2.4.3 Waste Materials Suitable for Processing

Waste Materials Suitable for Processing in the EWS Mobile Incinerator

The following table is a generic description of waste materials that can be processed effectively using this equipment.

Solid Waste	Description	Origin
Food Waste	Food, food packaging and containers, plastic and paper waste from food preparation	Kitchen and dining areas
Domestic waste	General refuse such as paper, plastics, cans, bottles, cardboard, newsprint	Dormitory areas, recreation facilities, office areas, warehouse, plant and production facilities
Packaging	Cardboard boxes, paper, plastic containers, plastic film, styrofoam, poly-weave bags	Inbound supplies to all work areas
Wood waste	Skids, pallets, crates	Construction activity, inbound supplies
Absorbents	Rags, wipes, spill cleanup materials	From all work areas
Filters – Air and Fluid	Filters coated with fine particles and trapped solids, saturated with water or fluids (glycol, lube oils, fuel)	From water treatment facility, or generated at point of maintenance of vehicles, machinery and equipment
Clinical Waste	Bandages, dressings, gloves, swabs, syringes, sharps	Medical clinic or first aid centre
Tires & Rubbers	Tires (only 1 at a time), belts, hoses	From vehicles and equipment maintenance shop
Semi-solid Waste	Description	Origin
Kitchen grease, oils	Solid kitchen fats, grease, used cooking oil in small pails (maximum volume 10 litres per burn)	Kitchen grease traps, fryers

2.4.4 Waste Materials NOT Suitable for Processing

Unacceptable Waste Materials

Waste Type	Examples
Bulky Materials	Automotive or heavy equipment parts such as engine blocks and transmissions
Non-Combustible Materials	Drywall, asbestos, bricks, concrete, soils
Radioactive Materials	Smoke detectors, laboratory wastes
Potentially Explosive Materials	Pressurized vessels including, but not limited to propane tanks, aerosol cans (deodorant, shaving, cleaning, etc) and the like. Actual explosives.
High Alkaline or High Acid Materials	By-products of industrial processes, unrefined fuels.
Solvents	Solvents such as acetone, xylene, methanol

NOTE

All materials of these types are strictly forbidden from processing. It is very important that all materials in these categories are diverted away from the incinerator in-feed. The examples provided are not an exhaustive list of all possible forms of these waste types.

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.

2.5 REGULATORY COMPLIANCE

2.5.1 Environmental Regulatory Compliance

The Mobile Incinerator Package is required to operate with air emissions that comply with the regulations as set out by the CCME Canada Wide Standard for Dioxin and Furans.

EWS guarantees compliance of the **EWS Mobile Incinerator** with the stated limits in the CCME Canada Wide Standard for Dioxin and Furans, subject to the conditions outlined below (see Performance Criteria Conditions).

3.0 ASSEMBLY & INSTALLATION INSTRUCTIONS

3.1 GENERAL ASSEMBLY & INSTALLATION INFORMATION

The **EWS Mobile Incinerator** is largely assembled with interconnections and external components to be mounted as required.

3.1.1 Customer Responsibility

3.1.1.1 Provide all foundation work of concrete blocks for the ends of the containers and packed gravel under the frame and tanks

NOTE

a. **Fuel tanks should be out of the way and protected using bollards against accidental impact of mobile equipment (e.g. trucks, etc.)**

b. Foundation requirements between pads to be determined by customer

c. Specific locations to be determined by customer and site restrictions

3.1.1.2 Install I-beams, spacers and equipment using a crane, forklift, come-alongs, hydraulic jacks/hand-pumps, etc.

3.1.1.3 Provide all utility services including connections to the equipment including fuel, electrical, water, air, etc. using basic hand tools.

3.1.1.4 Provide all external thermal insulation and heat tracing when required on incoming and outgoing utilities.

3.1.1.5 Provide proper protection of all equipment from accidental damage or vandalism (bollards, exterior lighting, etc).

3.1.1.6 Perform any touch up painting and cleanup of equipment after assembly.

3.1.1.7 Locate the fuel tank at the specified distances to ensure maximum positive supply pressure on the suction side.

3.1.1.8 Obtain any and all construction, operating and environmental permits and other approvals as may be required in the area of jurisdiction where the equipment is being deployed and operated. EWS will assist in supplying technical information required for these permits to the customer as it relates to EWS equipment.

3.1.1.9 Maintain ample space around all equipment for maintenance, cleaning and safety considerations. A suggested provision would be to provide a minimum of 1.83 meters from all major equipment surfaces and edges. Always allow proper space for the swing radius of the chamber doors including vehicular traffic.

NOTE

Do not scale drawings: If certain dimensions are required which are not shown on drawings, EWS should be contacted for the required dimension. 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, assembly and/or erection, unless so indicated.

Please note that some of the diagrams and/or photos in this MANUAL are conceptual in nature and may not be exact representations of the equipment purchased.

3.1.2 Preparation Prior to Assembly & Installation

3.1.2.1 Electrical & Fuel Availability

The electrical supply must be the Canadian supply of 600 V 60 Hz, 3 phases. There is one main electrical hook-up opening 2" located on the side of the Controls Container. All electrical connections are distributed from the Controls Container to the Primary Chamber Container and the Secondary Chamber Container.

DO NOT CONNECT THE EXTERNAL POWER SUPPLY TO THE EWS MOBILE INCINERATOR UNTIL ALL INTERNAL ELECTRICAL CONNECTIONS ARE COMPLETE AND THE SYSTEM IS COMPLETELY ASSEMBLED.

The fuel supply connections are located on the Primary Chamber Container and connect the fuel supply to the fuel tank located externally. There are fuel lines between the containers for fuel distribution which are to be connected before the external hook-ups and connections are made.

DO NOT CONNECT THE EXTERNAL FUEL SUPPLY TO THE EWS MOBILE INCINERATOR UNTIL ALL INTERNAL FUEL CONNECTIONS ARE COMPLETE AND THE SYSTEM IS COMPLETELY ASSEMBLED.

3.1.3 Assembly & Installation Overview

3.1.3.1 Specialized Tools and Equipment for Assembly and Installation

The complete assembly of the **EWS Mobile Incinerator** will require 2-3 full time personnel for 2 days. The following list identifies the tools and equipment required to be supplied by the customer in order to proceed with the assembly:

a. Crane
b. Forklift
c. Boom Lift, Scissor Lift and/or Scaffolding
d. Steel Shims
e. Ladder (12')
f. Come-along
g. Hydraulic Jack/pump
h. Level
i. Erection Wrench / Alignment bar
j. Container Clamp 2"-Wrench

k. Sling
l. I-beam Clamp

The following list identifies the consumable items to proceed with the assembly:

a. Anti-Seize Compound (Generic Graphite-Based Anti-Seize Compound)
b. Gasket Spray-on Adhesive (Generic Spray-On Contact Cement)

3.1.3.2 Assembly Overview

The following general steps are the order in which the **EWS Mobile Incinerator** Package needs to be installed. Each step is detailed in the subsequent section.

ORDER OF ASSEMBLY (and detailed in Section 3.1.4)

1) I-Beam & Spacer Base Structure (Base Frame Structure)
2) Connections Between Primary and Secondary Chamber Containers
3) T-Stack Section on Secondary Chamber Container
4) Stacks and opacity monitor
5) Internal Component Connections
6) Internal Connections
7) External Connections

NOTE

Important Notes to Consider Prior to and During Assembly

a. Lifting lugs are provided on the stacks, and major accessories, and should be used in setting these units into position.

b. Do not allow lifting chains or cables to put loads on piping, or mounting flanges as they may be damaged.

c. Avoid dragging lifting gear across painted surfaces.

d. When placing the system into position, be careful not to subject the refractory to mechanical shock, which may result in refractory damage.

3.1.4 Assembly Instructions

3.1.4.1 I-BEAM & SPACER BASE STRUCTURE (Base Frame Structure)

NOTE

For <u>all</u> fasteners used in assembly use regular-grade anti-seize spray to ensure that fasteners will be easily removed when disassembly is required.

NOTE

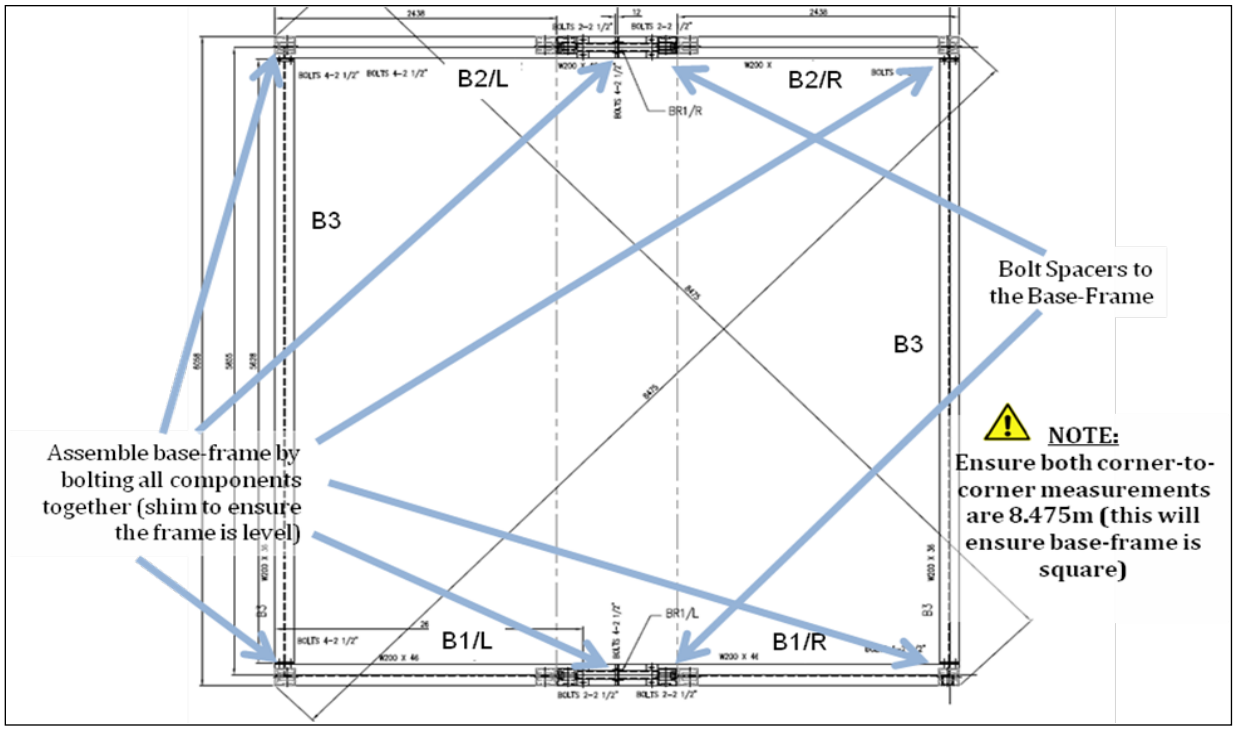
Do not fully torque bolts during initial assembly.

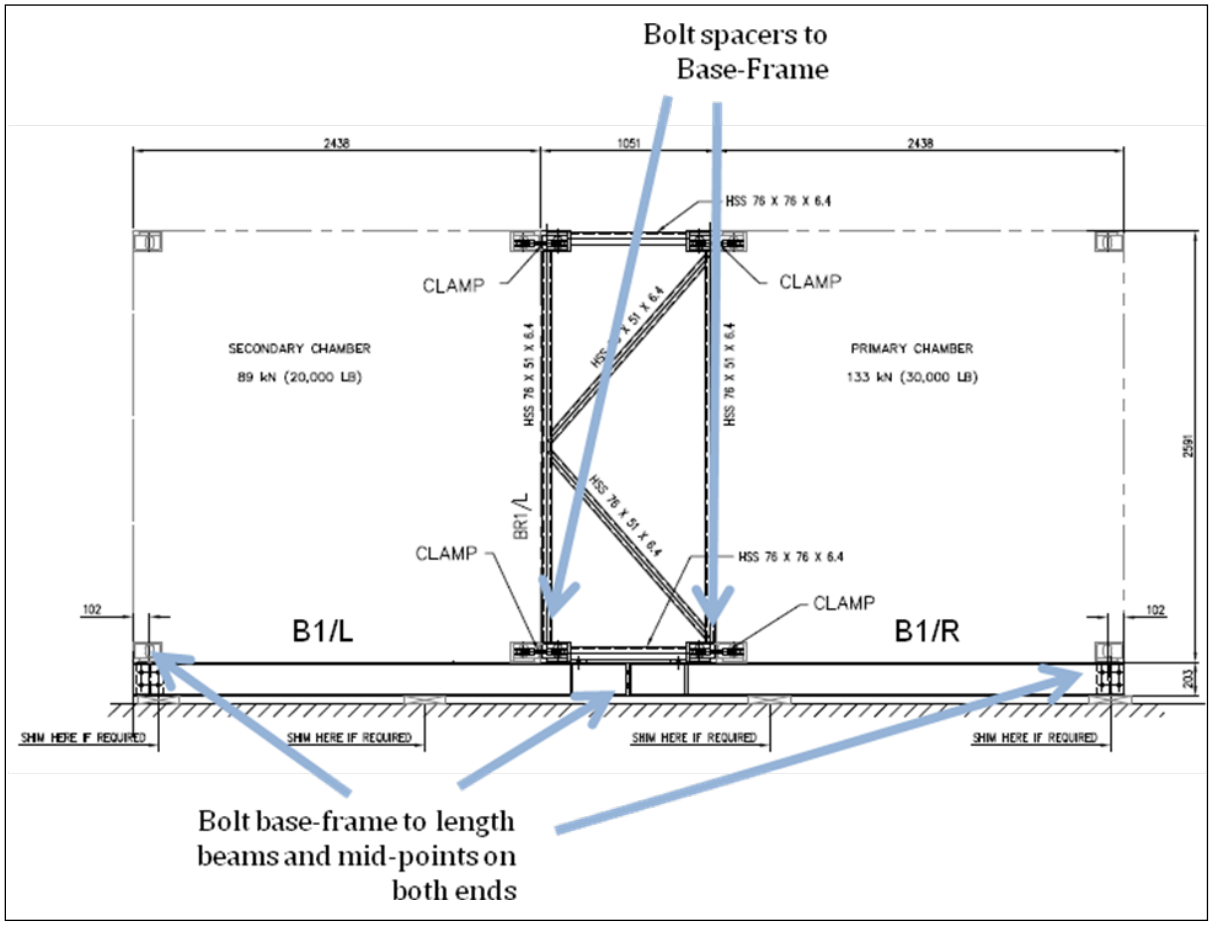
<u>Correct Clamp Installation</u>

When installing the clamps, install in such a manner that the installer pulls back on the

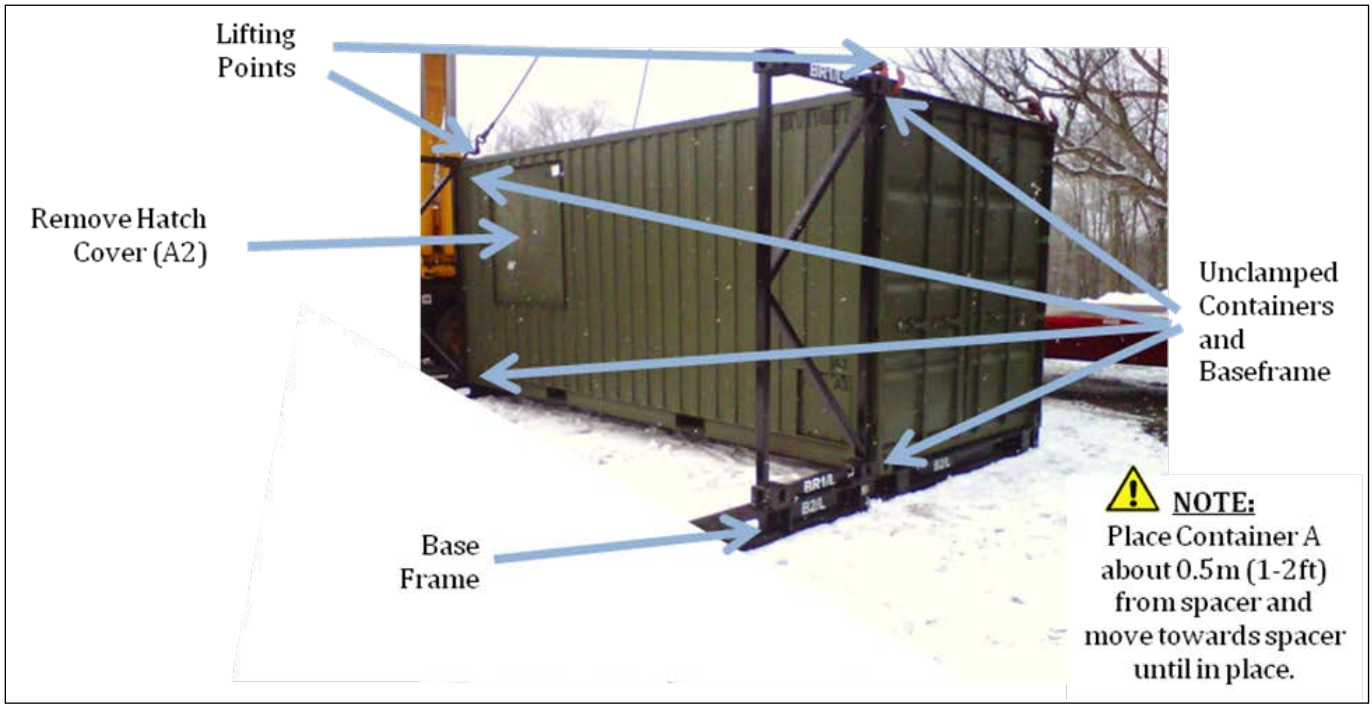
wrench when tightening the clamp. From the installer's perspective, the smaller nut would then be located on the right of the large nut. If it is installed the other way, or during removal, a lift-truck or other lifting device will need to be employed for safety reasons.

Failure to follow the above instructions poses a safety hazard to an installer situated on top of the Primary Container as they would need to push forward to tighten or loosen the clamp.



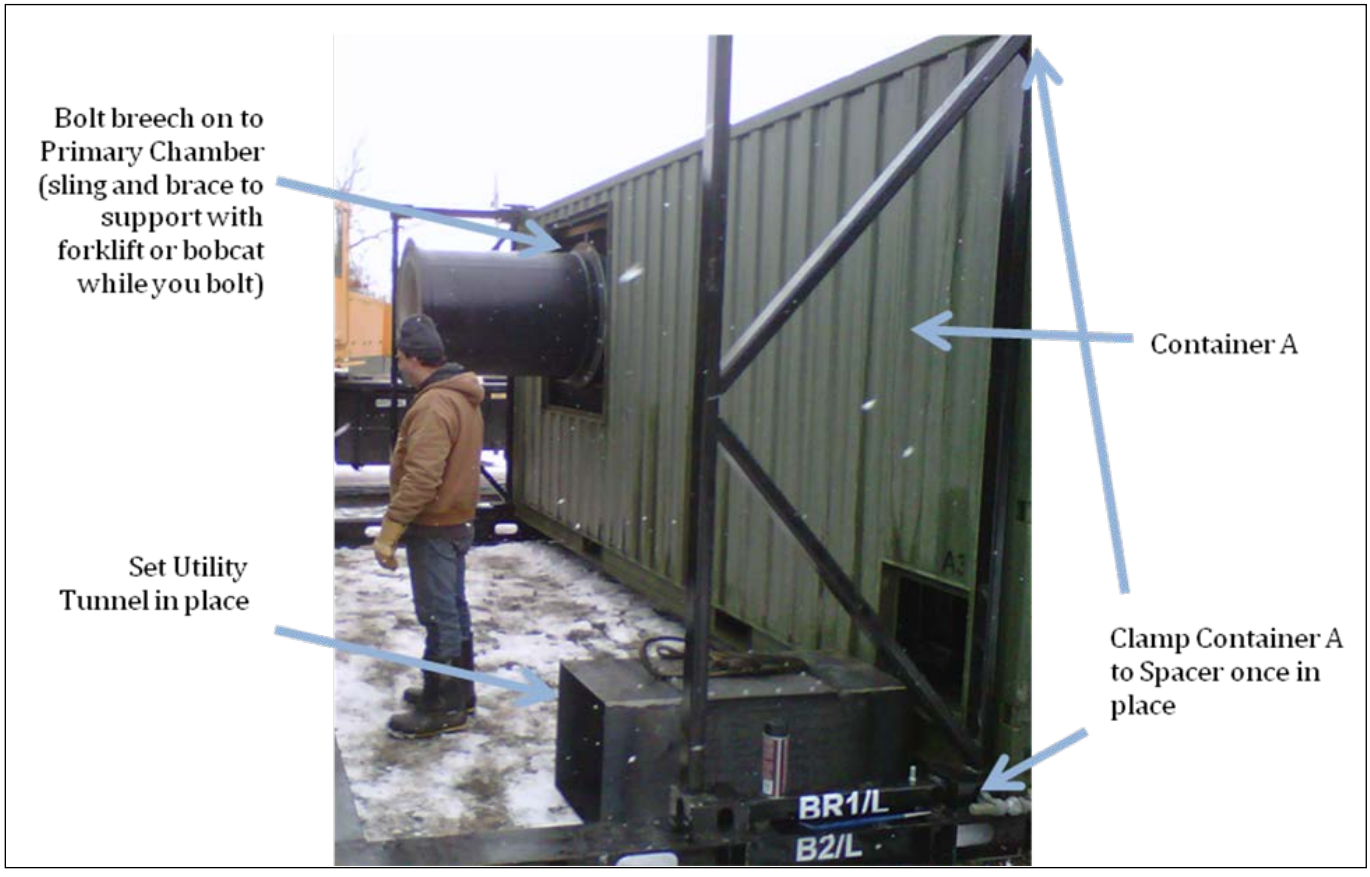


3.1.4.2 CONNECTIONS BETWEEN PRIMARY AND SECONDARY CHAMBER CONTAINERS



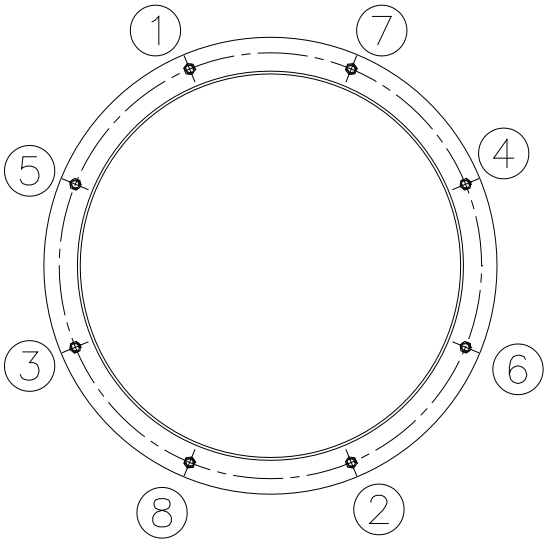
Gasket adhesive spray being applied

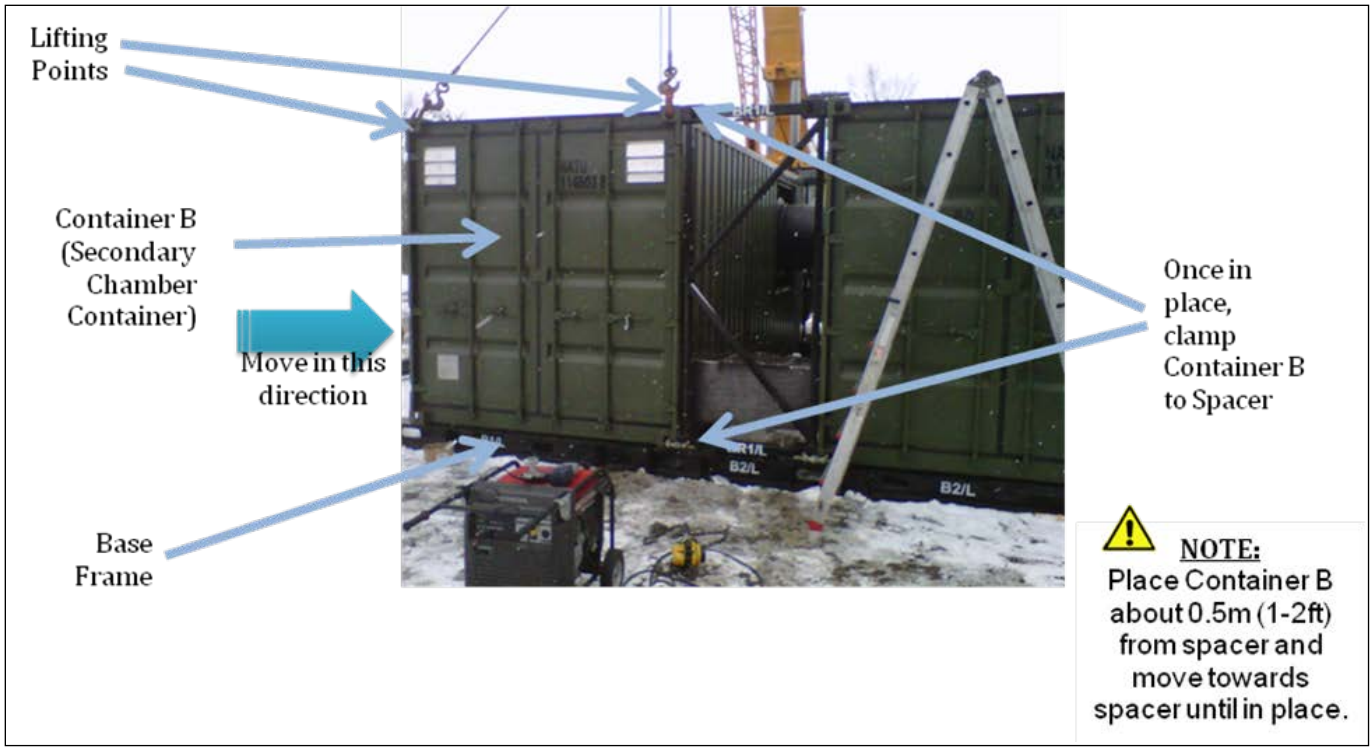
Correctly Installed Gasket

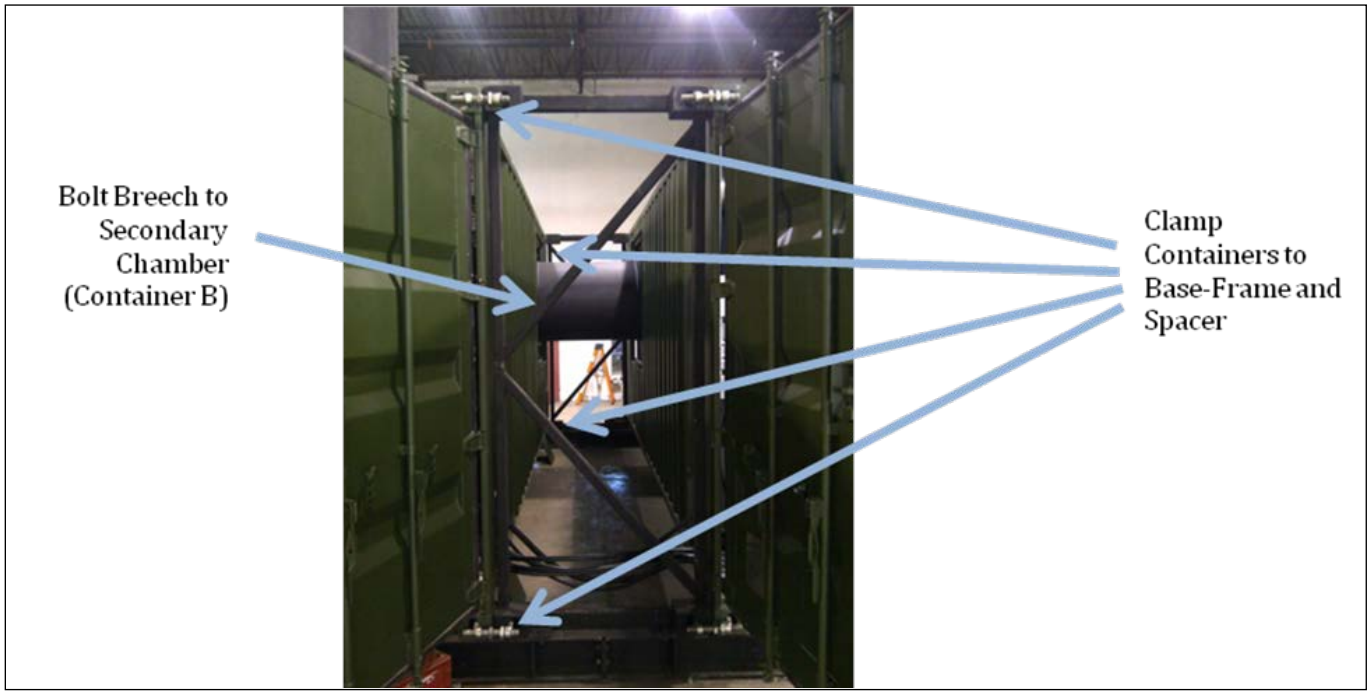


NOTE

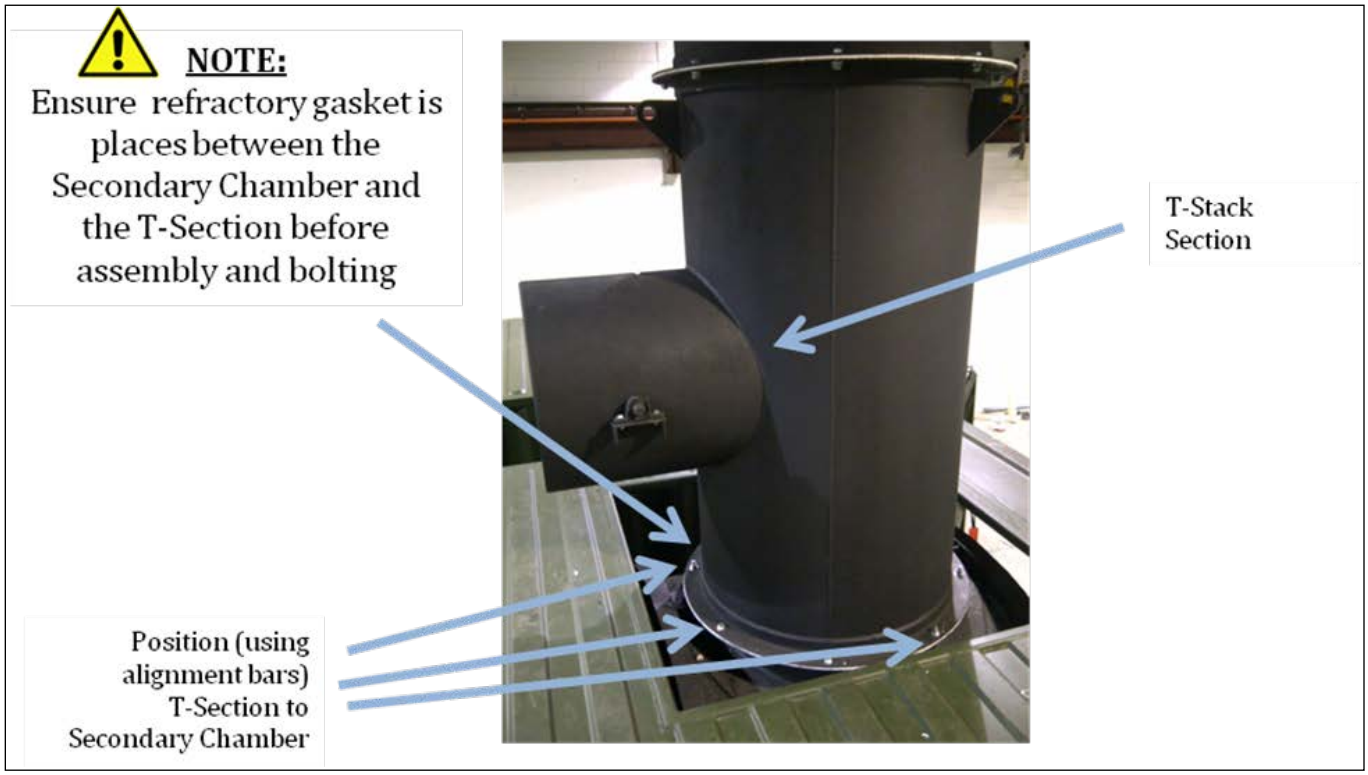
Once breech flanges are aligned and together bolt flanges together using the numerical order described in the pattern below.

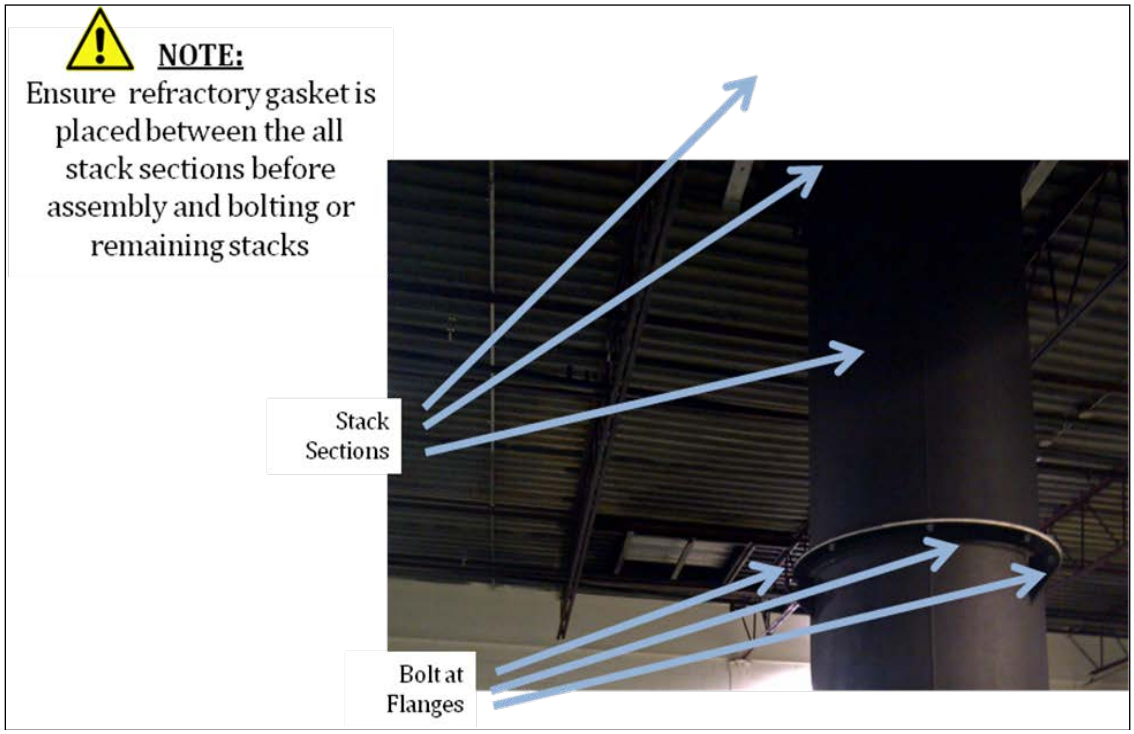

1
7
4
5
3
6
8
2


Lifting Points
Container B (Secondary Chamber Container)
Move in this direction
Base Frame
Once in place, clamp Container B to Spacer
NOTE:
Place Container B about 0.5m (1-2ft) from spacer and move towards spacer until in place.



3.1.4.3 T-STACK SECTION AND SECONDARY CHAMBER CONTAINER





NOTE

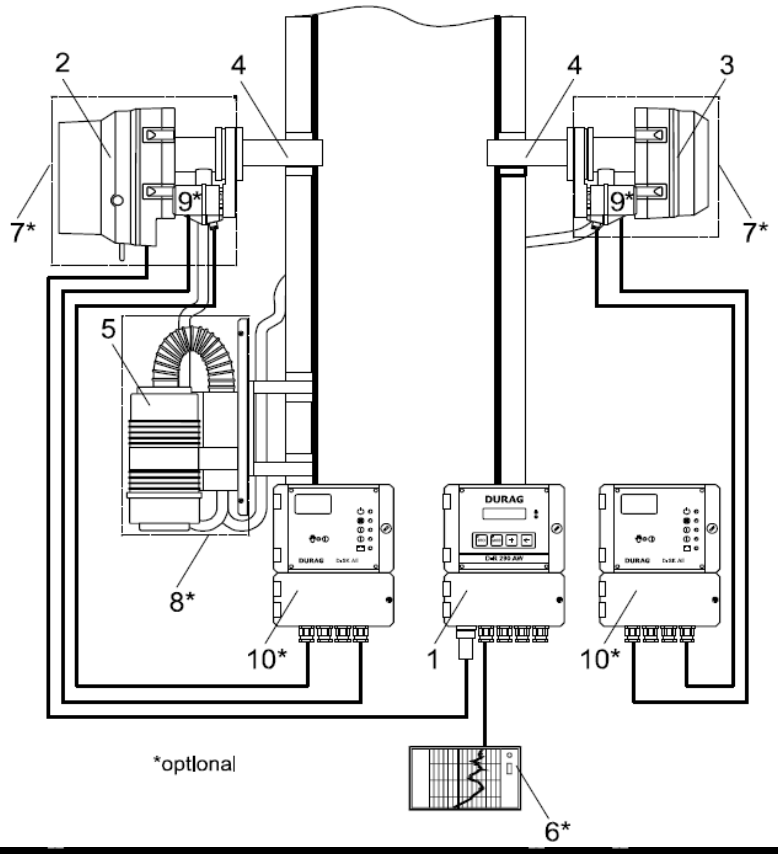
One of the washers must be a lock washer.

3.1.4.4 OPACITY MONITOR

The sensors and purge air unit of the opacity monitor are shipped unassembled and in boxes.

The sensor's mounting flanges are pre-installed in the stack section and the bracket for the purge air unit are installed in the T –stack.

The Control Unit D-R 290 AW is installed inside the Secondary chamber container and pre-wired to the PLC



	Standard		* Optional
1	Control unit, D-R 290 AZ (stack display) Or D-R 290 AW (evaluation unit)	6	Customer supplied recorder or data logging system
2	Transceiver, D-R 290 MK	7 & 8	Weather Hood, US built systems use one
3	Reflector, D-R 290 R1 or R2		Large weather hood for blower and optics
4	Mounting flange, D-R 280 E	9	Fail-safe shutters
5	Purge air unit	10	Fail-safe shutter control electronics

Install the Transceiver and Reflector in the flanges provided in the stack section

Install the Purge Air Unit in the bracket provided in the T-Stack

Connect the Transceiver to the Control unit

Connect power to the Purge Air Unit

3.1.4.5 INTERNAL COMPONENT CONNECTIONS

Flexible conduit in Container 2 (secondary chamber)

Feed flexible conduit from container 2 to containers 1 and 3 through the openings connecting the containers

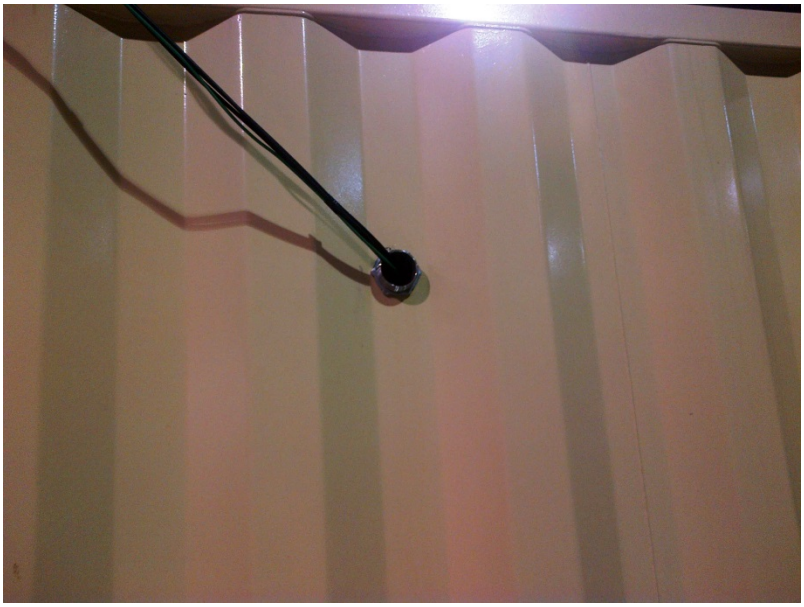
Junction Boxes in container 3 (control container)

Connect each flexible conduit to the correspondent Junction Box (i.e. JB1 conduit with JB1 box) wire the terminal block inside the junction box following the labels on both the wires and the terminal block

Junction Boxes in container 1 (primary chamber)

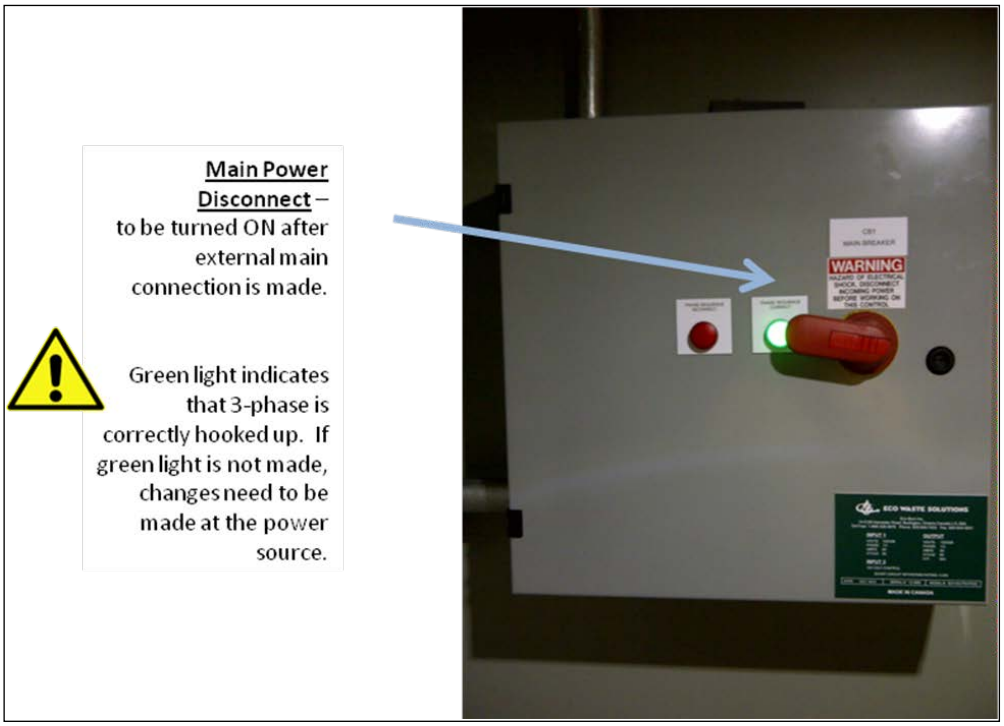
Complete all Junction boxes in both Container 3 and Container 1

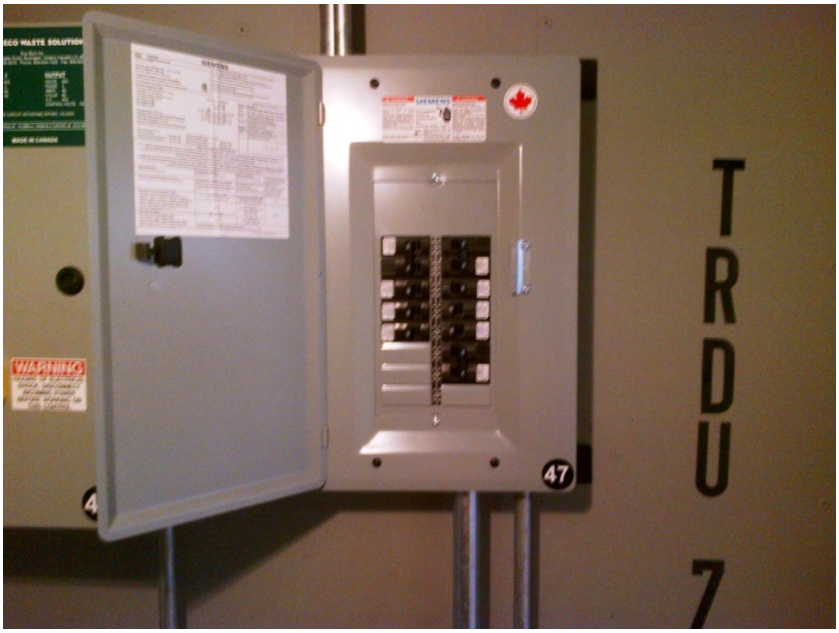
DO NOT CONNECT THE ELECTRICAL UNLESS THE MAIN SUPPLY FROM THE SITE HAS BEEN INTERRUPTED AND THE INCINERATOR BREAKERS ARE IN THE OFF POSITION



2” opening for power supply in container 3

Feed the 600v 40Amp 60Hz power through the 2” opening in container 3 (power supply cable and 2“coupling to be provided by the customer) and connect the wires to the Main Disconnect. The main supply from the site can be turned on now.





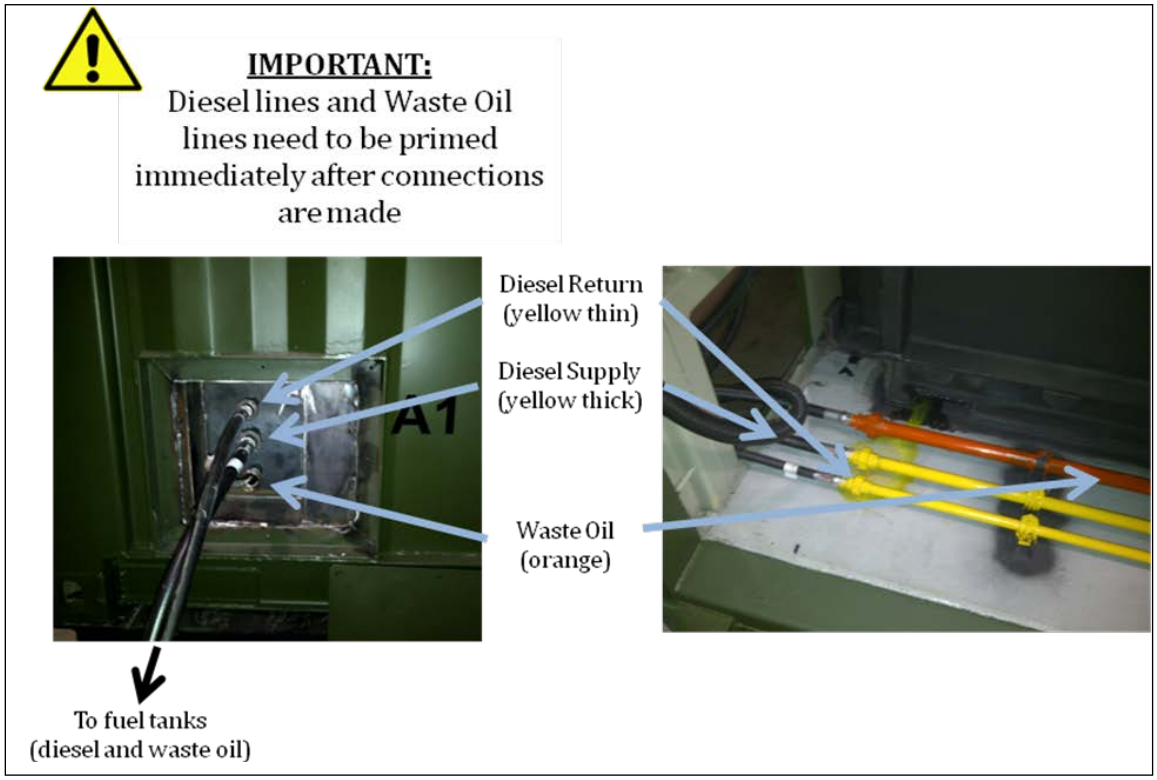
Switch on all incinerator breakers in the Breaker Panel

Control Panel Power On– turn on the power to the Control Panel.

3.1.4.6 INTERNAL CONNECTIONS

Compressed air quick connect for Waste Oil Burner

Connect the air hose from the Waste oil Burner to the quick connect fitting



Feed wires for the tanks' level sensors and waste oil tank heater from the tanks through the opening beside the hose adaptors and connect to the junction boxes

3.2 DISASSEMBLY INSTRUCTIONS

3.2.1 General Disassembly Information

The customer's personnel and/or contractors are responsible to:

3.2.1.1 Perform disassembly according to instructions provided by EWS in this *Manual*.

3.2.1.2 Disassemble I-beams, spacers and all incinerator component equipment using a crane, forklift, come-alongs, hydraulic jacks/hand-pumps, etc…

3.2.1.3 Disconnect all utility services including connections to the equipment including fuel, electrical, water, air, etc. using basic hand tools prior to disassembly

NOTE
Do not scale drawings: If certain dimensions are required which are not shown on drawings, EWS should be contacted for the required dimension. 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, assembly and/or erection, unless so indicated.

Please note that some of the diagrams and/or photos in this FACILITY MANUAL are conceptual in nature and may not be exact representation of equipment purchased.

3.2.2 Preparation Prior to Disassembly

NOTE
DO NOT DISCONNECT THE INTERNAL ELECTRICAL CONNECTIONS UNTIL THE EXTERNAL POWER SUPPLY TO THE MOBILE INCINERATOR HAS BEEN SAFELY DISCONNECTED.

NOTE
TURN POWER OFF AT CUSTOMER SUPPLIED GENERATORS

The fuel supply connections (diesel and waste-oil) are located on the Primary Chamber Container and disconnect the fuel supply from the fuel tanks located externally. There are fuel lines between the containers for fuel distribution which are to be disconnected after the external hook-ups and connections have been disconnected.

NOTE
DO NOT DISCONNECT THE INTERNAL FUEL CONNECTIONS UNTIL THE EXTERNAL FUEL SUPPLY TO THE MOBILE INCINERATOR HAS BEEN DISCONNECTED.

3.2.3 Disassembly Overview

3.2.3.1 Specialized Tools and Equipment for Disassembly

The complete disassembly of the **EWS Mobile Incinerator** will require 2-3 full time personnel for 2 days. The following list identifies the equipment required to be supplied by the customer in order to proceed with the disassembly:

a. Crane
b. Forklift
c. Scissor Lift
d. Shims
e. Ladder (12')
f. Come-along
g. Hydraulic Jack/pump
h. Level
i. Erection Wrench / Alignment bar
j. Container Clamp 2-Wrench
k. Sling
l. I-beam Clamp

3.2.3.1 Disassembly Overview

The following general steps are the order in which the **EWS Mobile Incinerator** Package needs to be disassembled. Each step is detailed in the subsequent section.

ORDER OF DISASSEMBLY (as detailed in Section 3.2.4)

3.2.4.1 External Disconnections
3.2.4.2 Internal Disconnections
3.2.4.3 Internal Component Disconnections
3.2.4.4 Removal of opacity monitor
3.2.4.5 Removal of Stack Sections
3.2.4.6 Disassembly and Removal of Containers from Base Frame Structure
3.2.4.7 Disassembly of Base Frame Structure

NOTE

Important Notes to Consider Prior to and during Disassembly

a. Lifting lugs are provided on the stacks, and major accessories, and should be used when disassembling the incinerator

b. Do not allow lifting chains or cables to put loads on piping, or mounting flanges as they may be damaged.

c. Avoid dragging lifting gear across painted surfaces.

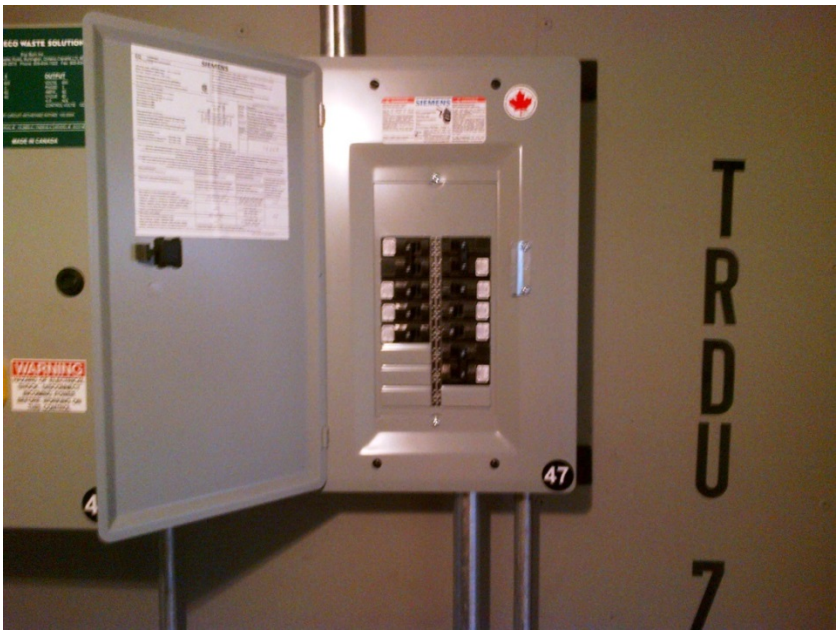
d. When removing the system from its position, be careful not to subject the refractory to mechanical shock, which may result in refractory damage.

3.2.4 Disassembly Instructions

3.2.4.1 EXTERNAL CONNECTIONS

Control Panel Power Off – turn off the power to the Control Panel.

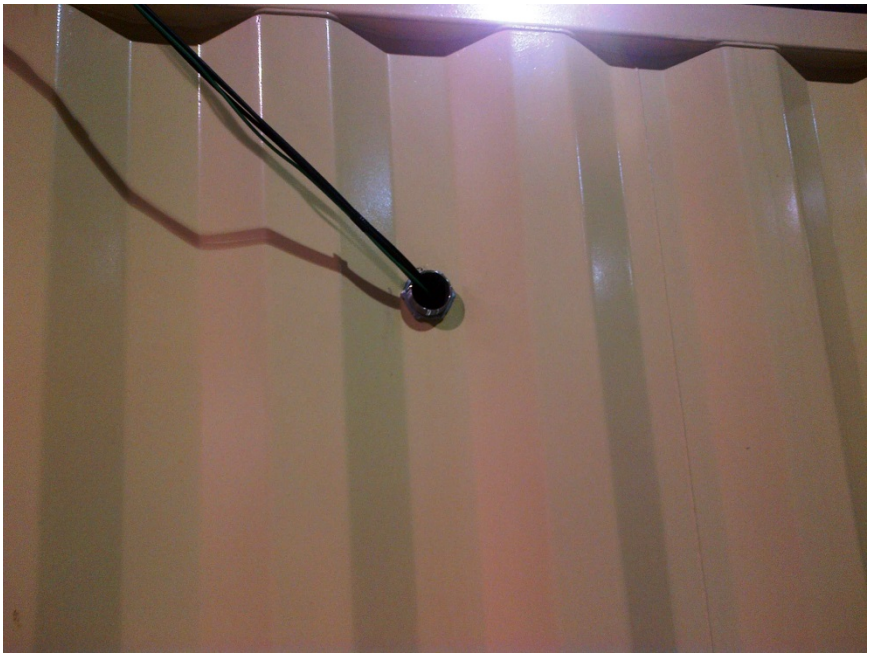
Main Power Disconnect – to be turned OFF before disconnecting any external or internal connections.



Switch off all breakers in the Breaker Panel

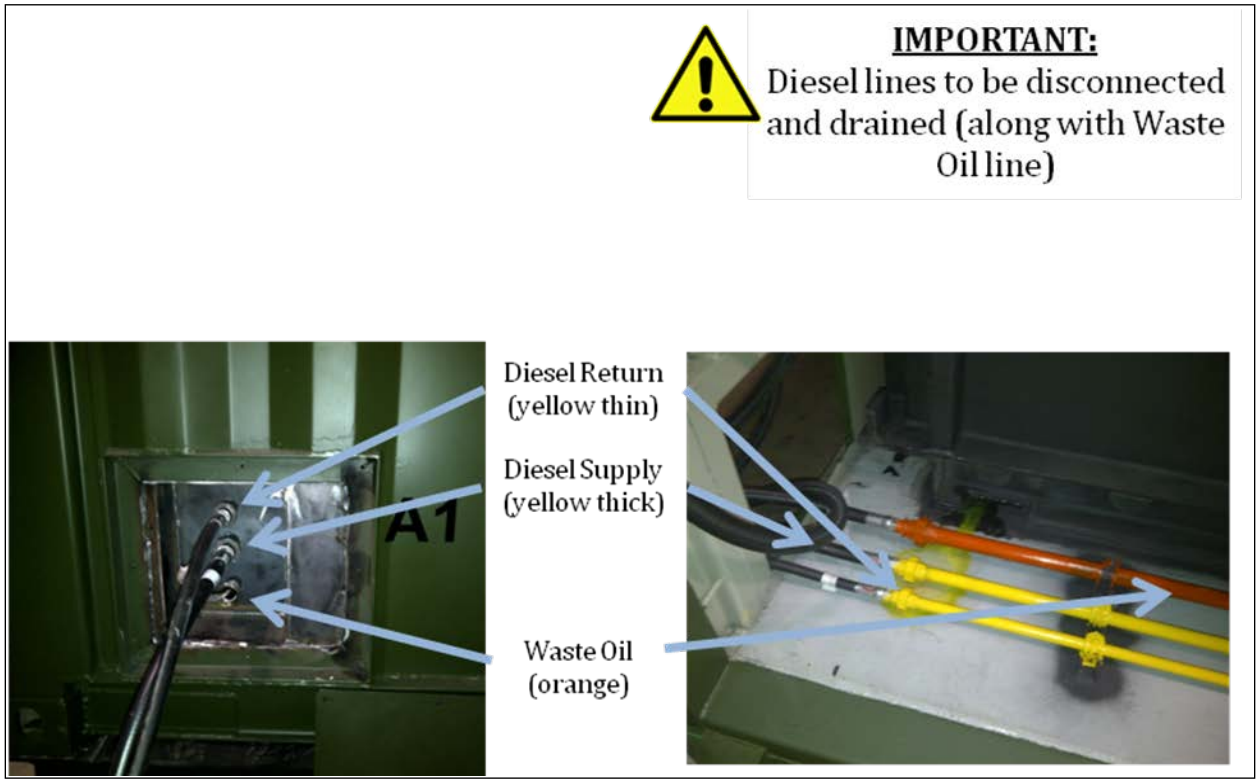
DO NOT DISCONNECT THE ELECTRICAL UNLESS THE BREAKERS ARE IN OFF POSITION

DO NOT DISCONNECT THE MAIN POWER FEED UNLESS THE MAIN SUPPLY FORM THE SITE HAS BEEN INTERRUPTED



2” opening for power supply in container 3

Disconnect the wires to the Main Disconnect and remove the 600v 40Amp 60Hz power through the 2” opening in container 3



Disconnect wires to the tanks level sensors and waste oil tank heater from the junction boxes and remove then through the opening beside the hose adaptors.

3.2.4.2 INTERNAL CONNECTIONS

Junction Boxes in container 1 (primary chamber)

Junction Boxes in container 3 (control container)

Disconnect the wires from the terminal block inside every junction box in both Container 1 and 3, replace any wire labels and conduit labels missing or damaged

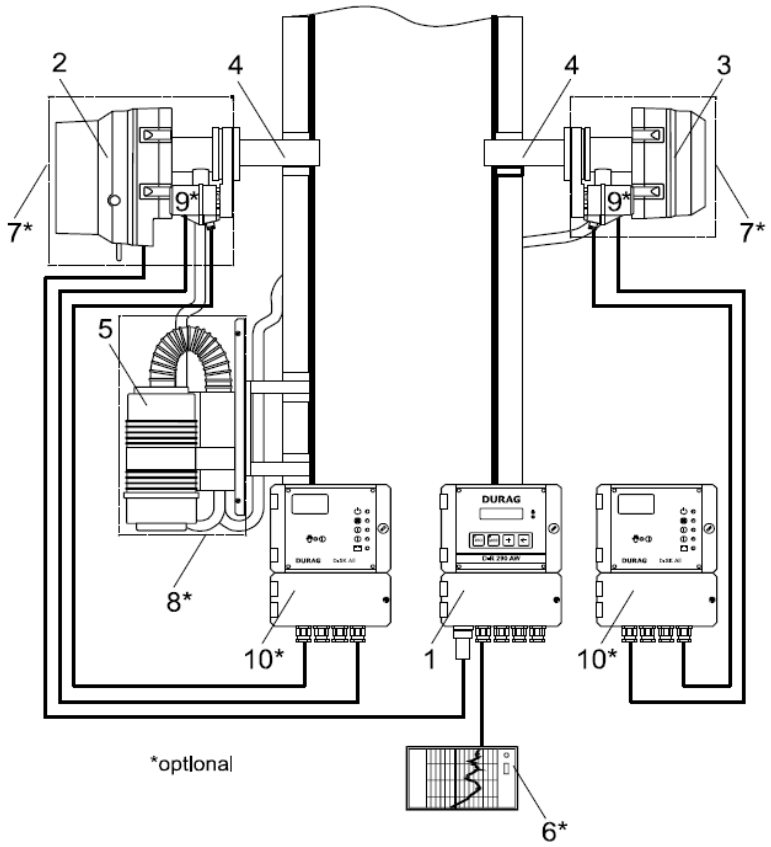
Flexible conduit in Container 2 (secondary chamber)

Pull the flexible conduit from container 1 and 3 into container 2 through the openings connecting the containers

Compressed air quick connect for Waste Oil Burner

Disconnect the air hose for the Waste oil Burner from the quick connect fitting

3.2.4.3 REMOVAL OF OPACITY MONITOR



	Standard		* Optional
1	Control unit, D-R 290 AZ (stack display) Or D-R 290 AW (evaluation unit)	6	Customer supplied recorder or data logging system
2	Transceiver, D-R 290 MK	7 & 8	Weather Hood, US built systems use one
3	Reflector, D-R 290 R1 or R2		Large weather hood for blower and optics
4	Mounting flange, D-R 280 E	9	Fail-safe shutters
5	Purge air unit	10	Fail-safe shutter control electronics

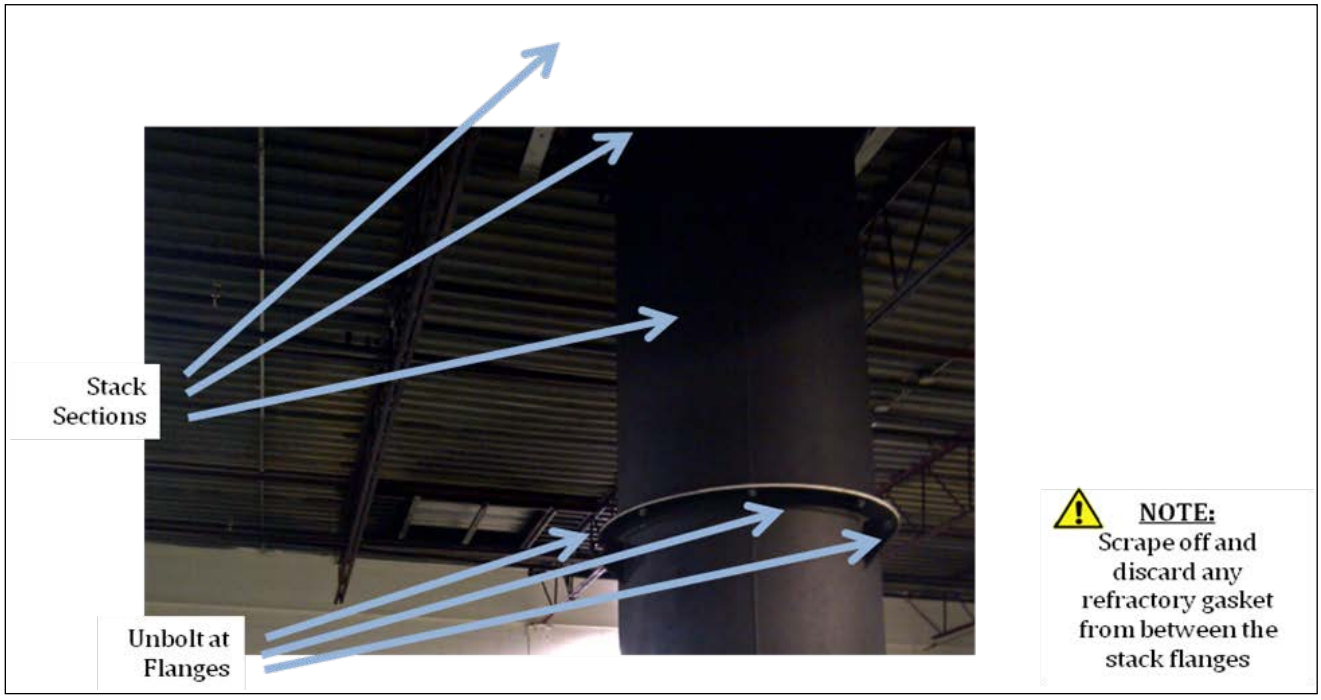
Disconnect power to the Purge Air Unit

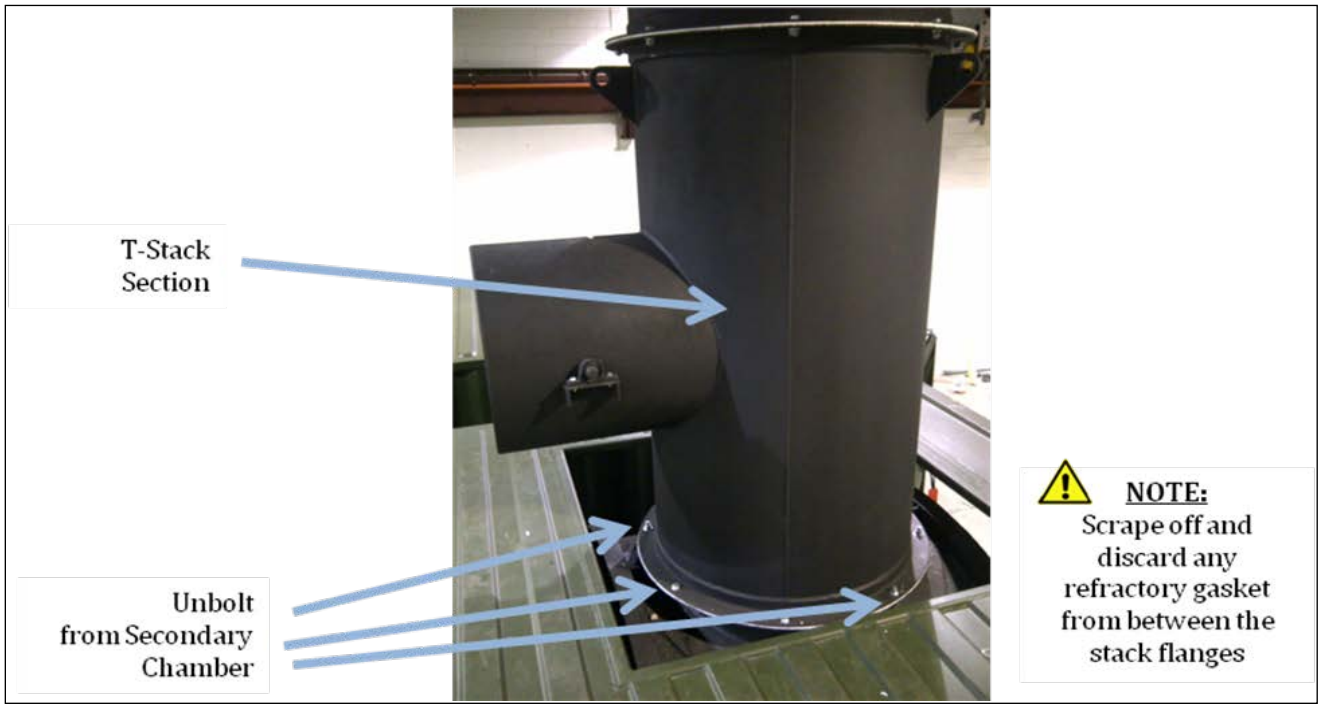
Disconnect the Transceiver to the Control unit

Uninstall the Purge Air Unit in the bracket provided in the T-Stack

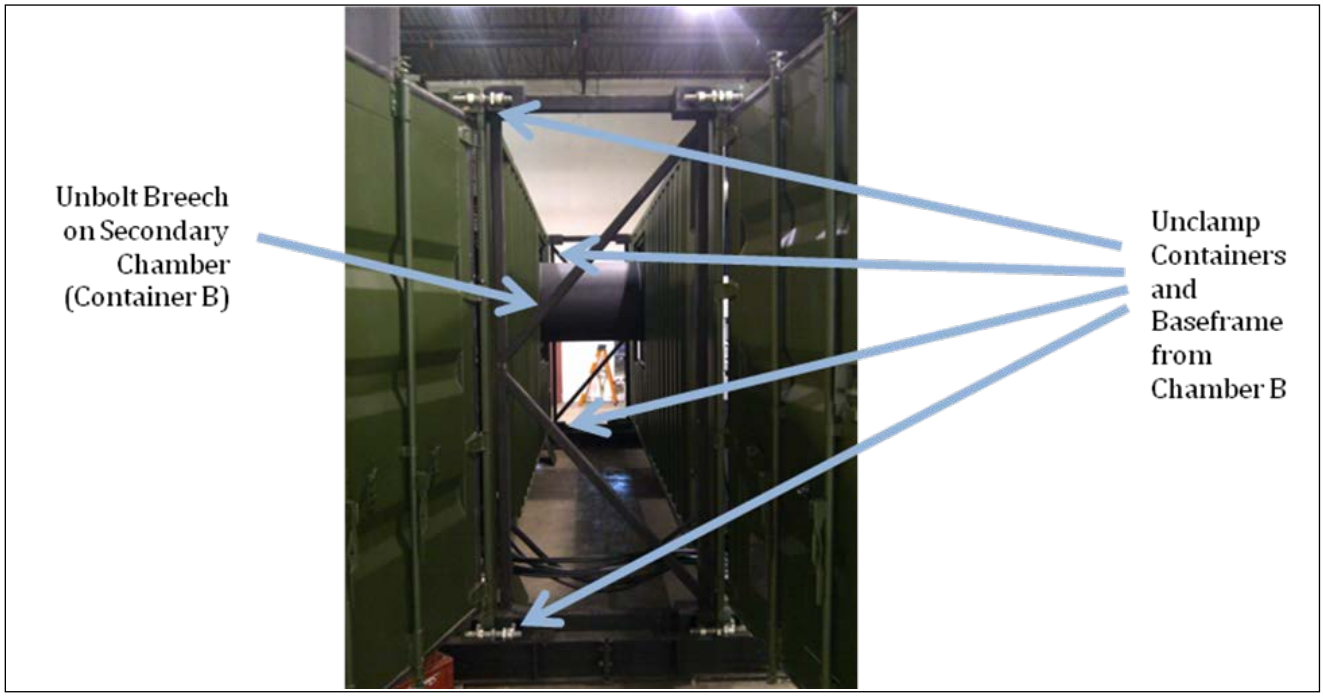
Uninstall the Transceiver and Reflector in the flanges provided in the stack section

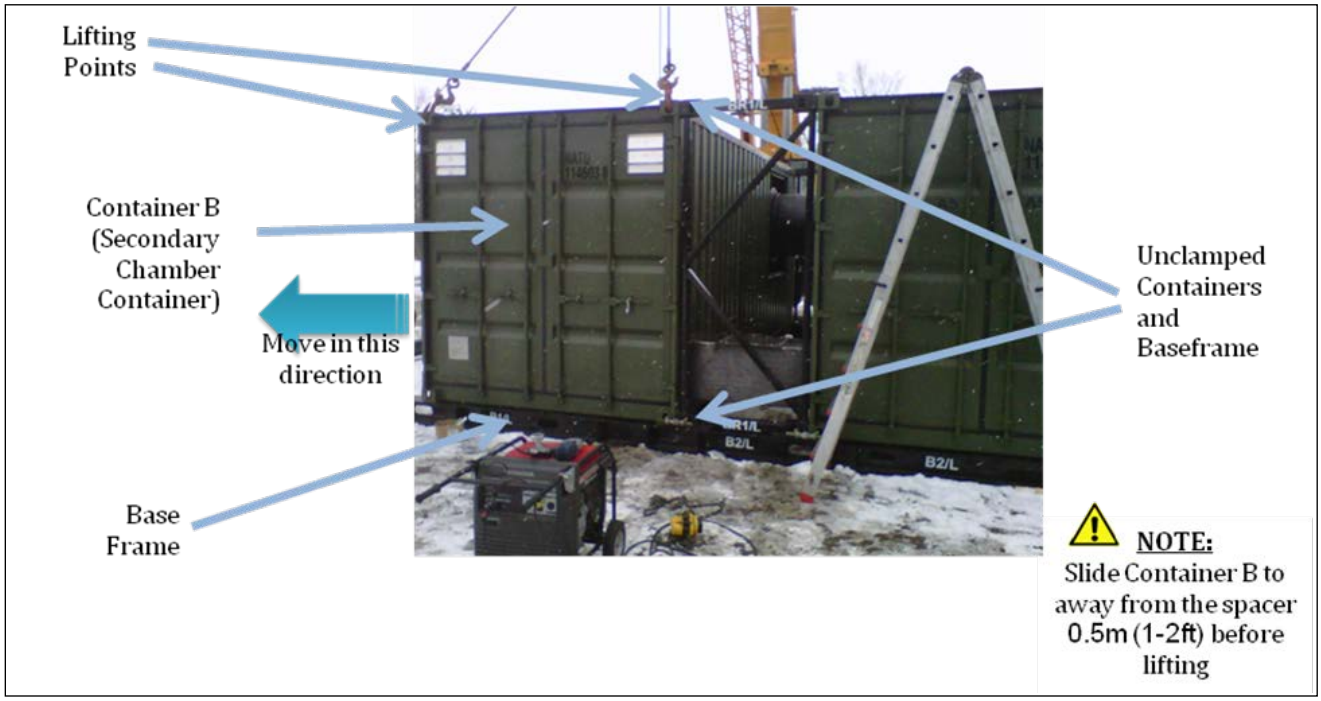
3.2.4.4 REMOVAL OF STACK SECTIONS



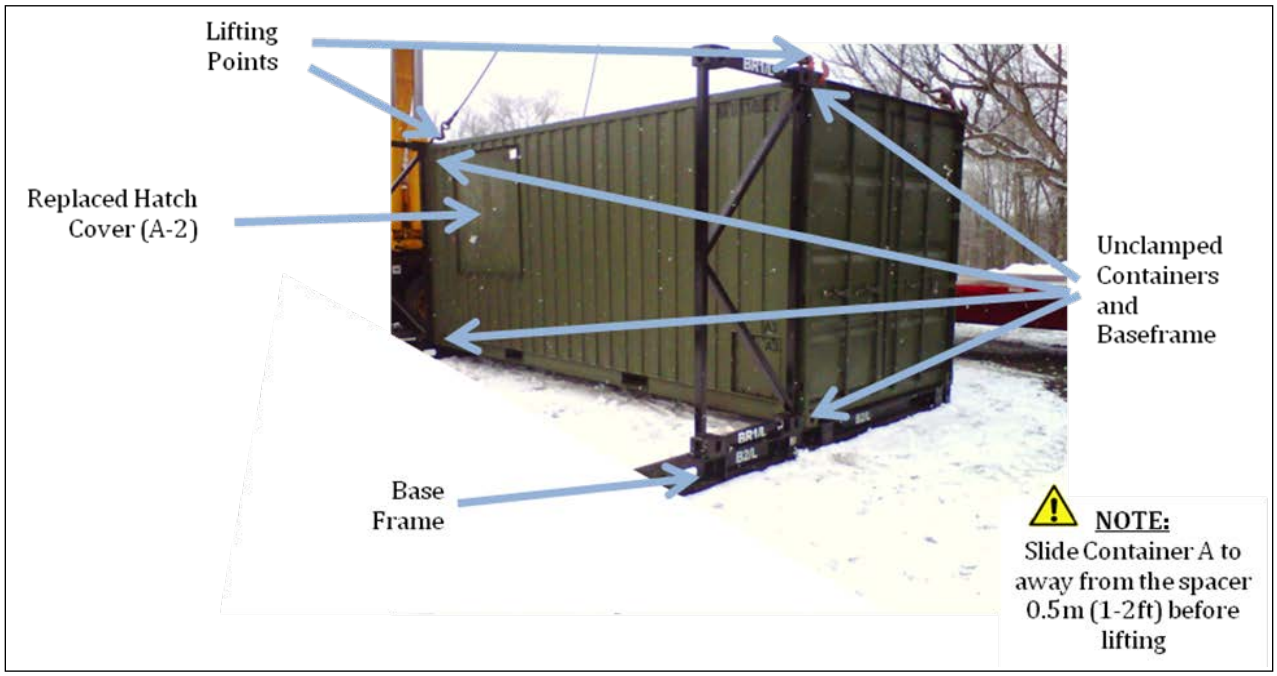


3.2.4.5 DISASSEMBLY AND REMOVAL OF CONTAINERS FROM BASE FRAME STRUCTURE

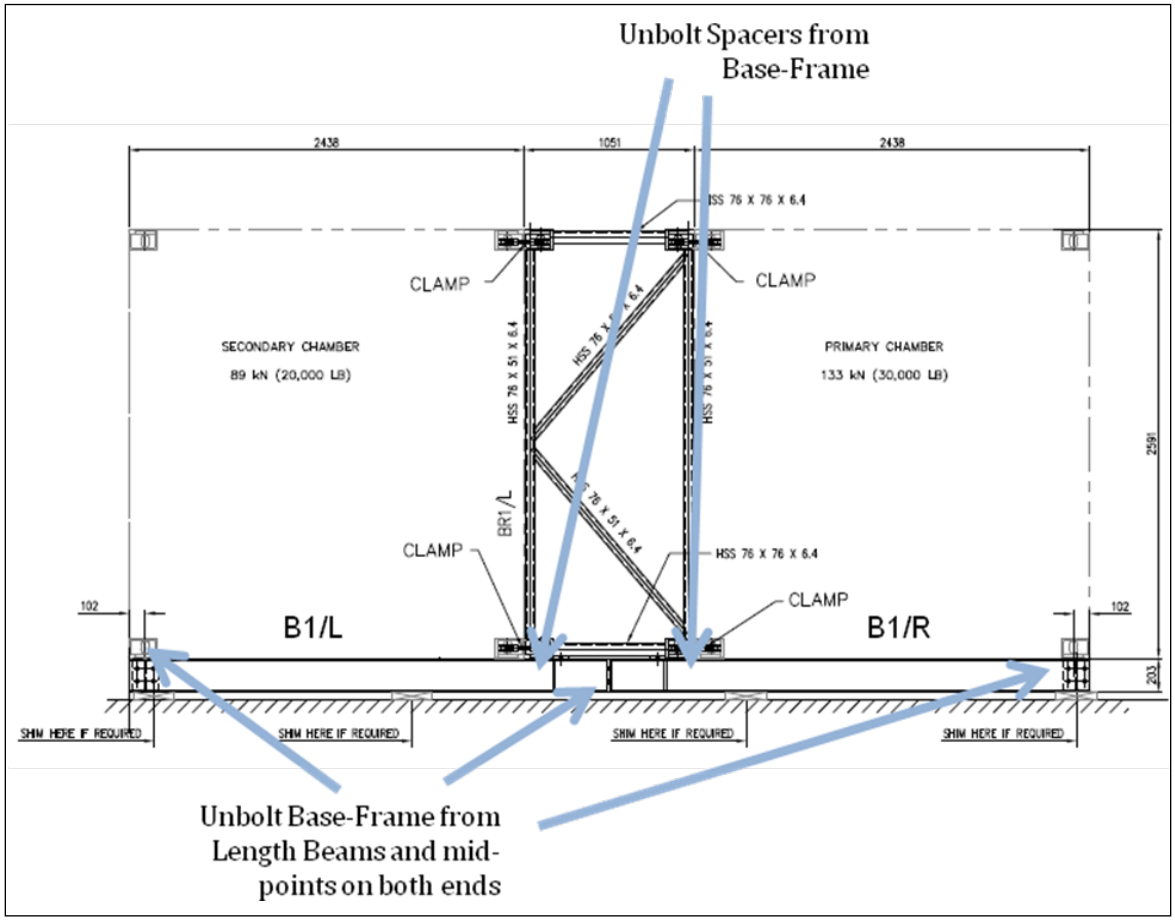

Unbolt Breech on Secondary Chamber (Container B)
Unclamp Containers and Baseframe from Chamber B

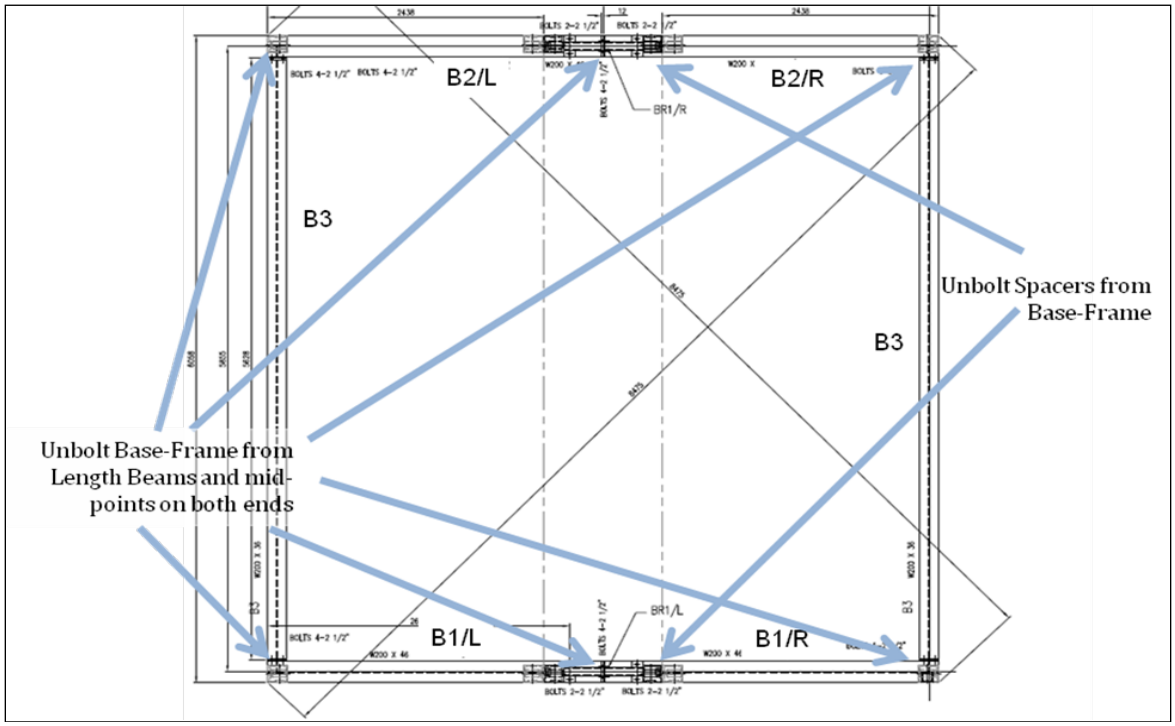

Lifting Points
Container B (Secondary Chamber Container)
Move in this direction
Base Frame
Unclamped Containers and Baseframe
NOTE:
Slide Container B to away from the spacer 0.5m (1-2ft) before lifting


Unbolt Breech on Primary Chamber (sling and brace to support with forklift or bobcat)
Container A
Remove Utility Tunnel
Unclamp Containers and Base-frame from Container A
BR1/L
B2/L


Lifting Points
Replaced Hatch Cover (A-2)
Unclamped Containers and Baseframe
Base Frame
NOTE:
Slide Container A to away from the spacer 0.5m (1-2ft) before lifting

DISASSEMBLY OF BASE FRAME STRUCTURE





Miscellaneous Final Items:

- Replace all remaining hatch covers on Containers A, B and C
- Pack all remaining parts for shipment:
  Nuts, bolts and washers
  Stacks, t-section and breech on marked skids
  I-beams and spacers from the base-frame
  Fuel and Waste Oil tanks

3.2.4.6 PREPARATION FOR STORAGE AND WHILE IN STORAGE

The following items will be required for final packing and storage:

- Lubricant (Lithium Spray Grease)
- Standard Grease (Mobilgrease 28)
- Silicone (MONO Ultra)
- Desiccant (Shipping Container Desiccant)

1. **Primary Chamber Container (1) and Secondary Chamber Container (2):**

General

a. Place desiccant bags under chambers and replace every 6 months

b. Lubricate door frames (hinges and bearings) using standard grease.

c. Place desiccant bags in the Primary and Secondary Chambers and replace every 6 months.

d. Seal all container openings with silicone rubber caulking (Sealastic® or equal - block to discourage pilfering).

Ventilation and Exhaust Fans

e. Coat coupling and all external machined parts with standard grease.

f. Spray light penetrating oil on fan wheel.

g. For long term or outdoor storage, mounted bearings should be re-greased and wrapped with plastic for protection. Rotate the fan wheel by hand at least every two weeks to redistribute grease on internal bearing parts. Each month the bearings should be purged with new grease to remove condensation, since even a filled bearing can accumulate moisture. Use caution when purging, as excessive pressure can damage the seals. Rotate the shaft while slowly adding grease. Place desiccant bag in fan housing and replace every 6 months.

Fan and Pump Motors

h. Spray light penetrating oil on the shafts of the motors.

i. Fill bearing housing with grease containing five percent rust-preventive concentrate.

j. Coat all exposed machined parts with standard grease

k. Do not rotate motors

2. **Controls Container (3)**

Air Compressor

a. Purge compressor cylinders of hydrocarbons.

b. Blank compressor suction and discharge.

c. Fill crankcase, cooling water jacket and valves with oil containing five percent rust-preventive concentrate. Allow space for thermal expansion.

d. Coat all exposed machined parts with standard grease.

e. Top-up oil level in the cooling water jacket.

f. Controls container must be stored in a climate-controlled building during this period to protect the PLC and instrumentation from freezing temperatures or fluctuations in temperature that go below the dew point. No components will require special attention if the container is stored in a building kept above the dew point temperature (e.g. above 15°C at less than 35% relative humidity).

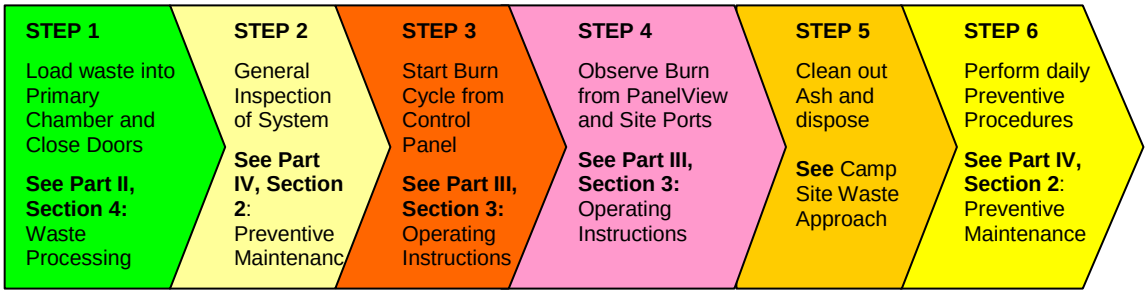
3.2.4.7 PACKING SKIDS AND CRATES IN CONTAINERS

1. Prior to shipment ensure all components are strapped and fastened within the container.

2. If all above items were followed for the preparation and while in storage, the system should be ready for shipment and usage.

3.3 OPERATING INSTRUCTIONS

The operation of the Mobile Waste Incinerator package follows 6 general steps that take place over a 24 hour period.



This section focuses on Steps 3 and 4 and how to start the system and monitor it during operation, however it is assumed that the waste is properly loaded with the weight, density and type stated in Part II Section 4. 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.

3.3.1 Operator Interface

3.3.1.1 Control Panel Components

1. Main Disconnect Switch
2. Panel View Operator Panel
3. Control Power ON
4. Emergency Stop Button
5. Ethernet Ports

1. Main Disconnect Switch : Controls all power to the system.

2. PanelView Operator Interface ("PanelView"): Displays various screens reflecting system performance.

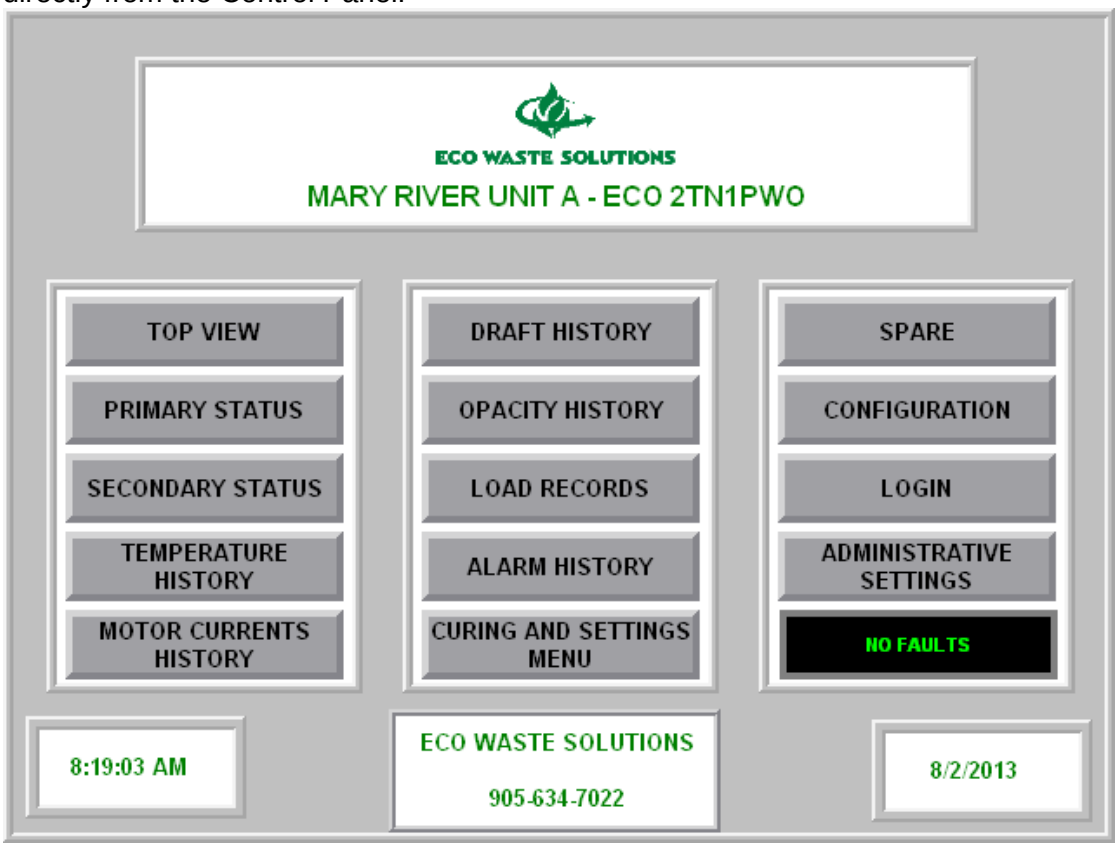
3. Control Power On:
   1 – Green light indicates the control power in the panel is on;
   2 – Pushing this button if the E-stop is out will turn on the control power.

4. Emergency Stop Keylock Button: Stops the current burn cycle in progress and disables the ability to restarting it.

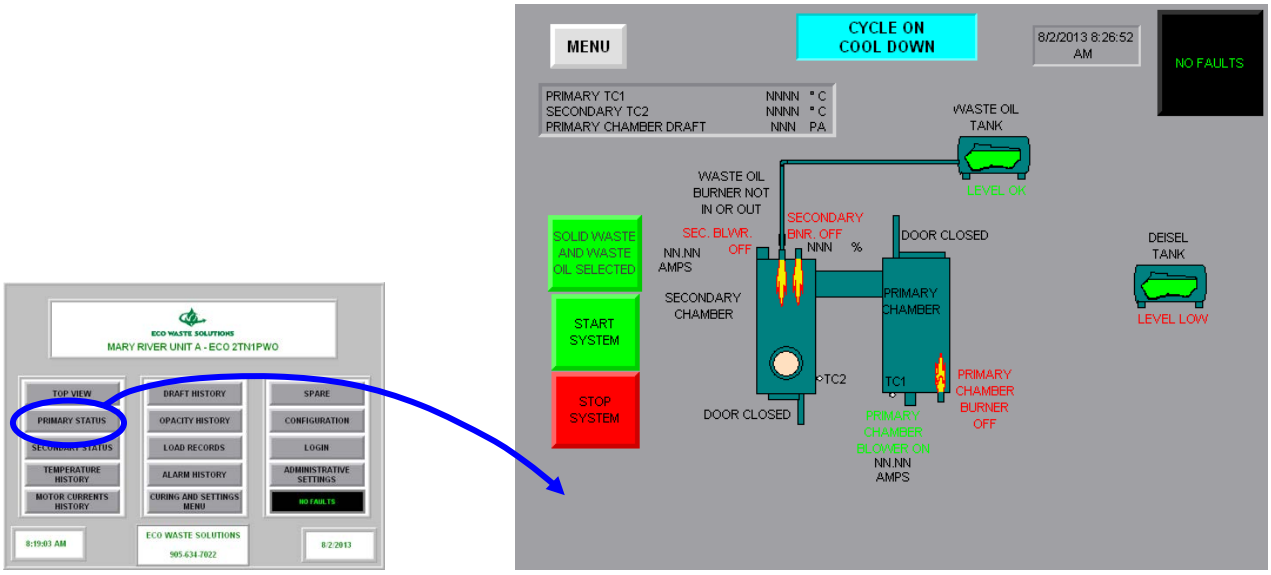
5. Ethernet Port: Port used to download system historical usage data.

3.3.1.2 Operator Interface

The PanelView Operator Interface controls the operation of the mobile incinerator package directly from the Control Panel.

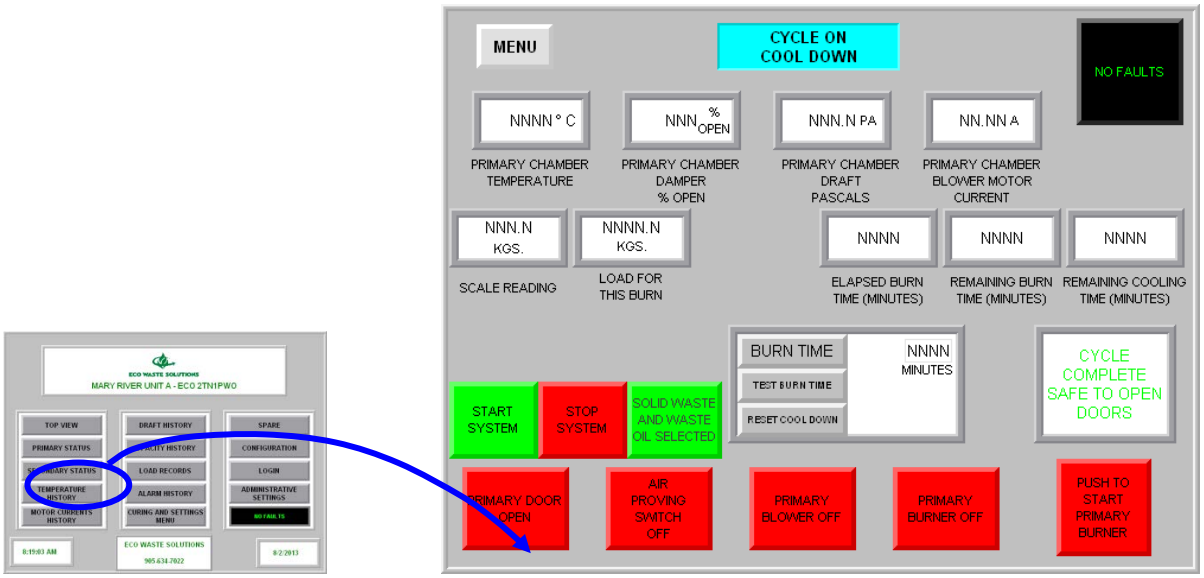


The main screen displays all the available options for viewing the system in operation. The PanelView is a touch-screen and items can be selected by touching them on the screen.



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

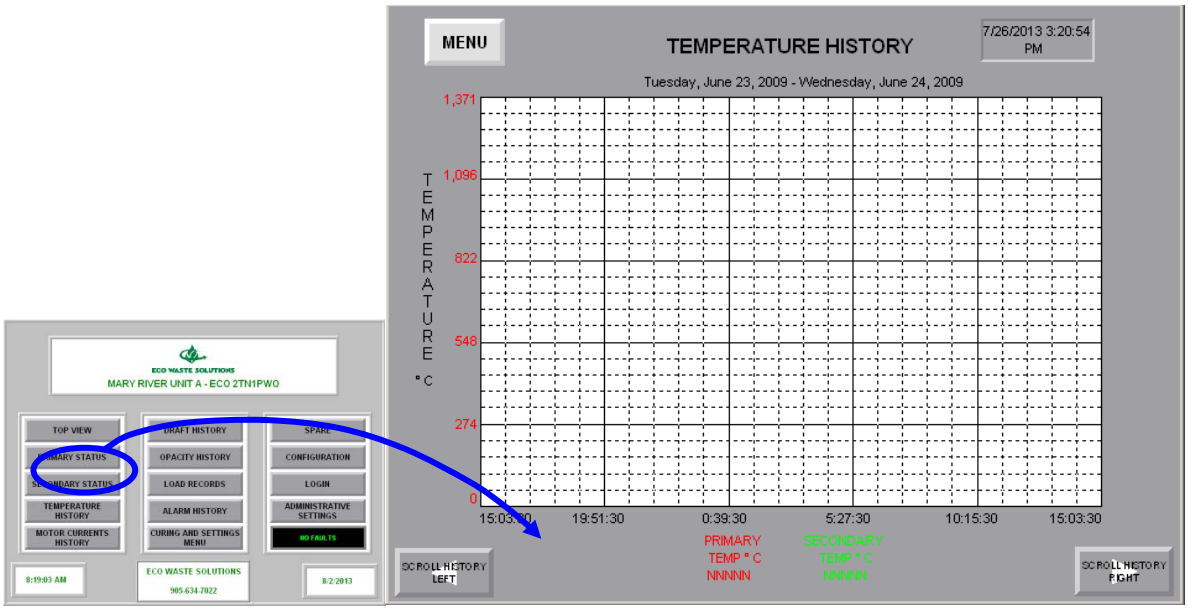
The system will not start if there are alarms or faults present. To clear (acknowledge faults) At any time, touch or press **MENU** to go back to the main screen.



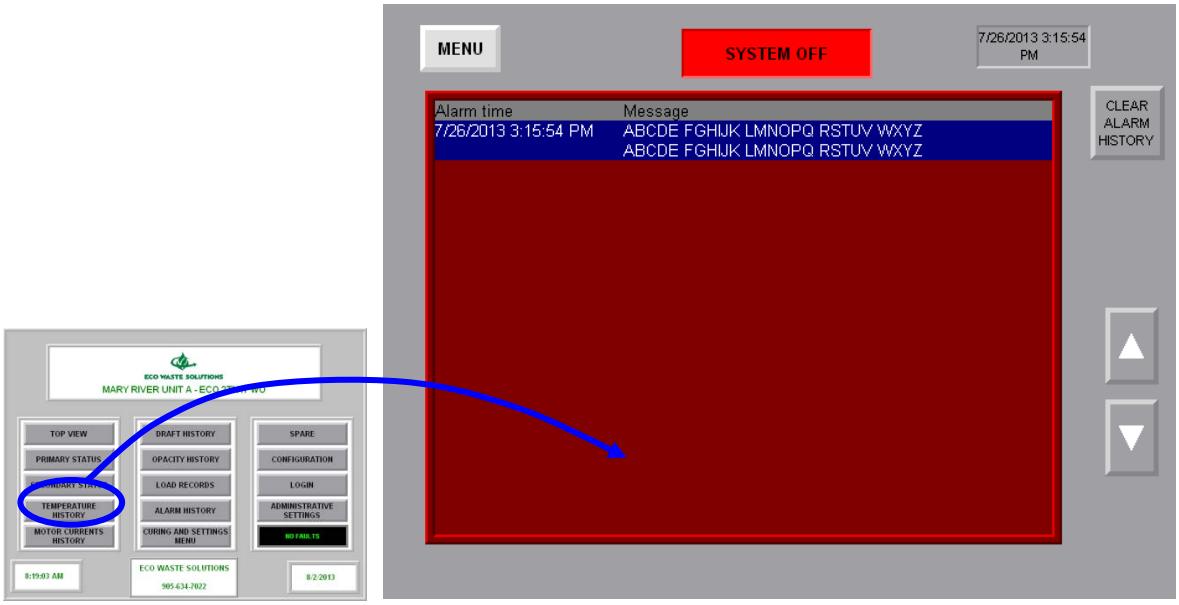
When the PRIMARY or SECONDARY SYSTEM STATUS is selected from the Main Menu a screen (above) will display the status of all the operating parameters of the respective chamber such as the temperatures and the time remaining in the cycle as well as displaying other informational items such as status of the door and 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 mix. (E.g. a very wet batch of garbage will take more time than a dryer batch of waste).

At any time, touch or press **MENU** to go back to the main screen.



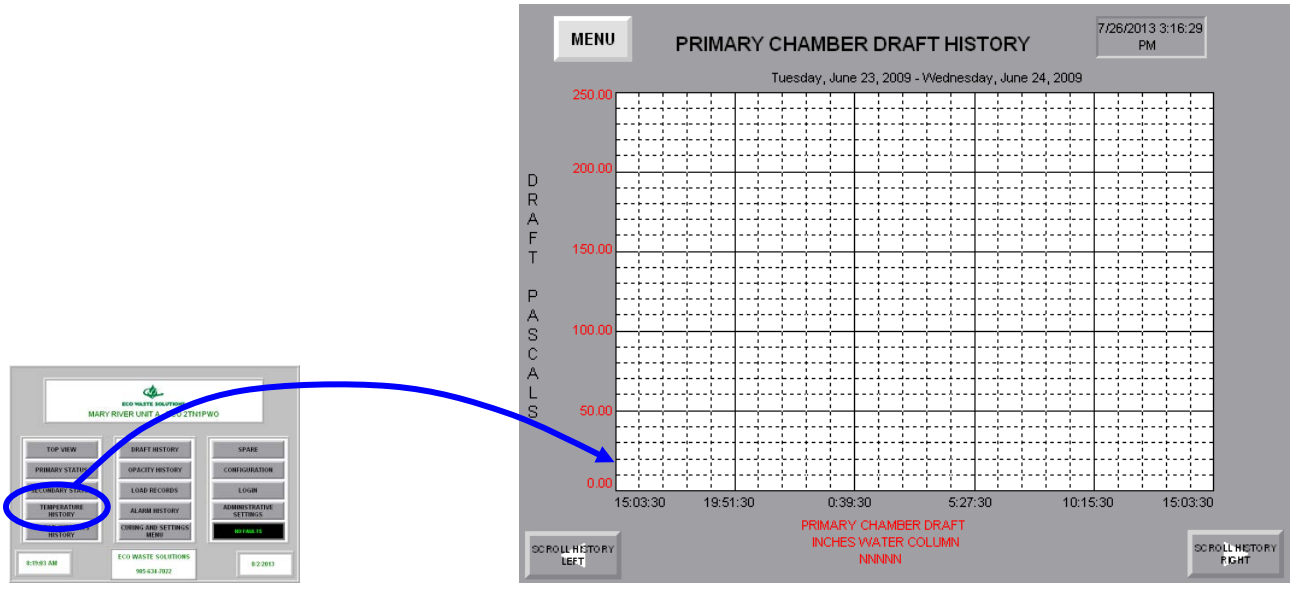
When the **TEMPERATURE HISTORY** is selected the screen will display the temperature history for the last burn showing various temperatures throughout the system. This information is stored for 30 days.



When **ALARM HISTORY** is selected the screen displays the last 25 faults with the date & time of occurrence. The operator can press the CLEAR ALARM HISTORY to clear all of the faults. The operator can also clear individual alarms by selecting them on-screen and pressing the ACKNOWLEDGE button.

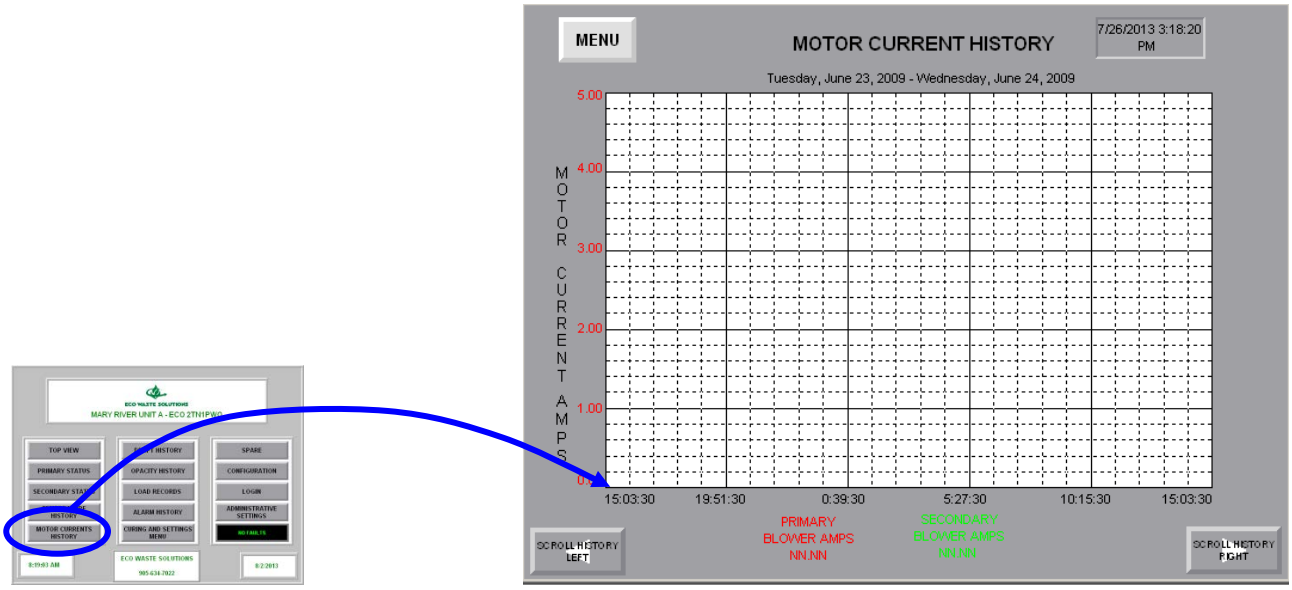
The operator can select **ALARM COUNT**, and view the specific number of alarm faults.

At any time, touch or press **MENU** to go back to the main screen.



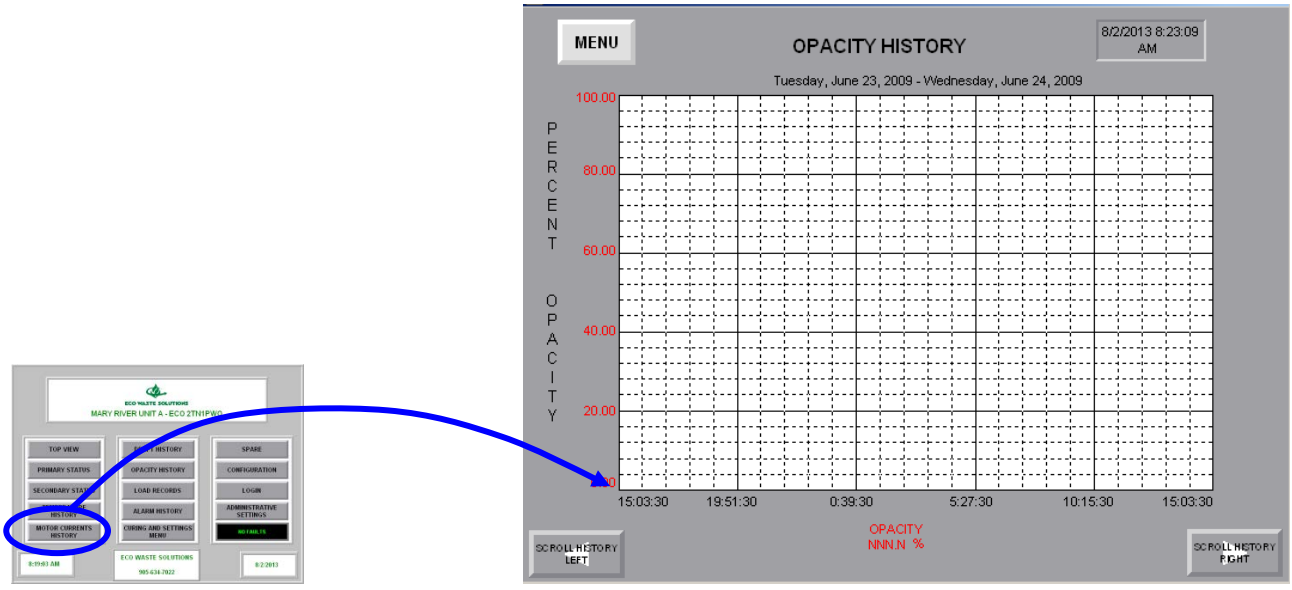
When the **DRAFT HISTORY** is selected the screen will display the draft history for the last burn showing data throughout the system. This information is stored for 30 days.

At any time, touch or press **MENU** to go back to the main screen.



When the **MOTOR CURRENT HISTORY** is selected the screen will display the motor current history for the last burn showing data throughout the system. This information is stored for 30 days.

At any time, touch or press **MENU** to go back to the main screen.



When the **OPACITY HISTORY** is selected the screen will display the opacity current history for the last burn showing data throughout the system. This information is stored for 30 days.

At any time, touch or press **MENU** to go back to the main screen.

3.3.1.3 Starting the Cycle

To start the burn cycle, ensure that the waste is loaded into the system according to the waste mix described in Part II Section 4 and not blocking the burner cone or area where the flame will be directed into the Primary Chamber. Make sure the door is clamped in all places on the Primary Chamber.

At the control panel, on the Panel View press the “Start System” button and the system will initiate the Purge Cycle, followed by the Burn Cycle and then ending with the Cool Down Cycle.

3.3.1.4 Purge Cycle

This is the first step in the burn cycle and is in place for safety reasons. The purge exhausts potentially explosive gases that could be remaining in the system and burners. The primary and secondary blowers will run to purge both chambers. The primary and secondary blower indicators on the Top View screen on the Operator Interface will say “Primary Chamber Blower On” and “Secondary Blower On”

3.3.1.5 Burn Cycle

When the purge is finished the Secondary Burner will come on and for safety reasons will perform a purge and then ignite. Once the Secondary Chamber temperature reaches 1000°C the Primary burner will purge and then ignite. The burn cycle time will start when the Primary Chamber temperature reaches 427°C

The Secondary Burner will modulate to maintain Secondary temperature. If the Secondary Chamber starts getting too hot the Secondary damper opens and the blower will increase in speed to assist with cooling. When the secondary chamber cools down the damper will start to close again.

When the waste in the Primary chamber starts to burn hot enough, the primary burner turns off (815^{o}C) and stays off. When the waste can no longer sustain the temperature in the Primary chamber, the primary burner will come back on (760^{o}C). This will continue until the remaining burn time reaches zero.

When the burn time reaches zero, the system will enter the cool down cycle. The Primary chamber and Secondary chamber burners turn off; the secondary chamber blower turns off and the primary blower starts and runs until the cool down cycle is complete. The cool down cycle is complete after the cool down timer has timed out.

3.3.1.6 Using Historical Charts

a. Go to the Main Screen of the control panel operator interface.
b. Select the historical chart you want to view (e.g. Temperature, Draft, etc).
c. Once the desired chart appears the “buttons” on the bottom left and right of the screen can be used to scroll through to previous days’ information by selecting them and holding down.
d. Once the desired date is selected the graph will be on the screen indicating the time and specific data trends (e.g. Temperature, Draft, etc) of the burn.

3.3.1.7 Retrieving Data from the PLC

a. Once a week or when the warning message appears the data will need to be downloaded.

b. Go to the laptop supplied with the equipment. *DO NOT* turn the computer on.

c. Connect the Ethernet cable to the computer.

d. Plug the Ethernet cable into the Ethernet port on the front of the control panel.

e. Turn on the laptop.

f. The laptop will start up and ask for a password. The password has been set to: **ecowaste** and is case sensitive.

g. Once the password has been accepted RSLinx will start automatically.

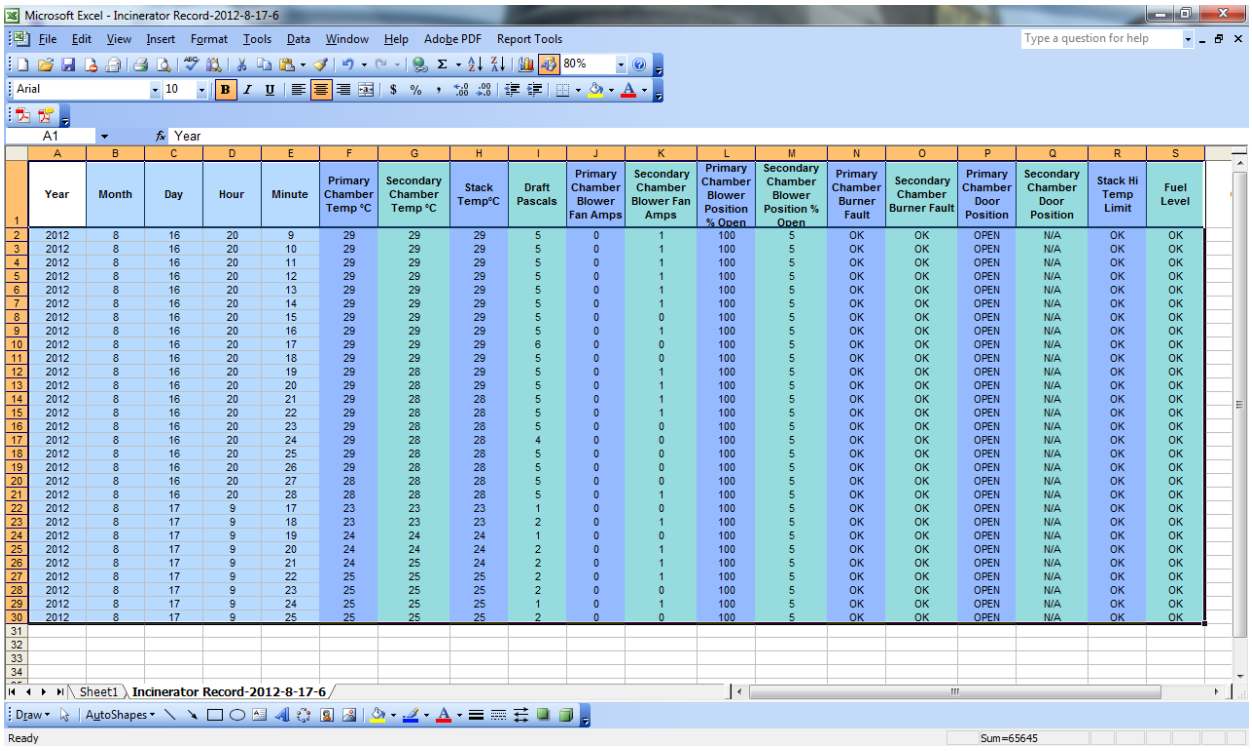
h. When RSLinx has finished starting up the screen can be minimized.

i. On the desktop there is an Excel File called **"Incinerator Data Logging"**. Double click this icon and Excel will open and automatically begin downloading the data from the PLC.

j. A full data file will take approximately 2 hours to complete download.

k. Once the data has been downloaded it will close Excel and save the downloaded data to a folder on the C: drive called C:/Incinerator Data Logging. The data can be printed from Excel as needed.

The data logging file will look like this in Excel



Microsoft Excel - Incinerator Record-2012-8-17-6

Year	Month	Day	Hour	Minute	Primary Chamber Temp °C	Secondary Chamber Temp °C	Stack Temp°C	Draft Pascals	Primary Chamber Blower Fan Amps	Secondary Chamber Blower Fan Amps	Primary Chamber Blower Position % Open	Secondary Chamber Blower Position % Open	Primary Chamber Burner Fault	Secondary Chamber Burner Fault	Primary Chamber Door Position	Secondary Chamber Door Position	Stack Hi Temp Limit	Fuel Level
2012	8	16	20	9	29	29	29	5	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	10	29	29	29	5	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	11	29	29	29	5	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	12	29	29	29	5	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	13	29	29	29	5	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	14	29	29	29	5	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	15	29	29	29	5	0	0	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	16	29	29	29	5	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	17	29	29	29	6	0	0	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	18	29	29	29	5	0	0	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	19	29	28	29	5	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	20	29	28	29	5	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	21	29	28	28	5	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	22	29	28	28	5	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	23	29	28	28	5	0	0	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	24	29	28	28	4	0	0	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	25	29	28	28	5	0	0	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	26	29	28	28	5	0	0	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	27	28	28	28	5	0	0	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	28	28	28	28	5	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	17	9	17	23	23	23	1	0	0	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	17	9	18	23	23	23	2	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	17	9	19	24	24	24	1	0	0	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	17	9	20	24	24	24	2	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	17	9	21	24	25	24	2	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	17	9	22	25	25	25	2	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	17	9	23	25	25	25	2	0	0	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	17	9	24	25	25	25	1	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	17	9	25	25	25	25	2	0	0	100	5	OK	OK	OPEN	N/A	OK	OK

3.3.2 Procedure before Start Up

The operating instructions are to occur once the assembly of the system is completed and inspected. Before you continue with the operating instructions ensure that the following items are completed:

a. All physical components attached and bolted
b. All internal electrical connections are completed
c. All internal fuel and air connections are completed
d. All external fuel lines have been connected (tanks to container)

NOTE

Before connecting the external electrical connection, ensure that all internal electrical connections have been made

Once all the above activities and the assembly instructions have been completed, follow the procedure outlined below:

3.3.2.1 Located in the control room of the Controls Container turn on the power on the Main Disconnect

a. If red light is illuminated, change the phase on customer-supplied power. DO NOT TRY CHANGING THE PHASE ON EWS SUPPLY.

b. If green light is illuminated, power supply and phasing are confirmed and start-up procedures can be continued

3.3.2.2 Turn lights on, located in the auxiliary power breaker panel

3.3.2.3 Turn exhaust fan on, located at the auxiliary power breaker panel

a. If outside ambient temperature < 5˚C: Turn heater on from the auxiliary power breaker panel because the temperature in Controls side of container must be > 5˚C

3.3.2.4 Turn on remaining breaker in auxiliary panel

3.3.2.5 Once the Human Machine Interface (HMI) (Panel View) is running and power sequence is correct push the “Control Power On” button.

3.3.2.6 Ensure there is power supply to all containers by selecting the Top View from Panel view and check:

a. All temperature readings (if 1371˚C is displayed the thermocouple is not connected or is faulty.)

b. That the Primary and Secondary Chamber door position on screen is the same as on the system, if shown incorrectly check limit switch

3.3.2.7 Fill fuel tank and the Waste Oil Tank if the planned burn is with waste oil

NOTE **ONLY DIESEL FUEL CAN BE STORED IN THE DIESEL FUEL TANK**

Before filling the tank ensure:

a. The storage tank is in good condition, e.g. tank shall not exhibit severe rusting, apparent structural defects or deterioration.

b. No leaking visible. If leaking is detected perform the following clean-up steps:
   i. Stop the release
   ii. Contain the released fuel
   iii. Clean up and properly manage the released fuel as per best environmental standards
   iv. Repair or replace the leaking tank prior to returning it to service.

c. Inspect the bottom of tank for sludge formation. Perform the following steps.
   i. Remove fuel tank access cover.
   ii. Do a visual inspection of the inside of the tank, clean if necessary. A drain valve is located at the bottom of the tank to assist with cleanout. Ensure the drain valve is in place before filling.
   iii. Ensure valve is closed
   iv. Fill the tank through the access.

NOTE

Load the oldest liquid inventory first. Long term storage may result in the formation of sludge or the growth of soluble and insoluble bacteria that can clog the downstream filters.

When the tank is full, do a “walk around” of the tank and inspect tank for leaks and structural defects.

3.3.2.8 Ensure all ball valves are in the open position.

3.3.2.9 Physically prime the Primary Burner located in the Primary Chamber container

a. Using scaffolding, a scissor-lift, or another safe method of elevation, prime the fuel line by inserting a funnel into the opening where the line meets the connector to the tank. Fill using a 20 L diesel fuel container until the line is devoid of air, taking care to avoid spillage.

b. **Before starting the burner, make sure that the tank return line is not clogged.**

c. The pump leaves the factory with the by-pass closed.

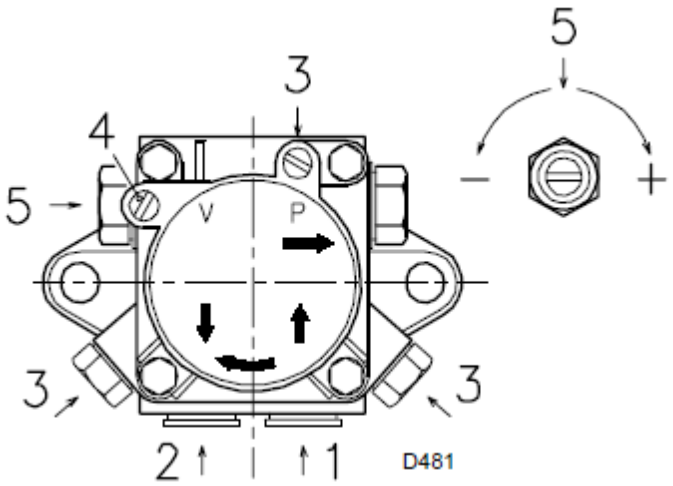


Figure A

d. In order for self-priming to take place, one of the screws (#3) must be loosened in order to bleed off the air contained in the suction line; see Figure A (above) of the pump. Start with switch #1 see Figure B (below) in the "ON" position. The pump must rotate in the direction of the arrow marked on the cover.

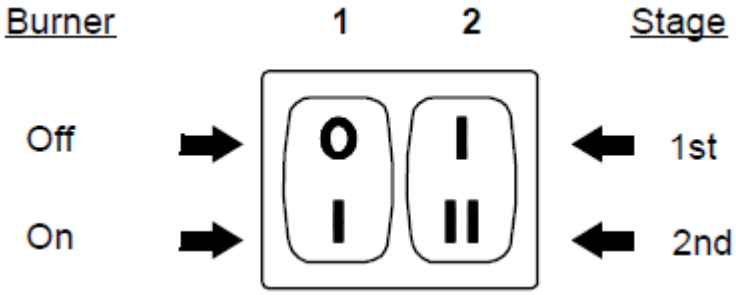


Figure B

e. The pump can be considered to be primed when the light oil starts coming out of the screw #3 see Figure A (above). Stop the burner: switch #1 see Figure B (above) set to "OFF" and tighten the screw #3 see Figure A (above). The time required for this operation depends upon the diameter and length of the suction tubing. If the pump fails to prime at the first starting of the burner and the burner locks out, wait approx. 15 seconds, reset the burner (by pressing the reset button, red illuminated button on the control box), and then repeat the starting operation as often as required. And so on.

f. After 5 or 6 starting operations allow 2 or 3 minutes for the transformer to cool.

g. Do not let extraneous light hit the photocell or the burner will lock out; the burner should lock out anyway about 10 seconds after it starts.

h. **NOTE The pump is full of fuel when it leaves the factory. If the pump has been drained, fill it with fuel through the opening on the vacuum meter prior to starting; otherwise, the pump will seize.**

i. Whenever the length of the suction piping exceeds 20-30 meters, the supply line must be filled using a separate pump

3.3.2.10 Physically prime the Secondary Burner located in the Secondary Chamber container

a. Before starting the burner, make sure that the tank return line is not clogged. Obstructions in the line could cause the sealing organ located on the pump shaft to break.

b. In order for self-priming to take place, screw #3 see Figure C (below) of the pump must be loosened in order to bleed off the air contained in the suction line.

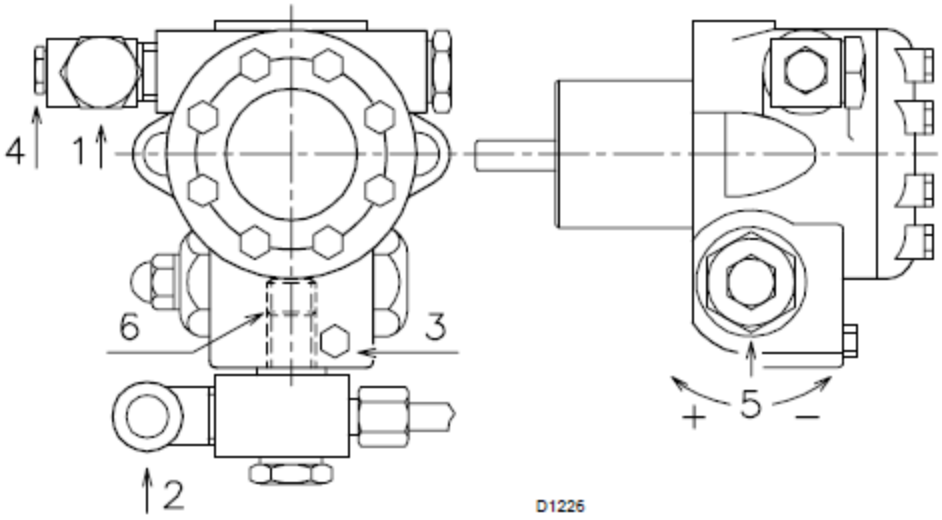


Figure C

c. Start the burner by closing the control devices with switch #1 in Figure D (below) in the "MAN" position. As soon as the burner starts, check the direction of rotation of the fan blade, by looking through the flame inspection window.

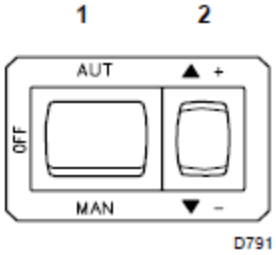


Figure D

d. The pump can be considered primed when the light oil starts coming out of screw #3 in Figure C (above). Stop the burner: switch #1 in Figure D (above) set to "OFF" and tighten screw #3 in Figure C (above). The time required for this operation depends upon the diameter and length of the suction tubing. If the pump fails to prime at the first starting of the burner and the burner locks out, wait approx. 15 seconds, reset the burner, as often as required. After 5 or 6 starting operations allow 2 or 3 minutes for the transformer to cool.

e. **NOTE The pump is already full of fuel when it leaves the factory. If the pump has been drained, fill it with fuel through the opening on the vacuum meter prior to starting; otherwise, the pump will seize**.

Whenever the length of the suction piping exceeds 20-30 meters, the supply line must be filled using a separate pump.

3.3.3 First Time Use (WILL ONLY BE PERFORMED ON SYSTEM ONCE)

NOTE:
This is to be performed the first time the system is ever used; it will only be required to be done once.

3.3.3.1 From Panel View Main Screen select Curing.

3.3.3.2 From the Curing menu select Curing Status push the following buttons to set up the curing for Primary and Secondary Chamber “Push to enable Primary Curing” and push “Push to enable Secondary Curing”

3.3.3.3 From Panel View press Start Cure

3.3.3.4 The system will start the curing process which takes 24 – 30 hours

3.3.3.5 If the curing cycle is interrupted reset the curing cycle from the Curing Status screen

3.3.3.6 The cycle will restart from where it got interrupted.

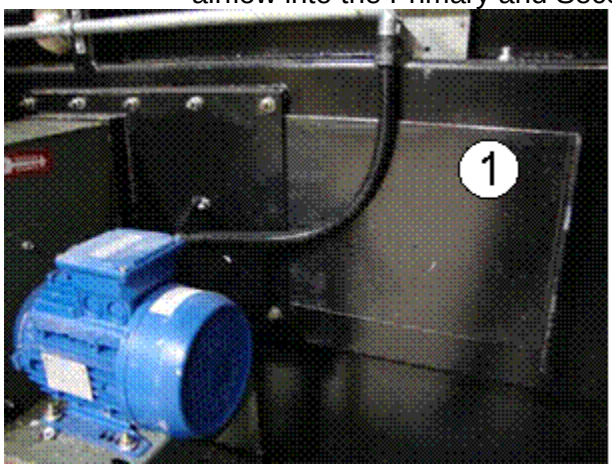
3.3.4 Standard Operating Procedures

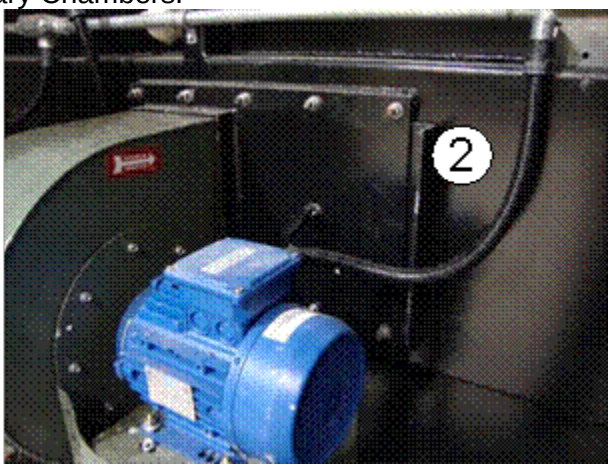
The following section details the procedures for the operation of the incinerator.

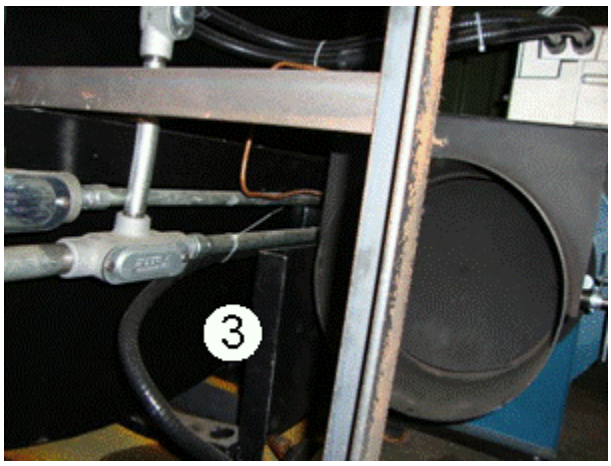
3.3.4.1 System Start up (solid waste only)

a. Drain the air compressor before starting system

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





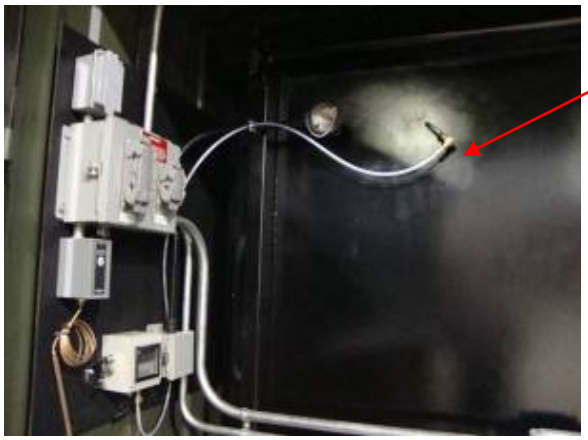


1. Primary Chamber blower Manual Slide Gate Open Position
2. Primary Chamber blower Manual Slide Gate Closed Position
3. Secondary Chamber blower Manual Slide Gate Open

c. 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.

d. Ensure all valves are in the open position (supply and return)

e. Ensure the draft gauge hose connection is tight and sealed. This is a copper tubing located in the back upper corner of the Primary Chamber.



f. Unlatch all four clamps on the Primary Chamber door, open and secure in the open position

g. Ensure that the Primary Chamber has been cleaned out, and the Chamber floor is cool (less than 40°C).

NOTE
If the floor is hotter than this temperature the waste may spontaneously catch on fire during loading.

h. Weigh the waste on scale and begin loading the Primary Chamber from the front (or hand bomb as required).

NOTE
In the event that some waste is loaded by hand do not deliberately throw the waste towards the sides of the Primary Chamber. Doing so will damage the ceramic blanket refractory.

NOTE
When loading the waste loading avoid contact with refractory (wall modules, door jams, sills, lintel, etc)

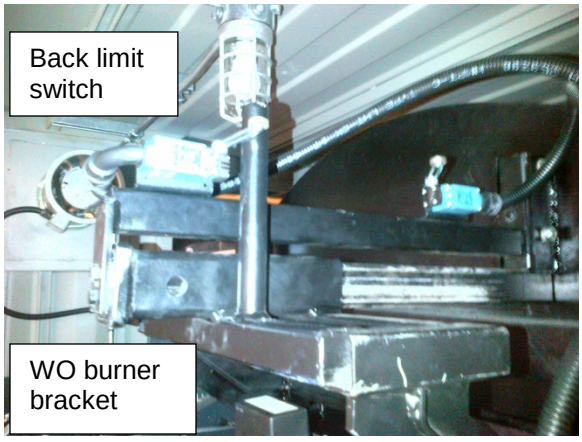
NOTE
Load only the waste stream that the unit has been rated for see Facility Manual Part II Section 4 Waste Processing Capabilities.

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

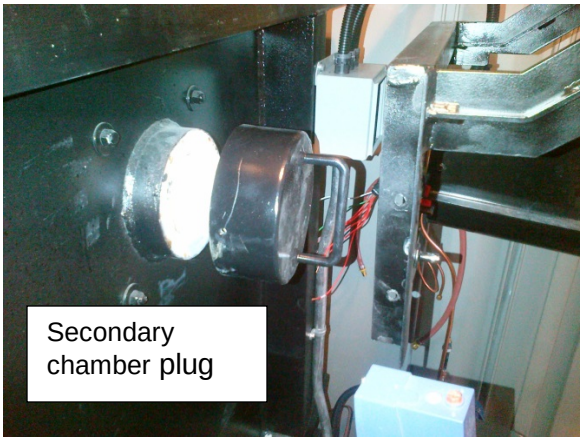
NOTE
Do not load the Primary Chamber such that the breech section is blocked in any way

i. Close the Primary Chamber access door by clamping each latch until it is tight

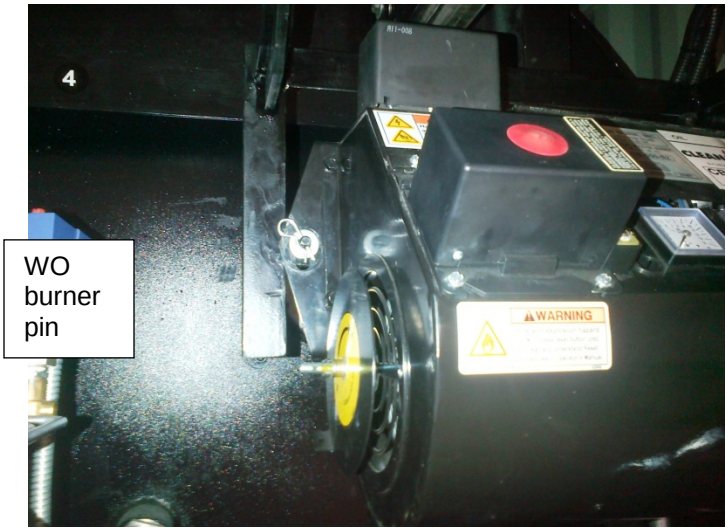
j. Ensure that the waste oil burner is all the way out (limit switch in the back of the bracket activated), insert the waste oil plug in place and insert the locking pin to avoid burner from swinging



Waste oil all the way out limit switch made



Secondary chamber plug being installed



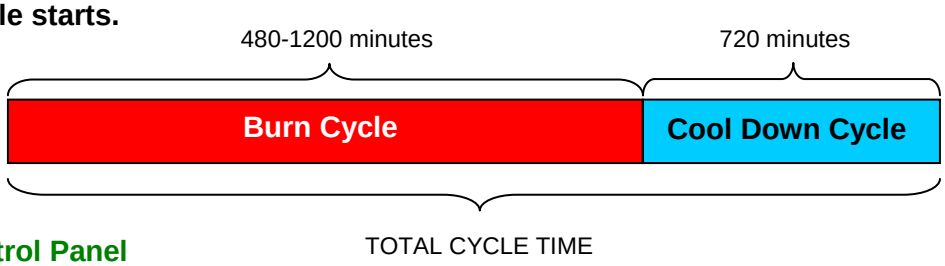
Waste oil burner secured with pin

k. Proceed to the Control Panel on the HMI Panel View, from the Top View menu choose solid waste only.

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.



Main Control Panel

l. On the Main Control Panel press “Start” on HMI (Panel View). The following steps will automatically take place, controlled by the 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 will purge for safety and upon completion with ignite
iv. The Burn time will start counting down when the temperature in the Primary Chamber reaches 427°C

NOTE

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

v. After the burn cycle is completed, the system will automatically enter the Cool Down cycle and the following will be shown on the system status:
- Primary Chamber & Secondary Chamber burners OFF
- Secondary Chamber Blower OFF
- Primary Modutrol 100% open
- Primary Blower ON

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

NOTE

System drains and exhausts should discharge at atmospheric pressure. In order to prevent inaccurate readings or instrument damage, do not allow the discharge side to back up or freeze.

3.3.4.2 Clean Out

Operators responsible for loading and cleaning out incinerators shall wear appropriate protective equipment, including 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 shall not be inhaled. The operator shall wear dust protection safety gear.

When the internal temperature of the Primary Chamber has cooled to less than 90°C, lock out the power to the system on the Main Control Panel by moving the main disconnect to the “OFF” position.

a. Unlock all door latches on the access door to the Primary Chamber

b. While standing in front of the Primary Chamber door, slowly open the door to its fully open position. Secure Primary Door in the open position.
c. Inspect the interior for wear and inspect around the door seals to ensure the door will maintain a tight seal upon closure
d. Check the air inlet holes and remove any obstructions if necessary.

e. Inspect the door seals to ensure there are no gaps between the door gasket and the door jamb

f. Close the Primary Chamber access door by clamping each latch until it is tight

g. 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.

3.3.4.3 Burning Waste Oil

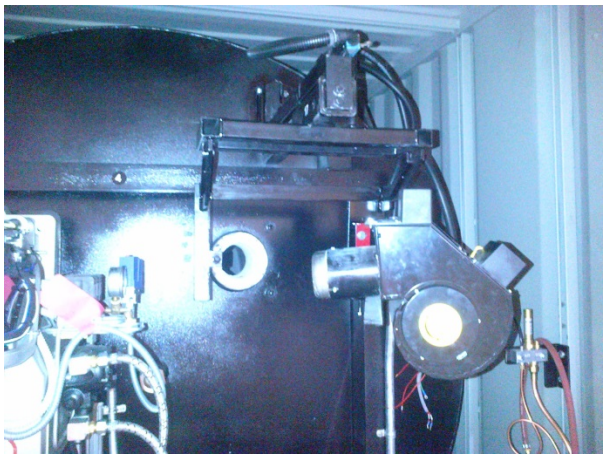
Do not use this incinerator to burn waste oil only. Always burn a complete load of solid waste when burning waste oil

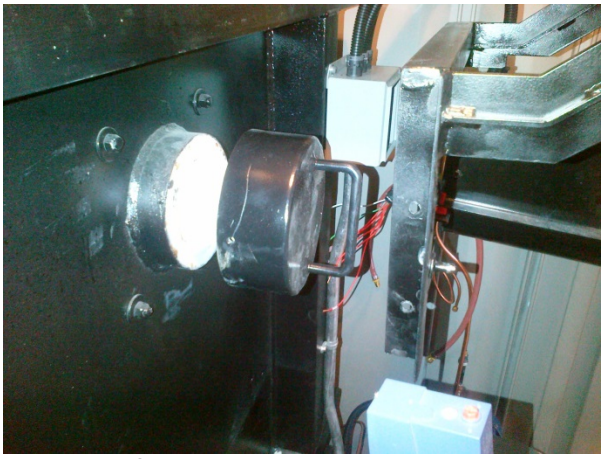
a. Follow all the procedures to load the primary chamber as per procedure 3.3.4.1 above.

Ensure the waste oil valve is opened (by the tank).

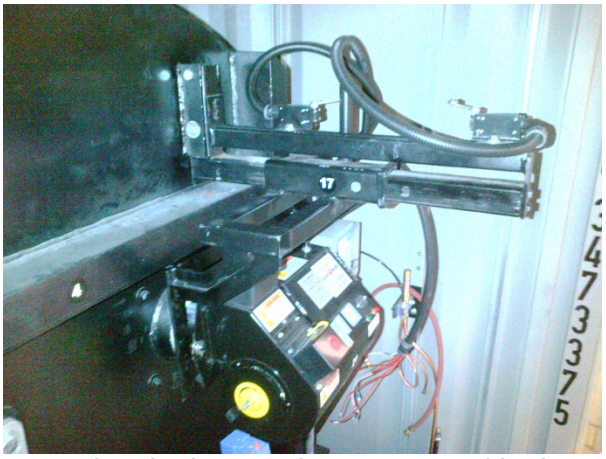
b. Ensure that the secondary chamber plug is removed, the burner cannot swing open by locking the pin and the waste oil burner is all the way in (limit switch in the front of the bracket activated).

With the burner all the way out remove pin


Swing the burner open



Remove plug



Swing the burner close, secure with pin and push all the way in until front limit switch is made

c. Proceed to the Control Panel on the HMI Panel View, from the Top View menu choose Solid Waste and Waste Oil.

3.3.5 Start up

3.3.5.1 After Shut Down (Emergency)

a. Once the power is restored main disconnect back on

b. The Operator Interface and PLC will begin a boot up procedure

c. Wait until the HMI on the control panel has booted up before turning the control power to the panel back on by pressing the Control Power ON button

d. When the power is restored to the Main Control Panel, the button should illuminate.

e. If the system was interrupted during a burn cycle, restart the system by pressing “Start” on HMI. If the system was interrupted during cool down, it will resume the cycle where it left off.

3.3.5.2 After Power Failure

a. On the main menu of the Panel View (HMI), press the Configuration Key and the application will now shut down. (This will take 1-2 minutes).

b. There will be a GREY screen with a number of Touch Buttons.

c. Press the “RUN (F1)” button on this screen.

d. The application will now restart. (This will take approximately 1-2 minutes)

e. When it is up and running, the system is now ready for operation

NOTE

In the event of a power shut down to the system, the control panel must be re-started from the HMI Panel View:

3.3.6 Dealing with Warnings and Faults

3.3.6.1 Troubleshooting

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

a. The Systems is in the “cool down” part of the cycle. Wait until the “cool down” cycle is complete.

b. There is a fault in the system as indicated on the Panel View.

c. Loss of Power due to any one or more of the following:

i. 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.

ii. An open breaker. Check the breakers and replace any that are defective.

iii. 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.