supply has been completely disconnected and locked. In many cases, a fan can windmill despite removal of all electrical power. The rotating assembly should be blocked securely before attempting maintenance of any kind.**

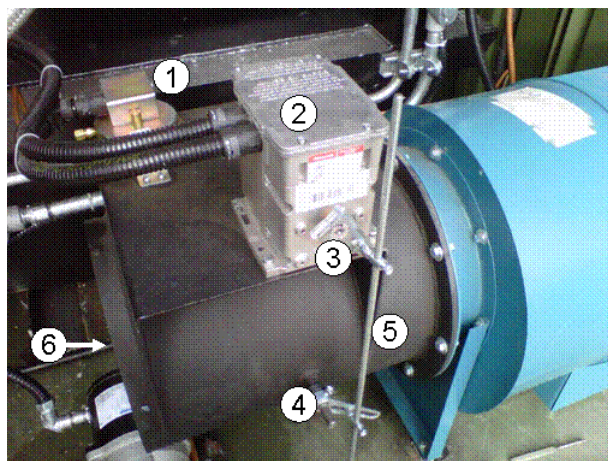
Primary Blower assemblies are not a commonly repaired part on the incinerator. Parts within this assembly will need to be repaired or replaced. They are outlined below.



### Primary Blower

1. Air Proving Switch
2. Modutrol Motor
3. Motor Crank Arm
4. Damper Crank Arm
5. Rod
6. Damper

Secondary Blower assemblies are not a commonly repaired part on the incinerator. Parts within this assembly will need to be repaired or replaced. They are outlined below.



### Secondary Blower

1. Air Proving Switch
2. Modutrol Motor
3. Motor Crank Arm
4. Damper Crank Arm
5. Rod
6. Damper

\*Sample picture of a Secondary Blower and its assembly

**AIR PROVING SWITCH REPLACEMENT (6.3.4/01-001A & 02-001A)**

1. Ensure all power is locked out.
2. Remove wiring from switch.
3. Remove tubing from switch.
4. Unscrew screws at the two locations and remove switch.
5. Reinstall new switch (PN: SML8221210034) complete with tubing and wiring and then retighten.
6. Turn power back on.

**DAMPER CALIBRATION (6.3.4/01-001B & 02-001B)**

Sometimes the damper linkage will slip when the connections become loose (Items 3,4,5 in the Secondary Blower photo) In order to ensure that the linkage is correctly calibrated the operator will need to look at the display screen on the control panel while the unit is in operation

1. Read the % Open value on the control panel operator interface (PanelView) for the Primary Blower.
2. During operation the damper is factory preset to be 0% open, or fully closed.
3. Look inside the damper (Item 6) and ensure that the linkage is completely closed.
4. If it is then this maintenance is complete.
5. Should the damper be open even a small percentage the linkages are to be loosened and the damper adjusted to be completely closed, and then retighten.

**MODUTROL RESISTOR REPLACEMENT (6.3.4/01-001C & 02-001C)**

The Modutrol resistors are located inside the top lid of the Modutrol motor. Remove the lid to the Modutrol motor by unscrewing the top four (4) screws. The connection between the control panel and the Modutrol is made with a small white connector with 3 terminals. Jumped between these terminals is the resistors.

Remove and replace the resistors one at a time to ensure the correct resistors are replaced. You identify the correct resistor by examining the color band on the center node of the resistor. Replace like resistors.

**DAMPER CRANK ARM REPLACEMENT (6.3.4/01-001D & 02-001D)**

The crank arm will only need to be replaced if the arm is damaged due to misuse. Identify the damper crank arm (Item #4 in the picture on the previous page).

Identify the location of the linkage on the rod and the damper arm with a marker, so the new crank arm will be in the same spot when reinstalled. Remove the connections to the crank arm and replace with the new one (PN: 26026G) and ensure it is in the same spot as the old one.

#### **MODUTROL MOTOR & TRANSFORMER REPLACEMENT (6.3.4/01-001F & 02-001F)**

To replace the Modutrol motor all power needs to be off to the system as you will need to expose electrical connections. Firstly get the new motor and orientate the motor in the same direction as the old motor. Identify where the conduit is connected on the old motor and punch the connector holes for the new motor.

##### **Removal**

1. Remove all electrical terminations and remove the transformer.
2. Install the transformer in the new Modutrol motor.
3. Remove all conduit connections on the motor.
4. Remove the damper arm and linkage from the motor.
5. Unbolt the motor from the damper, and ensure all nuts and bolts are kept for the new motor install

##### **Install**

1. Bolt the new motor in the same orientation as the old motor.
2. Install the damper arm and linkage to the motor
3. Install all conduit connections

Terminate all electrical connections the same as the old motor.

#### **REPLACE THE BLOWER CONTACTOR 6.3.4/01-001G**

1. Turn the Main Disconnect Switch off.
2. Open Panel.
3. Remove the wires from M1.
4. Pull the retaining clip up.
5. Tilt contactor forward and remove.
6. To reinstall tilt new contactor (PN: 100-C09D10) until it clicks back in.
7. Pull the retaining clip back down to lock.
8. Reinstall wires to M1.
9. Close panel.
10. Turn power back on.

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**viii. Main Control Panel Corrective Maintenance Instructions**

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**MAIN CONTROL PANEL (6.3.6/03-010A)**

All control panel diagnostics are to be completed by certified or trained technicians. Electrical drawings / diagrams are provided to aid electricians with any diagnostics.

**REBOOT PLC (6.3.6/03-010B)**

Turn Main Disconnect to the off position on the front of the Control Panel. Turn the main disconnect back on.

## **SECTION 7**

## **PARTS LIST**





## ECO 1.75TN 1PV100L Parts List

General Incinerator Components		Quantity	Part # Supplier
Primary Door Bearings			F4B-E-200R DGE Canadian Bearings Ltd.
Secondary Door Bearings		5	F4B-E-104R DGE Canadian Bearings Ltd.
Stack Bearings		2	P2B-SC-100 Canadian Bearings Ltd.
Toggle Clamps US\$		6	51335A66 McMaster-Carr
View Ports		5	P1030/8 Pegasus
Thermocouple		4	TA-A427A-K08B-010.0 Thermo-Kinetics Company Ltd.
Metal ash bins 2.5 yds with lid		2	JT-2.5-60-188 JT Fabrication Ltd..
Blower Assemblies		Quantity	Part # Supplier
Primary Chamber Blower		1	B110 Canarm
Secondary Chamber Blower w/flanges		1	B113 Canarm
Modutrol		2	M9184D4009 Yorkland Controls Limited
Air Proving Switch		3	SML 8221210034 Yorkland Controls Limited
Primary Chamber Burner		Quantity	Part # Supplier
Primary Burner RL 28/2		1	C9511200 Riello
Fuel Tank 4500l		1	6011000 Hassco Industries Inc.
Ktech 37.5" low level switch stainless steel		1	FS301SF-1 28"NC Ktech Industrial Products Inc.
Diesel filter		1	VF1210 National Energy Equipment Inc.
5 micron pleated paper filter	2	KPP21005B	National Energy Equipment Inc.
High Output Used Oil Burner		Quantity	Part # Supplier
Special 6514-8-A fireall dual fuel burner complete with refractory tile, standard capacity iron nose	1	6514-8-A/LX/1.0A-X13546	Fives North American Combustion
3/4" Pilot Set	1	4015-0-T	Fives North American Combustion
1/2" std regulator	1	7218-01	Fives North American Combustion
3/8" sensitrol oil valve	1	1813-02-D	Fives North American Combustion
1/2"dia. x 18" AOL; 1/2" mnpt connectors e/e; braided CGA approved and tagged	1	C8777-01/18-CGA	Fives North American Combustion
2" butterfly valve	1	1122-4	Fives North American Combustion
Gauge, 0 - 60" wc and 0 - 35 osi	2	8735-HI	Fives North American Combustion
8" wafer valve	1	1156-9	Fives North American Combustion
Control motor, 310 IN/LBS, 37 second timing, 4-20 ma, no feedback signal, 1000 ohm potentiometer, 135 degree travel, 110-120VAC	1	1615-F	Fives North American Combustion
Bracket and Linkage for 1615-A through N, for 1136, 1146, and 1156-9 through -22	1	2-9004-205	Fives North American Combustion
Pressure switch, 12 - 60" wc	1	8757-GAO-A4/4/6	Fives North American Combustion
DIF. PRES. SW 1-20"W.C.AUTO.RST	1	C8757-DG50T-DIF	Fives North American Combustion
1/2" ball valve	4	C1821-01	Fives North American Combustion
1/4" ball valve	5	C1821-03	Fives North American Combustion
Pressure gauge, 2-1/2"; 0-60 psi/400 kPa, dual scale; liquid filled 1/4" bottom; SS case;	2	C8735-M-LF	Fives North American Combustion
1/2" pressure regulator	1	7142-01-25	Fives North American Combustion
1/2" relief valve	1	7177-01-75	Fives North American Combustion



## ECO 1.75TN 1PV100L Parts List

Pressure switch #B424B range=0-100 psi	2	C8757-B424B-100 Fives North American Combustion
1/2" oil solenoid valve, NEMA 3R	1	1483-01 Fives North American Combustion
1/2" automatic reset oil shutoff valve 120/1/60	1	1517-01 Fives North American Combustion
1/4" Oil flow meter nickel-plated brass housing Buna o-ring 0.2-0.9 GPM SS orifice and spring vertical flow up	1	8598B-03-0.9-VU Fives North American Combustion
1/2" ratiotrol with gauges	1	7052-01-WG Fives North American Combustion
1/2" expansion chamber	1	C7000-0-HSR Fives North American Combustion
3/4" regulator	2	C1485-01 Fives North American Combustion
Combustion Blower -Chicago Blower	1	D53 E4 Canada Blower
Burner control	1	RM7895C1012 Yorkland Controls Limited
1" three way valve	1	4093T25 McMaster-Carr
1/2" three way valve	1	4093T23 McMaster-Carr
Used Oil Pump	1	03HB1131 code10/13 Albany Pump Company Ltd.
Basket suction strainer with 60 mesh	1	SBS-100 Albany Pump Company Ltd.
Ball Valve, 1" NPT, cUL Listed	1	BAVA-100 Albany Pump Company Ltd.
Relief Valve c/w WS spring (30-100 PSI)	1	FVJ-3R-SS Albany Pump Company Ltd.
Pressure gauge, 4" Dial; liquid filled, 100 PSI	1	PG100LF-100 Albany Pump Company Ltd.
Compound Gauge;4" Dial; liquid filled; 30-0-30 PSI	1	CG100LF-30/30 Albany Pump Company Ltd.
Watson McDaniel size 3/4" Series 'B' pressure reducing valve	1	with Viton disc and diaphragm. 1-50 psig Albany Pump Company Ltd.
Waste Oil circulation heater with controller 600v. 3ph, 4687watts	1	CBLS747E13S Hassco Industries Inc.
Transfer Pump	1	FR450B National Energy Equipment Inc.
Oil Filter	1	VF1210 National Energy Equipment Inc.
5 micron pleated paper filter	2	KPP21005B National Energy Equipment Inc.
Waste oil Tank 5000L	1	CUSTOMTANK Hassco Industries Inc.
Level Switch	1	FS301SF-1 45"NC for 60 dia. tank Ktech Industrial Products Inc.
Mixer	2	NP HGL-3.3 Metex Corporations
Waste oil totes IBC containment	2	H4435 ULINE CANADA CORPORATION
Waste oil totes IBC	2	H-3886 ULINE CANADA CORPORATION
Salt and/or sand box spillage kit	2	S18304 ULINE CANADA CORPORATION
<b>Top Loading Package</b>	<b>Quantity</b>	<b>Part # Supplier</b>
Lid lifter HT 3500 Stoke 72"	1	9-LL-3500-72-BE-575 Canada Hydraulique Equipment Inc.
Lid Lifting Link Assembly	4	ECO5TN2PV-06-XX P.D.S. WELDING LTD
Jaw Only 3/4" - 10 Right Hand Thread 12" max adj	4	3001T23 McMaster-Carr
18-8 Stainless Steel Clevis Pin, 3/4" Dia 2" L	4	92390A521 McMaster-Carr
<b>Opacity Monitor</b>	<b>Quantity</b>	<b>Part # Supplier</b>
Compliance Opacity Monitoring System (EPA PS-1)	1	PN 80-0290 Akrologica
Includes:		
Transceiver / Reflector		
Stack Mounting Flanges		
Local Control Panel		
1hp Air Purge Assembly		



## ECO 1.75TN 1PV100L Parts List

-60C Air Purge Hose (2 pcs @ 20')	1	PN 80-3411 (Upgrade) Akrulogic
Opacity Optic Head Extension Control Cable	1	PN 80-0297 Akrulogic
<b>Scale</b>	<b>Quantity</b>	<b>Part # Supplier</b>
4 x 4 Scale w/ digital indicator, analog output and weather gland	1	Matrix Scale Service Inc.
<b>Electrical</b>	<b>Quantity</b>	<b>Part # Supplier</b>
IEC 60 amp 600 volt rotary disconnect	1	GS2GU3N Graybar
Disconnect operating handle	1	GS2AH420 Graybar
Operating shaft	1	GS2AE81 Graybar
175 amp power distribution block	1	PDB220-3 Graybar
175 amp power distribution block cover	1	CPB162-1 Graybar
Ground lug	1	LAMA2/0-14-QY Graybar
600 volt 30 amp 3 pole class J fuse block	11	JT60030 Graybar
250 volt 30 amp 1 pole class RK1 fuse block	11	H25030-1CR Graybar
600 volt 60 amp class J fuse	3	LPJ-60SP Graybar
600 volt 17 amp class J fuse	3	LPJ-17SP Graybar
600 volt 10 amp class J fuse	3	LPJ-10SP Graybar
600 volt 7 amp class J fuse	8	LPJ-7SP Graybar
600 volt 4 amp class J fuse	9	LPJ-4SP Graybar
250 volt 30 amp class RK1 fuse	1	LPNRK-30SP Graybar
250 volt 10 amp class RK1 fuse	1	LPNRK-10SP Graybar
250 volt 6 amp class RK1 fuse	1	LPNRK-6SP Graybar
250 volt 5 amp class RK1 fuse	2	LPNRK-5SP Graybar
250 volt 2 amp class RK1 fuse	2	LPNRK-2SP Graybar
250 volt 1 amp class RK1 fuse	4	LPNRK-1SP Graybar
12 amp IEC contactor 120 VAC coil	1	LC1D12G7 Graybar
9 amp IEC contactor 120 VAC coil	6	LC1D9F7 Graybar
4 N.O. top mount auxiliary contact	1	LADN40 Graybar
IEC solid state overload relay range 6.4- 32 a	1	LR9D32 Graybar
IEC solid state overload relay range 1.6-8 a	2	LR9D08 Graybar
IEC solid state overload relay range 0.2- 2 a	2	LR9D02 Graybar
16 amp SPDT slim line relay 120 VAC coil	10	RXG15F7 Graybar
Base slim line relay	10	RGZE1S35M Graybar
8 PIN tube based relay 120VAC coil	10	RUMC23F7 Graybar
DPDT 8 PIN tube based relay base	10	RUZC2M Graybar
600 to 120 VAC 3000 VA transformer	1	CE3000JA Graybar
24 VDC 1.3 amp switching power supply	1	PS5R-SC24 SnS
5 port unmanaged ethernet switch US\$99	1	SE-SW5U Automation Direct
Current transducer US\$75.5	1	ACT050-42L-F Automation Direct
10.4" TFT touch panel with Intouch run time	1	TCND1U-10AC-CM2 Wonderware Canada East
600 volt 3 H.P. V.F.D.	1	ACS25-03U-04A1-6 Gerrie
480 volt 8 amp line reactor	1	3PR-004C5H Graybar
0-1" H2O draft transmitter	1	616KD-00 Furneco
Ethernet PLC programing port	1	P-R2-F3R0 Gerrie



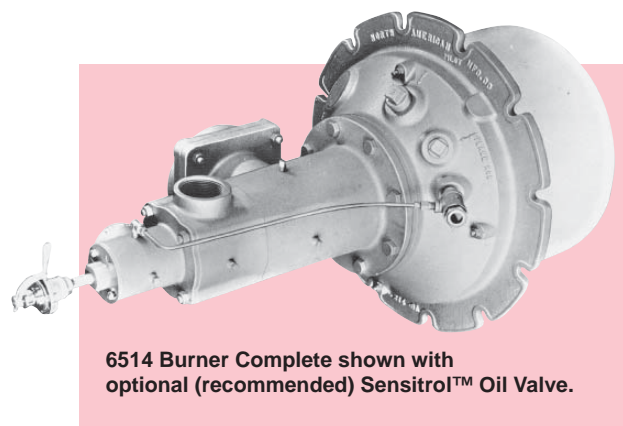
## ECO 1.75TN 1PV100L Parts List

22mm Green illuminated push button operator	2	ZB5AW333 Graybar
22mm Emergency stop push button operator	1	ZB5AS844 Graybar
22mm 3 position return to center selector switch	1	ZB5AD5 Graybar
22mm Green flush push button operator	2	ZB5AA34 Graybar
22mm Black flush push button operator	2	ZB5AA24 Graybar
22mm Red extended push button operator	2	ZB5AL4 Graybar
Green integrated led module	2	ZBVG3 Graybar
N.O. contact block	5	ZBE101 Graybar
N.C. contact block	3	ZBE102 Graybar
Limit switch	4	802T-AP Gerrie
Limit switch lever	4	802T-W2B Gerrie
18 mm AC inductive proximity switch US\$31	2	VK1-AO-1B Automation Direct
Pt100 RTD for cold junction compensation	1	TFD Omega
Unity CPU cw 1 Enet port and 1 serial port	1	BMXP342020 Graybar Canada Inc.
8 Slot Backplane	1	BMXXBP0800 Graybar Canada Inc.
110Vac Power supply	1	BMXCPS2000 Graybar Canada Inc.
16 point 120 vac input module	2	BMXDAI1604 Graybar Canada Inc.
8 channel analog input module	1	BMXAMI0810 Graybar Canada Inc.
4 channel thermocouple input module	1	BMXART0414 Graybar Canada Inc.
16 point relay output module	1	BMXDRA1605 Graybar Canada Inc.
4 Channel analog output module	1	BMXAMO0410 Graybar Canada Inc.
Connectors for all modules except AMI0810 and ART0814	4	BMXFTB2000 Graybar Canada Inc.
Connector for AMI080	1	BMXFTB2800 Graybar Canada Inc.
Connector	1	BMXFCW301S Graybar Canada Inc.
IEC solid state overload relay range 0.2- 2 a	1	LR9D02 Graybar
1hp VFD ABB	1	ACS250-03U-02A1-6 Gerrie
1hp line reactor	1	REX3PR0002C5H Graybar Canada Inc.
Type K Thermocouple 20AWG	300	K-20S-TT Thermo-Kinetics Company Ltd.

**APPENDIX B • TECHNICAL SPECIFICATIONS OF WASTE OIL BURNER**

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- Dual Fuel Burner – gas or oil (light or heavy grade oil)
- Conventional forward flame pattern
- 1.8 to 30 million Btu/hr
- Chambers up to 2400F (with alloy nose)
- Includes low pressure fuel oil atomizer



6514 Burner Complete shown with optional (recommended) Sensitrol™ Oil Valve.

6514 FIRE•ALL Dual-Fuel Burners are nozzle mix, sealed-in burners for gas, light oil, or heavy oil. Capable of efficient operation throughout a wide temperature range, these burners are equally at home on low temperature ovens and high temperature forge and melting furnaces.

Ruggedly built for sustained, maintenance-free operation, 6514 Burners also provide for quick change of fuels without disturbing process operations.

Sealed mountings help maintain furnace pressure, controlled atmosphere, and closer air/fuel ratio control—all contributing to better product quality.

Fire•All Burners are a proven workhorse on all types of furnaces.

#### COMBUSTION CHARACTERISTICS

**Oil.** Oil viscosity at the burners must not exceed 100 SSU. Oil pressure at air/fuel Ratiotrol™ should be between 25 and 30 psi. Oil pressure at rated capacity is 10 to 15psi at Sensitrol™ and less than 1 psi at burner. Minimum atomizing air pressure at the burners is 14 osi for light oil, 22 osi for heavy oil.

**Gas.** Atomizing air (4 osi minimum) should be left on to protect the atomizer. Maximum required natural gas pressure at the burner for stoichiometric ratio is less than 4osi.

**Air/Fuel Ratio.** 6514 Dual-Fuel Burners are stable throughout a wide range from excess fuel to excess air. They can operate with excess fuel without forming carbon, but additional air for complete combustion must be available in the furnace near the burner.

For limits in a specific case, either rich or lean, consult Fives North American.

**Turndown.** Fire•All Burners can be turned down to atomizing air only (with fuel to match) except when burning residual oils in a cold, tight furnace.

#### Total air capacities (including main and atomizing air)

Burner designation	16 osi air pressure drop across the burner				24 osi air pressure drop across the burner				Approx. flame lengths with 16 osi main air (in open furnace)
	Air <sup>①</sup> scfh	Light oil <sup>②</sup> gph	Heavy oil <sup>③</sup> gph	Gas <sup>④</sup> scfh	Air scfh	Light oil gph	Heavy oil gph	Gas scfh	
6514-6	17 900	13	12	1 790	21 900	16	15	2 190	4' - 5'
6514-7	28 400	21	19	2 840	34 800	26	23	3 480	5' - 6'
6514-8-A	48 900	36	33	4 890	60 000	44	40	6 000	8' - 9'
6514-8-B	81 500	60	54	8 150	100 000	74	67	10 000	9' - 12'
6514-9	165 000	122	110	16 500	202 000	150	135	20 200	15' - 18'
6514-10	247 000	183	165	24 700	303 000	224	202	30 300	20'

① For Btu/hr, multiply by 100

② Light oil at 135 000 Btu/gal.

③ Heavy oil at 150 000 Btu/gal.

④ Natural gas at 1000 Btu/cf.

Burner designation	Main air capacities in scfh						Atomizing air capacities in scfh					
	Air pressure drop across the burner in osi						Air pressure drop across the burner in osi					
	1	5	6	8	12	16	14	16	18	20	22	24
6514-6	3 710	8 300	9 100	10 500	12 900	14 900	2 800	3 000	3 180	3 360	3 510	3 660
6514-7	6 100	13 600	15 000	17 200	21 000	24 400	3 770	4 030	4 270	4 500	4 720	4 900
6514-8-A	10 600	23 700	26 000	30 000	36 700	42 400	6 050	6 500	7 000	7 300	7 600	7 850
6514-8-B	17 600	39 200	43 000	49 600	60 500	70 000	10 600	11 300	12 000	12 700	13 200	13 800
6514-9	36 600	82 000	89 500	104 000	127 000	146 000	17 200	18 400	19 600	20 700	21 600	22 500
6514-10	54 500	122 000	135 000	154 000	189 000	218 000	27 200	29 100	30 900	32 600	34 100	35 500

**Flame Supervision.** An ultraviolet cell† will monitor pilot or main flame on gas or oil. For maximum safety, Fives North American urges **interrupted** pilots when flame safeguards are used--pilots should be on only for a preset ignition period (usually 15 seconds), after which flame supervision detects main fire only. Adapters for mounting flame detection devices on 6514 Burners are tabulated on Bulletin 8832.

**Tile/Installation.** Burner tiles are cast refractory rated for 2800F furnace temperature. They should be supported securely in the furnace wall by castable refractory (not insulation) at least 9" thick all around the tile, extending back to the furnace shell and securely anchored to it. (See Supplement DF-M1.)

Tiles are replaceable in the field except for the 6514-10, whose mounting must be returned to the factory for tile replacement (or purchase a spare mounting plate with a tile cast onto it).

**Complete burners include** tile, mounting plate, and an observation port into which a small quantity of atomizing air is introduced to keep the glass clear. Order pilot tips and Sensitrol™ Oil Valve separately. See 6514 Dimension Sheet for recommended Sensitrol™ oil valve and premix pilot tip.

**Jacketed Tile** options are available for applications where the tile is not supported by furnace refractory. Jackets are available in three different metals and have maximum temperature ratings for each. They must be protected with sufficient insulation so as not to exceed rated temperature. The maximum temperature rating depends upon frequency of heat-up/cool-down cycles. As an example, batch annealing furnaces that are heated and cooled every day should use the "intermittent exposure" ratings. Continuous annealing furnaces that remain at the same temperature for months at a time, can use the higher "continuous" rating.

Designation	Jacket Metal	Continuous max.temp.	Intermittent exposure
6514- -LC	carbon steel	700 F	700 F
6514- -L4	304 stainless	1600 F	1500 F
6514- -L9	309 stainless	1900 F	1800 F

† Cleaning air must be introduced into the port downstream of the sensor to keep oil and poc's off the lens.

#### CLEARANCE DIMENSIONS (for details, see Dimensions 6514)

Burner designation	dimensions in inches									Wt. lbs.
	A†	B	C	D	E	F	G	H	I	
6514-6	3	2	1½	¾	18¾	9	15	10¾	19½	195
6514-7-	4	2½	2	¾	20⅜	8⅞	16	11¾	20½	225
6514-8-A	6	2½	2½	¾	27⅞	10	17¾	12¾	22¾	335
6514-8-B	6	3	3	¾	31¼	12⅞	19	13½	24	450
6514-9	8	4	4	½	38⅞	13⅞	23	16	28	795
6514-10	10	6	6	½	45⅞	13⅞	27½	20½	32½	1035

† SW connection standard for -9 and -10 only.

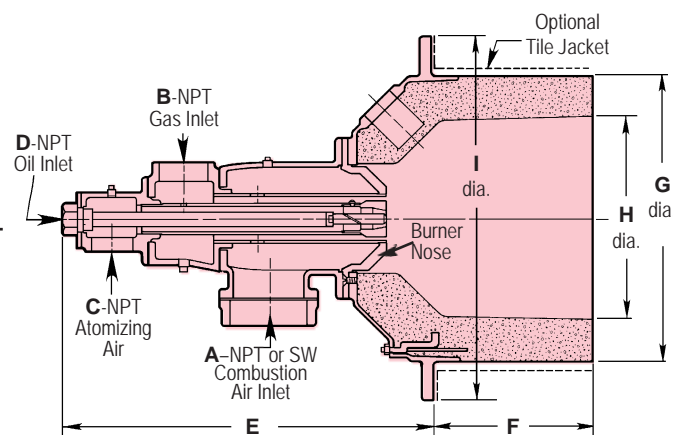
**Burner Nose** options are available for sizes shown below and can be specified in the product number. The burner nose establishes main combustion air flow and influences flame propagation. Nose material is either cast iron that is suitable for cold air applications up to 1800F, or cast stainless alloy for preheated air (maximum 700F) applications up to 2400F.

Mat'l	Cap'y	-6	-7	-8A	-8B	-9	-10
Cast iron	1.0	√	√	√	√	√	√
Cast Alloy	1.0	√	√	√	√	√	√
Cast iron	1.1		√	√	√	√	√
Cast Alloy	1.1		√	√	√	√	√
Cast iron	1.2			√	√	√	√
Cast Alloy	1.2			√	√	√	√
Cast iron	1.3			√	√	√	√
Cast Alloy	1.3			√	√	√	√

The product designation 1.0 represents standard main air capacity shown on page 1. Use of an extra capacity burner nose will result in either more air at 16 psi or standard air flow at lower pressure. Extending the capacity of the burner by increasing air pressure beyond 16 psi, or using the extra capacity nose, is acceptable for most gas and light oil applications. Specific applications involving either low Btu fuels or heavy oil and extra capacity should be reviewed with Fives North American.

Also, when firing extra capacity, the combustion air flow velocity within the supply piping, and associated pressure loss, can be excessive for some burners. The -8B, -9 and -10 products when operated at 1.2 or 1.3 capacity will develop high pipe velocity based on the burner's air connection size. As an alternative to increasing blower pressure, an oversized air inlet can be purchased separately for these size burners. The connections are SW-type (slip-on sleeve or welded construction) and are one pipe size larger than the standard supply. Nose and oversize air connection part numbers can be found in supplement literature (see Parts List and Burner Options documents).

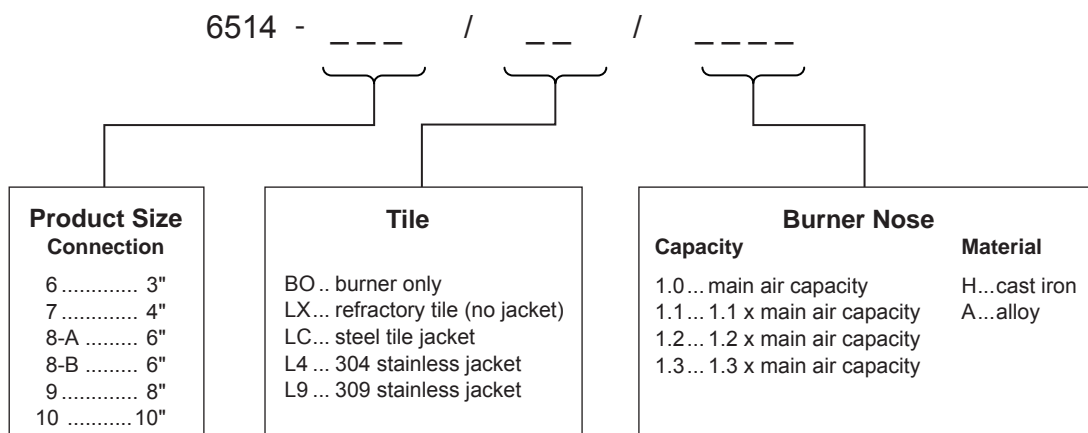
**Options** are available for the 6514 burner but require consultation with your Fives North American for application and ordering information. See Sheet 6514-3 for an overview of burner options.



DIMENSIONS SHOWN ARE SUBJECT TO CHANGE. PLEASE OBTAIN CERTIFIED PRINTS FROM FIVES NORTH AMERICAN COMBUSTION, INC.  
IF SPACE LIMITATIONS OR OTHER CONSIDERATIONS MAKE EXACT DIMENSION(S) CRITICAL.



## Ordering Information



Example 1 6514-8-A/LC/1.2A Fireall gas burner complete with carbon steel jacketed tile and 1.2 capacity alloy nose

Example 2 6514-6/BO/1.0H Fireall gas burner only with standard capacity iron nose

Example 3 6514-9/LX/1.2H Fireall gas burner complete with refractory tile and 1.2 capacity iron nose

*Note: See Supplement 6514-6 for cross referencing old product numbers.*

**WARNING:** Situations dangerous to personnel and property may exist with the operation and maintenance of any combustion equipment. The presence of fuels, oxidants, hot and cold combustion products, hot surfaces, electrical power in control and ignition circuits, etc., are inherent with any combustion application. Parts of this product may exceed 160F in operation and present a contact hazard. Fives North American Combustion, Inc. urges compliance with National Safety Standards and insurance Underwriters recommendations, and care in operation.

Fives North American Combustion, Inc. - 4455 East 71st Street - Cleveland, OH 44105 USA - Phone 216.271.6000  
Fax 216.641.7852 - email: [fna.sales@fivesgroup.com](mailto:fna.sales@fivesgroup.com) - [www.fivesgroup.com/fivesna](http://www.fivesgroup.com/fivesna)

**APPENDIX C • REGISTRATION FORM FROM THE NUNAVUT DEPARTMENT OF ENVIRONMENT: USED OIL AND WASTE FUEL APPLIANCE**

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## REGISTRATION FORM: USED OIL AND WASTE FUEL APPLIANCE

A copy of the Used Oil and Waste Fuel Appliance registration form and user's guide is available by contacting the Nunavut Department of Environment or by downloading the documents at <http://env.gov.nu.ca/programareas/environmentprotection>. Although registration is voluntary, it enables Nunavut's Department of Environment to better manage used oil and waste fuel by maintaining an up-to-date inventory of certified appliances operating in Nunavut.

### Instructions

1. The following information must be provided in order to register a used oil or waste fuel appliance and obtain a registration number. Incomplete applications will be returned to the applicant.
2. Completed registration forms are to be forwarded to the Environmental Protection Division, Department of Environment, Government of Nunavut, Box 1000, Station 1360, Iqaluit, Nunavut, X0A 0H0. Electronic registration forms are preferred and may be forwarded to [EnvironmentalProtection@gov.nu.ca](mailto:EnvironmentalProtection@gov.nu.ca).
3. Use additional pages to provide information as required.
4. Applicants should refer to the accompanying user's guide for further assistance on completing the generator registration form.
5. There is no fee for registering a used oil or waste fuel appliance with the Department of Environment.

### Section 1 - Identification

Applicant (Legal Name) Agnico Eagles Mines Limited- Meliadine Project  
 Mailing Address Suite 879- Rankin Inlet, Nunavut, Canada  
 \_\_\_\_\_ Postal Code X0C 0G0  
 Principle Contact Person Martin Theriault Title Compliance counselor  
 Phone 1-819-759-3555; EX: 4608171 Email martin.theriault@agnicoeagle.com

### Section 2 – Description of Operation

General Type of Business Mining Industry  
 Site Location(s) Where the Waste is Generated Meliadine project, Rankin Inlet- Incinerator area  
 \_\_\_\_\_  
 \_\_\_\_\_  
 Make, Model and Size of the Appliance 5000L waste oil tank- Hassco- 5000L DW S601  
Waste Oil tank level switch- Ketch industrail FS301-01: Mixer- NP HGL 3.3

### Section 4 - Certification

*I certify that the information provided on this form is correct, accurate and complete.*

Signature of Contact Person \_\_\_\_\_ Date (dd/mm/yy) 2019-01- 16  
 Print Name of Contact Person Martin Theriault Title Compliance counselor  
 Phone 1-819-759-3555; EX: 4608171 Email martin.theriault@agnicoeagle.com

#### For Department Use Only

Appliance Registration Number NUA# \_\_\_\_\_ Approved by \_\_\_\_\_ Date \_\_\_\_\_