Baffinland Iron Mines Corporation
Mary River Project

Waste Management Plan for Construction, Operation, and Closure

2013-09-09	1	Approved for Use	C. Gonzalez	T. Mackay	S. Perry	J. Millard
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Document was previously number as H337697-0000-07-126-0001						
Date	**Rev.**	**Status**	**Prepared By**	**Checked By**	**Approved By**	**Approved By**

Revision History

Revision No.	Section	Revision Date	Changes	Approval
1		September 2013	Updated for Type A Water License	
0		April 2013	Updated to Support 2013 Work Program	

Track Changes Table

A review and update of the Waste Management Plan for Operation, Construction and Closure has been undertaken, with the following salient revisions to the April 2013 version.

Revision 1, September 2013:

Modification/Addition	Where they appear in the document	
	Section	Page Number
Update Roles and Responsibilities Section	5	33-39
Updated Section to align with Type A Conditions	4.3.3	17-18
Updated Section to align with Type A Conditions	4.3.4	18-19
Updated Section to align with Type A Conditions	4.4.3	22
Updated Section to align with Type A Conditions	4.5	24-25
Updated Section to align with Type A Conditions	4.5.1	25
Updated Section to align with Type A Conditions	4.5.3	27
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Added Annex 8: Table of Concordance	Annex 8	N/A

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ABBREVIATIONS

Baffinland	:	Baffinland Iron Mines Corporation
CCME	:	Canadian Council of Ministers of the Environment
EHS	:	Environmental, Health and Safety
EIS	:	Environmental impact statement
EPCM	:	Engineering, Procurement, and Construction Management
EPP	:	Environmental Protection Plan
ERCB	:	Energy Resources Conservation Board
HSE	:	Health, Safety and Environment
IIBA	:	Inuit Impacts Benefits Agreement
the Project	:	Mary River Project
NIRB	:	Nunavut Impact Review Board
NWB	:	Nunavut Water Board
NWT	:	Northwest Territories
QIA	:	Qikiqtani Inuit Association
TDG	:	Transportation of Dangerous Goods
VEC	:	Valued Ecosystem Components
WMP	:	Waste Management Plan

1. Introduction

Baffinland Iron Mines Corporation is committed to taking the necessary steps to ensure that the collection, handling, storage, transportation and disposal of wastes generated during the construction, operation and closure of the Mary River Project is conducted in a safe, efficient and environmentally compliant manner. One of the first steps towards achieving these goals is the preparation of this Waste Management Plan for Construction, Operation and Closure (WMP). The WMP establishes the roles and responsibilities of employees, contractors and other site personnel as well as protocols for handling, storing and disposing of all solid wastes generated onsite. The intent is to afford a high degree of control over the waste generation and to minimize the adverse environmental effects associated with waste generation.

The basis of a sound waste management program lies in the three R's: reduction, recovery, reuse and recycling of wastes. The main objectives of this WMP are:

- The creation of a framework for the proper handling and disposal of wastes.
- The minimization of potentially adverse impacts on the environment.
- Compliance with all regulatory requirements for waste management.

Waste generation follows the "Cradle to Grave" principle. It is the primary responsibility of all personnel to implement the plan as outlined, in accordance with their contractual and legal obligations, under the supervision of the Project Manager or Site Manager as assisted by the Site Environmental Coordinator (SEC).

This WMP applies to the Construction, Operation and Closure Phase of the Mary River Project at all project sites. This plan will be reviewed on an annual basis and updated as necessary to accommodate any deficiencies, inadequacies or potential improvements that are identified.

1.1 2013 Work Plan

A camp currently operates at both Milne Port and Mary River Mine site to support exploration activity on site. During the summer of 2013 new equipment will begin to arrive onsite for use during the construction and mining operation phase of the site. Prior to the 2013 sealift, minor site preparation activities will be undertaken at Milne Port and the Mine Site from May to July 2013 to prepare for sea lift and post sea lift construction phase of the work program. The completion of this work is contingent on receipt of a new Type B Licence (currently in process) and approval of applicable Work Plan activities by the QIA. The 2013 Work Plan and site layout plans are presented in Annex 7 to this report. Throughout the remainder of 2013 a portion of the construction and operation phase facilities will need to be installed, commissioned and brought into service. The waste management infrastructure at each project site will continue to be used as approved and designed for. During start-up and commissioning of the new waste management infrastructure, personnel levels will remain within the design capacity at each site. For the 2013, this plan will be applied as appropriate

to all project sites applicable under the existing/future Type B and future Type A Water Licence including Milne Port and the Mary River Mine Site.

1.2 Purpose

The aim of the Waste Management Plan is to implement a sound waste minimization program that will focus upon the principles of Reduction/Recovery/Reuse/Recycling. The residual waste generated by the Project activities will then be disposed of in a landfill/landfarm, incinerated or shipped off-site to southern Canada for final disposal, treatment, or recycling.

This Waste Management Plan deals with wastes generated by the Mary River Project including, among others, inert and non-hazardous solid wastes, i.e., solids, semi-solid and sludge, construction debris, domestic waste etc. The management of sewage effluent and sludge from the sewage treatment plants is the subject of the Fresh Water Supply, Sewage, and Wastewater Management Plan, H349000-1000-07-126-0006. The management of hazardous wastes (used oils, contaminated fuel, and antifreeze, used chemical products, biomedical waste and spills clean-up materials) is the subject of the Hazardous Materials and Hazardous Waste Management Plan, H349000-1000-07-126-0008.

The Waste Management Plan presents the various disposal methods, the types and expected quantities of waste produced and the ultimate disposal of the waste stream. The Plan also defines the roles and responsibilities, specific requirements, and monitoring controls for managing solid and hazardous wastes generated by the Project. It also presents the strategy for adaptive management and continuous improvement.

In order to handle, storage, transport and treat/dispose the wastes generated during the construction, operation and closure phase of the Project, several treatment or disposal facilities must be built on-site to ensure that the waste management is being conducted in a safe, efficient and environmental-compliant manner. The infrastructure deemed necessary to manage the wastes appropriately are:

- Two long term waste management facilities at the Mine Site and Steensby Port.
- Two long term landfills and land farms at the Mine Site and Steensby Port.
- Temporary landfarm, incinerator, hazardous/medical waste storage facility and waste oil treatment/recovery facility at Milne Port.
- Temporary incinerator and waste storage areas at Mine Site, Steensby Port and Rail Camps for use only during construction.
- Short term waste storage area at a future possible Tote Road camp (subject to regulatory approval).

All Project activities are regulated and will be performed according to the law and regulations applicable to the Project and procedures developed.

The Waste Management Plan (WMP) presented in this document establishes a management strategy for all the wastes generated during the construction, operation, closure and reclamation of the Project.

1.3 Definitions

Project : All necessary tasks and work from construction, operation, closure and reclamation phase, during the lifespan of the Project, on the Site.

Site : All of the areas occupied by the Project facilities (permanent or temporary) during the construction, operation, closure and reclamation phase of the Project.

Contractor : A person or business which provides goods, material, equipment, personnel, and/or services to Baffinland Iron Mines Corporation under terms specified in a contract.

Waste : All residual material (hazardous, non-hazardous or Putrescible) generated during the construction, operation, closure and reclamation phase of the Project.

Hazardous Waste : All kind of wastes generated during the lifespan of the Project and that present a threat to the human health or the environment because they posses one or more of the following characteristics: corrosive, reactive, explosive, toxic, inflammable, or biologically infectious.

Non-Hazardous Waste : All kind of wastes generated during the lifespan of the Project and that do not present a threat to human health or the environment.

Putrescible Wastes : All kind of wastes generated during the lifespan of the Project and that are degraded very rapidly, i.e., plants, food scraps or animal remains.

1.4 Regulatory Requirements

A number of Acts and Regulations provide specific requirements for the management of the different types of waste generated at the Mary River Project. They are:

- Territorial Lands Act 1985
- Territorial Land Use Regulations
- Nunavut Waters and Nunavut Surface Rights Tribunal Act 2002
- Canadian Environmental Protection Act
- Transportation of Dangerous Goods Act and Regulations
- Safety Act, Occupational Health and Safety Regulations

- Work Site Hazardous Materials Information Systems Regulations
- Export and Import of Hazardous Waste Regulations
- Spill Contingency Planning and Reporting Regulations
- National Fire Code
- Public Health Act
- Explosives Act
- Fisheries Act
- Metal Mining Effluent Regulations
- Petroleum Refining Liquid Effluent Regulation.

Due to the complexities and the number of acts and regulations involved, the Government of Nunavut has published a number of Guidelines to assist the generators of waste in the development and an effective waste management plan for their specific sites. These guidelines are listed as references in Section 10.

The Project will be subject to a future Type 'A' Water License. Proposed site preparation activities between May and July 2013 will be subject to its current and new Type 'B' Water Licences. Conditions during the construction phase of the Project regarding aspects of waste disposal as outlined in this Plan will/are specified by water license terms and conditions and may include the following:

- The Licensee shall perform regular inspection of all waste management facilities. Records of inspection shall be available for the Inspector upon request.
- Submission of landfill expansion design documents t prior to construction.
- Any required updates to the Landfill Operations and Maintenance Plan.
- Submission of a revised Environmental Monitoring Plan.
- The Licensee shall locate areas designated for solid waste transfer or temporary storage at a minimum distance of thirty-one (31) metres from the ordinary high water mark of any water body such that the quality, quantity or flow of water is not impaired, unless otherwise approved by the Board in writing.
- Prior to the removal and transfer of waste, a declaration of authorization must be obtained from the Hamlet of Pond Inlet which clearly indicates the authorization to allow the deposit of solid waste in the Hamlet's NWB licensed solid waste facility.
- Records must be maintained of waste (including hazardous waste, waste oil, and non-combustible waste) that is backhauled and records must be maintained confirming proper disposal/fate of backhauled waste.

- Food waste, paper waste, and wood products must be incinerated using an incinerator capable of meeting Canada Wide Standards for Dioxins and Furans, and Mercury.
- The Licensee shall implement waste reduction and recycling practices.
- To the extent possible, the Licensee shall sort waste at the source.
- Recyclable waste material (scrap metal/machinery) shall be stored separately from general debris and solid waste.
- All solid waste generated at temporary construction sites or at Milne Port shall be transported to either the Mine Site landfill or the Steensby Port landfill for ultimate disposal.

1.5 Relationship to Other Management Plans

This plan is based on the concepts and principles found in Appendix 10A-1 EHS Management System Framework Standard and 10A-2 Hazard Identification and Risk Assessment Standard of the FEIS. The plan should be reviewed in concert with the following additional plans that have been prepared for the FEIS and in some cases, updated in early 2013:

- Construction Environmental Protection Plan.
- Surface Water and Aquatic Ecosystem Management Plan.
- Wastewater Management Plan.
- Freshwater Supply, Sewage and Wastewater Management Plan.
- Preliminary Mine Closure and Reclamation Plan.
- 2013 Abandonment and Reclamation Plan for Advanced Exploration.
- 2013 Work Plan Marginal Closure Cost Summary.
- Air Quality and Noise Management Plan.
- Emergency Response and Spill Contingency Plan.
- Explosives Management Plan.
- Terrestrial Wildlife Management Plan.
- Hazardous Materials and Hazardous Waste Management Plan.

1.6 Baffinland's Commitments

Baffinland provides adequate resources to implement and maintain the EHS Management System including the necessary human, material and financial resources. Baffinland's Health Safety and Environment (HSE) Policy is presented in Section 2.

1.7 Update of This Management Plan

The Waste Management Plan is a "living document". It will be regularly updated on the basis of management reviews (as outlined in Section 8), incident investigations, regulatory changes or other Project related changes.

2. Baffinland Policy

2.1 Health Safety and Environment (HSE) Policy

Figure: Health Safety and Environment (HSE) Policy

Baffinland
Iron Mines Corporation

Mary River Project
Health, Safety and Environment Policy

The Baffinland Iron Mines Corporation (BIMC) Mary River Project Health, Safety and Environment Policy is a statement of our commitment to achieving a safe, healthy and environmentally responsible workplace. We will not compromise this policy for the achievement of any other organizational goal.

The Mary River Project implements this Policy through the following commitments:

- Continual improvement of safety, occupational health and environmental performance.
- Meeting or exceeding the requirements of regulations and company policies.
- Integrating sustainable development principles into our decision-making processes.
- Maintaining an effective Health, Safety and Environment Management System.
- Sharing and adopting improved technologies and best practices to prevent injuries, occupational illnesses and environmental impacts.
- Engaging stakeholders through open and transparent communication.
- Efficiently using resources, and practicing responsible minimization, reuse, recycling and disposal of waste.
- Rehabilitation of disturbed lands to a safe, acceptable, and localized state.

Our commitment to provide the leadership and action necessary to accomplish this policy is exemplified by the following principles:

- All injuries, occupational illnesses and environmental impacts can be prevented.
- Employee involvement and active contribution is essential and required.
- Management is responsible for preventing injuries, occupational illnesses and environmental impacts.
- Working in a manner that is healthy, safe and environmentally sound is a condition of employment.
- All operating exposures can be safeguarded.
- Training employees to work in a manner that is healthy, safe and environmentally sound is essential.
- Prevention of personal injuries, occupational illnesses and environmental impacts is good business.
- Respect for the communities in which we operate is the basis for productive relationships.

We have a responsibility to provide a safe workplace and utilize systems of work to meet this goal. All employees must be clear in understanding the personal responsibilities and accountabilities in relation to the tasks we undertake.

The Mary River Project has no higher priority than the health and safety of all people working on our behalf and the responsible management of the environment. In ensuring our overall profitability and business success every Baffinland and business partner employee working at one of our work sites is required to adhere to this policy.

Tom Peddon
President and Chief Executive Officer
March 2013

2.2 Baffinland Sustainability Policy

At Baffinland Iron Mines Corporation, we are committed to conducting all aspects of our business in accordance with the principles of sustainable corporate responsibility and always with the needs of future generations in mind. Everything we do is underpinned by our responsibility to protect the environment, to operate safely and fiscally responsibly and to create authentic relationships. We expect each and every employee, contractor, and visitor to demonstrate a personal commitment to this policy through their actions. We will communicate the Sustainable Corporate Policy to the public, all employees and contractors and it will be reviewed and revised as necessary on an annual basis.

These four pillars form the foundation of our corporate responsibility strategy:

Health and Safety
Environment
Investing in our Communities and People
Transparent Governance

1.0 HEALTH AND SAFETY

- We strive to achieve the safest workplace for our employees and contractors; free from occupational injury and illness from the very earliest of planning stages. Why? Because our people are our greatest asset. Nothing is as important as their health and safety.
- We report, manage and learn from injuries, illnesses and high potential incidents to foster a workplace culture focused on safety and the prevention of incidents.
- We foster and maintain a positive culture of shared responsibility based on participation, behaviour and awareness. We allow our workers and contractors the right to stop any work if and when they see something that is not safe.

2.0 ENVIRONMENT

- We employ a balance of the best scientific and traditional Inuit knowledge to safeguard the environment.
- We apply the principles of pollution prevention and continuous improvement to minimize ecosystem impacts, and facilitate biodiversity conservation.
- We continuously seek to use energy, raw materials and natural resources more efficiently and effectively. We strive to develop pioneering new processes and more sustainable practices.
- We understand the importance of closure planning. We ensure that an effective closure strategy is in place at all stages of project development and that progressive reclamation is undertaken as early as possible to reduce potential long-term environmental and community impacts.

3.0 INVESTING IN OUR COMMUNITIES AND PEOPLE

- We respect human rights and the dignity of others. We honour and respect the unique culture, values and traditions of the Inuit people.
- We contribute to the social, cultural and economic development of sustainable communities adjacent to our operations.
- We honour our commitments by being sensitive to local needs and priorities through engagement with local communities, governments, employees and the public. We work in active partnership to create a shared understanding of relevant social, economic and environmental issues, and take their views into consideration when making decisions.

4.0 TRANSPARENT GOVERNANCE

- We will take steps to understand, evaluate and manage risks on a continuing basis, including those that impact the environment, employees, contractors, local communities, customers and shareholders.
- We ensure that adequate resources are available and that systems are in place to implement risk-based management systems, including defined standards and objectives for continuous improvement.
- We measure and review performance with respect to our environmental, safety, health, socio-economic commitments and set annual targets and objectives.
- We conduct all activities in compliance with the highest applicable legal requirements and internal standards

We strive to employ our shareholder's capital effectively and efficiently. We demonstrate honesty and integrity by applying the highest standards of ethical conduct.

Tom Paddon
President and Chief Executive Officer
September 2011

3. Targeted VEC's

Waste will be generated throughout the life cycle of the project. To ensure that wastes are handled, stored and managed in a safe and environmentally acceptable manner, Baffinland will apply best practices for its waste management activities.

Inadequate handling, storage and elimination of waste could impact the following valued ecosystem components (VECs):

- Soils (spills and contamination).
- Water quality (contamination of runoff).
- Fish and fish habitat.
- Permafrost.
- Vegetation (uptake of contaminants or loss of vegetation).
- Birds (exposure and ingestion of contaminants).
- Terrestrial wildlife (exposure and ingestion of contaminants).
- Human health (exposure and ingestion of contaminants).

4. Waste Management Approach

The aim of the Waste Management Plan is to implement a sound waste minimization program that will focus upon the principles out lined in Appendix 10A-1 EHS Management System Framework Standard. The remaining waste will then be disposed of in a non-hazardous landfill, incinerated or shipped off-site for final disposal/treatment or recycling.

4.1 Waste Identification

A summary of the types of waste expected to be generated by the Project, and disposal method, are presented below. Operations and Maintenance procedures will be developed for each waste to be managed. This information will be summarized in manuals and training will be provided as required. For the majority of long term infrastructure, the facilities used in construction will be the same ones used during the operations phase.

Error! Reference source not found. presents an overview of the types of waste generated by the Mary River Project and the general disposal method for each type of waste.

Table 4–2, Table 4–3, and Table 4–4, presents the expected quantities of waste generated for the construction and operation phases respectively presents the expected quantities of waste generated for the construction and operation phases respectively.

4.2 Waste Management Methods

Wastes remaining after application of the waste minimization techniques will be managed in a practical and environmentally responsible manner utilized methods appropriate for each waste type generated. The following methods will be applied at the site:

- Waste sorting at all generation points.
- Incineration of non-hazardous combustible wastes.
- Open burning in a regulated burn pit of untreated wood and cardboard.
- Landfilling of inert non-combustible wastes.
- Temporary storage and off-site shipping of hazardous and recyclable waste materials.
- On-site treatment for contaminated soil and oily water from hydrocarbon spills in a landfarm.

Note: Prior to the commencement of any open burning Baffinland will incorporate into the Waste Management Plan a section that details open burning QA/QC provisions including requirements to document and report on the type and quantity of material being burnt. Surface water and sediment quality of potentially affected water bodies will be monitored as outlined by the Surface Water and Aquatic Ecosystems Management Plan.

Table 4–1: Waste Type and General Disposal Methods

Source	Waste Description	Waste Type	General Disposal Method
Offices	Computers and other electronic wastes, fluorescent lights	Recycle	Off-site recycling or disposal
	Waste paper	Combustible/ non-hazardous	Incineration
Wastewater treatment facility	Biological sludge (dried solids)	Combustible/ non-hazardous	Incineration/Landfilling
Maintenance complex	Used batteries, waste hydrocarbon products, engine oil, oil filters, glycols, aerosol cans, refrigerants, solvents, etc.	Hazardous	Off-site recycling or disposal, possible reuse of fuel and oil for heating and other uses.
	Scrap metal, tires, rubber, plastic	Inert	Inert landfill
Laboratory	Chemical laboratory wastes, toxic substances	Hazardous	Off-site recycling or disposal
Domestic waste from construction camp, accommodation facility and kitchens/canteens	Accommodation facility garbage, food wastes	Combustible/ non-hazardous	Incineration

Source	Waste Description	Waste Type	General Disposal Method
Inert waste from construction sites and materials from operations	Treated wood, plastics, cement, sand, used construction materials, metal, pipes, glass, insulation, etc.	Inert	Landfill
	Untreated wood/cardboard	Combustible/ non-hazardous	Incineration/open burning
Medical facility	Biomedical wastes	Hazardous	Biomedical off-site disposal
Incinerator	Ash (placed in closed drums)	Inert	Inert Landfill (if non-hazardous)
Fuel spill	Hydrocarbon-contaminated soil	-	On-site treatment using landfarm facility
Fuel spill	Hydrocarbon-contaminated snow/water/ice	-	On-site treatment and reuse of product if practical

Table 4–2: Waste Generation Estimates

Non-Hazardous Solid Waste Generation Estimate										
Project Phase and Location	Time Period	On Site Personnel [1]	Total Waste Generated (excluding sludge and ash)[2]	Incineration Waste			Inert Landfill Waste			
				Waste Stream - Suitable for Incineration	Sewage Sludge Cakes [6]	Total Waste Incinerated	Waste Stream - Suitable for Landfill	Inert Wastes[6]	Ash[7][9]	Total
			(tonnes)					(m^3)		
2013 WORK PLAN										
Mine Site Camp	Daily (avg)	320	1.79	0.60	0.12	0.72	1.19	2.99	0.36	3.34
	Annual	320	654	218	43.2	261	436	1090	131	1221
	Total[7] (2 years)		1308	436	86.4	522	872	2180	261	2442
Milne Inlet Camp	Daily (avg)	175	0.98	0.33	0.06	0.39	0.65	1.63	0.20	1.83
	Annual	175	358	119	23.6	143	238	596	71	668
	Total[7] (2 years)		715	238	47.3	286	477	1192	143	1335
Tote Road Construction Camp[8]	Daily (avg)	49	0.27	0.09	0.02	0.11	0.18	0.46	0.05	0.51
	Annual	49	100	33	6.6	40	67	167	20	187
	Total[7] (2 years)		200	67	13.2	80	134	334	40	374
2013 Work Plan Total			**2224**	**741**	**147**	**888**	**1483**	**3706**	**444**	**4151**
CONSTRUCTION PHASE[3]										
Mine Site Camp	Daily (avg)	1200	6.72	2.24	0.44	2.68	4.48	11.20	0.67	11.87
	Annual	1200	2453	818	162.1	980	1635	4088	245	4333
	Total[7] (4 years)		9811	3270	648.2	3919	6541	16352	980	17332
Steensby Port Camp	Daily (avg)	600	3.36	1.12	0.22	1.34	2.24	5.60	0.34	5.94
	Annual	600	1226	409	81.0	490	818	2044	122	2166
	Total[7] (4 years)		4906	1635	324.1	1959	3270	8176	490	8666
Milne Port Camp	Daily (avg)	165	0.92	0.31	0.06	0.37	0.62	1.54	0.09	1.63
	Annual	165	337	112	22.3	135	225	562	34	596
	Total[7] (4 years)		1349	450	89.1	539	899	2248	135	2383

Non-Hazardous Solid Waste Generation Estimate										
Project Phase and Location	Time Period	On Site Personnel [1]	Total Waste Generated (excluding sludge and ash)[2]	Incineration Waste			Inert Landfill Waste			
				Waste Stream - Suitable for Incineration	Sewage Sludge Cakes [6]	Total Waste Incinerated	Waste Stream - Suitable for Landfill	Inert Wastes[6]	Ash[7][9]	Total
			(tonnes)					(m^3)		
Rail Camp (Ravn River)[8]	Daily (avg)	200	1.12	0.37	0.07	0.45	0.75	1.87	0.11	1.98
	Annual	200	409	136	27.0	163	273	681	41	722
	Total[7] (4 years)		1635	545	108.0	653	1090	2725	163	2889
Rail Camp (Mid Rail)[8]	Daily (avg)	200	1.12	0.37	0.07	0.45	0.75	1.87	0.11	1.98
	Annual	200	409	136	27.0	163	273	681	41	722
	Total[7] (4 years)		1635	545	108.0	653	1090	2725	163	2889
Rail Camp (North Cockburn)[9]	Daily (avg)	200	1.12	0.37	0.07	0.45	0.75	1.87	0.11	1.98
	Annual	200	409	136	27.0	163	273	681	41	722
	Total[7] (4 years)		1635	545	108.0	653	1090	2725	163	2889
Rail Camp (South Cockburn)[9]	Daily (avg)	300	1.68	0.56	0.11	0.67	1.12	2.80	0.17	2.97
	Annual	300	613	204	40.5	245	409	1022	61	1083
	Total[7] (4 years)		2453	818	162.1	980	1635	4088	245	4333
Construction Total			**20971**	**6990**	**1386**	**8376**	**13981**	**34952**	**2094**	**37046**
OPERATION PHASE[4]										
Mine Site Camp	Daily (avg)	475	2.66	1.33	0.18	1.51	1.33	3.33	1.51	4.83
	Annual	475	971	485	64.1	550	485	1214	550	1763
	Total[7] (20 years)		19418	9709	1283.0	10992	9709	24273	10992	35264
Steensby Port Camp	Daily (avg)	175	0.98	0.49	0.06	0.55	0.49	1.23	0.55	1.78
	Annual	175	358	179	23.6	202	179	447	202	650
	Total[7] (20 years)		7154	3577	472.7	4050	3577	8943	4050	12992
Operation Total			**26572**	**13286**	**1756**	**15042**	**13286**	**33215**	**15042**	**48257**

Non-Hazardous Solid Waste Generation Estimate										
Project Phase and Location	Time Period	On Site Personnel [1]	Total Waste Generated (excluding sludge and ash)[2]	Incineration Waste			Inert Landfill Waste			
				Waste Stream - Suitable for Incineration	Sewage Sludge Cakes [6]	Total Waste Incinerated	Waste Stream - Suitable for Landfill	Inert Wastes[6]	Ash[7][9]	Total
			(tonnes)					(m^3)		

[1] Maximum populations were assumed to be carried year round to be conservative
[2] Disposal Rate of 5.6 kg/day - Cold Region Utilities Monograph, 3rd edition, pg 14-16 1996
[3] Assumed 1/3 of waste stream is suitable for incineration, 2/3 suitable for landfill during construction phase due to high amounts of packaging waste during construction
[4] Assume 1/2 of waste stream is suitable for incineration, 1/2 suitable for landfill during operation phase as per Meadowbank Landfill Management Plan, 2008
[5] Estimated sewage sludge production at 0.37 kg/person/day based on Draft EIS Appendix 10D-3, Seprotech specification
[6] Estimated waste density was assumed as 0.4 tonnes/m^3 for moderately compacted solid waste - AMEC Earth & Environmental. Victor Diamond Mine Project Comprehensive Study. Waste Management Addendum Jan 18 2005
[7] Estimated ash density was assumed as 1.0 tonnes/m^3 - AMEC Earth & Environmental. Victor Diamond Mine Project Comprehensive Study. Waste Management Addendum Jan 18 2005
[8] Assume all waste suitable for landfill goes to Mine site
[9] Assume all waste suitable for landfill goes to Steensby Port
[9] Assume 95% volume reduction, 200 kg/m^3 density for non-compacted waste

Table 4–3: Estimated Domestic Solid Non Hazardous Waste Generation

Waste	Waste Description	Disposal Method	Est. Total Annual Production (tonnes)
2013 Work Plan			
Organic	Kitchens	Incinerator	586
Paper	Packaging/Offices	Incinerator/On-site landfill	168
Plastic	Offices/Camps	Incinerator2/On-site landfill	120
Cardboard	Packaging/Camps	Incinerator	128
Cloth	Camps	Incinerator	39
Multi-Material	Packaging/Camps	Incinerator/On-site landfill	28
Metal	Packaging	On-site landfill	17
Glass	Camps	On-site landfill	16
Wood	Packaging	Incinerator	11
Construction Phase			
Organic	Kitchens	Incinerator	6172
Paper	Packaging/Offices	Incinerator/On-site landfill	1769
Plastic	Offices/Camps	Incinerator[2]/On-site landfill	1265
Cardboard	Packaging/Camps	Incinerator	1347
Cloth	Camps	Incinerator	410
Multi-Material	Packaging/Camps	Incinerator/On-site landfill	293
Metal	Packaging	On-site landfill	176
Glass	Camps	On-site landfill	164
Wood	Packaging	Incinerator	117
Operation Phase			
Organic	Kitchens	Incinerator	7002
Paper	Packaging/Offices	Incinerator/On-site landfill	2006
Plastic	Offices/Camps	Incinerator[3]/On-site landfill	1435
Cardboard	Packaging/Camps	Incinerator	1528
Cloth	Camps	Incinerator	465
Multi-Material	Packaging/Camps	Incinerator/On-site landfill	332
Metal	Packaging	On-site landfill	199
Glass	Camps	On-site landfill	186
Wood	Packaging	Incinerator	133

[1] Composition based in part on 2011 Mary River Waste Audit results (Aug 27 - Aug 29), Assume 50% of waste generated to be domestic

[2] Poly-chlorinated plastics will be sorted out of waste stream and sent to landfill and will not be incinerated

Table 4–4: Estimated Hazardous Waste Generation [1]

Waste	Waste Description	Disposal Method	Est. Total Annual Production (tonnes)
2013 Work Plan			
Waste oils and fluids	Maintenance	Shipped off Site	0.64
Batteries	Maintenance	Shipped off Site	0.06
Spent activated carbon	Domestic	Shipped off Site	0.06
Aerosol containers	Misc.	Shipped off Site	0.04
Empty compressed gas cylinders	Misc.	Shipped off Site	minimal
Kitchen grease	Kitchen	Shipped off Site	0.28
Crushed drums/plastic pails	Misc.	Shipped off Site	0.13
Spoiled CaCl	Drilling	Shipped off Site	0.02
Construction Phase			
Waste oils and fluids	Maintenance	Shipped off Site	133
Batteries	Maintenance	Shipped off Site	13
Spent activated carbon	Domestic	Shipped off Site	13
Aerosol containers	Misc.	Shipped off Site	8
Empty compressed gas cylinders	Misc.	Shipped off Site	minimal
Kitchen grease	Kitchen	Shipped off Site	57
Crushed drums/plastic pails	Misc.	Shipped off Site	26
Spoiled CaCl	Drilling	Shipped off Site	4
Operation Phase			
Waste oils and fluids	Maintenance	Shipped off Site	76
Batteries	Maintenance	Shipped off Site	7
Spent activated carbon	Domestic	Shipped off Site	8
Aerosol containers	Misc.	Shipped off Site	5
Empty compressed gas cylinders	Misc.	Shipped off Site	minimal
Kitchen grease	Kitchen	Shipped off Site	33
Crushed drums/plastic pails	Misc.	Shipped off Site	15
Spoiled CaCl	Drilling	Shipped off Site	3
Contaminated Soils or Snow to Landfarm during all phases (m^3)[2]			
Soils contaminated with Hydrocarbon	Fuel spill	On-site treatment (landfarm)	8400
Water/ice/snow contaminated with HC	Fuel spill	On-site treatment (landfarm)	25200

1 Composition based on Canutuec Hazardous Waste Shipment Manifest from Mary River Project 2011
2 Assume 350 m^3 of contaminated soil 1/4 of the year, Landfarm Design and Management Plan, Meadowbank Mine (Golder, 2007)
3 Assume 350 m^3 of contaminated snow/ice 3/4 of the year, Landfarm Design and Management Plan, Meadowbank Mine (Golder, 2007)

4.3 Waste Flow

Visual representations of waste flows are presented in Annex 1 as block flow diagrams. Waste streams are described and their respective storage and treatment paths are demonstrated. Diagrams are provided for construction and operation phase for the Mine Site and Steensby Port. Diagrams are provided for construction phase for Milne Port, Mid-Rail Rail Camp, Ravn River Rail Camp and Cockburn Lake Rail Camp. 1

4.3.1 Generation Points

Waste will be sorted and collected at all major generation points at each project site (Mary River, Steensby Port, Milne Port, and Rail Camps) according to the Mary River Project Waste Sorting Guidelines (Annex 6). Disposal will occur in appropriately labelled receptacles based on disposal methods and waste sorting guidelines. This will ensure waste types are disposed of in the correct methods as outlined in Table 4–1. Waste will be stored indoors or in secure wildlife proof receptacles prior to collection.

4.3.2 Waste Collection

Waste will be collected from generation points regularly by a waste collection vehicle(s) and taken the appropriate waste handling facility for treatment and/or final disposal as shown in Annex 1. Waste will be collected by personnel trained in waste handling guidelines and personnel will use visual inspection to ensure waste types are taken to the appropriate treatment or disposal location.

4.3.3 Temporary Waste Sorting and Processing Facilities (during Construction Phase only)

Temporary waste management facilities will be constructed at all sites (Mary River, Steensby Port, Milne Port, Ravn River Rail Camp, Mid Rail Camp and South Cockburn Lake Rail Camp for use only during the construction phase.

These facilities will consist of:

- A secure central depot where waste generated across the site will be managed, properly processed, packaged, labelled, inventoried, secured (e.g., on pallets) and stored for transportation to disposal site as per Block Flow Diagrams in Annex 1.
- All wildlife attracting wastes such as organics, sewage waste or petroleum based chemicals will be stored animal proof containers inside a secured area that will be monitored.

As much as possible and practical, the various waste streams will be sorted at the source according to the Mary River Project Waste Sorting Guideline (Annex 6).

All wastes generated during construction, operation and closure will be managed in order to prevent any wastes entering any Water body. Thus, area designated as waste disposal will be located at a minimum distance of thirty-one (31) metres from the ordinary High Water Mark of any water body such that the quality, quantity or flow of water is not impaired. 1

Wastes generated from the temporary and permanent shelters along the Tote Road and the Railway Corridor will be temporarily stored in containers and will be removed to be temporarily stored at one of the designated locations on-site. 1

BIM will maintain records of all Waste backhauled from the Mary River Project and confirmation of proper disposal through the use of Waste manifest tracking systems and registration with the Government of Nunavut, Department of Environment. These records will be available upon request, to an Inspector or the Board. 1

4.3.4 Permanent Waste Sorting and Processing Facilities

Permanent waste management facilities will be constructed at Steensby Port and the Mine Site. These facilities will consist of a heated all season building and adjacent laydown areas that provide the following capabilities, functions and/or facilities:

- A central depot where waste generated across the site will be managed, properly processed, packaged, labelled, inventoried, secured (e.g., on pallets) and stored for sealift or reuse on site.
- The waste management facility has a poured concrete floor with large doors for transferring waste in and out plus an adjacent office for the waste management technician.
- Waste oil storage tank adjacent to facility with waste oil filtering process inside and temporary storage for filtered or unfiltered oil.
    - The filtered waste oil will be used for waste oil burners used to heat select facilities on site which include the waste management facility itself, truck warming shed, etc. Waste oil can also be blended into fuel for certain operations.
- Oil filter draining and crushing facility.
- Drum crushing machine.
- Strapping and plastic wrap capabilities.
- Label making capabilities.

As much as possible and practical, the various waste streams will be sorted at the source according to the Mary River Project Waste Sorting Guideline (Annex 6).

All food waste and other animal attractants (greases, glycol based antifreeze) will be stored inside of the facility prior to incineration to avoid the attraction of wildlife.

All wastes generated during construction, operation and closure will be managed in order to prevent any wastes entering any Water body. Thus, area designated as waste disposal will be located at a minimum distance of thirty-one (31) metres from the ordinary High Water Mark of any water body such that the quality, quantity or flow of water is not impaired. 1

Prior to a planned discharge from any Waste Management Facility, Oily Water/Wastewater Treatment Facilities, Sewage Treatment Facilities, and any other relevant facilities associated 1

with the Project, BIM will provide at least ten (10) days' notice to the Inspector. The notice will include the estimated volume proposed for Discharge and the location and description of the receiving environment.

Prior the removal and transfer of wastes, BIM will provide to Nunavut Water Board (NWB) a Chain of Custody Form for southern destination receiving the wastes; however, wastes will not go to community hamlets. 1

BIM will maintain records of all Waste backhauled from the Mary River Project and confirmation of proper disposal through the use of Waste manifest tracking systems and registration with the Government of Nunavut, Department of Environment. These records will be available upon request, to an Inspector or the Board. 1

Table 4–5: Mary River Project Waste Management Facility Summary

Location	Facility Type	Components	Function
Milne Port	Temporary - Waste Management Facility	• Secured laydown area • Heated building • Incinerator • secure hazardous waste storage area • Used tire storage area	A central depot where hazardous waste and waste suitable for incineration generated across the site will be managed properly processed, packaged, labelled, inventoried, and treated and/or stored for disposal on site or off site as appropriate.
Milne Port	Landfarm	• Landfarm facility	See Annex 5.
Mine Site	Temporary - Waste Management Facility	• Secured laydown area • Secure hazardous waste storage area and containers • Animal proof containers for storage of animal attracting waste	A secure central depot where waste generated across the site will be managed, properly processed, packaged, labelled, inventoried, secured (e.g., on pallets) and stored for transportation to disposal or treatment locations
Mine Site	Landfarm	• Landfarm facility	See Annex 5.
Mine Site	Landfill	• Licensed Landfill facility • Access road • Used tire storage area	Disposal of inert, non-combustible waste and non-hazardous wastes.
Mine Site	Permanent - Waste Management Facility	• Secured area, • heated building, • incinerator, • secure hazardous waste storage area	A central depot where hazardous waste and waste suitable for incineration generated across the site will be managed properly processed, packaged, labelled, inventoried, and treated and/or stored for disposal on site or off site as appropriate.
Steensby Port	Temporary - Waste Management Facility	• Secured area, • Secure hazardous waste storage area • Animal proof containers for storage of animal attracting waste	A secure central depot where waste generated across the site will be managed, properly processed, packaged, labelled, inventoried, secured (e.g., on pallets) and stored for transportation to disposal or treatment locations.
Steensby	Landfarm	• Landfarm facility	See Annex 5.

Location	Facility Type	Components	Function
Port			
Steensby Port	Landfill	• Licensed Landfill Facility • Access road • Used tire storage area	Disposal of inert, non-combustible waste and non-hazardous wastes.
Steensby Port	Permanent - Waste Management Facility	• Secured area, • Heated building, • Incinerator, • Secure hazardous waste storage area	A central depot where hazardous waste and waste suitable for incineration generated across the site will be managed properly processed, packaged, labelled, inventoried, and treated and/or stored for disposal on site or off site as appropriate.
Ravn River Rail Camp	Temporary - Waste Management Facility	• Secured area, • Incinerator, • secure hazardous waste storage area	A central depot where hazardous waste and waste suitable for incineration generated across the site will be managed properly processed, packaged, labelled, inventoried, and treated and/or stored for disposal on site or off site as appropriate.
Mid Rail Rail Camp	Temporary - Waste Management Facility	• Secured area, • Incinerator, • secure hazardous waste storage area	A central depot where hazardous waste and waste suitable for incineration generated across the site will be managed properly processed, packaged, labelled, inventoried, and treated and/or stored for disposal on site or off site as appropriate.
North Cockburn Lake Rail Camp	Temporary - Waste Management Facility	• Secured area, • Incinerator, • secure hazardous waste storage area	A central depot where hazardous waste and waste suitable for incineration generated across the site will be managed properly processed, packaged, labelled, inventoried, and treated and/or stored for disposal on site or off site as appropriate.
South Cockburn Lake Rail Camp	Temporary - Waste Management Facility	• Secured area, • Incinerator, • secure hazardous waste storage area	A central depot where hazardous waste and waste suitable for incineration generated across the site will be managed properly processed, packaged, labelled, inventoried, and treated and/or stored for disposal on site or off site as appropriate.

4.4 Waste Handling and Minimization by Category

The Waste Management Plan is designed to ensure that a sound waste management program which focuses on the principles of reduction/recovery/reuse/recycling is implemented. The following are examples the Mary River Project will undertake to minimize the amount of waste being generated on Project sites and ensure proper handling.

4.4.1 Grubbed Material and Soil

There will be a need during and at the completion of construction for re-establishment of disturbed areas. There is very little topsoil and vegetation at the site, but what is available will be stockpiled for future use when re-establishing disturbed areas, including the temporary camp sites and laydown areas.

4.4.2 *Other Spoils Removed During Excavation*

Every effort will be made during the design to balance the cut and fill requirements. However most of the fill area has requirements for stability of materials that will preclude the use of some of the excavated materials. Such materials will be disposed of in one of the designated Disposal Sites (e.g., used for landfill cover) or used in other applications as much as possible.

4.4.3 *Nonhazardous Waste Materials Generated During Construction Operations*

A large amount of material will be generated during the construction operation, including packing materials, containers, temporary supports and general construction debris, used tools and pieces of construction material.

It is anticipated that some of the contractors generating this waste will carry out their own salvage of economically worthwhile recyclables, particularly ferrous metals and copper, where a ready market exists. Typically tires, where the casings are sound, are retreaded for ongoing use, reducing the materials requiring final disposal.

In some cases large amounts of a single waste product will be produced, that can be readily source separated. Specific items identified at this time include:

- Timber **-** generated by unpacking, and from the disposal of temporary supports. Where possible shipments will be bought in on pallets that can be returned for reuse, thereby reducing the waste generated. Where timber waste consists of clean timber of useable size it will be stacked and made available for reuse. Timber that is not reusable will be disposed of via open burning. Note that chemically treated timber shall be separated and, if it cannot be reused, shall be disposed of in the nonhazardous landfill.
- Polyethylene film - Film is used in large quantities to wrap and hence protect equipment. It is anticipated that substantial amounts will be generated by unpacking equipment. Opportunities for recycling this material will be explored and if practical the film will be baled and shipped for reuse. Otherwise, it will be disposed of in the non-hazardous landfill on site.
- Steel and other scrap metal waste shall be kept separate from the other solid waste produced during construction. Separation of steel and scrap metal from other solid waste shall be the responsibility of site personnel handling the materials. If economically worthwhile steel and other scrap metal waste will be shipped off site for recycling, otherwise it will be disposed of in the on-site non-hazardous landfill.

Recyclable materials shall be placed in appropriate recycling bins or on pads by site personnel. Containers shall be clearly marked and have signage reminding all workers of what is recyclable and what is not. Recycling bins shall be placed alongside garbage bins to promote recycling habits.

All other nonhazardous waste material will be separated at source into categories, based on potential for recycling, such as metal containers, water bottles, corrugated board, and the need for segregation for final disposal, such as tire casings.

During the course of the project, opportunities will be explored to expand the list of recyclables, particularly for wastes generated in large quantities. Recyclable materials shall be placed in appropriate recycling bins by site personnel. Containers shall be clearly marked and have signage reminding all workers of what is recyclable and what is not. Recycling bins shall be placed alongside garbage bins to promote recycling habits.

All sites will be provided with, at fixed locations, separate containers/areas for each type of waste to be separated, and dispose of to a recycling facility off site, hazardous waste facility off-site, landfill, or incinerator. The containers will be located in convenient locations to encourage utilization, and will be protected by fencing, to catch any wind blow generated during transfer of waste to the containers.

Each contractor will be responsible for bringing all of the waste collected on their site to the provided waste containers.

In locations where organic (food) waste will be generated, a separate container will be provided for this waste, secure against animal access. These organic waste containers will be emptied each day, and the waste will be disposed by incineration.

Untreated wood and cardboard will be open burned. Plastics, wood treated with preservatives, electric wire, Styrofoam, asbestos or painted wood, will not be open burned to prevent the deposition of waste materials of incomplete combustion and/or leachate from contaminated ash residual, from impacting any surrounding waters. 1

4.4.4 *Unset Concrete and Concrete Wash Water from Mixing and Transportation of Concrete*

During the major works, concrete will be provided from a batching plant located at the construction laydown area. Waste concrete will arise from off-spec mixes, residual concrete at the end of a pour, and from wash down of the equipment.

A purpose built pond shall be used to receive all of the waste concrete and concrete contaminated wash water. The pond that will receive wash water will be designed to allow for settling of solids and decant; and analysis, and if necessary pH adjustment, prior to discharge will occur.

All fresh concrete and concrete product waste to be disposed of onsite shall be disposed of in the concrete waste pond. No concrete truck shall be cleaned anywhere else onsite. Waste hardened concrete will be either used as fill or disposed of in one of the onsite landfills.

4.4.5 *Camp Site Waste*

During peak of construction camps will provide housing for up to 2900 of personnel across the project and provide meals and other domestic support facilities. Wastes generated from this operation will be similar to normal residential domestic garbage, with a higher percentage of organic (food) wastes.

The operation of the camp site will be by a contractor, who will have responsibility for the management, including source separation and disposal, of all waste generated on site.

Recyclables will be consolidated and disposed of to the Contractor supplied containers, and the remaining waste transported and disposed of to as per Annex1 by the Camp Contractor, using appropriate vehicles, equipped to stop any loss of either liquid or wind-blow during transportation.

The camp contractor will be required to collect all waste in secure containers, and to remove organic (food) waste daily. All containers containing food waste or items potentially contaminated by food shall be secure against animal access.

4.4.6 *Sewage Generated at the Various Working Locations and at the Rail Camp Sites*

Sewage will generate at all sites, throughout the period of construction and operation. During the period from beginning of construction until facilities are available, all sewage generated on site, will be collected in holding tanks, which will be pumped out for disposal once facilities become available. The trucks used for transport will be sealed and the unloading facility designed to minimize odor generation during waste transfer operations.

4.4.7 *Hazardous Waste*

Hazardous Waste handling is described in the Mary River Project Hazardous Waste Management Plan (H349000-1000-07-126-0008).

4.4.8 *Other Miscellaneous Materials, or Items that No Longer Have Economic Value*

During the operation miscellaneous tools, used parts, clothing etc. will be discarded. Items requiring special handling should be dealt with by the generator either by disposal or breakdown into readily handled components to be treated in accordance with the previous sections.

Parts should be drained of oil or other liquids before disposal, with the drained fluids being disposed of as per Mary River Project Hazardous Waste Management Plan (H349000-1000-07-126-0008).

4.4.9 *Office Paper*

All white paper waste generated at the office site shall be collected in secured bins for shredding and disposal. Paper waste generated elsewhere shall be placed in a waste disposal bin by site personnel. To reduce the amount of paper waste generated on site the following list of procedures could be developed and implemented:

- Distribute electronically – Electronic forms increase the amount of desk/shelf space available.
- Double Sided Printing – When practical ensure all documents are double sided.
- Print Only the Pages You Need – Rather than printing the entire document consider saving the file electronically as well as cutting and pasting relevant information. Only reprint pages of documents that have been revised rather than the full document.
- Reuse – Collect single sided paper in a bin so that it could be reused for printing, faxing or scratch pad.

- Route Hardcopy Memos and Newsletters – Instead of making numerous copies, route one copy around the office.
- Copier Maintenance – Only allow qualified personnel to provide maintenance to all copiers and printers.

4.5 Incinerators

The main disposal method for combustible non-hazardous wastes (such as food waste, paper waste and untreated wood products) generated on-site will be incineration. This method will eliminate problems associated with odours attracting wildlife, or the creation of poisonous or flammable gases through the decomposition of putrescible materials. 1

Incinerators for the Project are proposed as follows in Table 4.6:

Table 4–6: Incinerator Allocation

	2013 WORK PLAN		CONSTRUCTION		OPERATION		
	Waste Produced Suitable for Incineration (t/day)	Units	Waste Produced Suitable for Incineration (t/day)	Units	Waste Produced Suitable for Incineration (t/day)	Units	Capacity (t)
Mine Site	1.79	2 ton (x1)	2.68	2 ton (x1), 1 ton (x1)	1.51	2 ton (x1)	2
Steensby Port	-	-	1.34	1 ton (x2)	0.55	1 ton (x1)	1
Milne Port	0.98 (1.25 t combined)	2 ton (x1)	0.37	1 ton (x1)	0.00	-	-
Ravn River	-	-	0.45	1 ton (x1)	0.00	-	-
Mid Rail	-	-	0.45	1 ton (x1)	0.00	-	-
North Cockburn	-	-	0.45	1 ton (x1)	0.00	-	-
South Cockburn	-	-	0.67	1 ton (x1)	0.00	-	-
Tote Road Camp[1]	0.27	-	-	-	-	-	-

[1] Acceptable waste will be transported from Tote Road Camp to Milne Camp for incineration

The locations of the incinerators are shown in Annex 2.

The EWS Mobile Incinerator: ECO M2TN Equipment Manual (E 349000-TX001-00-118-0001) is presented in Annex 3. 1

All incinerators will have the option of using a liquid waste system to burn waste petroleum products such as used oil or off-spec fuels, which would decrease diesel requirements but would increase power consumption. Larger or additional incinerators will be brought on-line as required to meet the Project's needs during the construction phase.

Waste that is destined for the incinerator will be segregated as part of operating procedures to ensure that only appropriate materials will be incinerated. Biomedical waste, hazardous wastes, non-combustible materials, or treated wood products must not be incinerated. The incineration of plastics will be minimized to the maximum extent practicable. Incineration of some food-related and other plastics is unavoidable; however, best efforts will be made to reduce volumes of potentially dioxin/furan related plastics during the procurement process.

All incinerator systems will operate in accordance with the Environmental Guideline for the Burning and Incineration of Solid Waste by the Department of the Environment, Government of Nunavut, January 2012. This included all regulatory guidelines, operating procedures and best management practices whenever feasible.

Prior to commencing any incineration of on-site Project wastes, BIM will conduct at least one stack test immediately following the commissioning of each temporary and permanent incinerator. Stack test results will be reported to the NIRB and Environment Canada annually. as required. 1

4.5.1 *Personnel Training Programs for Incinerator Operation*

Only trained personnel will operate the incinerator(s), and the equipment manual will be provided (see Annex 3), including standard operating procedures. The incinerator manufacturer will be requested to provide on-site specialized training as required. 1

4.5.2 *Air Emissions*

Air emission standards establish limits on the amount of contaminants that can be released into the atmosphere. These standards are expressed as a concentration in the exhaust gases leaving the stack and are capable of being achieved using generally available technology or waste diversion practices. The following emission standards apply to solid waste incinerators operating in Nunavut and have been adopted from the Canadian Council of Ministers of the Environment (CCME) Canada Wide Standards for Dioxins and Furans and Mercury Emissions, respectively. Similar standards for the open burning of solid waste and modified burn barrels have not been established.

For existing, new or expanding solid waste incinerators the maximum concentration (corrected to 11% oxygen at stack) of dioxins, furans and mercury in the exhaust gases from the stack are provided in Table 4–7.

Table 4–7: Air Emission Standards for Solid Waste Incinerators

Parameter	Numeric Standard	Explanation
Dioxins and Furans	80 pgTEQ/cubic metre	Unit of measure is picograms of International Toxicity Equivalents per cubic metre of air
Mercury	20 µg/Rcubic metre	Unit of measure is micrograms per Reference cubic metre (the volume of gas adjusted to 25oC and 101.3 kilopascals)

Opacity is the degree to which the exhaust gases reduce the transmission of light and obscure the view of any object in the background. It is expressed as a percentage representing the extent to which an object viewed through the gases is obscured. Although not an emission standard, opacity provides an indication of the general performance of the incinerator during normal operation. Opacity in the incinerator stack should not exceed 5%. While it is not anticipated that opacity levels would exceed 1% to 2% under normal operation, values greater than 5% indicate the incinerator is not performing properly and additional performance evaluation and adjustment is required.

Air monitoring for dioxins, furans, and mercury will be conducted on an as-required basis based on applicable federal and territorial standards and guidelines. Guidelines also exist for sulphur dioxide and total suspended particulates, which may be analyzed as a 'best management practice.

Routine inspections and monitoring will be undertaken on incineration facilities as required. Details of the incinerators are provided in Annex 3.

4.5.3 Ash Disposal

The management of bottom ash and other unburned residue is an integral part of sound waste management and the ash will need to be disposed of. Extreme care must always be exercised when handling ash because of its physical (i.e. glass, nails) and chemical hazards. Closed or covered containers will be used when moving or transporting bottom ash from the incinerator to the final disposal site. This will minimize physical contact with the ash and any release of fine ash particles to the environment. Bottom ash will only be handled once completely cooled.

Bottom ash from the open burning of paper, paperboard packing and untreated wood waste or unburned materials from modified burn barrels used to burn paper, paperboard packing, untreated wood, food waste, food packaging and natural fibre textiles is suitable for burial in a designated pit or municipal landfill.

Ashes from the incineration process will be buried within a designated area of the landfill. A Toxicity Characteristic Leaching Procedure (TCLP) analysis will be conducted to ensure that the incinerator ash is suitable for disposal in the landfills. The ash testing protocol shall ensure that an ash sample will be collected at the beginning of operation of the incinerator. The sample will be compared to the Government of Nunavut guidelines for solid waste/process residual

concentrations suitable for landfills, as described in the Environmental Guideline for Industrial Waste Discharges and presented in Table 4–8.

Following the initial testing, ash samples will be collected and tested annually, or upon a significant change in the source or type of material sent to the incinerator. 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 this exceedance. Ash that does not meet guidelines following TCLP analysis will be treated on-site if possible or transported for off-site disposal at an appropriate facility. Records of analysis results and volumes of ash will be maintained on site, and will be available upon request to inspectors. The TCLP Procedure Test method 1311 (US EPA) will be the preferred method to analyze the residuals as this test is designed to simulate the processes a material would be subjected to if placed in a landfill.

Table 4–8: Guidelines for Solid Waste/Process Residuals Suitable for Landfill

Parameter	Concentration maximum (mg/L)
Arsenic	2.5
Barium	100
Cadmium	0.5
Chromium	0.5
Lead	5
Mercury	0.1
Selenium	1
Silver	5
Zinc	500

4.5.4 Monitoring During Operation

Monitoring of the incinerators will be conducted in conjunction with other monitoring program required for the Project. Specifically, incinerator monitoring will include incinerators will be inspected for signs of leakage, corrosion or other physical defects before each burn cycle. Repairs must be completed before the equipment is used again to ensure the health and safety of the operator, nearby people and the environment. An initial stack test will be conducted upon commissioning to confirm conformance with all applicable regulations based on a ‘typical’ waste stream.

The operation of incinerators will be monitored using on-line instruments capable of continuously measuring the combustion process and stack emission; this included the temperature in both the primary and secondary burn chambers. Temperature readings outside of the normal range can warn the operator that the system is not working properly.

Continuous emissions monitoring will also be used at all permanent incinerator units. In-stack monitoring provides the operator with information on the combustion process and on pollutants being released to the environment and help detect if operating conditions

malfunction and contaminates enter the environment (i.e. hydrogen chloride, dioxins, furans, mercury).

Each process and in-stack monitor will be equipped with visible and audible alarms to warn operators of poor incinerator operation.

Written records will be kept by incinerator operators of what waste is burned, when and how much.

Other record keeping requirements include:

- Operating data including readings from the process and emissions monitoring instruments.
- Weather conditions (i.e. air temperature and wind speed) at the time the incinerator is being operated.
- Repairs and maintenance performed on the incinerator and monitoring instruments.
- Major changes in operation.
- Quantity, condition and disposal location of the collected bottom ash.
- Operator training.

Records will be maintained on-site throughout the operational life of the facility and be made available to Inspectors and other regulatory officials upon request.

4.6 Inert Landfill

A central inert landfill has been constructed near the Mine Site. The landfill design was submitted to the NWB for approval before construction, as required by the water license. The landfill is used for disposal of inert, non-combustible waste only (plastics, cement, sand, used construction materials, scrap metal, pipes, glass, etc.). Non-hazardous waste, including ashes from the incineration process, and waste which cannot be salvaged or incinerated, will be deposited in this site. There will be no disposal of food waste, hazardous materials, paper products or biomedical waste in the landfill. A secondary landfill will be constructed at the Steensby Port site. The locations of these landfills are shown in Annex 2.

Details of the Landfill design and closure are provided in Annex 5. The quantities of inert waste expected are presented in Table 4–2.

4.6.1 Landfill Operation

Landfill operation will be performed under the same guidelines at both the Mine Site and Steensby Port landfills. As is presently the practice, the landfill will be operated by trained personnel who will carry out regular inspection and monitoring of the facility. An operation and maintenance manual approved by the NWB will direct landfill operations. This manual will include:

- A general description of how the landfill is to be operated and maintained.

- A proposed schedule for when specific operating and maintenance activities are to be conducted (i.e., seasonal surface water sampling, routine visual inspection, berm inspections, etc.).
- A list of who is responsible for completing each item scheduled.
- Location of the landfill and proximity to receiving waters.
- A description of the cover material to be used as well as the source of the material and how it will be placed.
- Runoff and drainage control within and around the landfill, including erosion and sediment control and proposed restoration measures for erosion which occurs.
- Treatment measures for contaminated drainage (although this is not seen as an issue).
- Prevention of windblown debris (although this is not seen as an issue).
- Method and frequency of site maintenance.

The manual will assist landfill site operators in establishing a proper waste management system and in ensuring that the system operates efficiently and in compliance with the permits.

4.6.2 Operating Procedure

Regular cover will be applied to reduce the risk of wind-blown debris, and the landfill will be engineered for closure. Open burning of un-treated wood and cardboard wastes may be conducted to reduce volume requirements as permits allow. Routine inspection and monitoring will be undertaken in terms of waste volume, type, source, water seepage, etc.

4.6.3 Placement of waste

The area method will be used to place the waste in the landfill. Once the first layer is completed and covered, a second layer will be formed. The following measures will be taken during the landfill operation:

- Compaction of waste will be undertaken typically once per week or in combination with collection frequency, depending on the nature of the waste. Generally the waste will be worked and compacted as they are dumped.
- Operations will be undertaken to minimize close-out requirements.
- Cover material will be placed to a thickness of 0.1 m between cells, 0.3 m on the surface of cells, and, 1.5 m for closure.

4.6.4 Monitoring during operation

Monitoring of the landfill will be conducted in conjunction with other monitoring program required for the Project. Specifically, landfill monitoring will include:

4.6.4.1 *Volume and Waste Composition:*

Records will be kept of waste volume/type and cover material placed in the landfill. The annual volume of waste disposed of in the landfill will be determined from these records. The annual volume may be confirmed through the use of survey.

4.6.4.2 *Water sampling and soil:*

The “Guidance Manual on Sampling and Data Management for Contaminated Sites” (CCME 1993) will be followed for all water and soil quality monitoring. Refer to the Site Water Management Plan for surface water sampling locations and procedures. A soil sampling program will be initiated at several locations around the landfill site(s) prior to construction and after the initial perimeter berm.

4.6.4.3 *Ground temperature monitoring:*

It is expected that the active layer will progress into the landfill waste and cover material. Ground temperatures are not expected to increase due to the presence of the landfill and the type of waste disposed in it. During regular landfill inspections, signs of ground warming will be monitored by watching for evidence of soil creep.

4.6.4.4 *Leachate monitoring:*

Leachate production is not expected based on the relatively dry, inert nature of the waste to be placed in the landfill. However, periodic surface water monitoring will allow for the detection of landfill leachate, in the unlikely event leachate is generated.

4.6.4.5 *Inspection and maintenance:*

Routine visual inspections will be conducted for various components of the landfill, including the berms, fencing (if installed), etc. If required, maintenance will be completed as soon as required. Records will be kept at all inspections and maintenance measures completed and will form part o the annual landfill site report.

4.6.5 *Annual Report*

An annual report will be completed for the overall project and will include the following information on the landfill:

- Total volume of waste deposited in the landfill site during the previous year.
- Progression of the landfill site development, indicating the landfill site location currently in use and areas that have been closed.
- Monitoring results.
- Remaining life expectancy of the landfill site.
- Details of operational problems encountered during the year and the measures taken to resolve the operational problems.
- Photographs.

4.7 Hazardous Waste Storage and Disposal

Some of the materials included in the waste streams are classified as hazardous wastes because of the potential risk to human health and safety, property and the environment. Hazardous wastes that will be generated on-site will include, but not be limited to: used oils, solvents and paints, used and/or surplus chemicals, medical wastes, gas cylinders, electronic waste, batteries, light bulbs, and smoke detectors.

Baffinland is responsible for ensuring that all hazardous waste generated on its site will be properly managed from the time it is generated to final disposal. Hazardous waste must be properly stored, transported, treated and disposed. Contractors can manage waste on behalf of Baffinland; however, Baffinland is responsible for ensuring, in advance, that the waste management method is acceptable. All of Baffinland's contractors will be required to submit a Waste Management Plan for their specific activities.

All Hazardous waste will be managed according the Mary River Project Hazardous Materials and Hazardous Waste Management Plan (H349000-1000-07-126-0008).

4.8 In-Site Treatment of Hydrocarbon Contaminated Material

Soils contaminated by hydrocarbons from spills will be salvaged and deposited within a land farm cell for bioremediation. The land farm will initially be approximately 70 m x 100 m in size and no more than 0.3 m deep to ensure the soils are kept within the thermally active zone. The cell will be confined within a berm and underlain by an Arctic geomembrane beneath select fill material. The contaminated soils will be placed and spread during summer months for remediation through natural microbiological and evaporative processes. Soil that has reached acceptable levels of hydrocarbon degradation will be removed and transferred to the landfill. The land farm will be operated in accordance with Nunavut government guidelines. The soil will be turned regularly to provide aeration and promote the remediation process. Inspections and sampling will be done to assess the effectiveness of the cell under different climatic conditions. If the harsh climatic conditions at Mary River inhibit natural biological activity, special bacteria may be introduced. If it becomes evident that effective remediation is still not achievable, Baffinland will source an off-site land farm for disposal. Note, as per New Substances Notification Regulations (Organisms) before importing or using bacteria in landfarming applications Baffinland will notify the Government of Canada if the bacteria used are not listed on Canada's Domestic Substance List and before the bacteria is imported or used at the Mary River Project site.

4.9 Ship waste management

Baffinland will not accept any type of waste originating from a ship. All vessels will be expected to be equipped with a sewage treatment plant and an incinerator for solid and liquid wastes. All tanks containing oil or oily waste will be placed in a location in the ship that will keep them separated from clean areas. A diesel fired incinerator for incinerating oil waste and sludge from the sewage plant may be installed in the incinerator room on board.

4.10 Used Tires

Used tires are a major waste stream of mining operations. Used tires will either be stockpiled at Milne or Steensby port facilities for shipment off site (re -treading, re-use, or disposal) or will be disposed on site in the landfill or in a designated location within the footprint of the waste rock pile at a depth that will allow for permafrost aggradations. Options that increase project sustainability will be taken advantage of if used tires can be re-used on site in an environmentally safe manner (e.g. road barriers).

4.11 Propylene Glycol

Propylene glycol will be used at Steensby Port and Mine Site airstrips for plane de-icing as will in the heating of project buildings. All storage, handling, use and disposal of propylene glycol will be done in contained areas to avoid spills to the environment and as described by the manufactures MSDS sheet. Prior to use propylene glycol will be stored in tightly closed containers or tanks in a cool, dry, well-ventilated area away from incompatible substances. Used propylene glycol will be collected then stored in the waste management temporary storage facilities on site in secured containers for shipment off-site for disposal.

4.12 EPP Procedures Relevant to this Waste Management Plan

The following table outlines the EPP procedures that are relevant to the Waste Management Plan. The EPP is a living document and is subject to on-going updates.

Table 4–9: Content of the EPP Related to the Waste Management Plan

Section	Title/Description
2.5	Geotechnical Drilling Operations
2.6	Equipment Operations
2.7	Fuel Storage and Handling
2.14	Solid Waste Management
2.15	Sewage Treatment
2.16	Hazardous Waste Management
2.17	Road Construction and Borrow Development
2.19	Road Traffic Management
2.21	Exploration Drilling Operations
3.7	Off-Site Waste Disposal Log

1

5. Roles and Responsibilities

5.1 Organization Chart for Environment

The Baffinland environmental team is organised into two parts, on site as well as off site. The organisational structure for the Mary River Project in relation to the environment discipline is shown in Table 5–1 below. Communication channels are described as liaisons in the tables outlining the responsibilities and accountabilities in the following sections.

5.1.1 The Baffinland Environmental Team

The Baffinland Environmental Team will oversee all environmental and community works on and off site. The Baffinland Corporate Environmental Team responsibilities are summarized in Table 5–1.

The Baffinland Environmental Team will oversee all environmental activities on site. These responsibilities on site are outlined in Table 5–2.

5.1.2 Construction Contractor's Environmental Team

The Construction Contractor will have their own organisational structure which is yet to be defined, but at a minimum the responsibilities for the environmental portion are summarized in Table 5–3.

5.2 Monitoring and Inspection

Responsibilities have been assigned to various personnel on the Project team. Where required, third party resources will be retained to supplement in-house resources and capabilities.

Table 5–1: Baffinland Iron Mines Corporation Senior Management

Baffinland Iron Mines Corporation Senior Management	
Position	**Responsibilities and Accountabilities**
Project Director	- Reports to Baffinland's CEO - Overall accountability for the Project execution - Allocation of resources (human and financial) for the implementation of Baffinland's commitments and objectives related to health, safety and environment during Construction of the Project - Accountable for on-site environmental, health and safety performance during construction of the Project
VP Operation	- Reports to Baffinland's CEO - Overall accountability for the Operation of the Project once constructed - Allocation of resources (human and financial) for the implementation of Baffinland's commitments and objectives related to health, safety and environment during Operation - Accountable for on-site environmental, health and safety performance during Operation

Baffinland Iron Mines Corporation Senior Management	
Position	**Responsibilities and Accountabilities**
VP Sustainable Development, Health, Safety and Environment	- Reports to Baffinland's CEO - Establish corporate environmental policies and objectives - Monitors and reports on Baffinland's performance related to environmental, health and safety policies and objectives - Community liaison - Liaise with regulatory authorities - Obtains necessary permits and authorizations - Monitors compliance with terms and conditions of permits and licences - Routine EHS audit of contractor performance while on site
Manager Purchasing and Contract	- Reports to Baffinland's Project Director - Accountable for procurement and purchasing - Ensure that environmental commitments, policies and objectives are included in all contract documents
VP Corporate Affairs	- Reports to Baffinland's CEO - Accountable for external communication (Governments, media, NGO, others) related to Baffinland's press release and overall communication of site incidents/events

Table 5–2: Baffinland Iron Mines Corporation On-Site Management Team

Baffinland Iron Mines Corporation On-Site Management Team	
Construction Manager	- Reports to the Project Director - Responsible for daily on-site management of construction activities - Accountable to the Project director for site environmental, health and safety performance - Organize and provides necessary induction, safety and environmental training for all employees - Ensure that all contractors on-site abide by Baffinland's policies, EHS commitments
Environmental Manager	- Reports to VP EHS & Sustainability - Monitors environmental performance of contractors on site - Monitors compliance with permits, licenses and authorizations - Regulatory environmental monitoring and reporting (monthly, annual) - Routine audit of contractor's environmental performance on-site - Initiate/supervise environmental studies - Investigate and reports on accidents and incidents when they occur - Review and update environmental management plans
Environmental Supervisor (s)	- Reports to Environmental Manager - Specific accountabilities for environmental monitoring and reporting - Provides induction and environmental awareness training to new employees and contract workers
Environmental Support Group	- Reports to the Environmental Supervisor - Environmental database management - Various sampling, monitoring and reporting activities as required by permits, licenses and environmental management plans - Prepare updates to environmental protection plan and management plans
Environmental Monitors	- Reports to the Environmental Superintendent

Table 5–3: Construction Contractor(s)

Construction Contractor(s)	
Construction Manager	- Reports to the Baffinland's Construction Manager - Accountable for the EHS components of his scope of work - Accountable for implementation of the Construction Environmental Protection Plan - Co-ordination/interaction with Baffinland and Baffinland's Representative Environmental Monitors.
EHS Superviser	- Reports to the Contractor's Construction Environmental Manager - Liaise with Baffinland's Environmental Supervisors and monitors. - Holds daily EHS briefing - Monitors and ensures that Contractor complies with requirements of management plans, terms and conditions of all authorization, licences and permits associated with the Contractor's scope of work - Investigate, reports and follow up on environmental accidents and incident - Provides site specific environmental monitoring - Daily supervision of construction activities for environmental performance - Attendance at all environmental meetings/Project meetings (as required). - Routine interaction with construction crews to ensure all construction activities are in compliance with requirements of the CEPP and Contractors Environmental Method Statements. Monitor the environmental permitting status of the Project to ensure that no work proceeds until appropriate and complete permitting is received for the applicable facility.

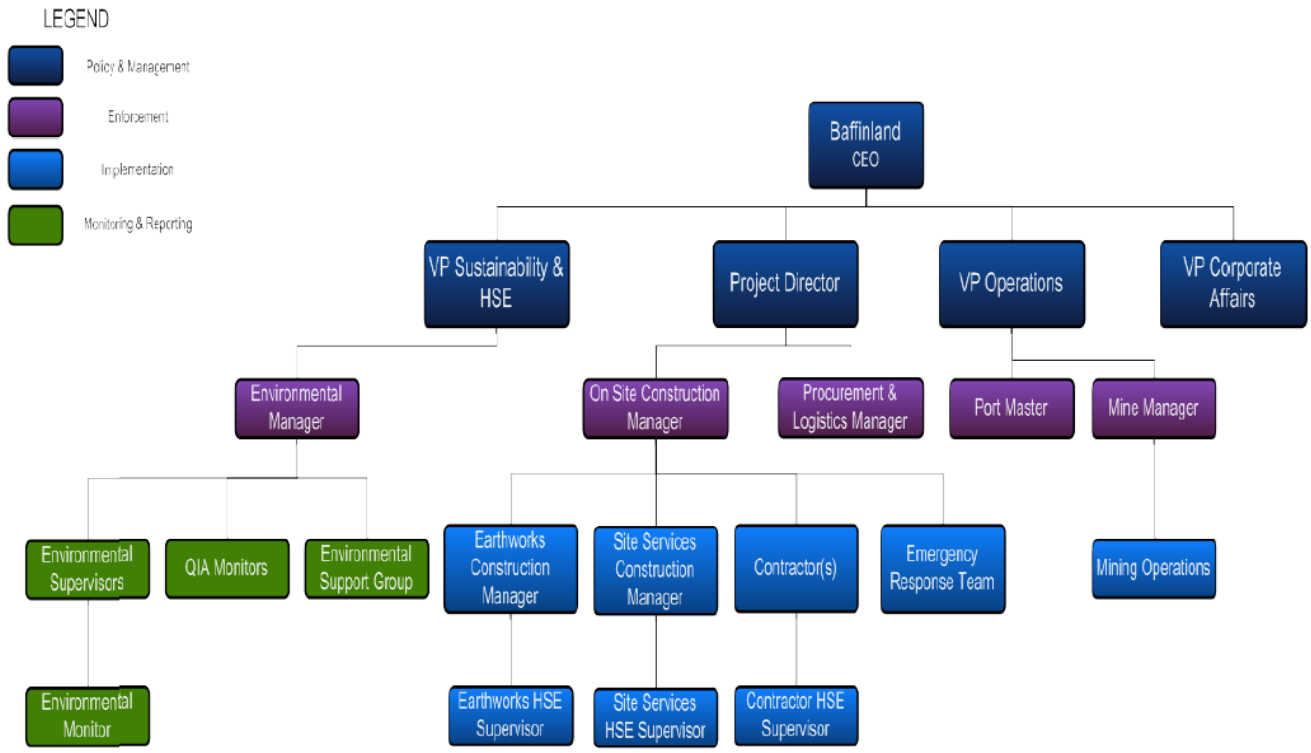

Figure 5.1. Mary River Project Organization Chart

5.3 Training and Awareness

Staff and sub-contractors working on site will receive environmental training as part of the Site Orientation, to achieve a basic level of environmental awareness understanding of their obligations regarding compliance with regulatory requirements, commitments and best practices.

Operations superintendents and contractor supervisors will be provided with this Management Plan, and will receive additional orientation with respect to the requirements outlined in this Plan. In addition, all supervising level staff and sub-contractors will be provided with the Operational Standards (found in the Environmental Protection Plan) as a written guidance for their work.

Targeted environmental awareness training will be provided to both individuals and groups of workers assuming a specific authority or responsibility for environmental management or those undertaking an activity with an elevated high risk of environmental impact. These will be delivered in the form of toolbox/tailgate meetings or other means as appropriate.

The content of the environmental component of the site induction will include at a minimum:

a) Location of environmental sensitivities.

b) Location of additional information on environmental matters.

c) Due diligence responsibilities.

d) Responsibilities related to waste management, minimizing noise as necessary, road traffic rules, etc.

e) Principles and necessary steps to avoid encounters with bears or other wildlife and what to do if one such encounter occurs.

With respect to hazardous materials management, Baffinland will have a written training and awareness plan which will consider:

- The differing level of risks and potential consequences associated with different types of hazardous materials.
- The different responsibilities, abilities, and literacy of employees.
- The culture of the employees.
- Contractors involved and their relevant experience/expertise.
- The trainers, training methods, and settings.
- Training frequency.
- Documentation of training and evaluation of training.

Baffinland will regularly review and update the training and awareness plan based on changes in training needs and regulatory required training.

5.4 Communication

The types of communications for which members of the team will participate include the following:

a) Formal written correspondence and meetings with stakeholders.

b) Site visits by community representatives.

c) Design, construction and planning meetings.

d) Field inspections and monitoring reports disseminated by the Environmental Manager.

e) Electronic communications.

f) Tailgate/toolbox meetings.

g) Formal written correspondence and meetings with government regulatory bodies.

h) Formal environmental awareness training.

Communications will be appropriately recorded and filed for future reference. Where appropriate, the copies of communications will be forwarded to the Operations Manager(s), and Environmental Manager.

5.5 External Communications

Effective forms of communication include the proactive notification to external stakeholders of Project activity. Project activity updates will be provided to the communities of North Baffin through various means including regular meetings, public notices and radio announcements as appropriate. Baffinland will maintain Community Liaison Offices to assist in this regard.

5.6 Construction

During the construction phase of the Project, the Baffinland Environmental Manager and EPCM (Engineering Procurement and Construction Management) contractor will be responsible for implementing this Plan.

This Management Plan will be updated to take into account the numerous construction sites, and types of construction equipment utilized. The organizational structure of the EPCM contractor will reflect the complexity of the construction phase.

The EPCM contractor and its subcontractors will appoint a Construction Phase Environmental Supervisors who will oversee the application and adherence to all of Baffinland`s EMMP. They will report to the site Construction Manager as well as to the Environmental Manager or his designate.

5.7 Operation and Closure

For the operations and closure phases, Baffinland will revise its organizational structure to reflect the realities of the operation. The Environmental Manager will be responsible for subsequent updates and implementation of the Plan.

6. Performance Indicators, Thresholds, and Incident Response

Periodic inspections of waste management facilities will ensure compliance with this waste management plan. The EPP and associated operations procedures / work instructions outline detailed procedures for handling and storage of fuel, lubricants and other waste materials. These procedures are in place and training will be provided to all employees and contractors on waste handling. Accidental spills are the most likely type of environmental incident to occur while conducting the above mentioned activities. Response procedures, documented in the EPP and the Emergency and Spill Response Plan (H349000-1000-07-126-0002), are in place to deal with these occurrences.

The ultimate performance indicator for hazardous materials management is the number of incidents of non compliance reported on a daily or monthly basis. Incidents of non-compliance are classified by type and each type entails remedial actions as outlined in Appendix 10A-2: Hazard Identification and Risk Assessment Standard.

Where an investigation triggers a review and update of established EPP procedures, these reviews and update will be carried out in accordance the procedures established by Baffinland`s EHS Framework.

7. Monitoring and Reporting Requirements

7.1 Waste Monitoring

Waste monitoring includes the visual inspection of three main components of the waste management system (described below) and the measurement and recording of all wastes taken off site. The following information will be reported on an annual basis as currently is the practice:

a) The quantities hazardous waste transported off-site for disposal.

b) The location and name of the disposal facility for each waste type.

c) The date that each was hauled off-site for disposal, for each occasion that these are removed from the site.

d) Quantities of non-hazardous inert solid wastes disposed in the landfill.

e) Quantities of hydrocarbon contaminated soils and water processed in treatment facilities.

Inert solid wastes will be stored and disposed in a manner that minimizes the opportunity for wind-blown debris and animal attraction. Any wastes that are shipped off site will be recorded using an Off-Site Waste Disposal Log or equivalent developed from the EPP.

Regular visual inspection of waste management facilities will be conducted by the HSE Manager to ensure proper operation and adequate environmental/health and safety controls are in place.

Waste audits will be undertaken periodically generation points to ensure waste streams are properly segregated

7.1.1 Incinerator Monitoring

Monitoring of the incinerator operation involves ensuring proper operation and that appropriate wastes are incinerated as well as those described in Section 4.1.

7.1.2 Landfill Monitoring

Monitoring of the inert landfill, involves visual inspections to ensure that only inert wastes are deposited in the landfill, and that adequate cover is provided so that wastes are contained and are not being dispersed by the wind. The Waste Disposal Facility (Landfill) Inspection Form is included in the EPP and landfill operating procedures. Wastes will be managed and monitored for compatibility with landfill disposal prior to disposal in the landfill. Also Waste audits will be undertaken periodically at generation points to ensure waste streams are properly segregated and that potential wildlife attractants are diverted from landfill.

A written operations manual has been developed and submitted to the Water Board as part of the landfill design and commissioning process. The operations manual provides the following information:

- A description of the facility and the design.
- The maintenance schedule, frequency of inspection of dams, dykes and drainage works.

- The operation schedule.
- Identify the personnel responsible for completion of operations.
- The runoff and drainage control within and around the facility and restoration of erosion.
- Treatment option for contaminated drainage.
- The control of effluent discharge and effluent quality.
- Prevention measures for windblown debris.
- Management procedures for sorting of waste, along with management of hazardous waste and recyclable materials.

7.1.3 Hazardous Waste Monitoring

All Hazardous waste will be monitored according the Mary River Project Hazardous Waste Management Plan (H349000-1000-07-126-0002).

7.1.4 Landfarm Monitoring

All Hazardous waste will be monitored according the Mary River Project Hazardous Waste Management Plan (H349000-1000-07-126-0002).

7.2 Operations Monitoring

In addition to specific monitoring and reporting requirements under the regulatory approvals such as the water license, QIA land lease, land use permits, and fisheries authorization as well as monitoring of project effects, the Environmental Manager will coordinate routine inspections of various aspects of the operations. Routine inspections are conducted to confirm overall conformance with the requirements of the Waste Management Plan, companion EPP, and operating procedures/work instructions, and will include inspections of site-based waste management activities.

Compliance Monitoring Forms are used to document the findings and required actions. These reports are generated as an internal operational management tool to promote continuous improvement in environmental performance and stewardship. Checklists are used as internal operational monitoring and compliance tools. These checklists are integrated into the EPP and other operating procedures/work instructions.

7.3 Data Management

The Environmental Manager is responsible for data management and reporting related to waste management. The data management system includes conducting routine inspections and monitoring, and providing these results to appropriate parties as required.

7.4 Water Licence Reporting

Since waste disposal is regulated by the Nunavut Water Board (NWB) through the water licensing process, there will be monthly water license reporting requirements. An annual Project report will be prepared that addresses requirements specified by the water licence, the Nunavut Impact Review Board (NIRB), and the landowners. Information likely to be included in reporting regarding waste disposal includes:

- GPS coordinates and photographic records of waste disposal facilities and status.
- Annual geotechnical inspection recommendations from a geotechnical engineer concerning the performance of lined and bermed waste containment structures.
- Quantities and fate of various types of waste on and off site Any other details on waste disposal requested by the NWB.

Records of waste disposal activities will be available upon request to NWB and landowner's inspectors.

7.5 Stakeholder Reporting

Future arrangements regarding reporting could be made through the Inuit Impact Benefits Agreement (IIBA) or other mechanisms; this will be incorporated in future Plan updates.

8. Adaptive Strategies

Baffinland is committed to continual improvement in its work activities with the aim of reducing risks to the environment and improving operational effectiveness. The strategy employed at Baffinland is regular monitoring supported by operational change and adoption of other mitigating measures if warranted.

Housekeeping and operational measures have been instituted. As part of the EPP, work procedures will continuously be adapted with the goal to reduce, recover, reuse and recycle waste. Regular scheduled inspections of waste management facilities along with the non-compliance reporting system described in Section 6 will ensure continual improvement and adaptation of waste management strategies throughout the life cycle of the Project.

As per the requirements of Baffinland`s EHS Management Framework, the company will conduct and document management reviews of its Waste Management Plan on a regular basis. Such reviews will ensure the integration of monitoring results for the waste management plan are integrated with other aspects of the Project and that necessary adjustments are implemented as required. These reviews also provide a formal mechanism to assess the effectiveness of the management in achieving the company's objectives and maintaining on-going compliance with Project permits and authorizations.

9. QA/QC

As per the requirements of Baffinland`s EHS Framework, regular audits will be undertaken to ensure compliance with the current Waste Management Plan and that best management practices are implemented for waste management. The result of these audits will form the basis for an annual written statement of assurance by management on the effectiveness of its Waste Management Plan.

Camp incinerators are installed at each of the camps associated with the Mary River Project, namely Milne Port, Mine Site, Mid-Rail and Steensby. Each of these incinerators utilizes dual chamber, variable air flow design technology and is specifically designed for remote camp

operations. QA/QC procedures for air emission monitoring are outlined in the *Air Quality and Noise Abatement Management Plan*.

Only appropriate material, such untreated wood and cardboards, will be open burn in order to prevent the release of dangerous toxins and/or emissions. Regular audits to ensure compliance with the current Waste Management Plan. The type and quantities of materials being burnt will be recorded. Records of open burn wastes will be available upon request to NWB and inspectors. 1

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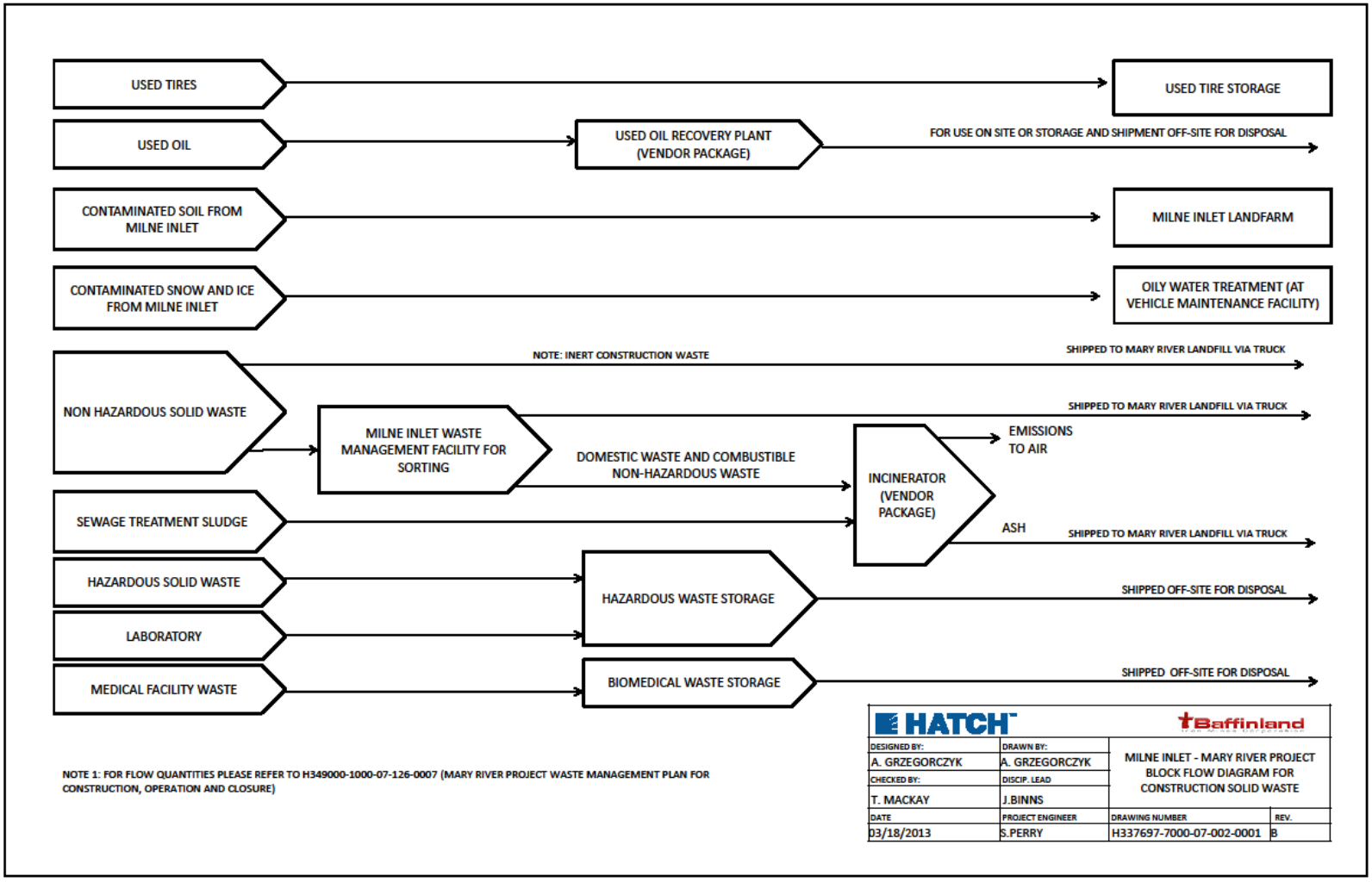
Annex 1

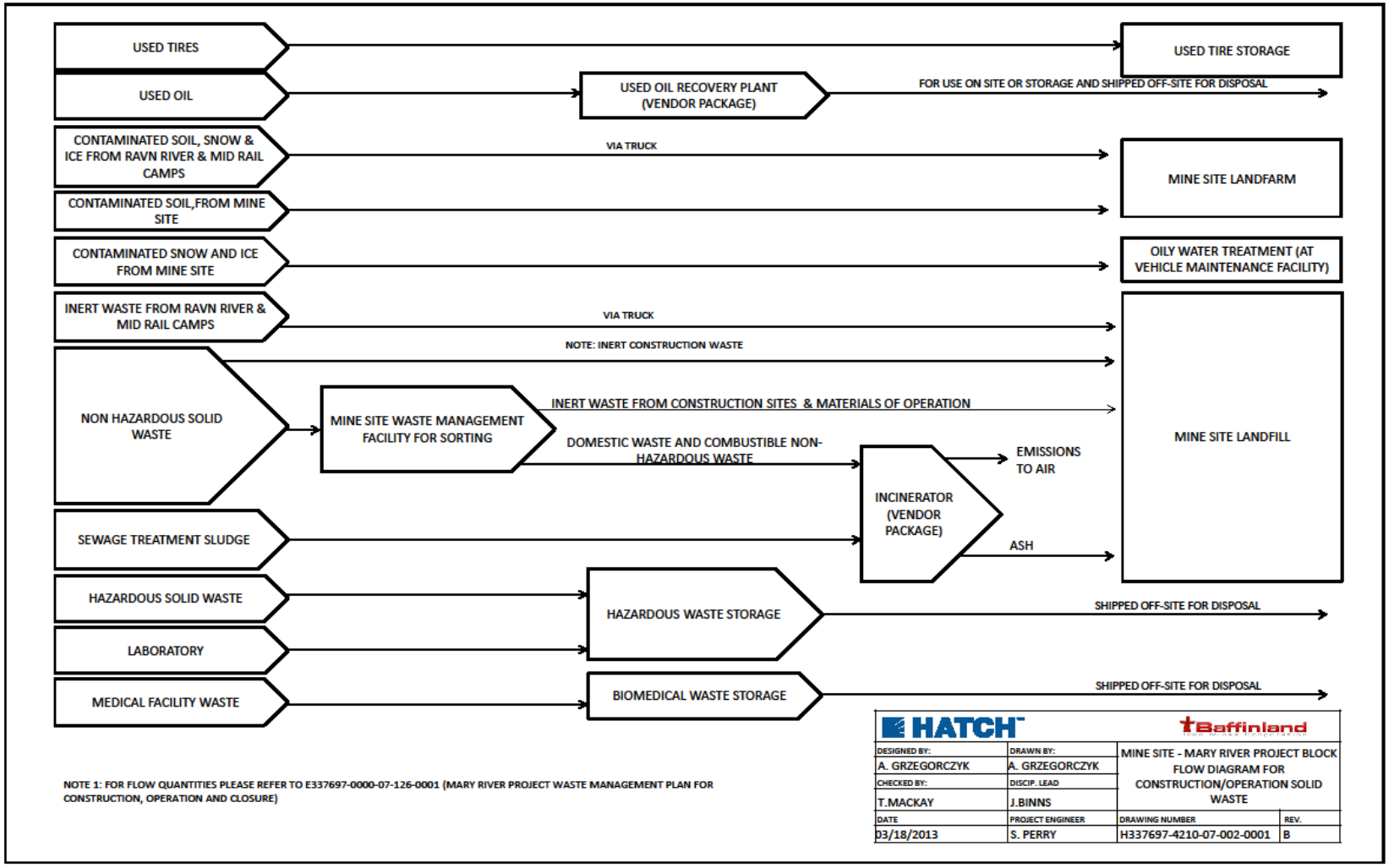
Block Waste Flow Diagrams

H337697-7000-07-002-0001	Milne Port - Mary River Project Block Flow Diagram for Construction Solid Waste
H337697-4210-07-002-0001	Mine Site - Mary River Project Block Flow Diagram for Construction Solid Waste
H337697-4510-07-002-0001	Steensby Port Site - Mary River Project Block Flow Diagram for Construction Solid Waste
H337697-7000-07-002-0003	Ravn River Rail Camp - Mary River Project Block Flow Diagram for Construction Solid Waste
H337697-7000-07-002-2002	Mid Rail Rail Camp - Mary River Project Block Flow Diagram for Construction Solid Waste
H337697-7000-07-002-0004	North Cockburn Lake Rail Camp - Mary River Project Block Flow Diagram for Construction Solid Waste
H337697-7000-07-002-0005	South Cockburn Lake Rail Camp - Mary River Project Block Flow Diagram for Construction Solid Waste

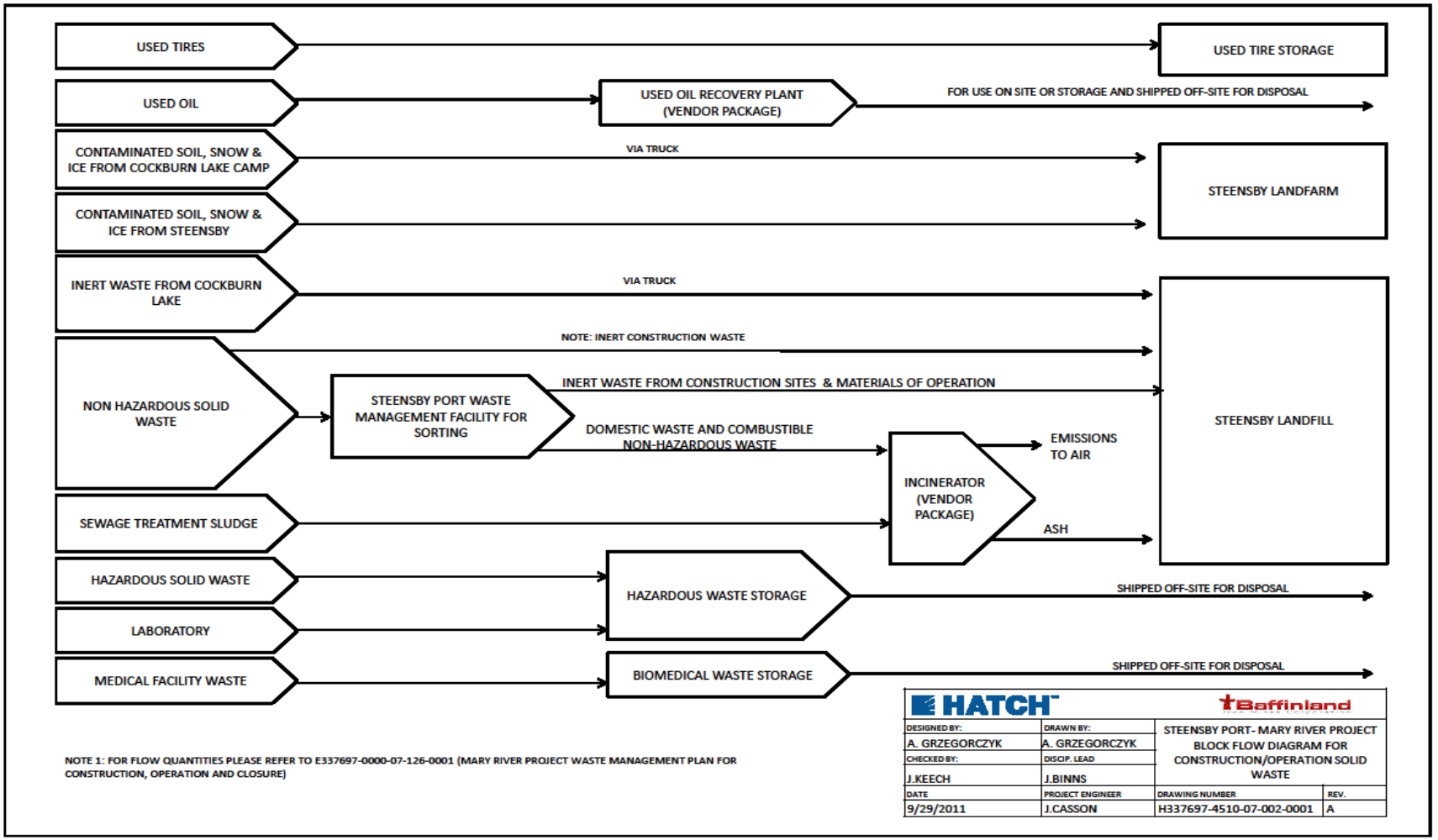
Annex 1. 1: H334697-70000-07*002-0001- Milne Port - Mary River Project Block Flow Diagram for Construction Solid Waste



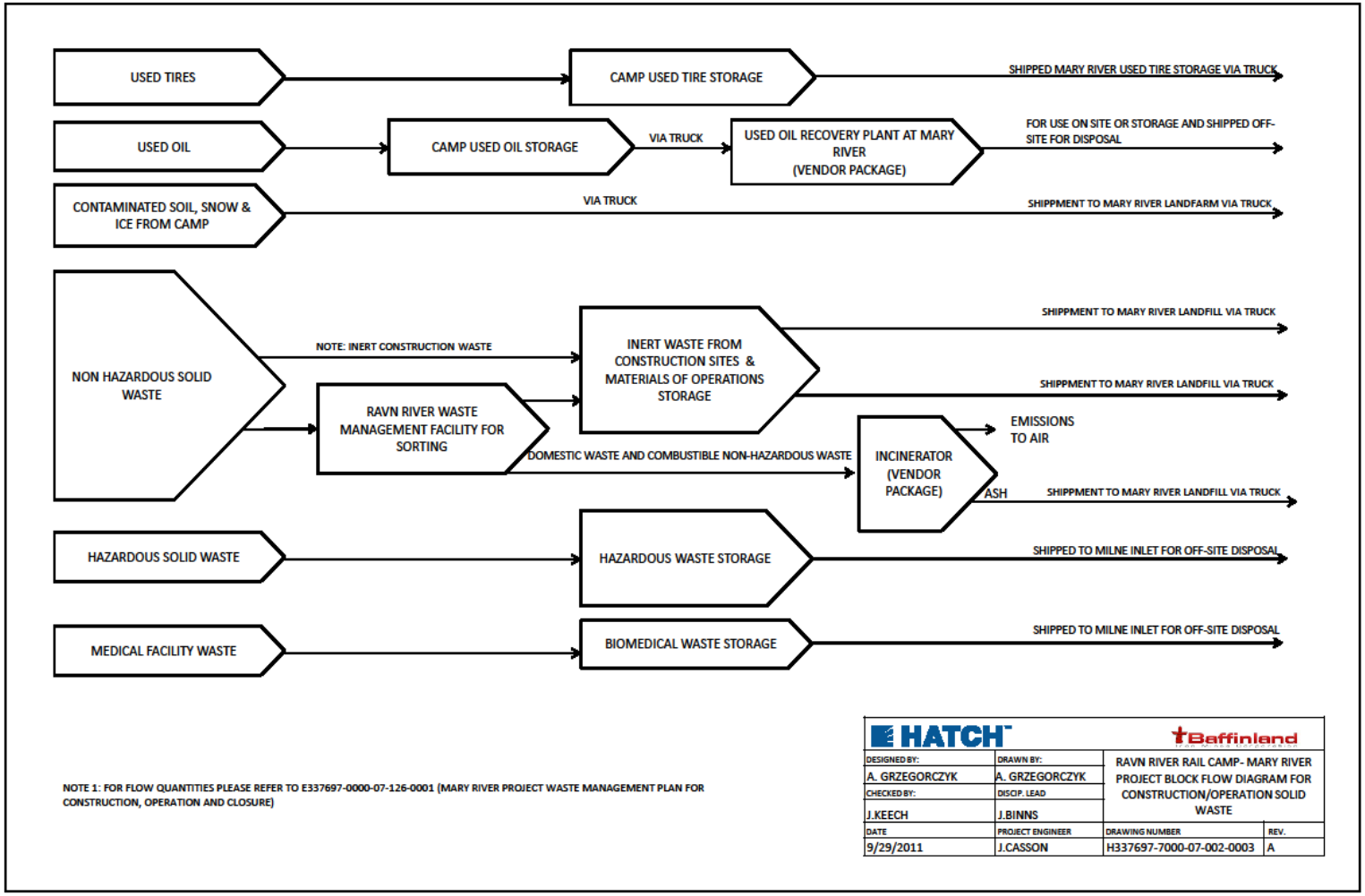
Annex 1. 2: H337697-4210-07-002-0001 - Mine Site - Mary River Project Block Flow Diagram for Construction Solid Waste



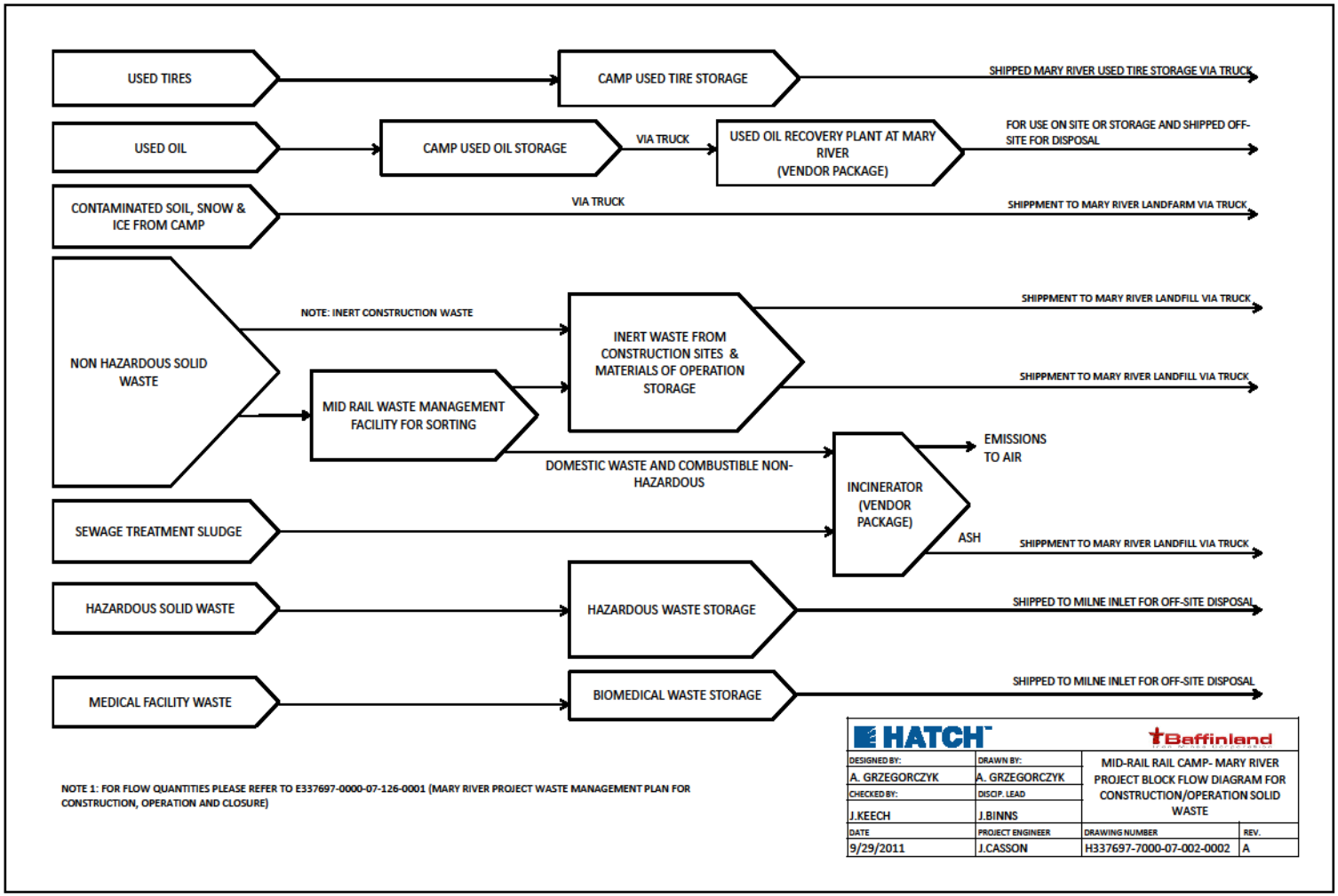
Annex 1. 3: H337697-4510-07-002-0001 - Steensby Port Site - Mary River Project Block Flow Diagram for Construction Solid Waste



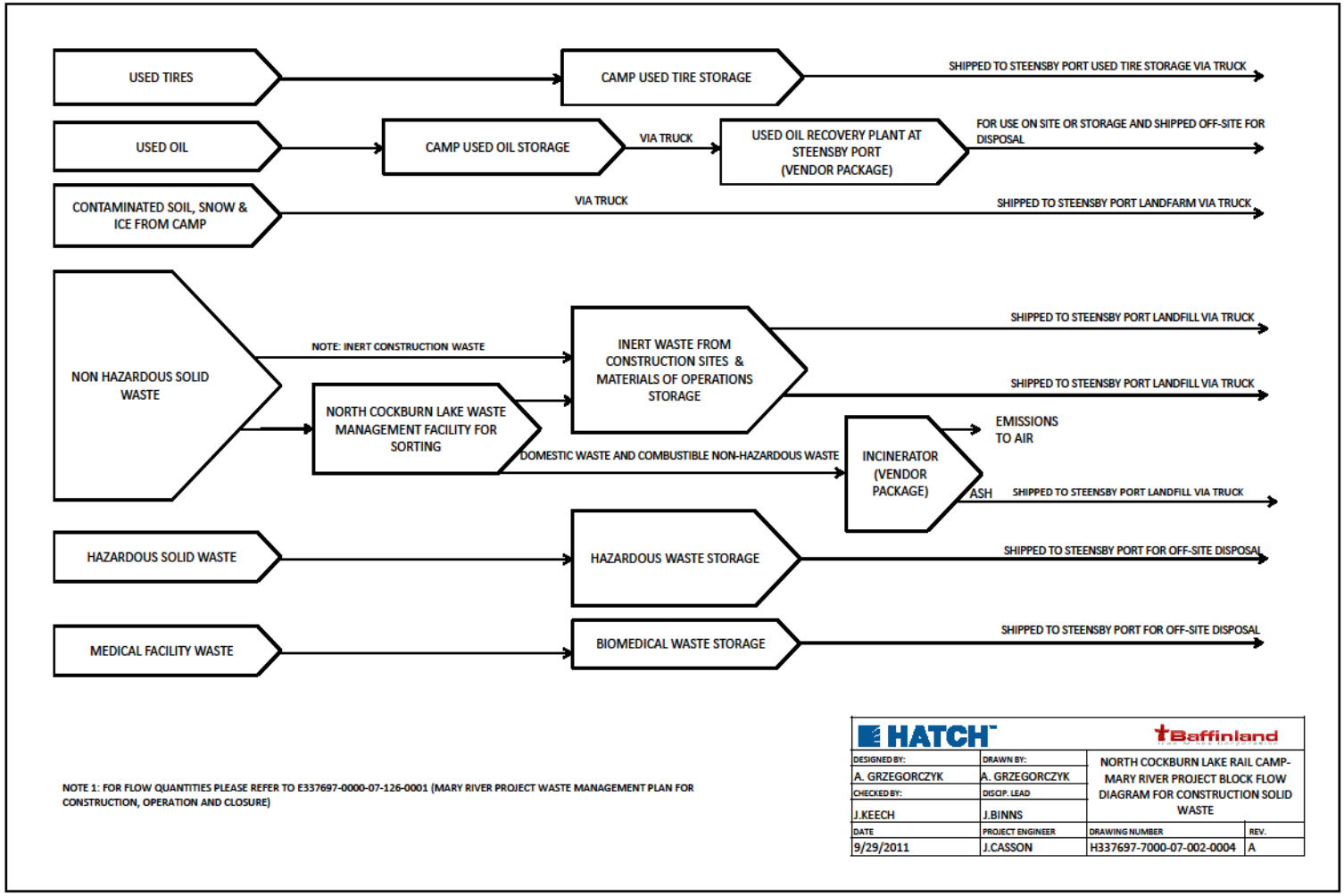
Annex 1. 4: H337697-7000-07-002-0003 - Ravn River Rail Camp - Mary River Project Block Flow Diagram for Construction Solid Waste



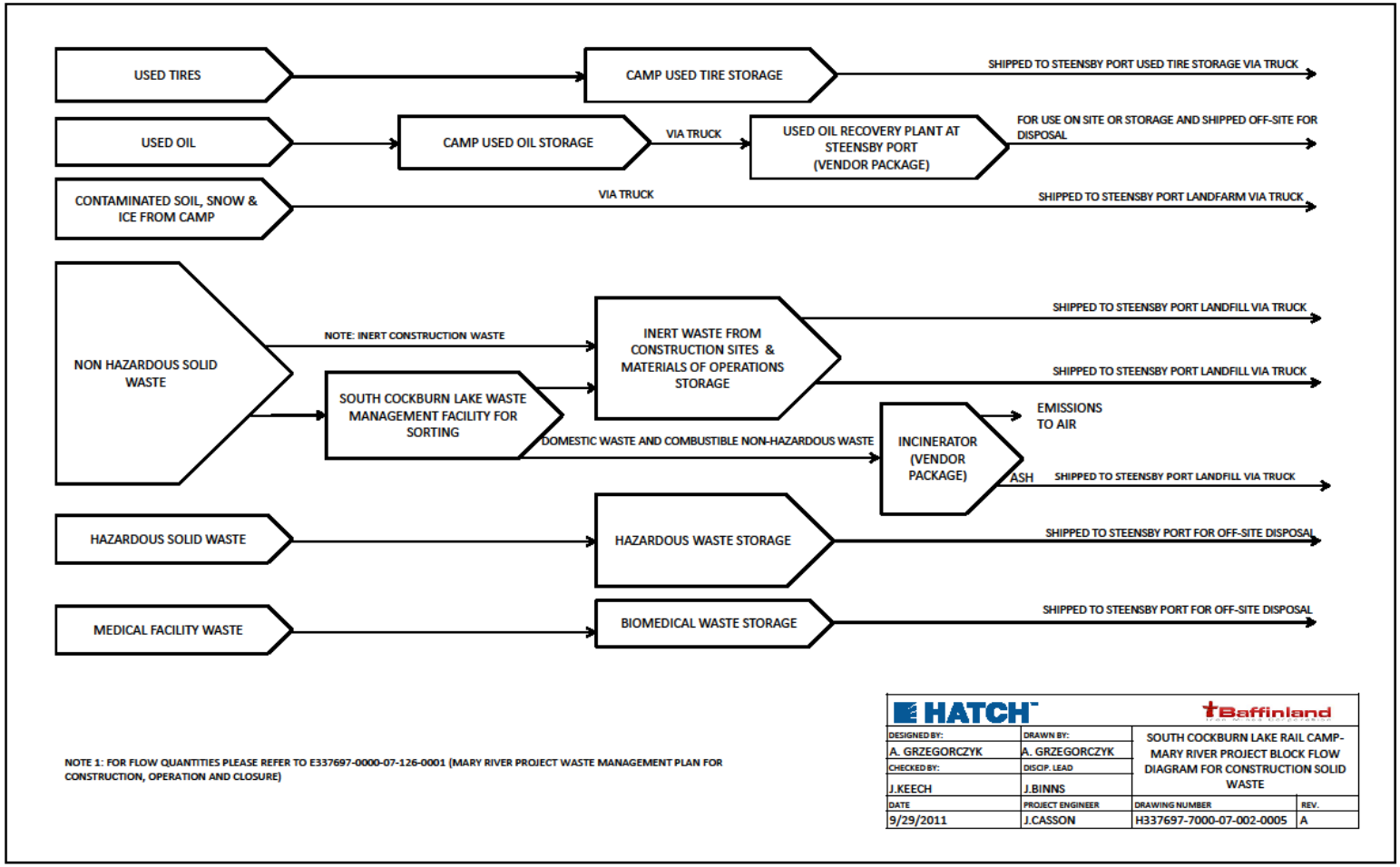
Annex 1. 5: H337697-7000-07-002-2002 - Mid Rail Rail Camp - Mary River Project Block Flow Diagram for Construction Solid Waste



Annex 1. 6: H337697-7000-07-002-0004 - North Cockburn Lake Rail Camp - Mary River Project Block Flow Diagram for Construction Solid Waste



Annex 1. 7: H337697-7000-07-002-0005 - South Cockburn Lake Rail Camp - Mary River Project Block Flow Diagram for Construction Solid Waste



Annex 2

Locations and Layouts of Waste Management Facilities

Please refer to Attachment 9 of Type A Water License Application for Drawings

H337697-7000-10-014-1001	Milne Port Construction Works Site Layout
H337697-7000-10-014-1002	Mary River Mine Site Construction Works Site Layout
H337697-7000-10-014-1003	Ravn River Rail Camp Construction Works Site Layout
H337697-7000-10-014-1004	Mid Rail Camp Construction Works Site Layout
H337697-7000-10-014-1005	South Cockburn Lake Rail Camp Construction Works Site Layout
H337697-7000-10-014-1006	Steensby Inlet Construction Works Site Layout
H337697-4610-07-042-0003	Steensby Inlet Environmental Monitoring Plan Site Layout (for proposed landfill location)
E337697-0000-10-042-0001	Hydrocarbon Impacted Soils Storage and Landfarm Facility - General Arrangement of Typical Landfarm
E337697-PM406-50-014-0001	Milne Inlet Environmental Waste Management Building Layout
H337697-7000-10-042-0007	Milne Inlet Environmental Waste Management Facilities
H337697-4350-10-014-0001	Mine Site Landfill and Landfarm Site Layout
H337697-4350-10-042-0001	Mine Site Environmental Waste Management Facility
E337697-PM406-50-014-0002	Mine Site Environmental Waste Management Building Layout
H337697-4660-10-014-0001	Steensby Inlet Landfill and Landfarm Site Layout
E337697-PM406-50-014-0003	Steensby Inlet Environmental Waste Management Building Layout
H337697-4660-10-042-0001	Steensby Inlet Environmental Waste Management Facility

Removed: H337697-7000-10-014-1001 - Milne Port Construction Works Site Layout

(Updated for 2013 Work Plan)

See: Annex 7 - Milne Port Site Layout - H349000-2000-00-015-0002

Removed: H337697-7000-10-014-1002 Mary River Mine Site Construction Works Site Layout

(Updated for 2013 Work Plan)

See: Annex 7 - Mine Site Layout - H349000-4000-00-015-0002

and

Mine Site Enhanced Site Layout - H349000-4000-00-015-0003

Annex 3

Incinerator Manual (E349000-TX001-00-118-001)

EQUIPMENT MANUAL

Revision A

EWS Mobile Incinerator: ECO M2TN

AUGUST 2013

HATCH™ **VENDOR DATA REVIEW**

Doc Number	E349000-TX001-00-118-0001	**Sub**	02
Date Received			

Review Grade	**Next Submittal Status**
☐ **C1** – Proceed to next submission & status	☐ Internal Review ☐ Certified Final ☐ Final ☐ As-Built
☐ **C2** – Proceed with exceptions as noted to next submission & status	**Next Submittal Date:**
☐ **C3** – Do not proceed, revise as noted & resubmit	
No further submission required - Complete ☐ ☐ **C4 -** No further submission required - Cancelled ☐ No further submission required - Superseded ☐	

Package Coordinator: Name, signature and Date:

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AMENDMENT LIST

Section	Description of Change (Subject of Amendment)	Rev Status (AL #)	Rev Date (AL Date)	Initials
All	Submittal to Hatch	Rev 0	6-Aug-13	CM
All	Added Retrieval of Data from PLC	Rev A	7-Aug-13	KD

TABLE OF CONTENTS

1.0 GENERAL INFORMATION

1.1 COMMON ACRONYMS

Acronym	Full Name
AC	Air Conditioning
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
Cd	Cadmium
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CSA	Canadian Standards Association
DCH0	Default Channel Zero
DP	Delta Pressure (amount of pressure change)
EPC	Electronic Proportional Control
ESC key	Escape Key
EWS	Eco Waste Solutions
EWS Mobile	EWS Mobile Incinerator
H20	Water
HCl	Hydrochloric Acid
HCL	Hydrogen chloride
Hg	Mercury
HMI	Human Machine Interface
IEC	International Electrotechnical Commission
ISO	International Organization for Standards
KPa	Kilopascals
LCD	Liquid Crystal Display
LED	Light-emitting Diode
MCR	Master Control Relay
ME	Mist Eliminator
MPCB	Motor Protection Circuit Breaker
N.C.	Normally Closed
N.O.	Normally Open
NO_x	Oxides of Nitrogen
O_2	Oxygen
Pb	Lead
PCCD/PCCF	Dioxins & Furans
PDT	Pole Double Throw
PET	Polyethylene Terephthalate
pH meter	pH meter
P&ID	Process & Instrumentation Diagram
PLC	Programmable Logic Controller
PM	Particulate Matter

Acronym	Full Name
PPM	Parts Per Million
SPDT	Single Pole Double Throw
SCFM	Standard Cubic Feet Meter
SO2	Sulphur Dioxide
SOC	Southern Operational Command
SOW	Statement of Work
SO_x	Oxides of Sulphur
SP	Static Pressure
TEFC	Totally Enclosed, Fan-Cooled
THC	Total Hydrocarbon
USB key	Universal Serial Bus
VDC	Volts Direct Current
VFD	Variable Frequency Drive
W.C.	Water Column

1.2 EWS CONTACT INFORMATION

	CONTACT INFORMATION	
Eco Waste Solutions	5195 Harvester Road, Unit 14	
	Burlington, Ontario, Canada	
	L7L 6E9	
Phone	905-634-7022	
Toll Free	1-866-326-2876	
Fax	905-634-0831	
email	info@ecosolutions.com	
Ask for/Address to	Customer Service Manager	

1.3 HEALTH & SAFETY PRECAUTION

1.3.1 Health and Safety Precautions

PLEASE READ THIS SECTION BEFORE READING THE REST OF THE MANUAL

1.3.2 Safety Warnings

 The **EWS Mobile Incinerator** has a number of safety related hazards that need to be recognized by all operators:

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

IMPORTANT POINTS TO FOLLOW

THE EWS MOBILE INCINERATOR CAN CAUSE SERIOUS INJURY OR DEATH, please follow these points below:

1.3.2.1 KEEP CLEAR OF ANY MOVING PARTS AT ALL TIMES.

1.3.2.2 BEFORE STARTING THE CYCLE OF THE SYSTEM ENSURE THAT ALL PERSONNEL ARE CLEAR OF THE EWS MOBILE INCINERATOR.

1.3.2.3 DO NOT ATTEMPT TO START OR OPERATE THIS EQUIPMENT UNTIL THIS MANUAL IS READ THOROUGHLY AND IS UNDERSTOOD

1.3.2.4 RESPONSIBILITY FOR THE SAFE OPERATION AND MAINTENANCE OF THE EQUIPMENT SUPPLIED REST SOLELY ON THOSE OPERATION IT.

1.3.2.5 OBEY THE FOLLOWING GENERAL SAFETY INSTRUCTIONS AT ALL TIMES.

NOTA

A qualified operator is a person whom the owner of the equipment deems as having the required experience, training and skills to perform the required work and shall be limited to Construction Engineering trades only.

1.3.3 General Safety Instructions

1.3.3.1 Keep the electrical panel doors closed at all times except when performing electrical maintenance or troubleshooting.

1.3.3.2 Allow only qualified operators to perform maintenance and troubleshooting on the machine.

1.3.3.3 Open and lockout the Main Disconnect Switch on the electrical control panel while working on the machine.

1.3.3.4 Do not bypass or tie down any of the door safety limit switches.

1.3.3.5 Do not open any of the doors while the Primary or Secondary Chambers are above 200°F (93 °C).

1.3.3.6 Do not enter the Primary Chamber unless the Emergency Stop Button is pushed

1.3.3.7 When opening or closing the Primary Chamber door keep clear of the door and ensure that the path for the door is clear.

1.3.3.8 Secure the Primary Chamber door when it is open so it cannot move accidentally.

1.3.3.9 Immediately correct any fuel leaks.

1.3.3.10 Do not fill the Primary Chamber above the breech opening. Overfilling can result in poor burning and damage to the **EWS Mobile Incinerator.**

1.3.3.11 Use proper tools; wear impact resistant, CSA certified industrial goggles, full face dust mask (such as Advantage 3000 Respirator) and industrial leather gloves while loading and cleaning the **EWS Mobile Incinerator.**

1.3.3.12 Be aware of component-specific safety hazards listed within each section of this manual.

1.3.4 General Operating and Maintenance Safety Instructions

Proper operating and maintenance procedures must be followed in order for the **EWS Mobile Incinerator** to perform at maximum efficiency. Do not attempt to start or operate this equipment until this 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 component-specific safety procedures outlined in this manual, however, no amount of written instruction can replace good judgment and safe operating practices.

NOTA

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 **EWS Mobile Incinerator** 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 schedule be followed diligently (please refer to the Incinerator Maintenance Plan). It is advisable to keep an equipment log) for recording maintenance activities along with unusual operation. In the event that the equipment is not operating in the normal manner contact Eco Waste Solutions immediately (please refer to *Section 1.2 EWS Contact Information*). It is important to report problems as soon as they are noticed to minimize damage that faulty operation could cause.

Proper maintenance of the equipment is essential to ensure long term, reliable operation of the **EWS Mobile Incinerator**. The preventive maintenance procedures outlined in Section 4 of this manual should be adhered to strictly for best service life.

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

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

2.0 OVERVIEW OF TECHNOLOGY

2.1 INTRODUCTION TO WASTE INCINERATION

2.1.1 Protecting the Environment

2.1.1.1 Why Incinerate?

An advanced technology incinerator like the **EWS Mobile Incinerator** is the basis of a pollution prevention approach to waste management for camp operations. Having an incinerator that can be transported to the point-of-need provides immediate and complete control over the disposal of camp waste.

Incineration is considered to be a sustainable waste management practice because it deals with the waste on-site and as it's generated. Landfills operate on the premise that once it is buried the problem is eliminated. However even landfills with the most advanced engineering can fail. The very fact that a landfill is forever predicts the deterioration and failure of landfill safety systems. The creation of a well-designed landfill has a high upfront capital cost, takes many months to build and requires on-going maintenance in perpetuity making them a poor fit for a mobile camp.

Often camps consider using open air burning to deal with waste. This may involve simply setting fire to the waste pile or the use of a barrel or pit to contain the waste while burning. Open air burning creates air pollution and can lead to damaging health effects for the operator and those living and or working nearby.

By contrast, modern advanced incineration with air pollution control allows for the complete destruction of domestic waste without polluting the air, land or water. The waste material is completely converted to a non-toxic ash that does not attract wildlife.

The primary advantages of incineration are:

- **REDUCTION** of the weight and volume of waste material that must be disposed of using landfills or other means
- **DESTRUCTION** of materials that may be an attractant to wildlife and any pathogenic agents that may be contained within waste materials

2.1.1.2 The Operator – Your Role

As the Operator of the incinerator you have an extremely important role in protecting the environment through the correct operation of this equipment. It is the operator's role and responsibility to protect the environment by:

1. Ensuring that no inappropriate materials are processed and that each batch contains an average mix of waste that resembles the design waste characteristics (particularly volume/weight per batch, average density, and overall heat value). See Waste Table in Section 2.4.2 for details.

2. Understanding the environmental operating permits and commitments made by your employer to regulatory bodies and other stakeholders. This includes the emission targets, monitoring and recording requirements. Understanding the wastes that can and cannot be processed in the equipment as specified by the manufacturer as well as applicable regulatory permits or

other commitments. Undertaking all necessary operational and maintenance practices to ensure compliance with applicable emission limits and operating requirements.

3. Ensuring the burn cycle is long enough to allow for thorough burn-out and the generation of high quality ash residual that is safe for disposal

4. Minimizing particulate matter (dust) emissions during ash removal and handling

5. Disposing of ash properly by sending it to appropriate disposal sites

6. Taking responsibility for regular maintenance inspections and ensuring the appropriate attention is given to any problems immediately.

2.1.1.3 Air Pollutants of Concern

All combustion processes produce an exhaust emission. The **EWS Mobile Incinerator** is technologically advanced and designed to thoroughly combust the waste while producing minimal emissions.

Correct operation and rigorous attention to maintenance will ensure that the **EWS Mobile Incinerator** operates with the least possible impact on the environment.

It is recommended that incinerator operators understand the potential for the creation of pollution from incorrect operation. The following table lists the pollutants that can occur in incinerator exhaust emissions.

POLLUTANT	CONCERN	SOURCE OR CAUSE
CO (Carbon Monoxide)	Combustion Indicator	High levels of CO indicates poor quality combustion
SOx (Oxides of Sulphur)	Contributes to acid rain, respiratory irritant	High sulphur content fuels
NOx (Oxides of Nitrogen)	Contributes to acid rain, respiratory irritant	Incorrect air input, too high operating temperatures
HCl (Hydrochloric Acid)	Contributes to acid rain, corrosive, respiratory irritant	Primarily from the burning of PVC (polyvinyl chloride) plastics
PM (Particulate Matter)	Respiratory effects	Incomplete combustion, rich fuel to air ratio, dust-laden waste stream
PCCD/PCCF (Dioxins & Furans)	Persistent organic compound known to bioaccumulate	Incomplete combustion due to overloading, air ingress, improper waste mix
Heavy Metals including: Pb (Lead), Hg (Mercury), Cd (Cadmium), etc.	Toxic and known to be hazardous to human health and living ecosystems	Presence of heavy metals in the waste stream will lead to appearance in the exhaust gases

2.1.2 Basic Combustion Principles

Combustion is a rapid chemical reaction between oxygen and combustible elements such as carbon or hydrogen. Combustion uses the oxygen in air to react with the combustible materials producing heat which continues the process. Most of the products of combustion are gases. Good combustion produces clean gases that are invisible. Poor combustion will create smoke.

2.1.2.1 Products of Combustion Reaction (Ideal Combustion)

The ideal combustion reaction is often used to explain combustion. In the ideal reaction a completely combustible material - a compound of carbon, hydrogen and oxygen is heated and allowed to react with oxygen. As it is heated water is vaporized and the carbon bonds with the oxygen and heat is released.

Carbon, Hydrogen, Oxygen + Oxygen + $\longrightarrow$ Heat Carbon Dioxide + Water and Heat

2.1.2.2 Incomplete Combustion

This ideal reaction is theoretical and does not occur in 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 or system exhaust. The products of incomplete combustion are typically elemental carbon (or soot) and carbon monoxide (CO). Soot particles are very fine and generally result in high opacity (smoke) at the combustion stack. Other products of incomplete combustion that cause concern 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 chamber 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 the ash.

2.1.2.3 Combustion Indicators

One of the most obvious combustion indicators is the presence of a visible exhaust emission or smoke.

2.1.2.4 Stack Gas Oxygen and Carbon Monoxide

More reliable indicators that can be used to monitor combustion quality are the concentrations of key compounds in the stack gas.

2.1.2.5 Stack Gas: O_2 (Oxygen) concentration

The stack gas O_2 concentration provides a measure of excess air. Waste incinerators typically operate at 140 to 200 percent excess air, which roughly corresponds to 12 to 14 percent O_2 in the stack gas.

- High O_2 means too much excess air (cools gases).
- Low O_2 means insufficient air (incomplete combustion).

2.1.2.6 Stack Gas: Carbon Monoxide (CO) concentration

Each combustion system has a "typical operating range" for CO. If the stack gas, CO concentration goes above this typical range, combustion problems are likely. With a waste incinerator this is typically <100 ppm.

2.1.2.7 Waste Characteristics

Different waste types have different heating values, densities and moisture contents. These primary characteristics of the waste will affect the combustion process.

The **HEATING VALUE** of waste is a measure of the energy released when the waste is burned. It is measured in units of joules per kilogram (j/kg). The heating value is proportional to the energy released when burned. A heating value of about 11.6 MJ/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 **MOISTURE CONTENT** of waste is a measure of the quantity of water contained or saturated in solid dry waste material. It is measured by a ratio or a percentage. The wetter the waste, the higher the moisture content and the longer it will take the waste to burn. As a result, a longer burn time requires more fuel while operating the incinerator. On the contrary, drier waste has lower moisture content. This dry waste requires a shorter burn time which results in less fuel being required.

2.1.2.8 Ash Quality

Visual appearance of the 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. A noted increase in ash combustibles indicates a combustion problem which may include temperatures that are too low, improper distribution of combustion air in the chamber (plugged air inlets), or burn cycle time is too short.

2.1.2.9 Summary of Key Operation Factors Affecting Combustion

2.1.2.9.1 Combustion Air supply
- i. Sufficient air for complete reaction
- ii. Distributed to promote mixing

2.1.2.9.2 Mixing/Turbulence
- i. Assure contact of oxygen and organics

2.1.2.9.3 Temperature
- i. High enough to sustain combustion
- ii. High enough to complete reaction

2.1.2.9.4 Residence time/Retention time
- i. Sufficient time to allow reaction to complete

2.1.2.9.5 Waste Feed Characteristics

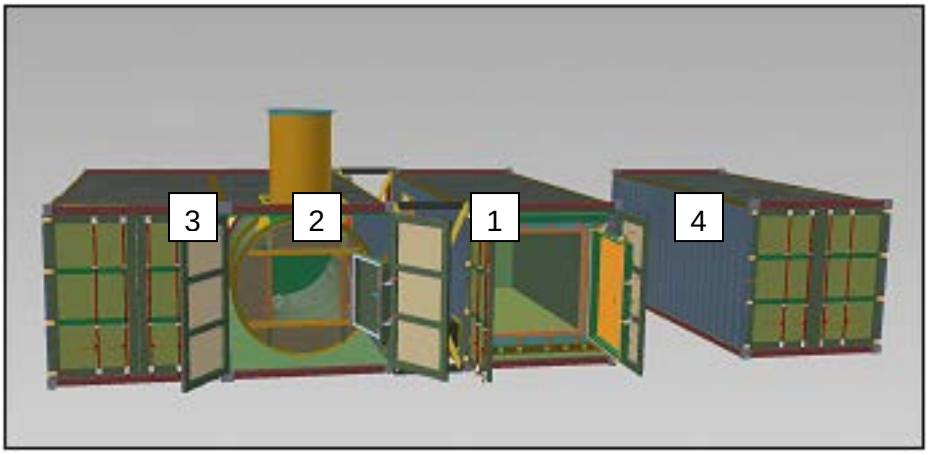
i. Waste feed must be representative of the waste feed assumptions used for the design of the incinerator

All of these key factors are interrelated.

2.1.3 Technology Overview

2.1.3.1 System Description

The **EWS Mobile Incinerator** is a fully containerized transportable waste incinerator system designed to meet the strictest environmental standards. The EWS Mobile Incinerator is comprised of 3 containerized modules and additional shipping container shown below.



View of the EWS Mobile Incinerator Containers

(Left to right: Container 3 - Controls Container, Container 2 - Secondary Chamber Container, Container 1 - Primary Chamber Container, Container 4 – Shipping Container)

2.1.3.2 System Process

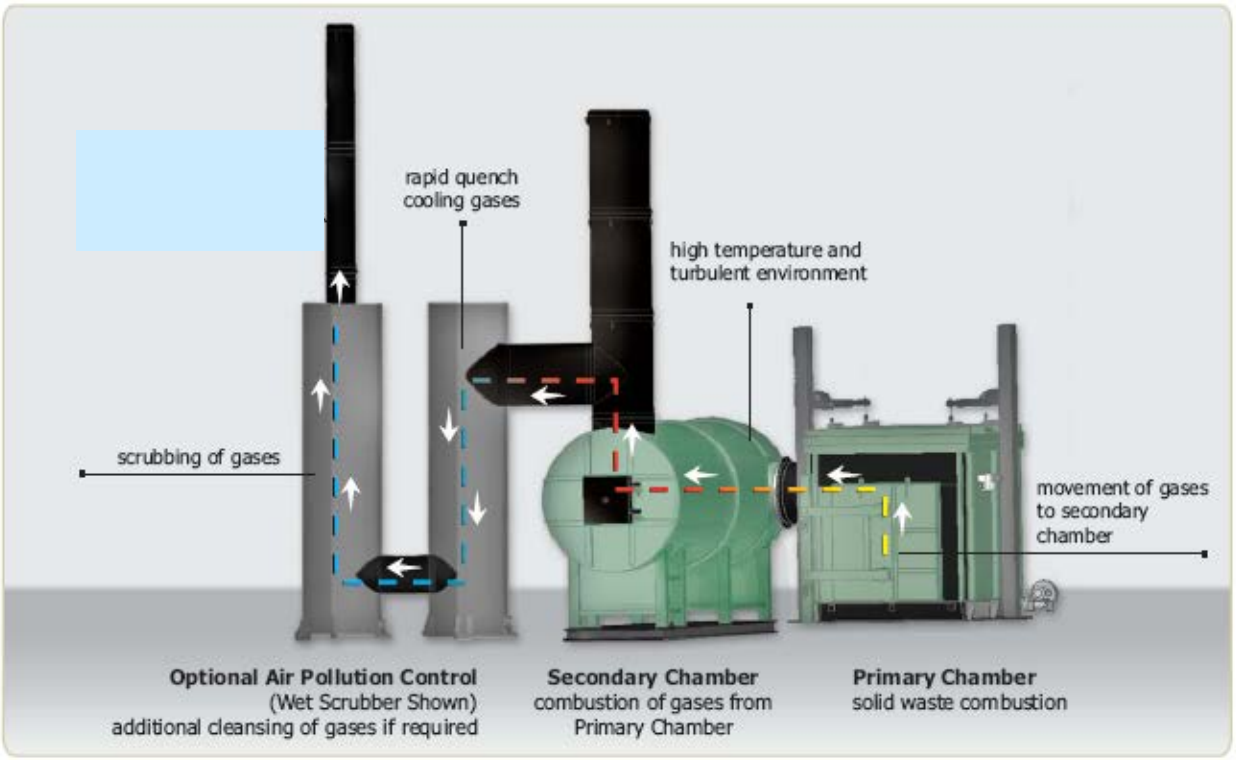
Stage One (Container 1 in diagram)
This container houses the incinerator's **Primary Chamber**. Waste is placed into the chamber until it is full, then the door is sealed shut and the system can be started. The waste will remain in this chamber, for the entire cycle, where it will be burned down to ash.

Stage Two (Container 2 in diagram)
This container houses the Incinerator's **Secondary Chamber** which burns the off-gases coming from the Primary Chamber that are continually formed as the waste is burned.

2.1.3.3 Process Overview

The following illustration depicts the process flow described previously and provides a schematic representation of the creation of gases and their flow through the system.

The system shown below is a graphic representation of the process and does not show the modules housed in ISO containers.



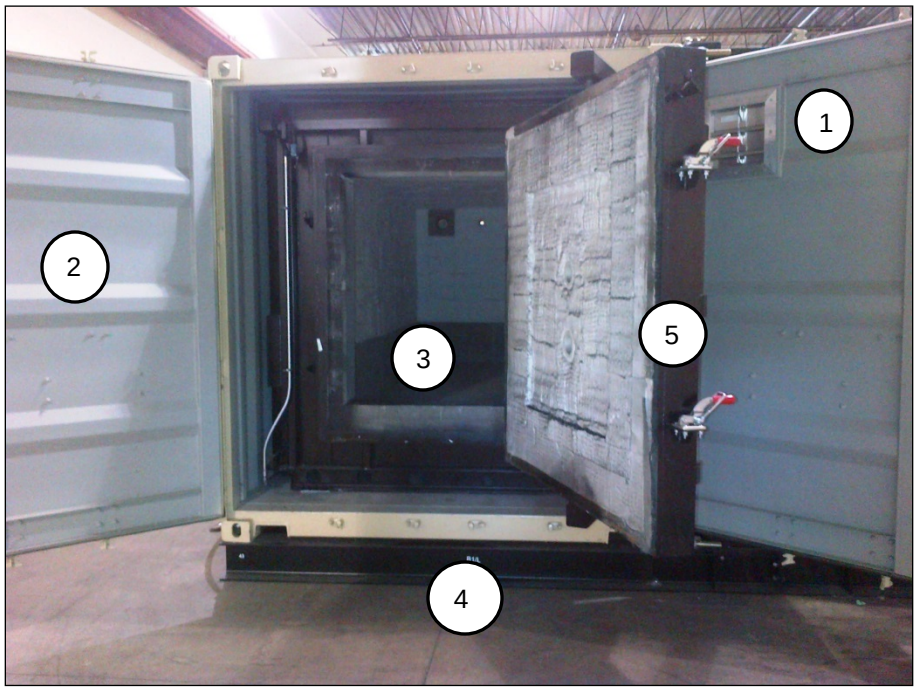
2.1.3.4 Functional Description of Major Components

The components within the Mobile Incinerator package that involve combustion are referred to as the incinerator. The main modules of the incinerator are the Primary Chamber and the Secondary Chamber. Both Chambers are large vessels constructed of steel with a special insulating liner known as refractory. The Primary and Secondary Chambers are described in detail below.

2.1.3.4.1 Primary Chamber

The **Primary Chamber** has a large front-opening door for loading of solid waste and removal of the ash residuals. Waste is loaded using a small skid-steer loader. The waste is dumped into the front of the chamber then pushed towards the back until full. Once the chamber is full, the door is closed and sealed shut using the toggle clamps. The operator will then use the control panel located in the Control Container to start the system. The Secondary Chamber must be at operating temperature before the Primary Chamber can activate.

To begin the process of burning the solid waste the **Primary Chamber Burner** is used to elevate the temperature of the Primary Chamber to ignite the waste. The burner package has a single motor that operates both the diesel fuel pump and combustion air supply fan of the burner. The burner ignites the fuel and supplies combustion air to create heat.



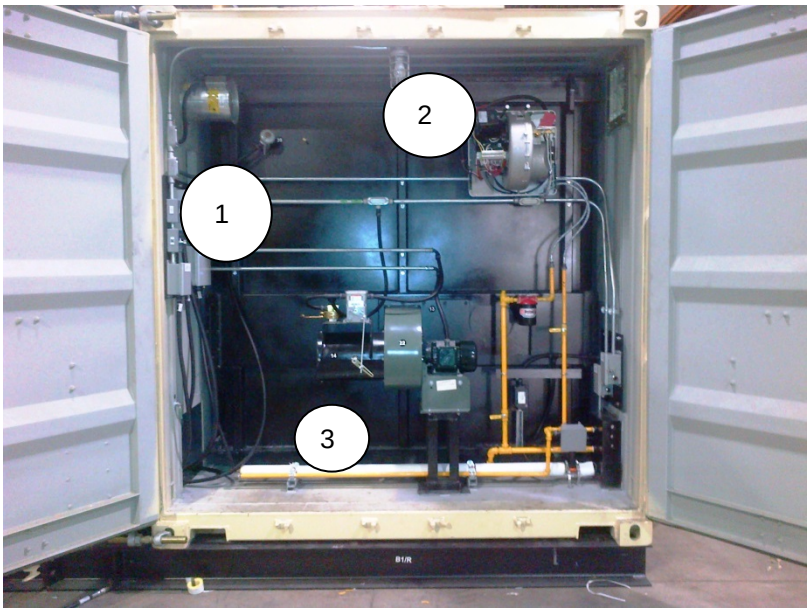
1. Louver
2. Container door
3. Opening for loading
4. Base frame
5. Toggle clamps

Front View: Primary Chamber Container (Chamber open)

A **Thermocouple** is used to measure the temperature of the Chamber. Once the 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.

The amount of heat released from the oxidation of the waste, is controlled by limiting the air into the Primary Chamber to less than what is required for complete combustion. This is described as *starved air* conditions. With controlled air and temperature the waste is dried, heated and oxidized thereby releasing moisture and volatile components. The non-volatile, combustible portion of the waste is burned to provide heat while the non-combustible portion accumulates as residual. These conditions ensure that the waste is allowed to fully combust and is rendered sterile. Waste volume is reduced by over 90%. After enduring the combustion process, metals and glass remain intact. Preservation of metals and glass protects the refractory lining from damage caused by melted and fused metals and glass, but also allows for post-combustion recycling where possible.

This chamber also has a small **cooling fan**, typically referred to as the **Primary Chamber Blower**. The blower does not operate during the burn cycle but will activate automatically once the burn is complete and the system goes into cool down phase. The blower then cools the chamber for a period of 12 hours so that the chamber will be sufficiently cool for the Operator to safely remove the ash and begin to load a new batch of waste.



1. Thermocouple
2. Burner (Diesel-fired)
3. Primary Chamber Blower/Cooling Fan

Rear View: Primary Chamber Container

2.1.3.4.2 Secondary Chamber

As waste burns in the Primary Chamber, gases containing the products of combustion are pulled continuously into the high temperature zone of the **Secondary Chamber** where the oxidation reaction of the combustible products is completed.

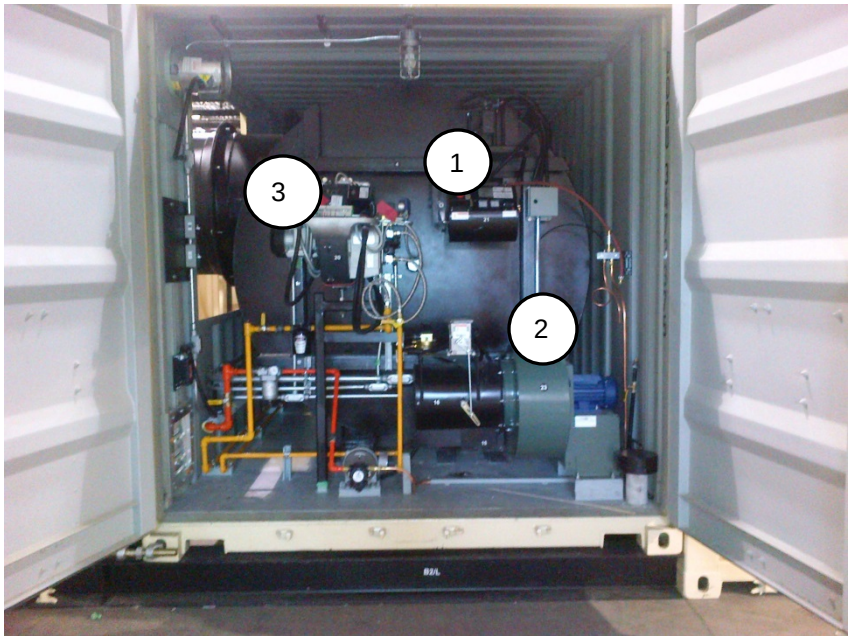
To accomplish this, the Secondary Chamber controls the temperature at 1000°C using a thermocouple to constantly measure the temperature inside the chamber. The temperature readings are monitored by the system's PLC and the PLC will initiate operational changes such as increasing or decreasing the speed of the **Secondary Chamber Blower** and the output of the **Secondary Chamber Burner (Diesel-fired).**

The **Secondary Chamber Blower** air is introduced into the chamber by an air ring manifold that surrounds the Secondary Chamber. The manifold has small air jets called tweers that open into the 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) to control the speed of the fan and modulating motors on the blower inlet dampers.

The 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 chamber and prevent temperature overruns.

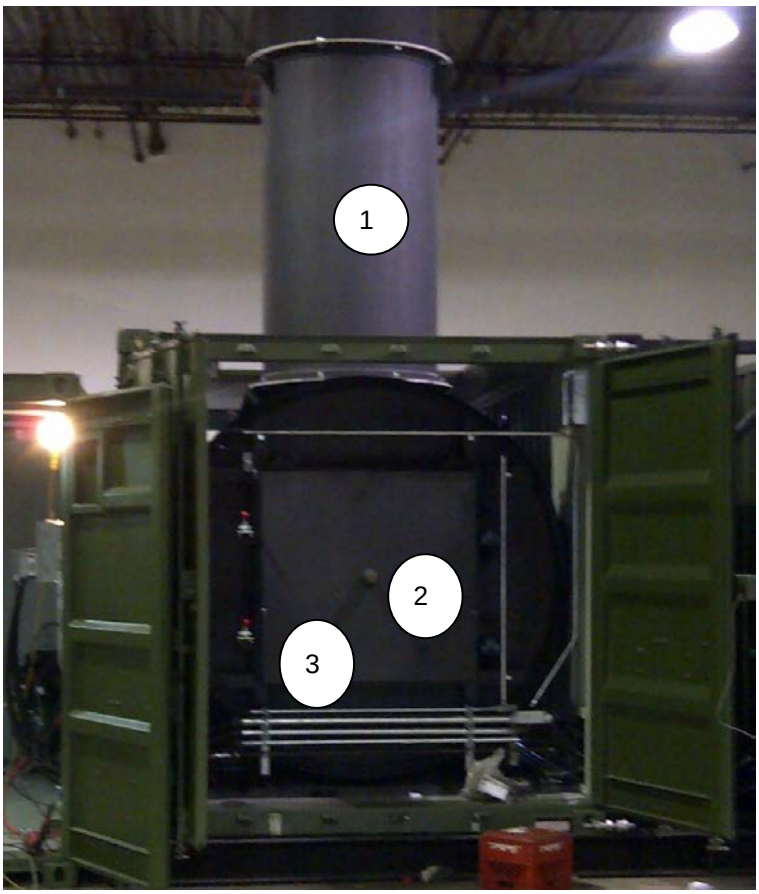
Secondary Chamber Burner (Diesel-fired) is similar to the burner used in the Primary Chamber except that it is a much higher output burner and its output is self-modulated over a broad range for very precise temperature control.

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.



1. Waste Oil Burner
2. Secondary Chamber Blower/Fan
3. Secondary Chamber Burner (Diesel-fired)

Front View: Secondary Chamber Container



1. Stack
2. Secondary Chamber View Port
3. Secondary Chamber Access Door

Sample Rear View: Secondary Chamber Container

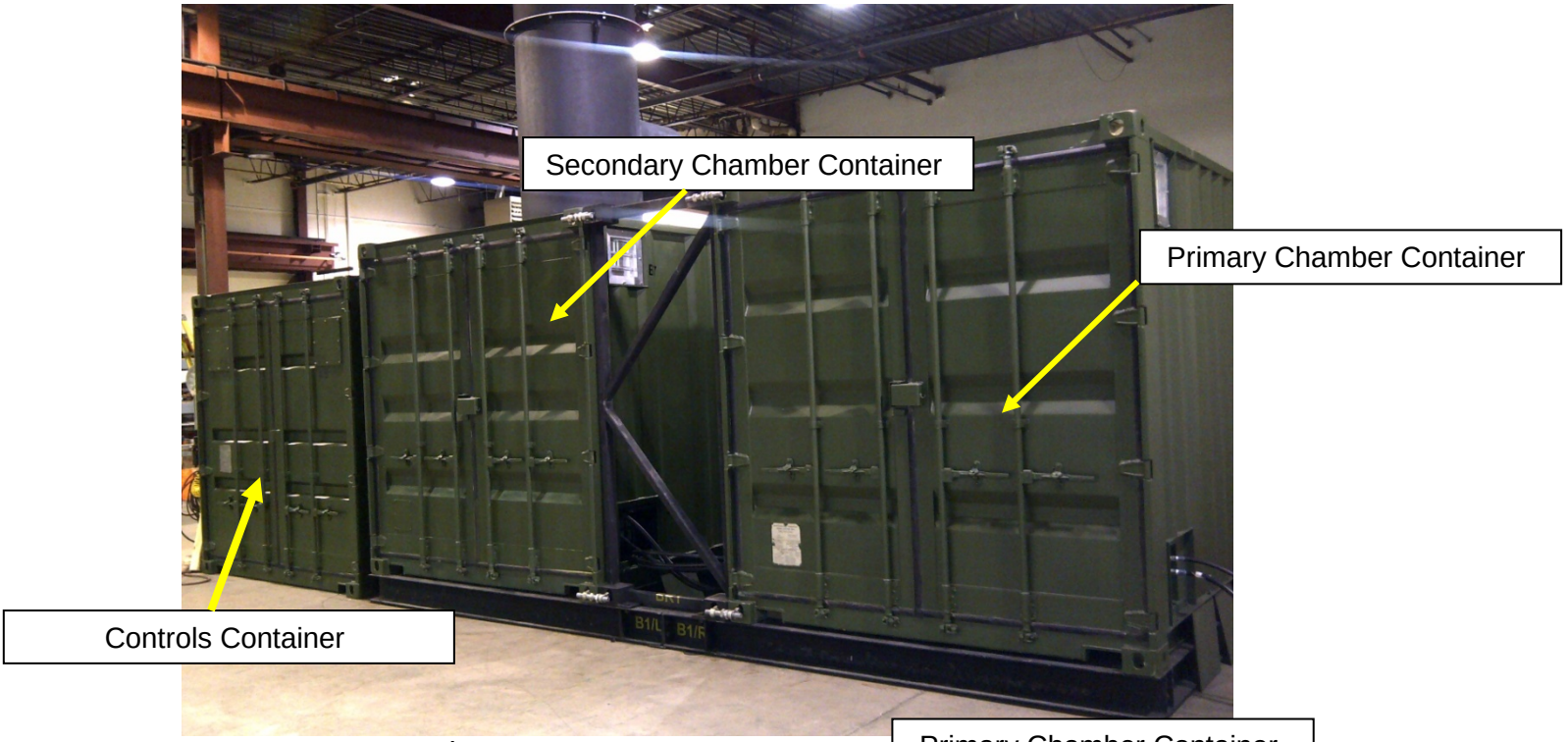
2.1.3.4.3 Main Control Panel

There is one Main Control Panel that controls all of the interconnecting modules. The Operator has one simple interface to start the equipment, view system status and change control settings if required. The entire process is managed using a **PLC** (programmable logic controller) to automate the operation. The critical process parameters such as temperature, combustion airflow and burner output are operated using EWS' patented system control program to maintain optimal combustion.

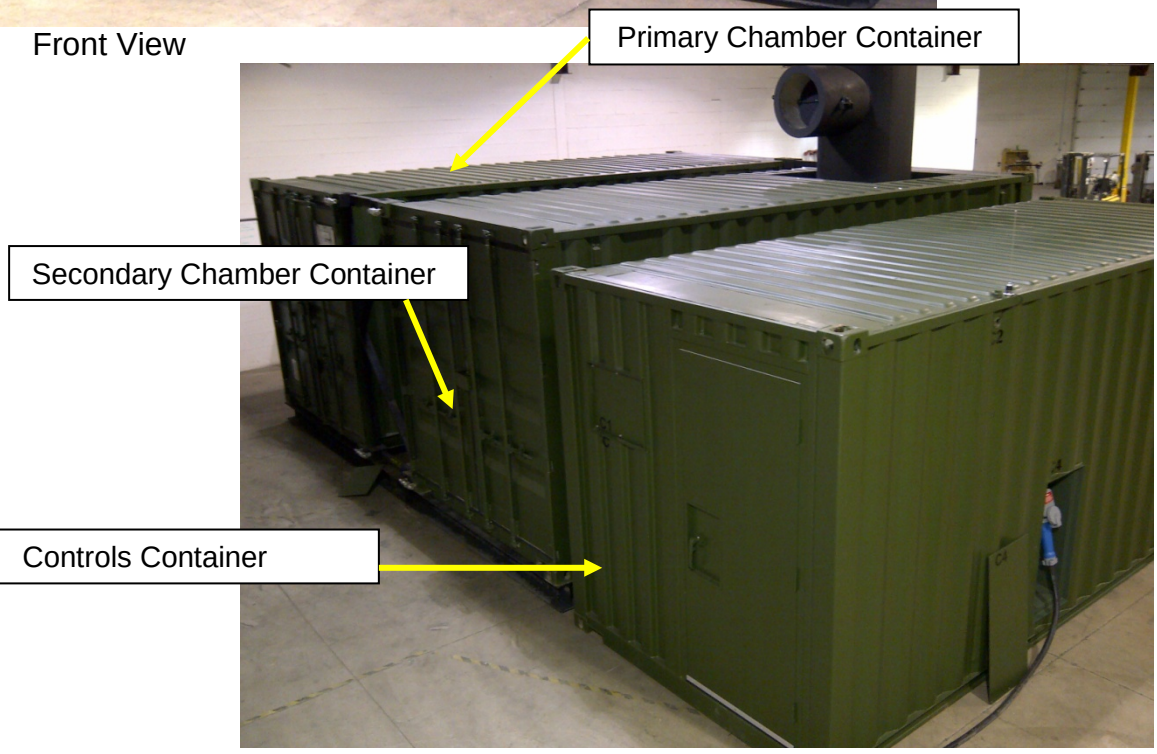
Front View: Main Control Panel

2.2 DESCRIPTION OF EWS MOBILE INCINERATOR

2.2.1 EWS Mobile Incinerator Containers



Front View



Rear View

The **EWS Mobile Incinerator** consists of the following containers as depicted in the drawing.

2.2.1.1 **Primary Chamber Container:** containing the Primary Chamber and diesel oil connectors

2.2.1.2 **Secondary Chamber Container:** containing the Secondary Chamber

2.2.1.3 **Controls Container:** containing the Main Control Panel (Monitoring and Control Centre) as well as the electrical hook-ups and Air Compressor

2.2.1.4 **Shipping Container:** Container to hold components during transportation (Not Shown)

EWS Mobile Incinerator: Description of each Container

2.2.1.1 #1 Primary Chamber Container

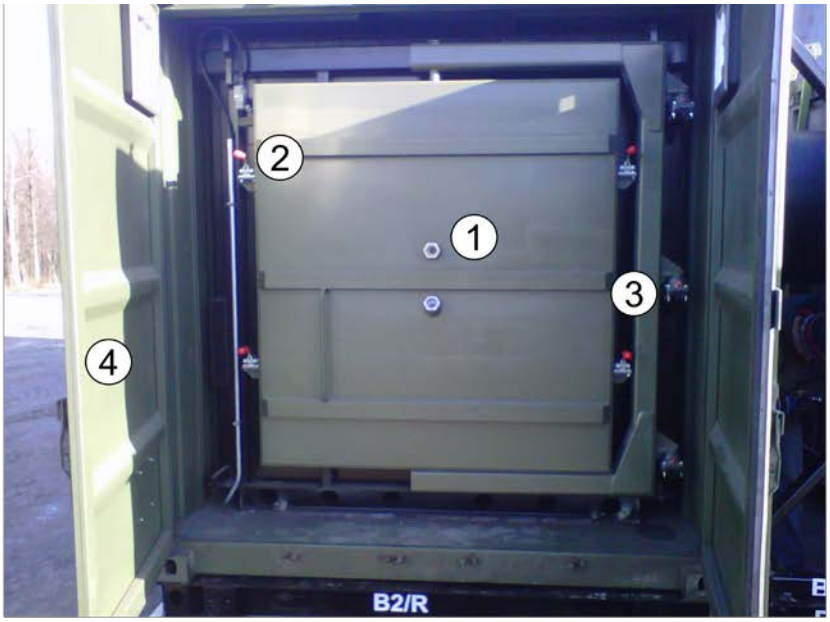
a. This standard 20' ISO shipping container permanently encloses the **Primary Chamber.**

b. At one end of the container the operator can open the container and gain access to the large front-loading primary chamber door. The Primary Chamber door will pivot on its hinge to allow for an opening of 90°.

c. At the other end of the container the doors will allow for unencumbered access to the auxiliary fuel (diesel) burner. Also located at this end is the Primary Chamber cooling fan. Other than during periodic maintenance and installation and disassembly, there is no need to regularly access these components and therefore these doors will be kept closed.
   i. The Primary Chamber including all of its major components and plumbing will be shipped fully assembled within the container, with minimal assembly of interconnections required in the field.

d. This container includes its own air handling system.

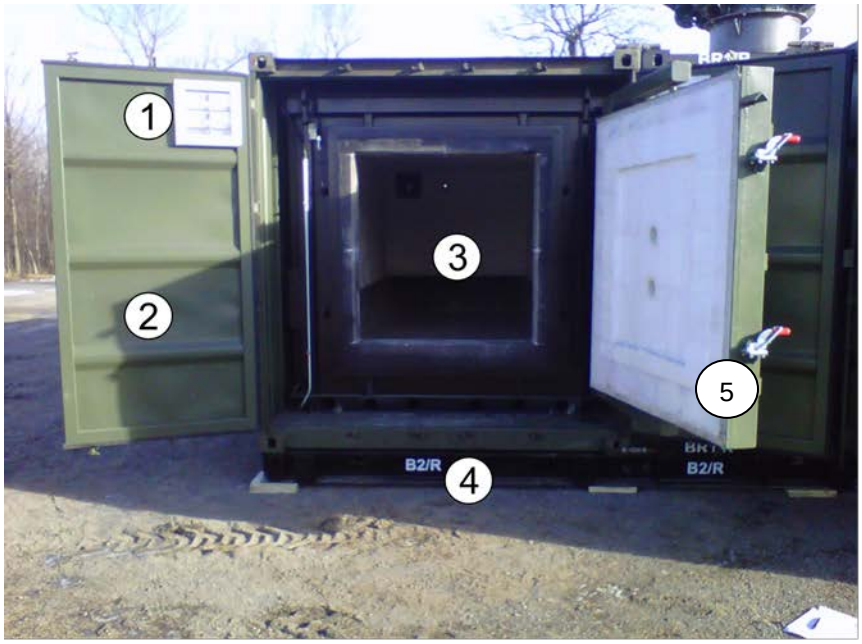
e. This container is modified to allow interconnections to the other containers:
   i. Hatch opening for interconnecting duct Breech between Primary and Secondary Chamber Containers
   ii. Utility Bridge for fuel in, fuel return line out, electrical power in and instrument cables out



1. Primary Chamber View ports (2)
2. Toggle Clamps (4)
3. Door Bearings (3)
4. Primary Chamber Container Door

Front View: Primary Chamber Container

(with Primary Chamber Door Closed)



1. Container Louver
2. Primary Chamber Container Door
3. Opening into Primary Chamber (loading area)
4. Base frame
5. Toggle Clamps

Front View: Primary Chamber Container

(with Primary Chamber Door Open)

1. Thermocouple
2. Burner (Diesel-fired)
3. Primary Chamber Blower/Cooling Fan

Rear View: Primary Chamber Container

2.2.1.2 #2 Secondary Chamber Container

a. This standard 20' ISO shipping container permanently encloses the **Secondary Chamber.**

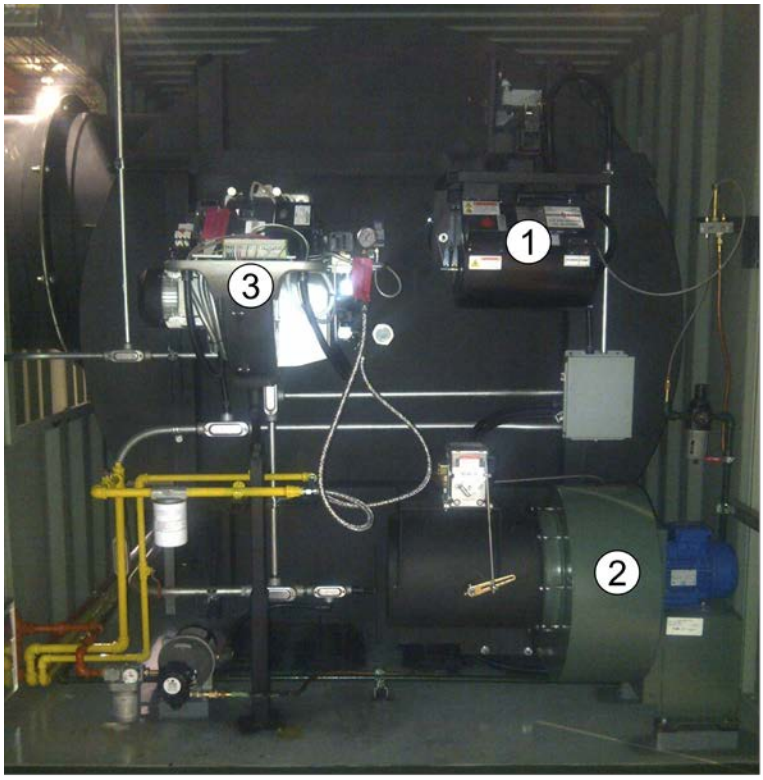
b. This container will be accessed by the Operator on a daily basis. The doors provide access for periodic maintenance and for access during installation and disassembly.

c. The Secondary Chamber including all of its major components and plumbing will be shipped fully assembled within the container, with minimal assembly of interconnections required in the field.

d. The Secondary Chamber includes an access door for inspection and maintenance access for the Secondary Burner

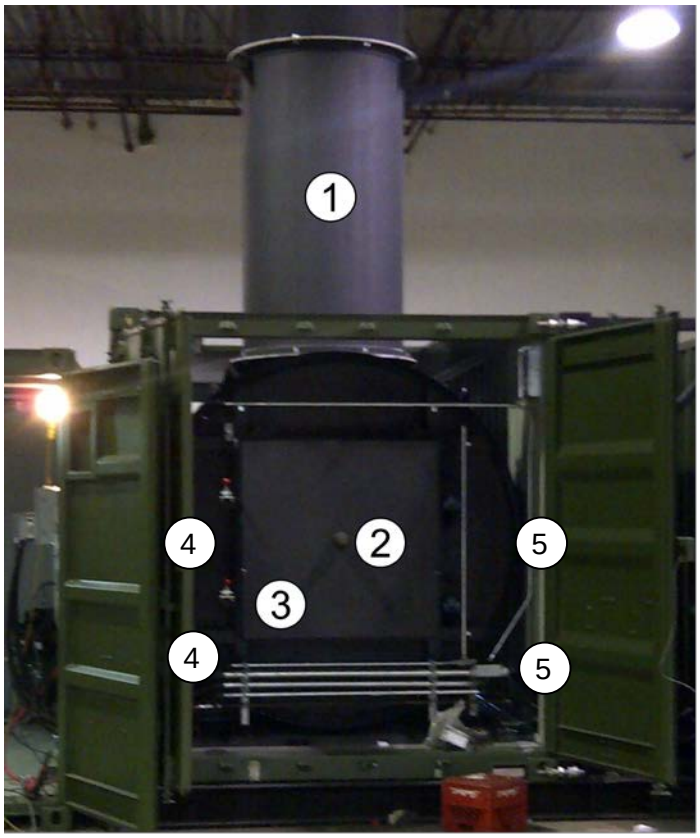
e. This container includes its own air handling system.

f. This container is modified to allow inter connections to the other containers.
   i. Hatch opening for interconnecting duct, Breech between Primary and Secondary Chamber Containers
   ii. Utility Bridge (Secondary Chamber to Primary Chamber) Interface for fuel in, fuel return line out, electrical power in and instrument cables out.
   iii. Utility Bridge (Secondary Chamber to Controls Container) fuel, electrical, instrument and air.



1. Waste Oil Burner
2. Secondary Chamber Blower/Fan
3. Secondary Chamber Burner (Diesel-fired)

Front View: Secondary Chamber Container



1. Stack
2. Secondary Chamber View Port
3. Secondary Chamber Access Door
4. Toggle Clamps (2)
5. Door Bearings

Rear View: Secondary Chamber Container

2.2.1.3 #3 Controls Container

a. This standard 20' ISO shipping container houses the Main Control Panel for the entire **EWS Mobile Incinerator** package.

b. This container will be the main point of operations and control for the entire **EWS Mobile Incinerator** package.

c. This container is modified to allow inter connections to the other containers.
   i. Utility Bridge Interface with Secondary Chamber, fuel, electrical, instrument and air.
   ii. Main power supply connection

1. Main Power Supply Connection 2" (power supply cable and coupling to be supplied by customer)

2. Control Room Door

2.3 SPECIFICATIONS & MATERIALS OF CONSTRUCTION

2.3.1 EWS Mobile Incinerator: Operating Parameters

Operational Parameter	Rating
Incinerator Type	Controlled-air, two-stage
Fuel Type	Main: Diesel; Auxiliary: Waste Oil
Waste load capacity	2000 kg
Batch cycle time	8-10 hours estimate
Factory Pre-set minimum burn time	480 minutes
Cool down cycle	10-12 hours
Pre-set automated cool down cycle operation time	720 minutes

2.3.2 EWS Mobile Incinerator: Technical Specifications

2.3.2.1 Incinerator: Materials of Construction

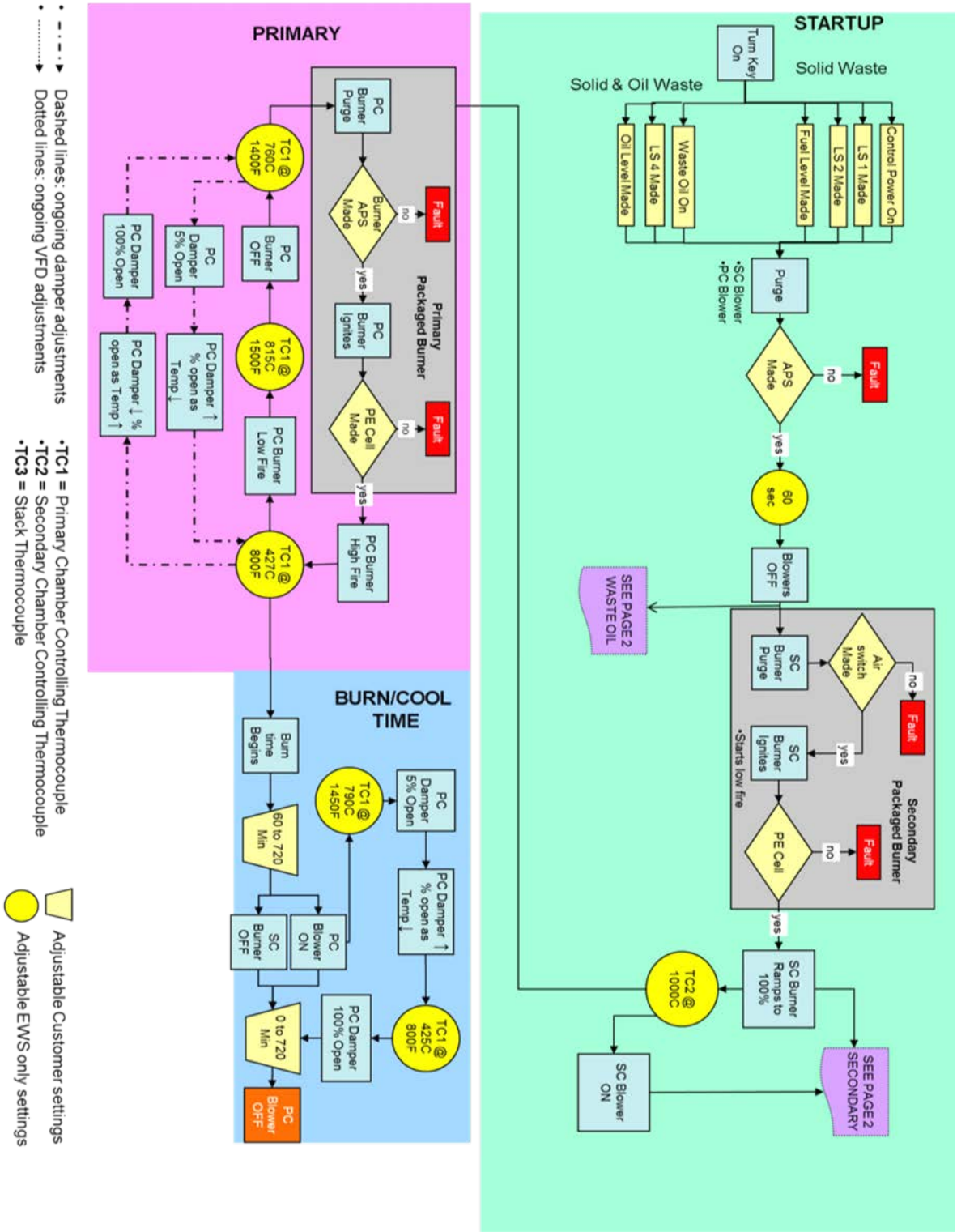
Component	Material of Construction
Incinerator Shell	¼" thick mild steel, welded with continuous bead welds Sand-blasted and painted with rust-inhibiting, high temperature paint
Incinerator Lining – Primary Chamber Floor	Factory cured, reinforced castable monolithic refractory, 6" thick Rated to 1760°C
Incinerator Lining – Primary Chamber walls and roof, Secondary Chamber interior	Ceramic fibre modules, 6" thick Rated to 1200°C Modules are lightweight and are individually anchored to the shell (Heavy, high-strength material not required or desirable in these areas) Highly reflective, does not retain heat against shell Immune to thermal shock from temperature cycling inherent in batch operation
Incinerator Lining – Door jambs, lintels, breech openings, and other penetrations	Factory cured, formed, reinforced castable refractory, 6" thick Rated to 1200°C High-strength, erosion and abrasion resistant material required in the susceptible areas
Fuel Oil Tanks (Diesel & Waste Oil)	Mild steel tank, sand-blasted and coated with corrosion resistant paint. Double-wall construction.

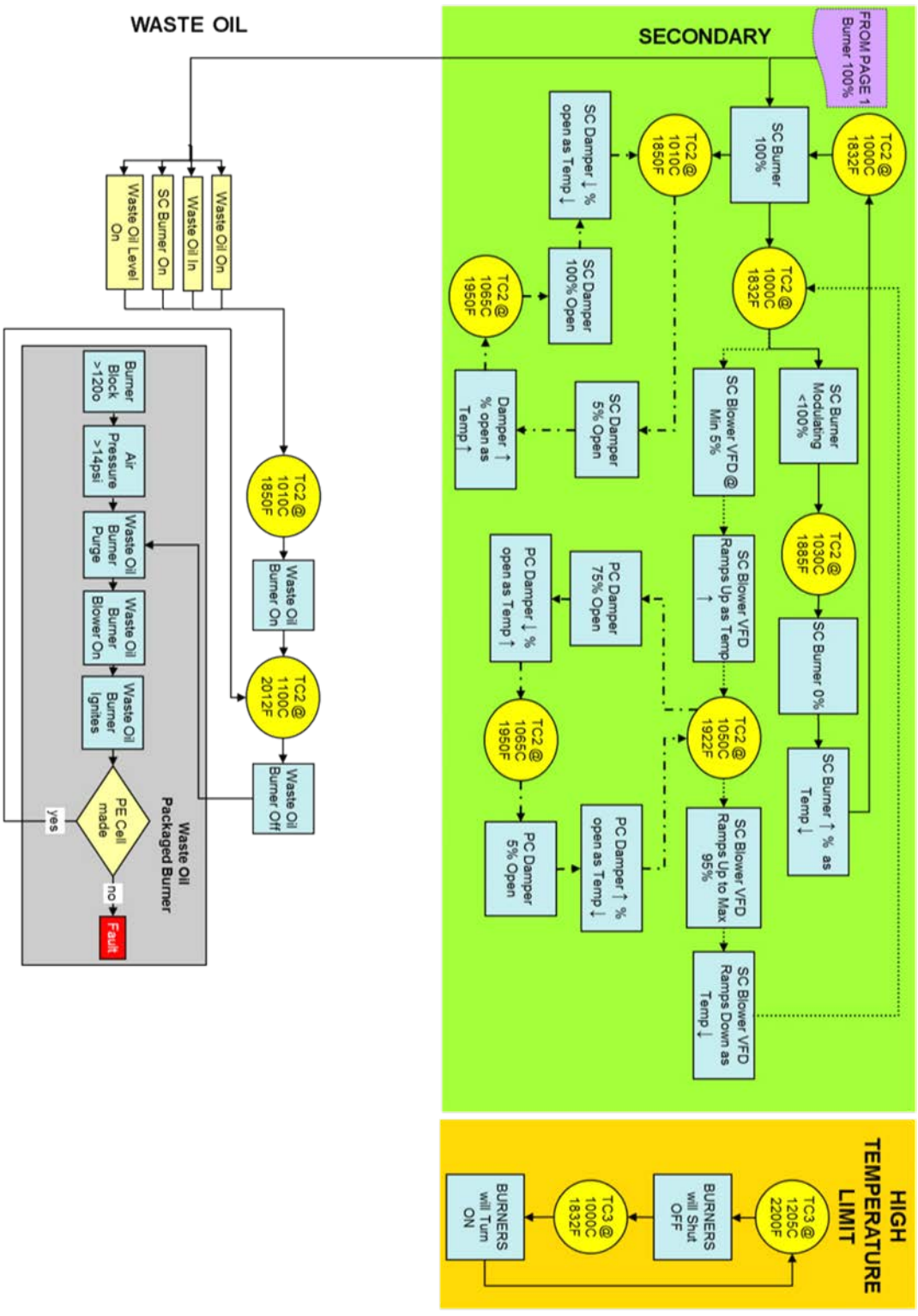
2.3.2.2 Incinerator: Major Components Specifications

Component	Description	Size/Rating
Control System	Single main control cabinet houses all motor starters, breakers and overloads. PLC process controller, Variable Frequency Drive (VFDs) to control Secondary Blower. LCD Operator Interface.	Electrical Power Design Input: 600V, 60 A
Packaged Diesel Fired Burners	Industrial burners each with built-in blower to supply combustion air, oil pump driven by same motor. Burner complete with integral relief valve and filter, fuel pressure gauge, air proving switch and igniters.	Primary Burner Rating: 97/154-395 kW **Motor: 0.7 kW** Secondary Burner Rating: 332/711-1482 kW **Motor: 2.1 kW**
Blowers	Factory run tested packaged design. Fan construction able to withstand high heat environment.	<u>Primary Blower:</u> Flow rate:1700 m^3/h Standard Static Pressure (SP): 31.5 mmH_2O **Motor: 1.12 kW (1.5 HP)** <u>Secondary Blower:</u> Flow Rate:4247 m^3/h Standard SP: 61 mmH_2O **Motor: 1.5 kW (2 HP)** Note: Standard Air, 70°F, 0.075IB/CF (21°C, 1.20 kg/m^3)
Diesel Fuel Tank	Includes all required accessories: vent, drain, level sensor and lifting lugs.	Volume: 2200 litres
Waste Oil Tank	Includes all required accessories: vent, drain, level sensors, heater and lifting lugs.	Volume: 500 litres

2.3.3 EWS Mobile Incinerator: Controls Philosophy

2.3.3.1 EWS Mobile Incinerator Package Central Control System




WASTE OIL
SECONDARY
FROM PAGE 1 Burner 100%
TC2 @ 1000C 1832F
SC Burner 100%
TC2 @ 1010C 1850F
SC Damper ↓ % open as Temp ↓
TC2 @ 1000C 1832F
SC Damper 100% Open
TC2 @ 1065C 1950F
Damper ↑ % open as Temp ↑
SC Damper 5% Open
SC Blower VFD @ Min 5%
SC Burner Modulating <100%
TC2 @ 1030C 1885F
SC Burner 0%
SC Burner ↑ % as Temp ↓
SC Blower VFD Ramps Up as Temp ↑
TC2 @ 1050C 1922F
SC Blower VFD Ramps Up to Max 95%
SC Blower VFD Ramps Down as Temp ↓
PC Damper ↓ % open as Temp ↑
PC Damper 75% Open
TC2 @ 1065C 1950F
PC Damper 5% Open
PC Damper ↑ % open as Temp ↓
HIGH TEMPERATURE LIMIT
TC3 @ 1205C 2200F
BURNERS will Shut OFF
TC3 @ 1000C 1832F
BURNERS will Turn ON
Waste Oil Level On
SC Burner On
Waste Oil In
Waste Oil On
TC2 @ 1010C 1850F
Waste Oil Burner On
TC2 @ 1100C 2012F
Waste Oil Burner Off
Waste Oil Packaged Burner
Burner Block >120o
Air Pressure >14psi
Waste Oil Burner Purge
Waste Oil Burner Blower On
Waste Oil Burner Ignites
PE Cell made
yes
no
Fault

2.4 WASTE PROCESSING CAPABILITIES

2.4.1 EWS Mobile Incinerator Waste Description

The waste types to be processed include: personal domestic waste, kitchen waste, dewatered sewage sludge, paper, packaging, lumber and textiles, documents, occasional tires and clinical medical waste (only gauze and needles). Furthermore, the specification indicates that hazardous materials including batteries will be eliminated from the incinerator waste stream.

2.4.2 Design Waste Assumptions

Quantity	**2000 kg/day**
Density	**160-240 kg/m^3**
Higher Heat Value	**15,150 KJ/kg**
Moisture Content	**Up to 40%**

System capacity of 2000 kg per day is based on the above waste mix assumptions. Waste will be loose, as received and not compacted prior to loading. If high volumes of PET (clear plastic) water bottles are received some compaction is recommended to ensure that the waste mix characteristics are representative of materials presented in the quote AMR-ECO M 2TN.

NOTA

2.4.2.1 Higher heat value materials should be mixed with lower heat value materials to ensure that the average heat value of the batch load is approximately that listed above. Overloading the system with high heat value materials can cause uncontrolled combustion leading to pollution and/or damage to the incinerator system.

2.4.2.2 A batch system capacity is closely related to the waste density. If a large amount of very low density, low weight materials are loaded into the system at one time the volume of the Primary Chamber may limit the capacity to much less than it is rated for. Care should be taken to mix waste materials to ensure the correct density range. Also, materials containing large air spaces such as empty plastic bottles, and cardboard boxes should be flattened before loading.

2.4.2.3 When processing batches of very wet materials the burn cycle time should be increased to accommodate the additional time required to dry the waste before it can combust.

2.4.2.4 Do not load the system with more than 25% by volume of extremely wet materials such as grey water or wet garbage.

2.4.2.5 When possible layer the materials so that the load is a mix of wet and dry, and/or high and low heat value materials.

2.4.2.6 Never load more than approximately 20 litres of high heat value waste such as kitchen grease or used cooking oil as this can lead to an uncontrolled burn.

2.4.2.7 See the list in Section 2.4.4 "Unacceptable Waste Materials" for items that should not be processed in the **EWS Mobile Incinerator**.

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

NOTA

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

NOTA

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.

NOTA

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

NOTA

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)

NOTA

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.

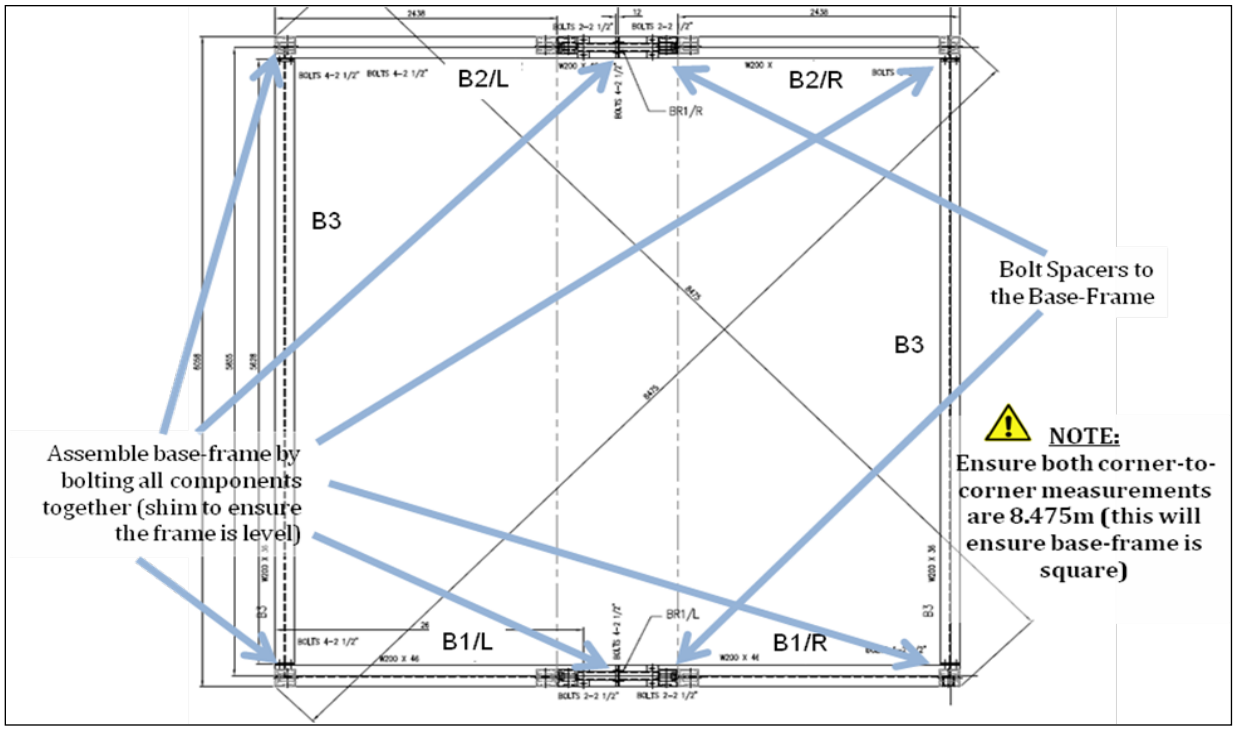
NOTA

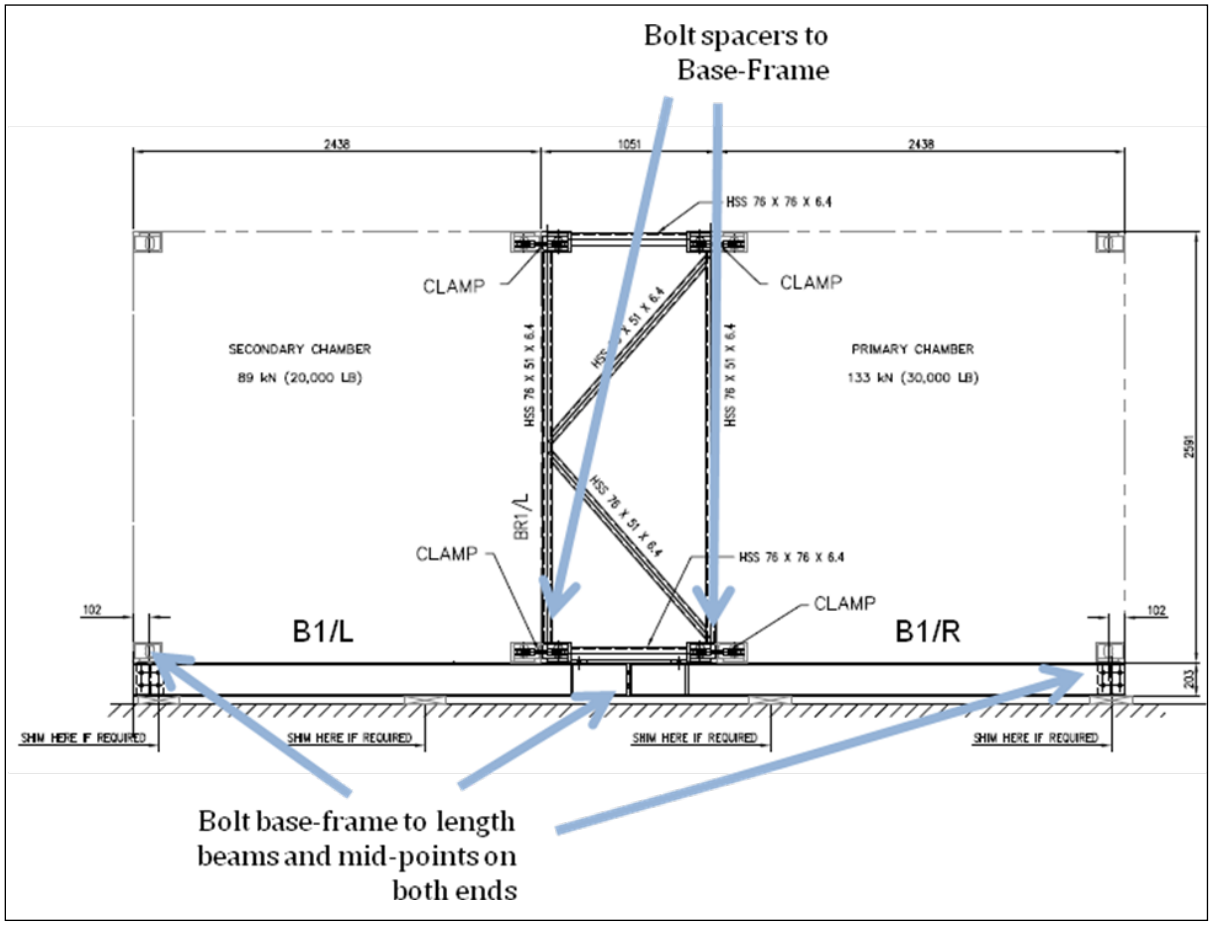
Do not fully torque bolts during initial assembly.

<u>Correct Clamp Installation</u>
When installing the clamps, install in such a manner that the installer pulls back on the

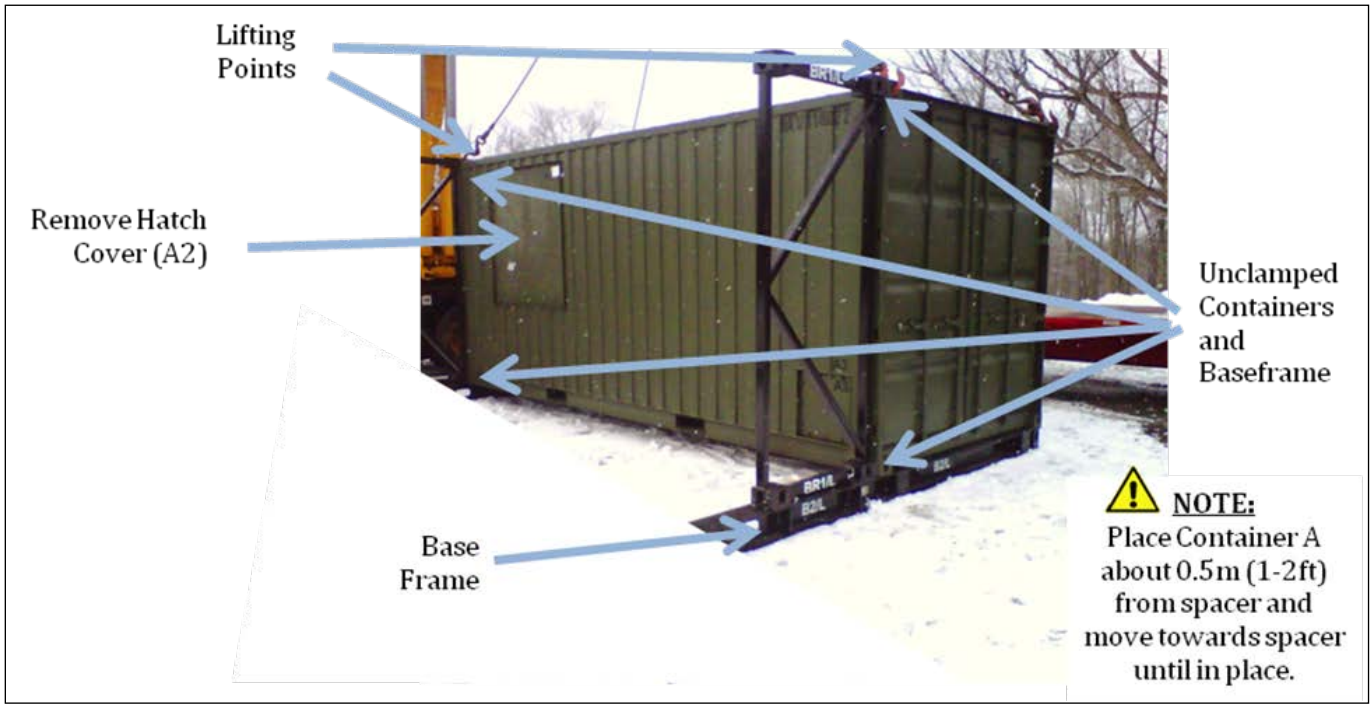
wrench when tightening the clamp. From the installer's perspective, the smaller nut would then be located on the right of the large nut. If it is installed the other way, or during removal, a lift-truck or other lifting device will need to be employed for safety reasons.

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.



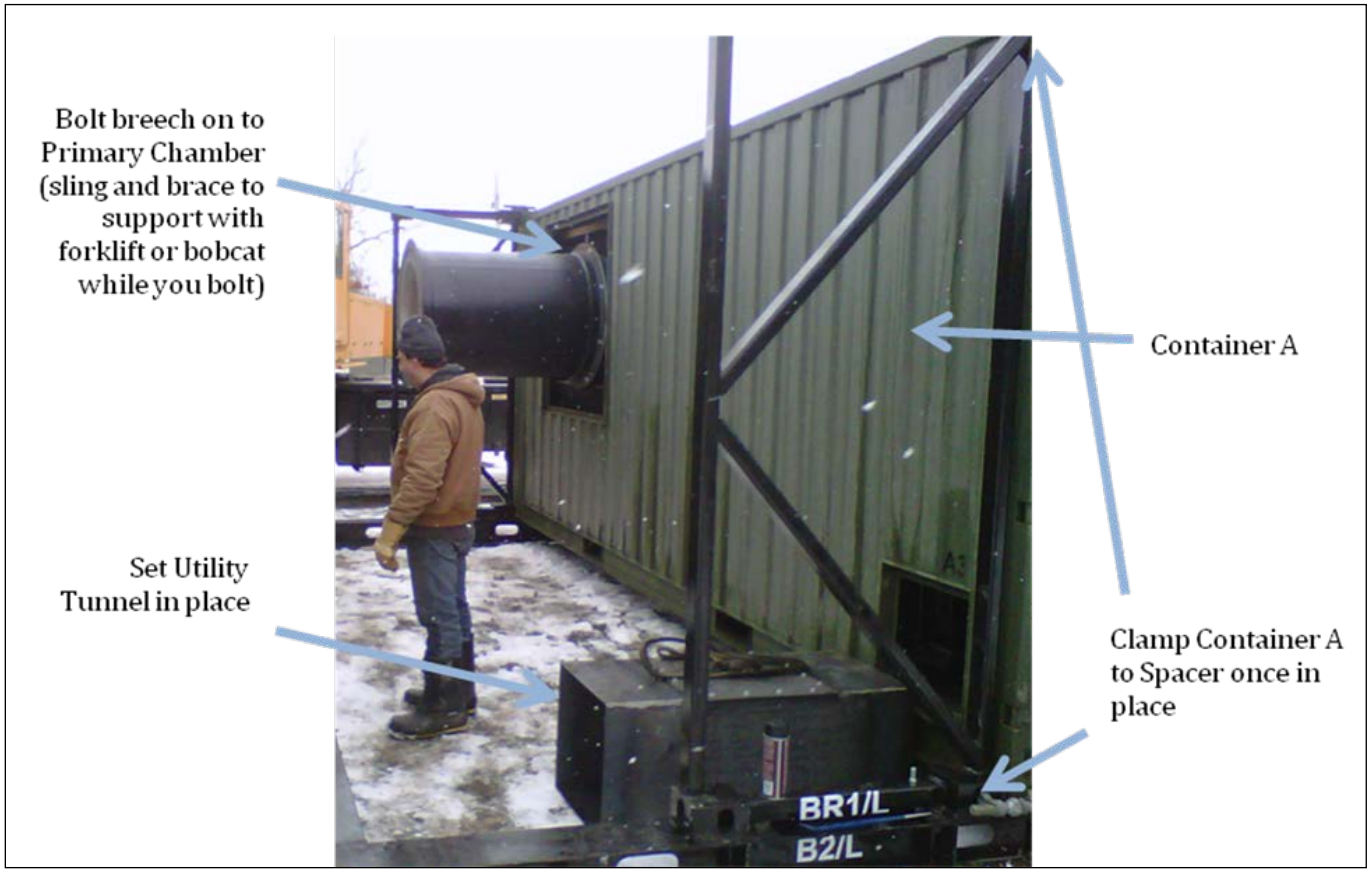


3.1.4.2 CONNECTIONS BETWEEN PRIMARY AND SECONDARY CHAMBER CONTAINERS



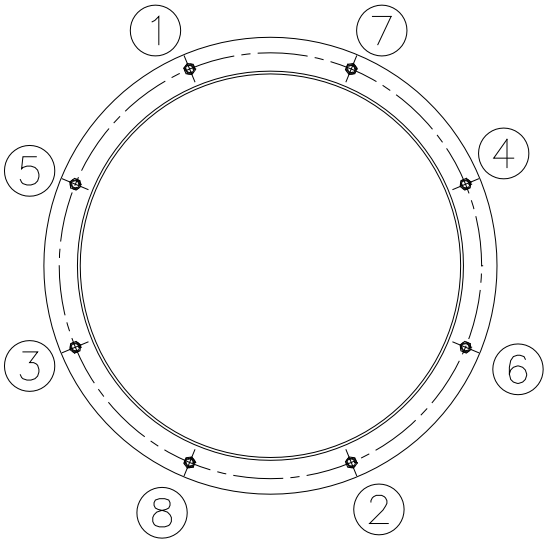
Gasket adhesive spray being applied

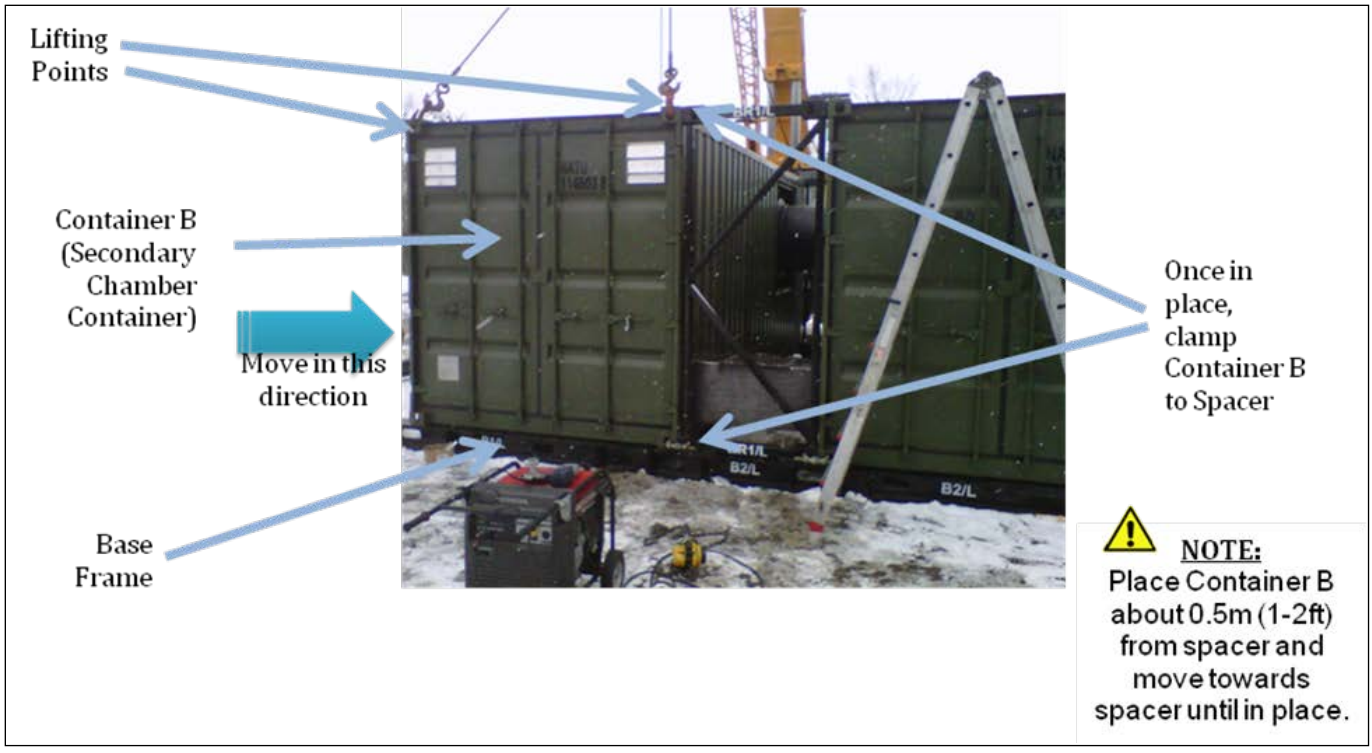
Correctly Installed Gasket

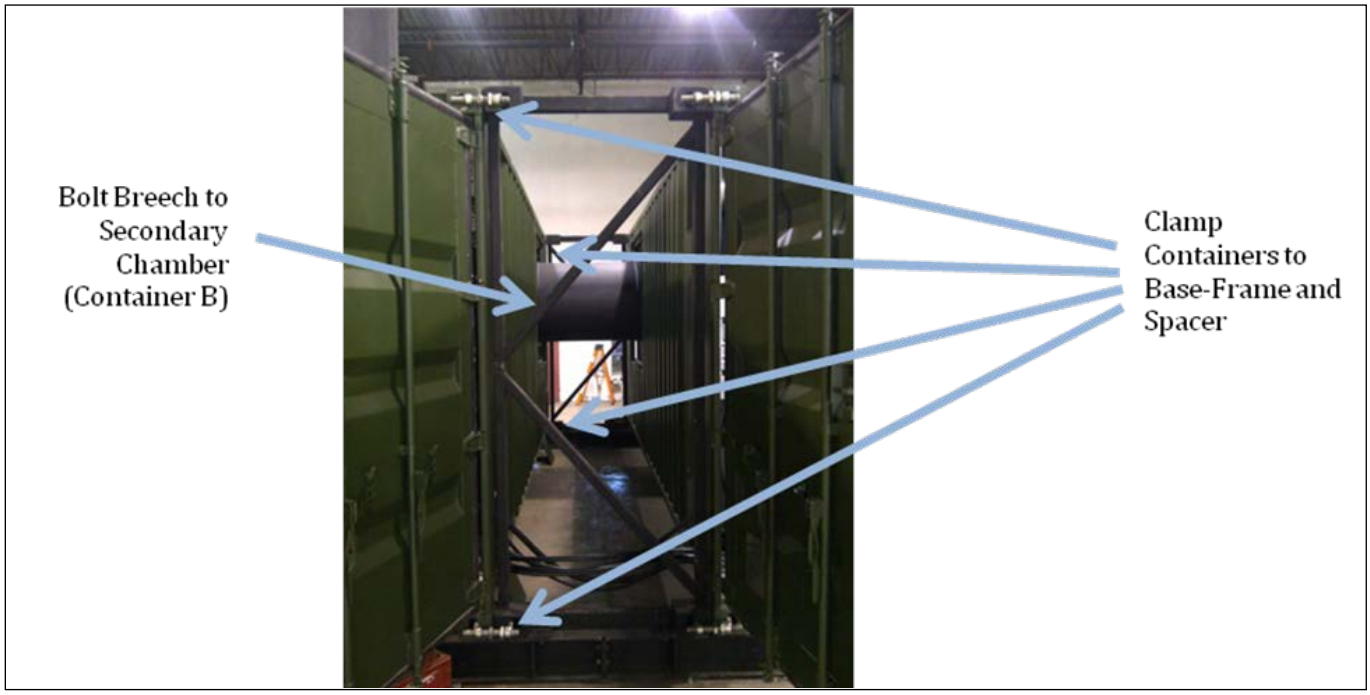


NOTA

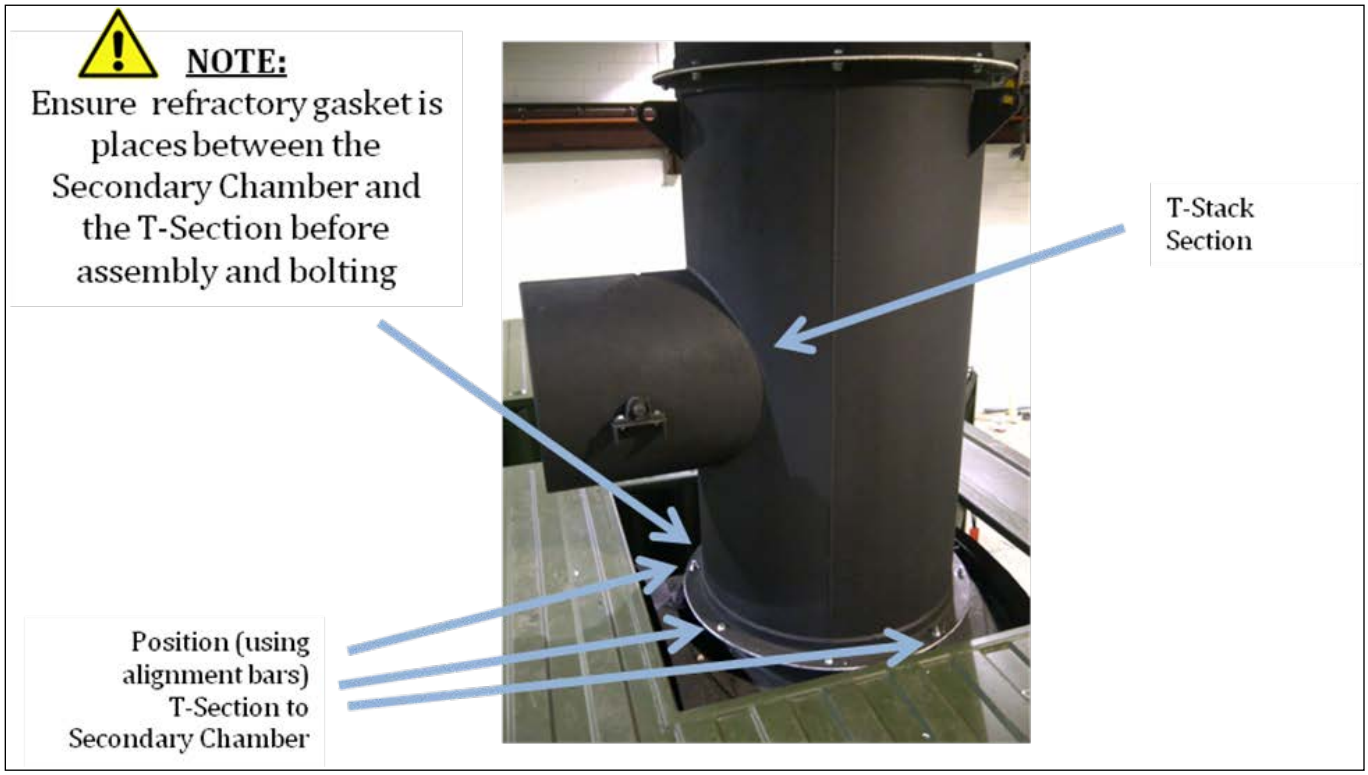
Once breech flanges are aligned and together bolt flanges together using the numerical order described in the pattern below.

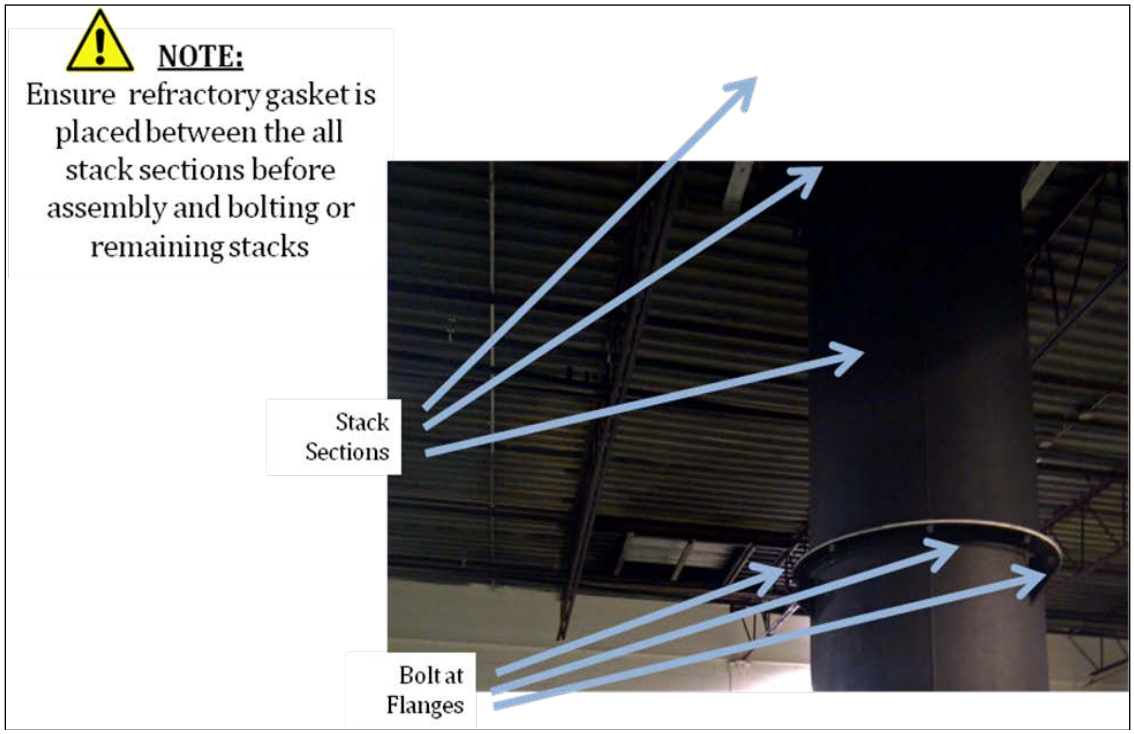

1
7
4
5
3
6
8
2


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





NOTA

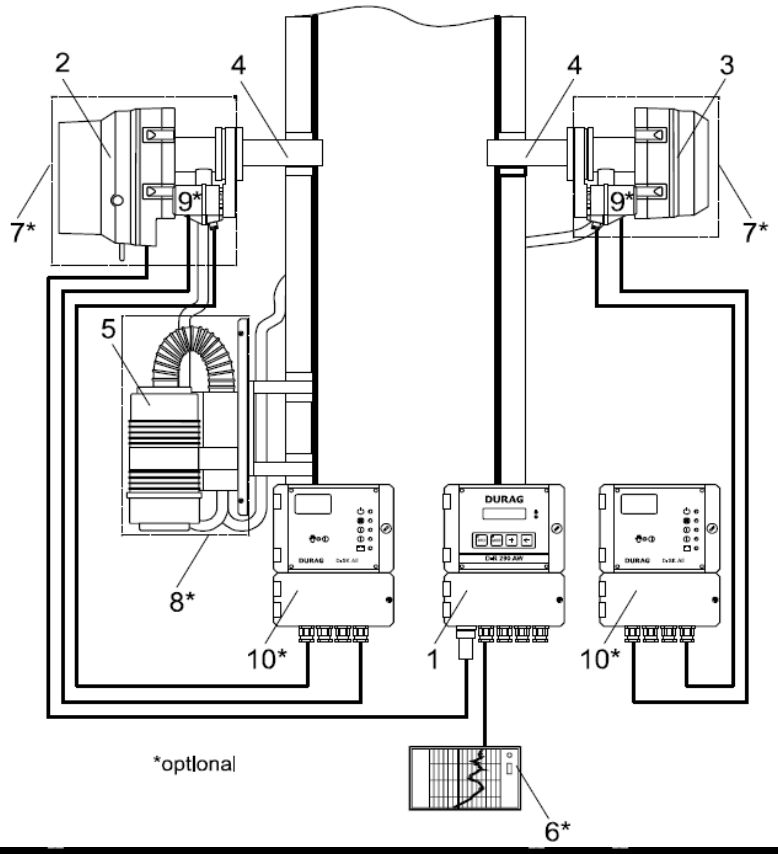
One of the washers must be a lock washer.

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

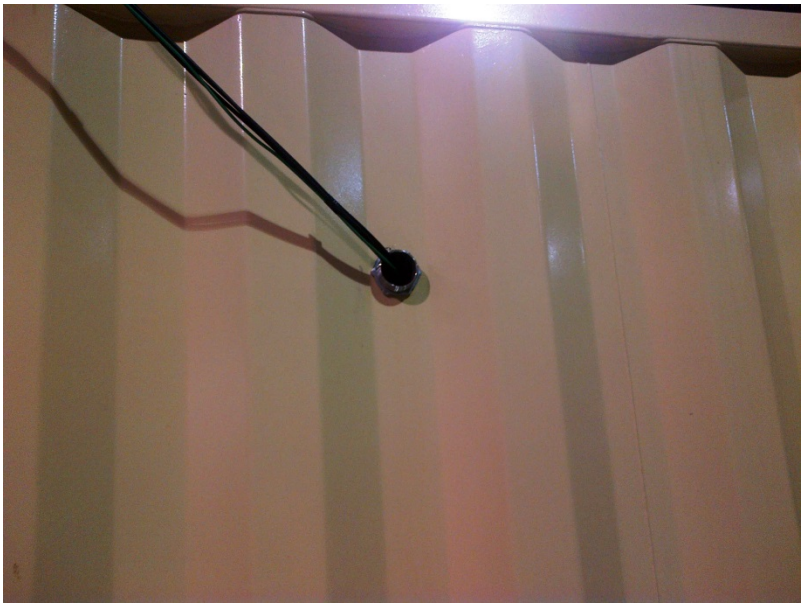
Junction Boxes in container 3 (control container)

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)

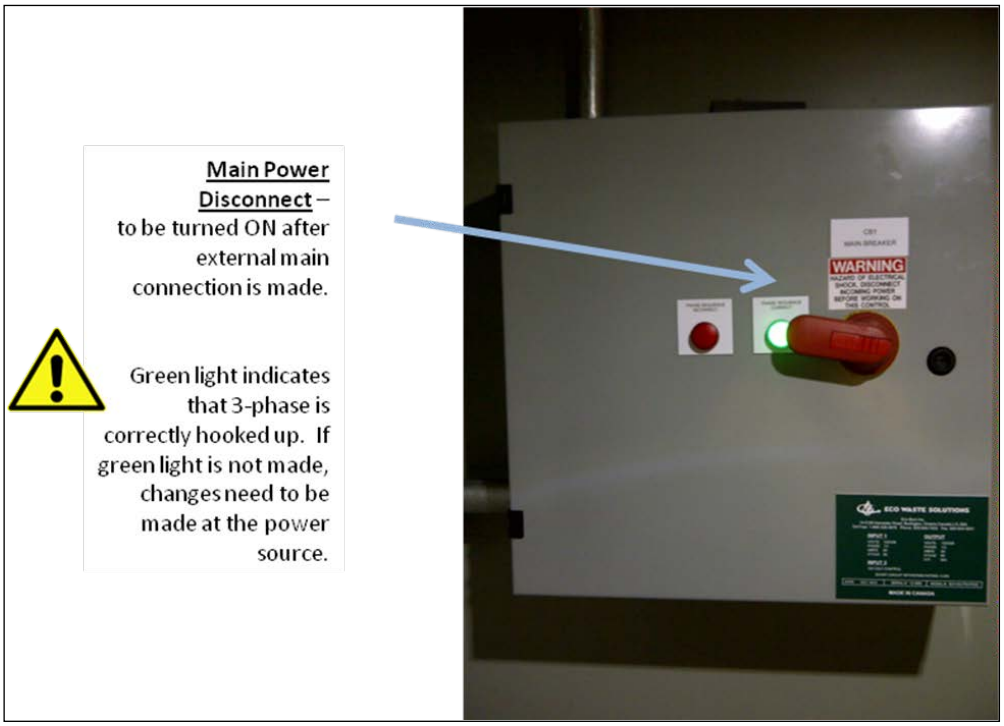
Complete all Junction boxes in both Container 3 and Container 1

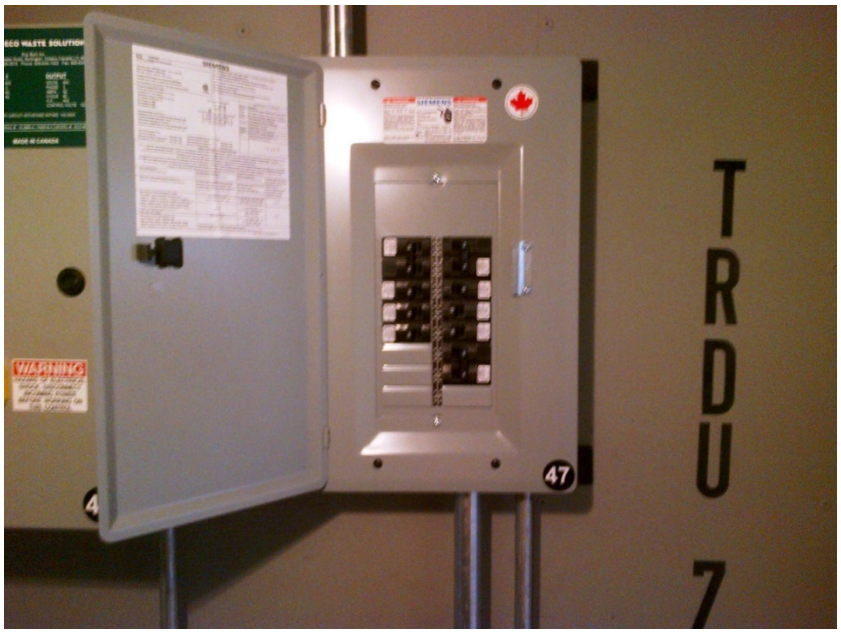
DO NOT CONNECT THE ELECTRICAL UNLESS THE MAIN SUPPLY FROM THE SITE HAS BEEN INTERRUPTED AND THE INCINERATOR BREAKERS ARE IN THE OFF POSITION



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.





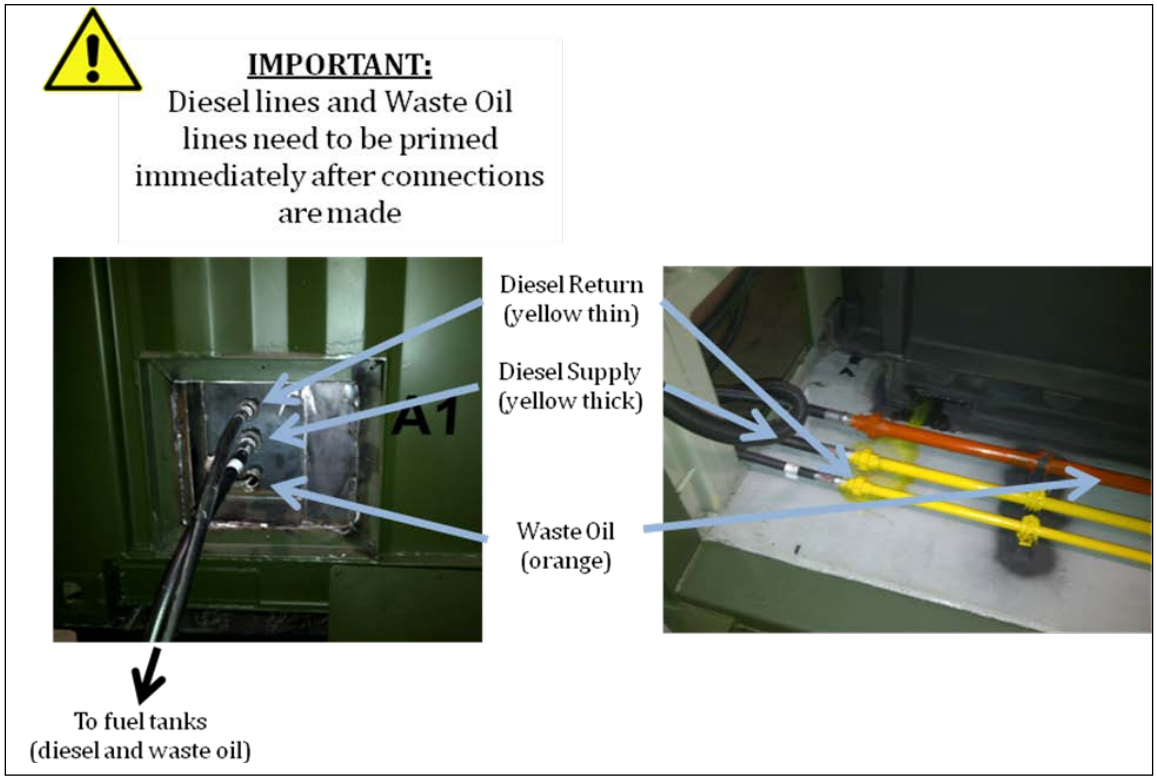
Switch on all incinerator breakers in the Breaker Panel

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

NOTA
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

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

NOTA
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.

NOTA
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

NOTA

Important Notes to Consider <u>Prior to</u> and <u>during</u> 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.

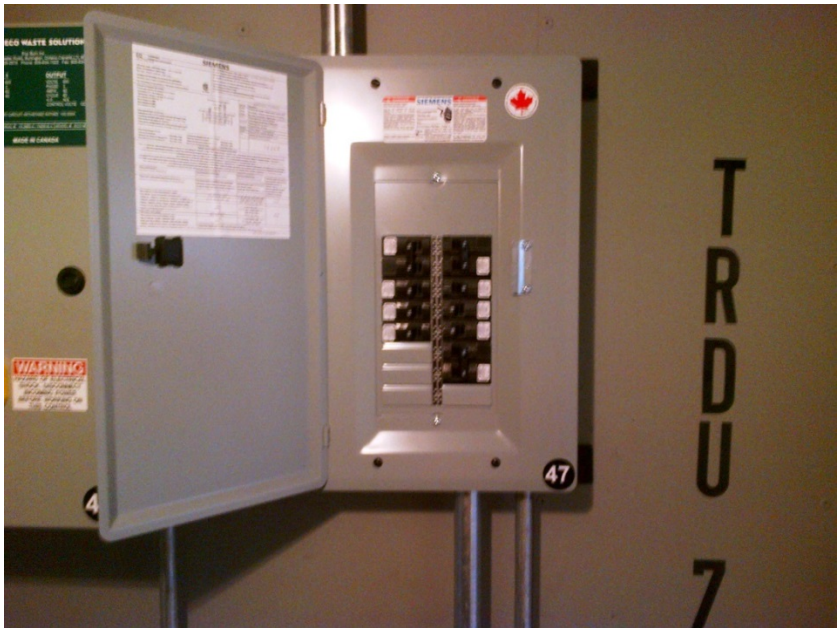
d. When removing the system from its position, be careful not to subject the refractory to mechanical shock, which may result in refractory damage.

3.2.4 Disassembly Instructions

3.2.4.1 EXTERNAL CONNECTIONS

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

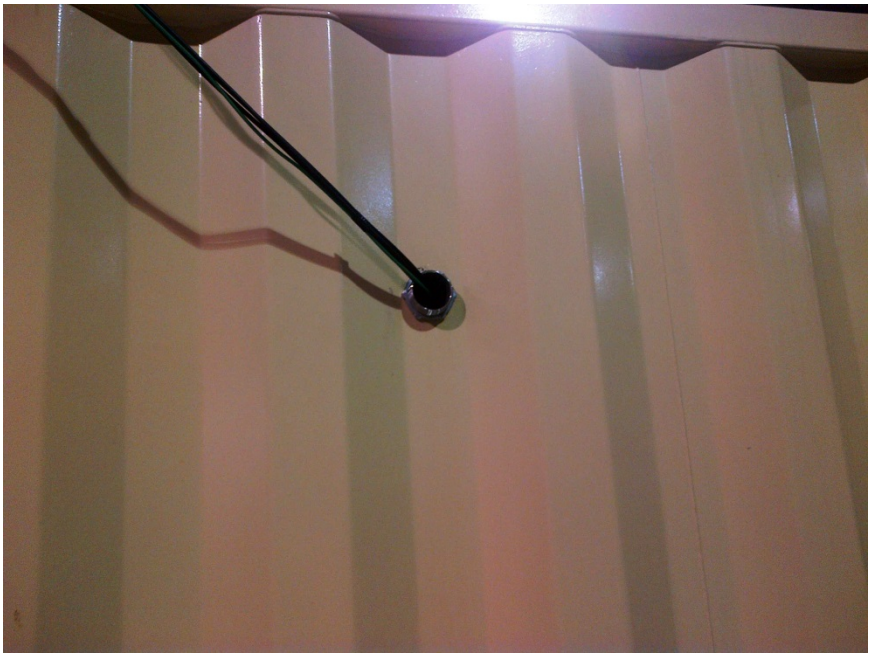
Main Power Disconnect – to be turned OFF before disconnecting any external or internal connections.



Switch off all breakers in the Breaker Panel

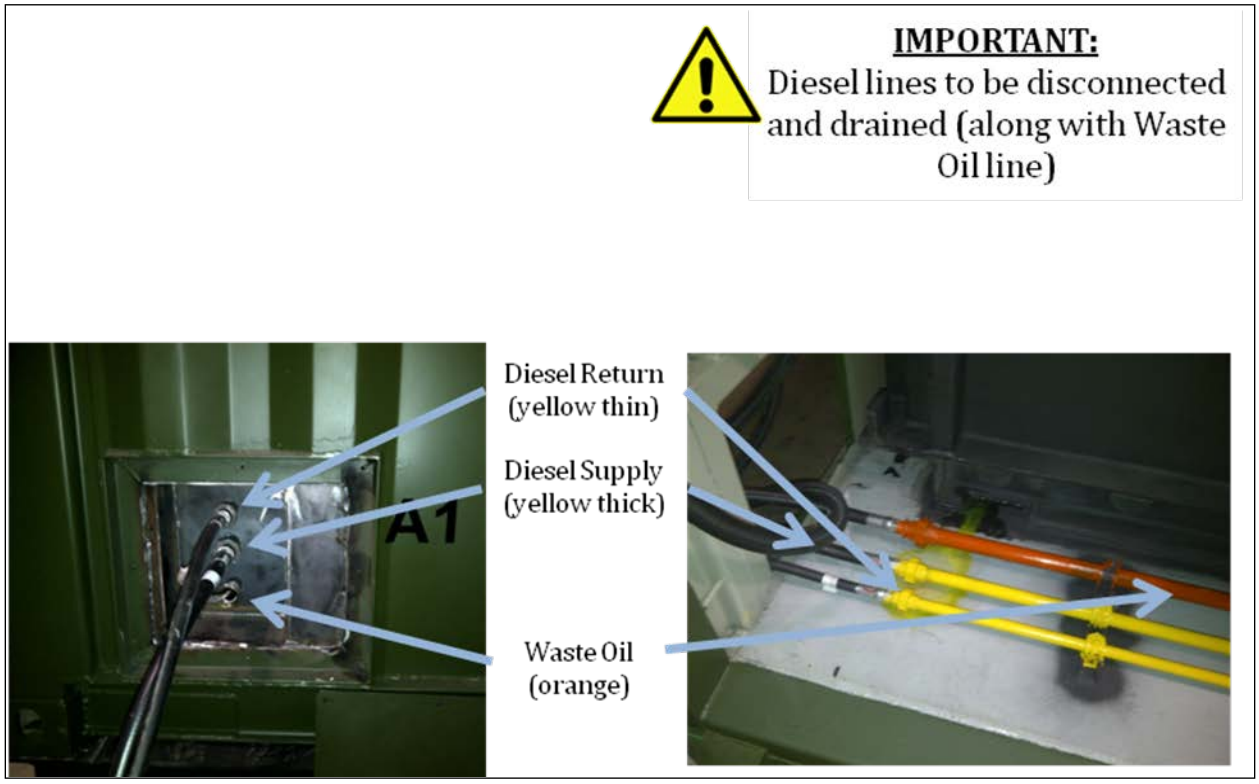
DO NOT DISCONNECT THE ELECTRICAL UNLESS THE BREAKERS ARE IN OFF POSITION

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

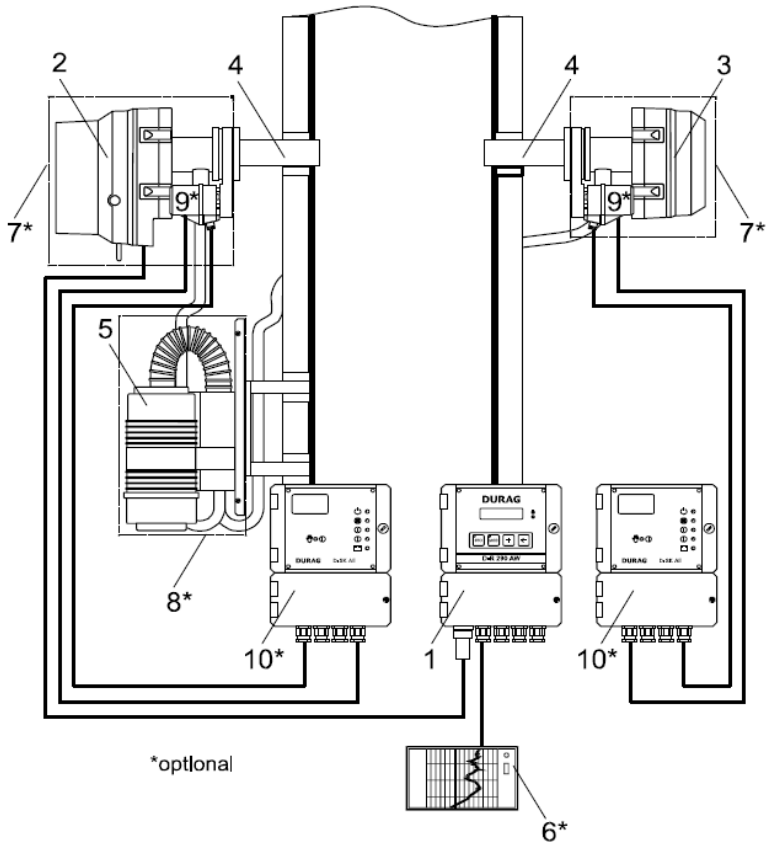
Flexible conduit in Container 2 (secondary chamber)

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

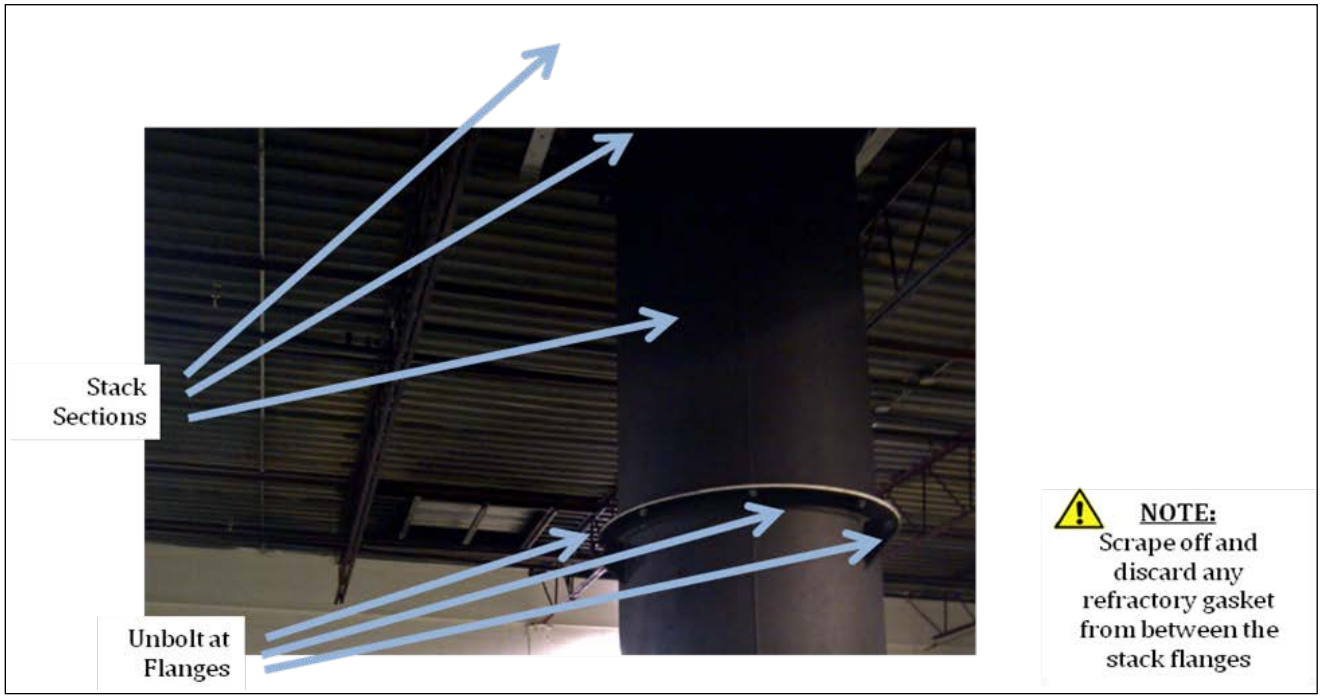
Disconnect power to the Purge Air Unit

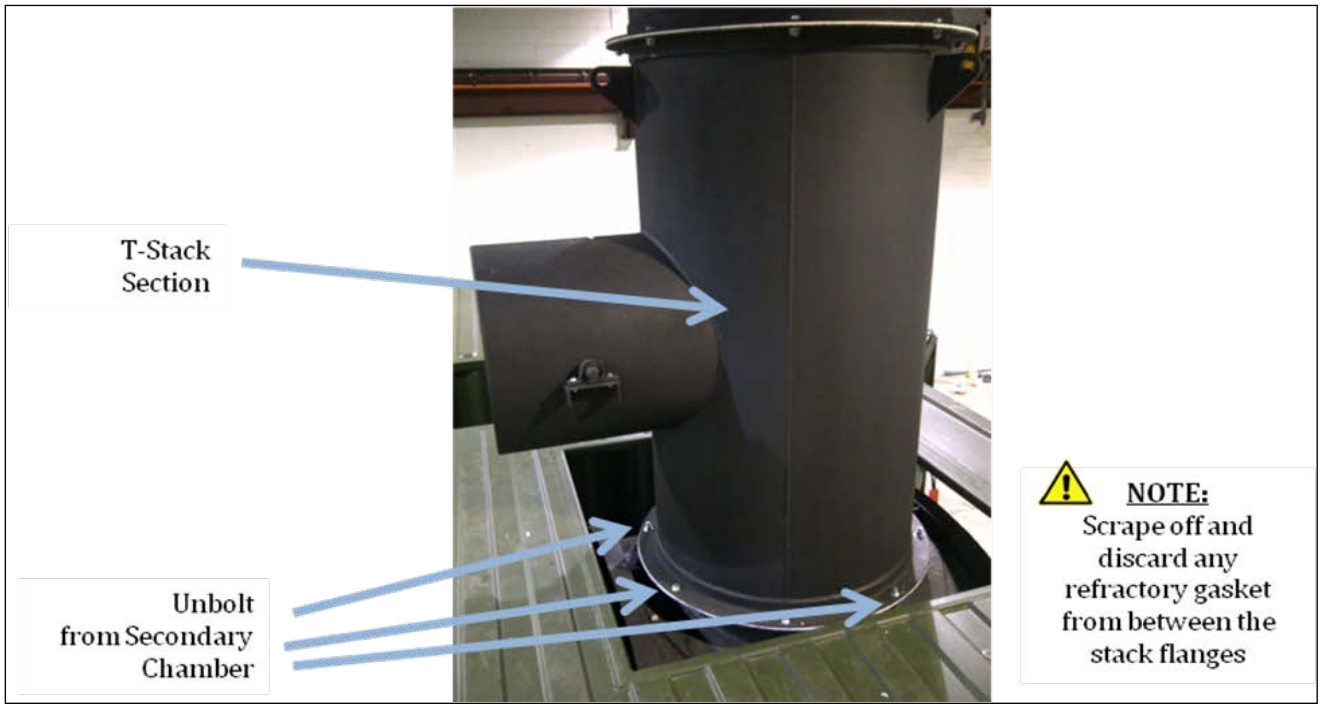
Disconnect the Transceiver to the Control unit

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

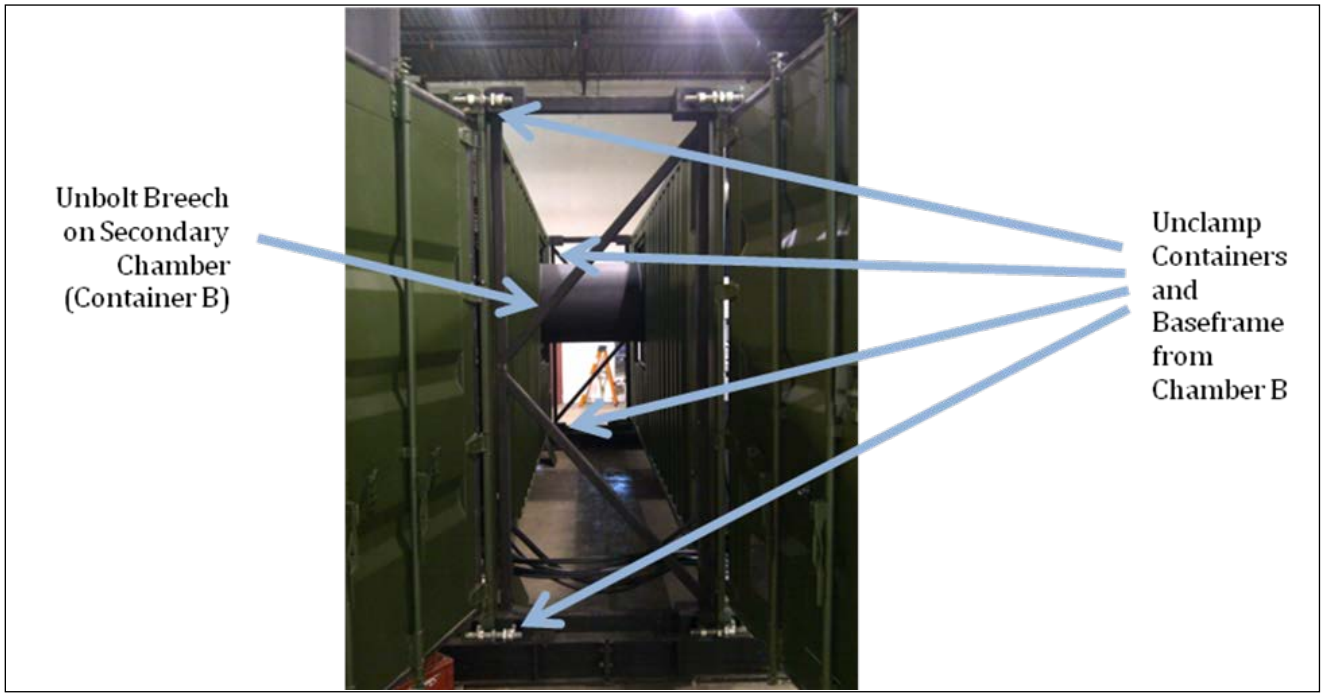
Uninstall the Transceiver and Reflector in the flanges provided in the stack section

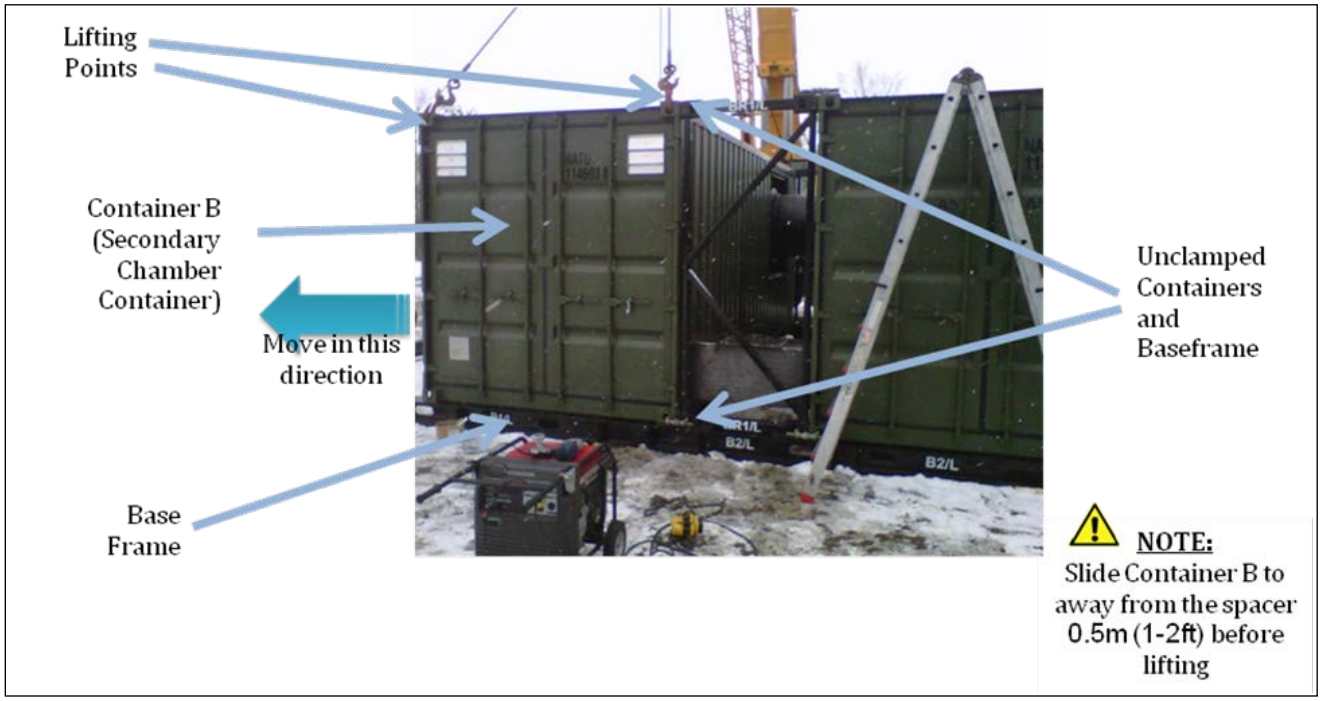
3.2.4.4 REMOVAL OF STACK SECTIONS



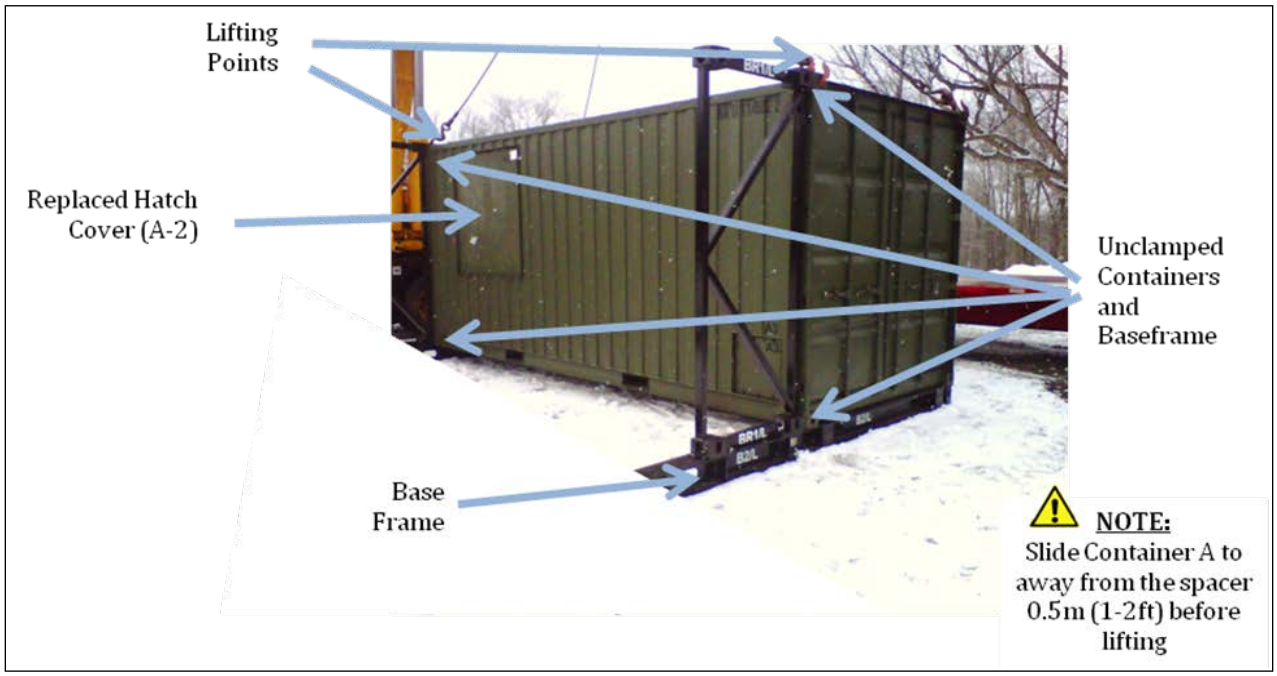


3.2.4.5 DISASSEMBLY AND REMOVAL OF CONTAINERS FROM BASE FRAME STRUCTURE

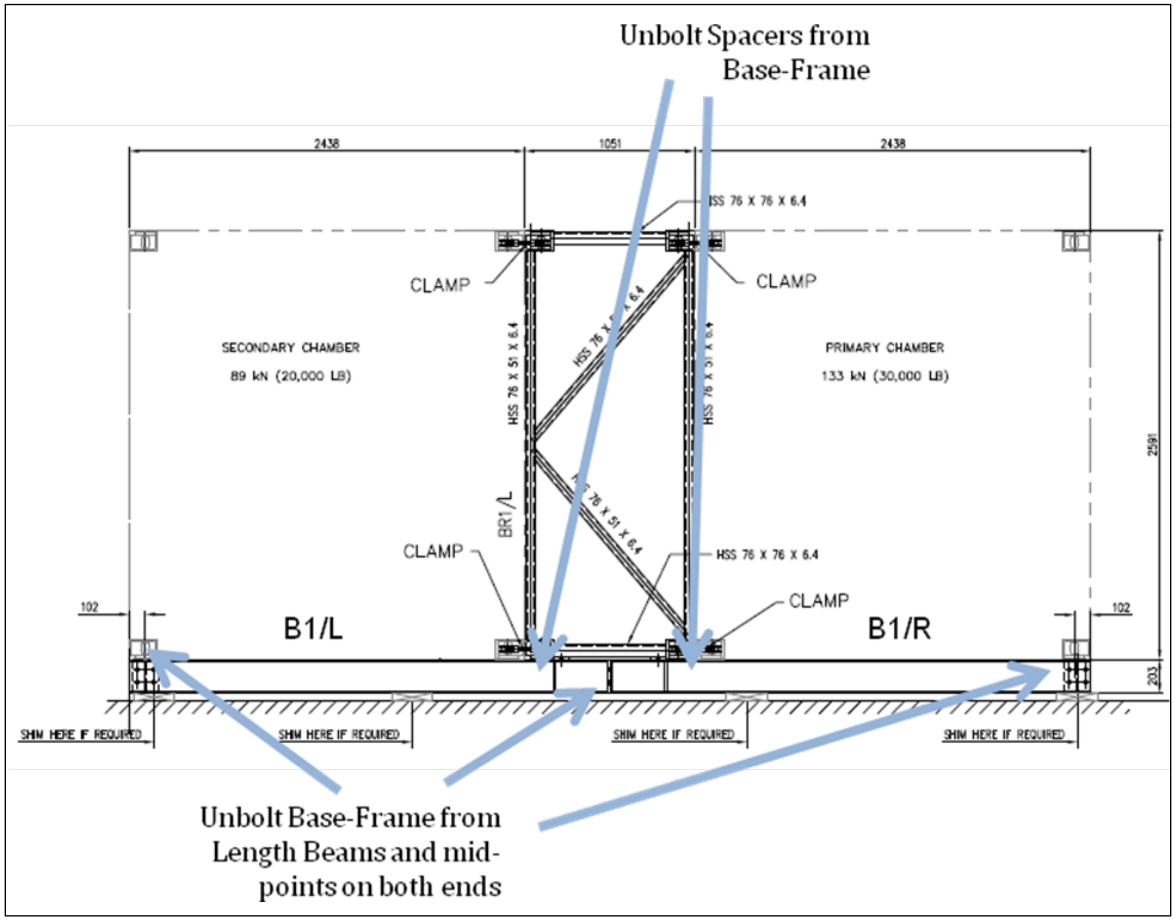

Unbolt Breech on Secondary Chamber (Container B)
Unclamp Containers and Baseframe from Chamber B

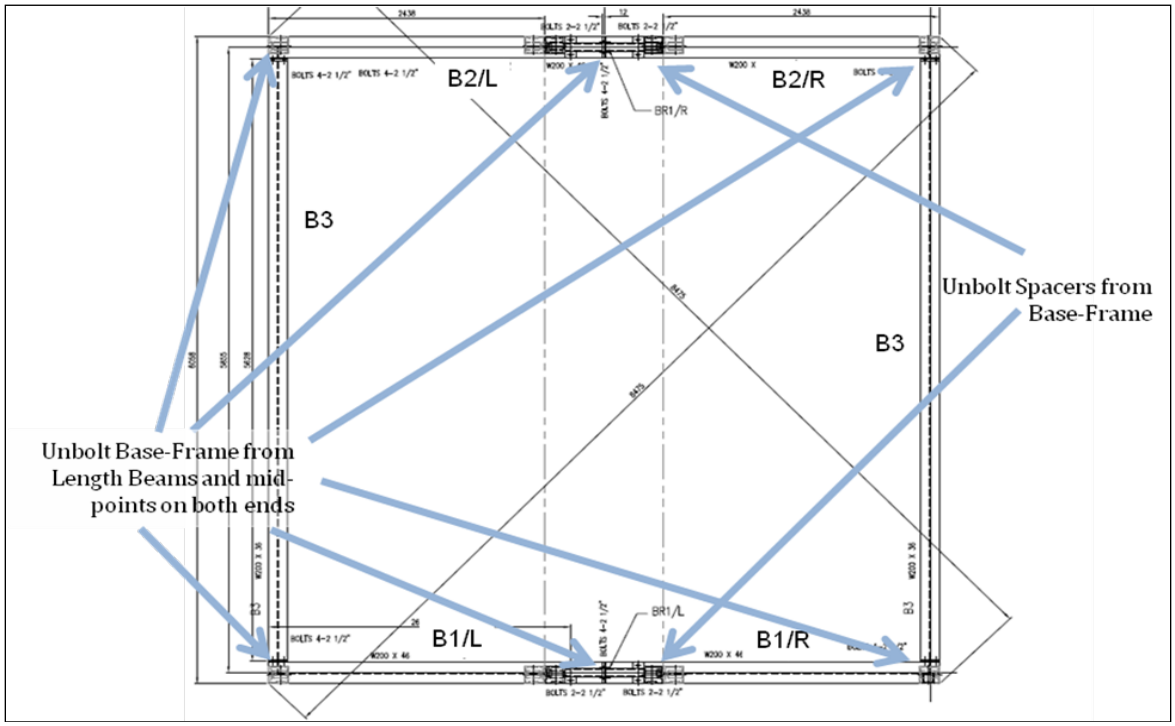

Lifting Points
Container B (Secondary Chamber Container)
Move in this direction
Base Frame
Unclamped Containers and Baseframe
NOTE:
Slide Container B to away from the spacer 0.5m (1-2ft) before lifting


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).

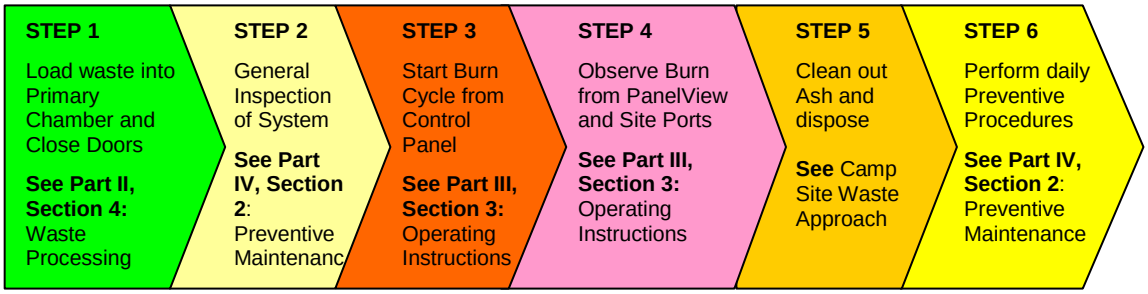
3.2.4.7 PACKING SKIDS AND CRATES IN CONTAINERS

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.

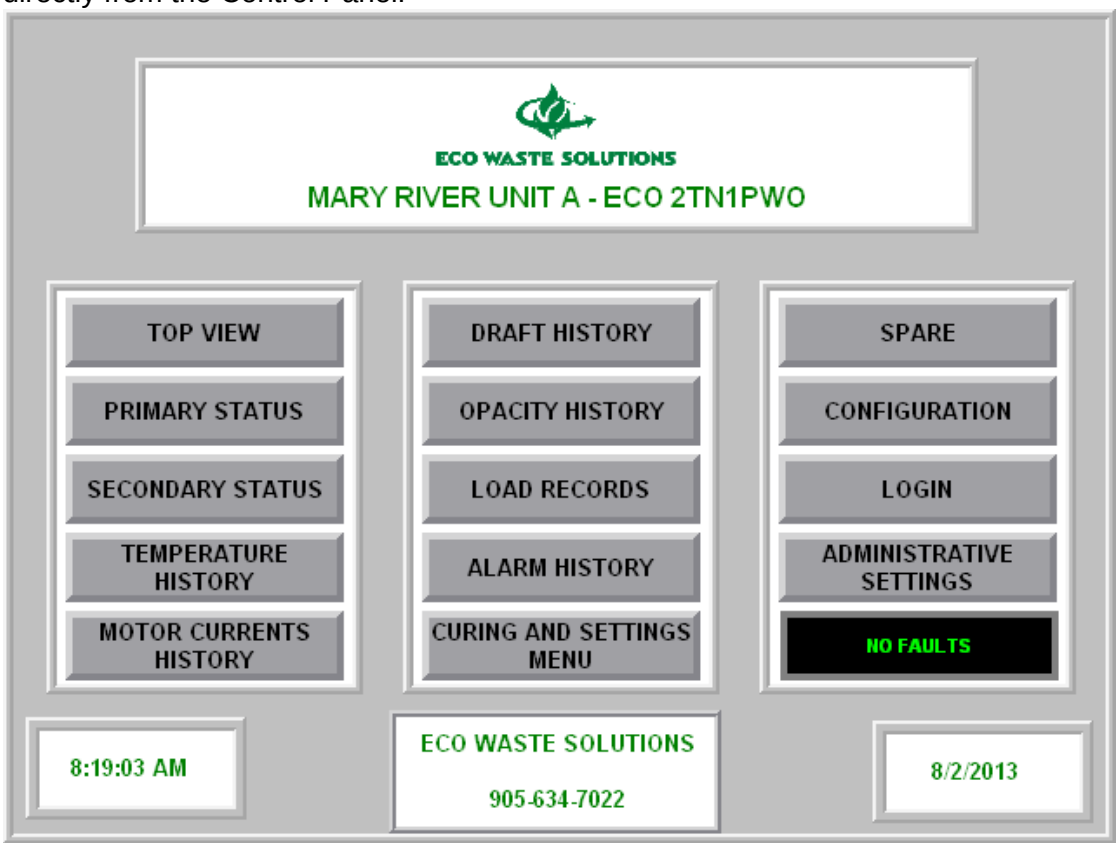
3. Control Power On:
   1 – Green light indicates the control power in the panel is on;
   2 – Pushing this button if the E-stop is out will turn on the control power.

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

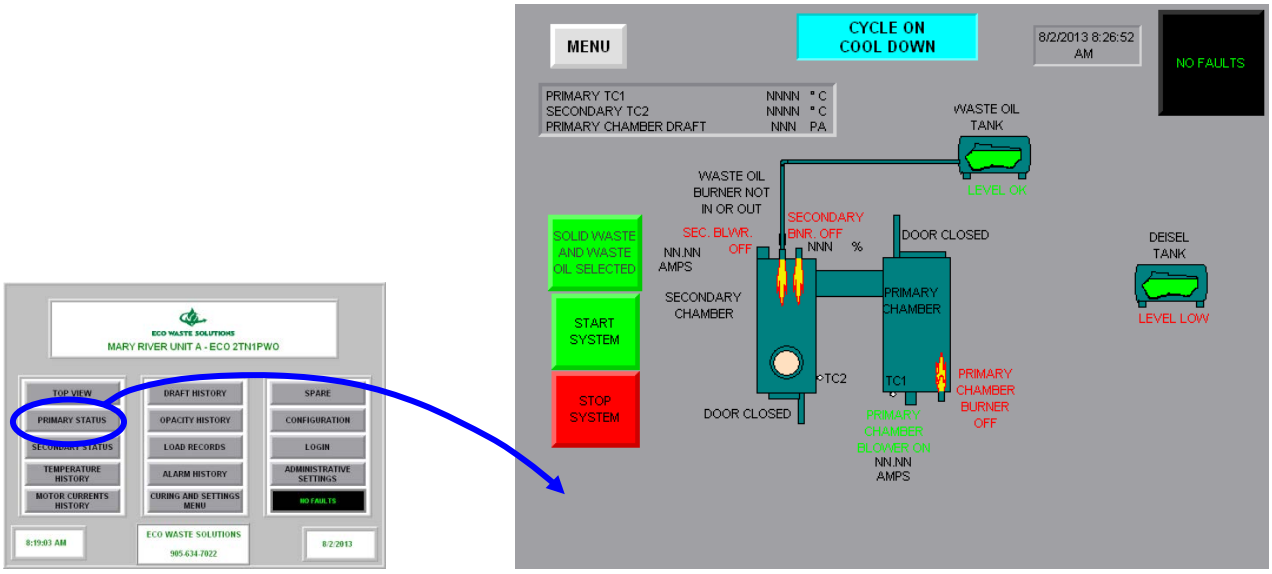
5. Ethernet Port: Port used to download system historical usage data.

3.3.1.2 Operator Interface

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

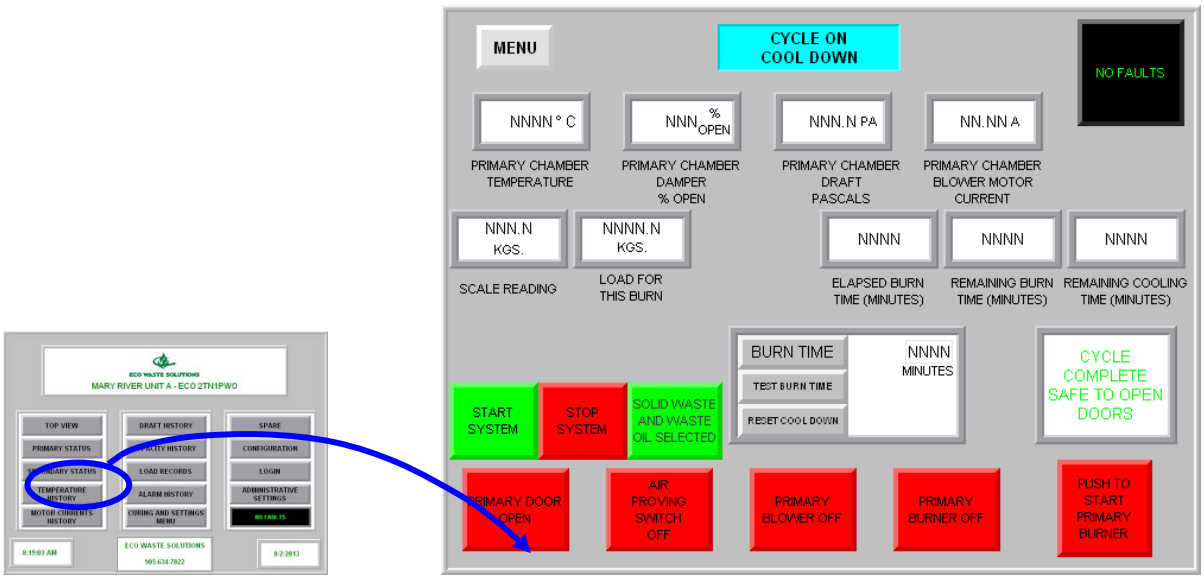


The main screen displays all the available options for viewing the system in operation. The PanelView is a touch-screen and items can be selected by touching them on the screen.



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.

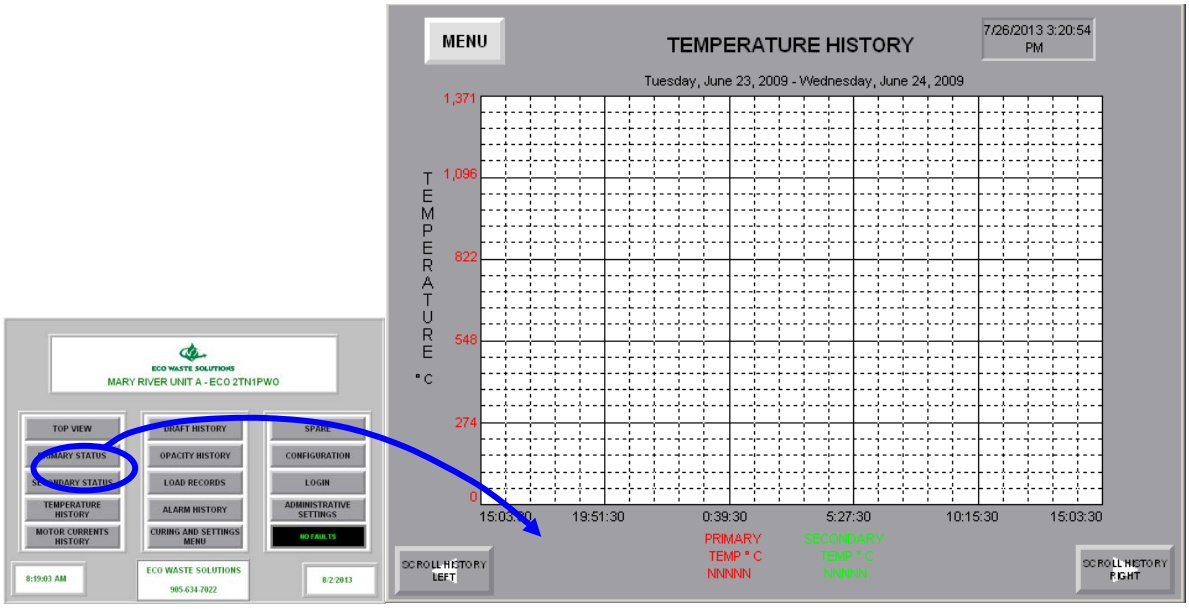
The system will not start if there are alarms or faults present. To clear (acknowledge faults) At any time, touch or press **MENU** to go back to the main screen.



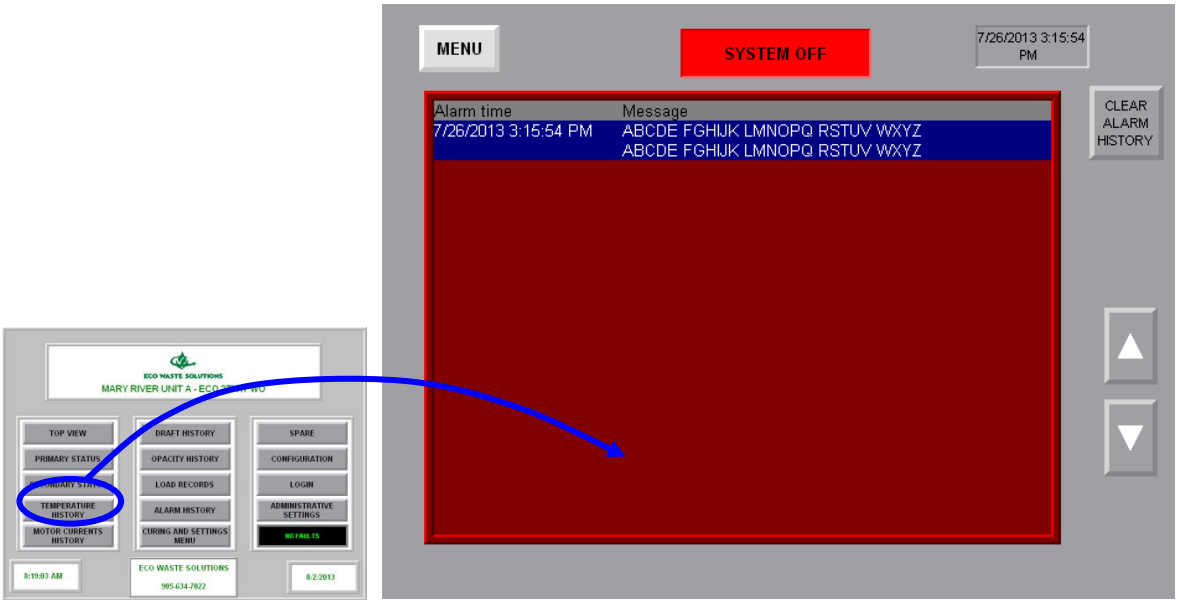
When the PRIMARY or SECONDARY SYSTEM STATUS is selected from the Main Menu a screen (above) will display the status of all the operating parameters of the respective chamber such as the temperatures and the time remaining in the cycle as well as displaying other informational items such as status of 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.



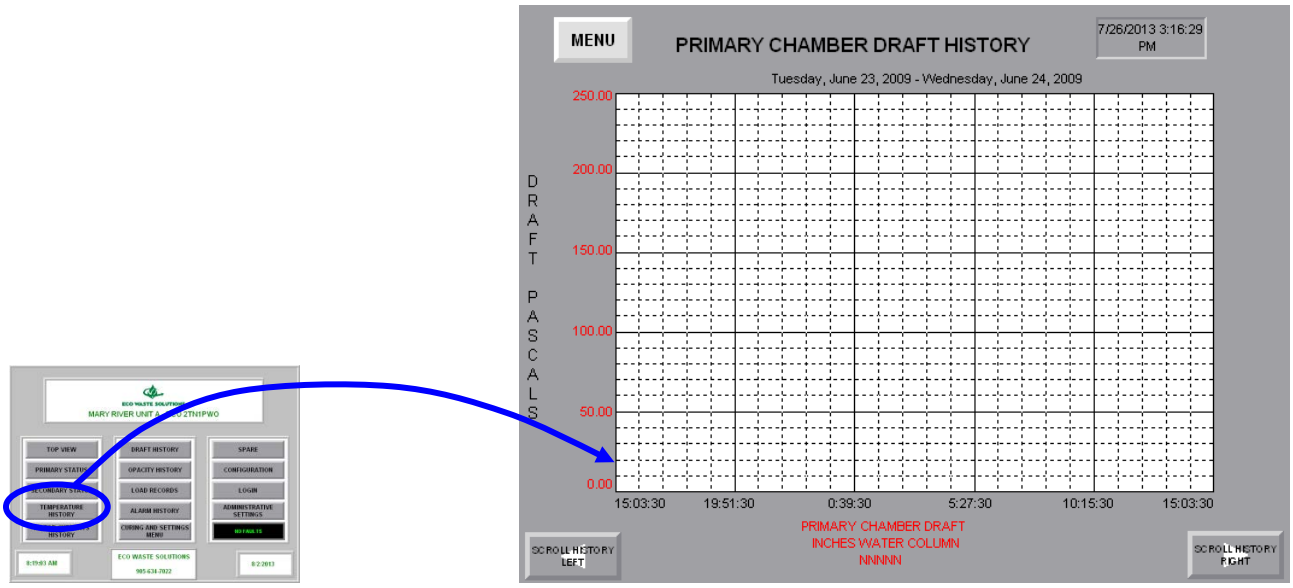
When the **TEMPERATURE HISTORY** is selected the screen will display the temperature history for the last burn showing various temperatures throughout the system. This information is stored for 30 days.



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.

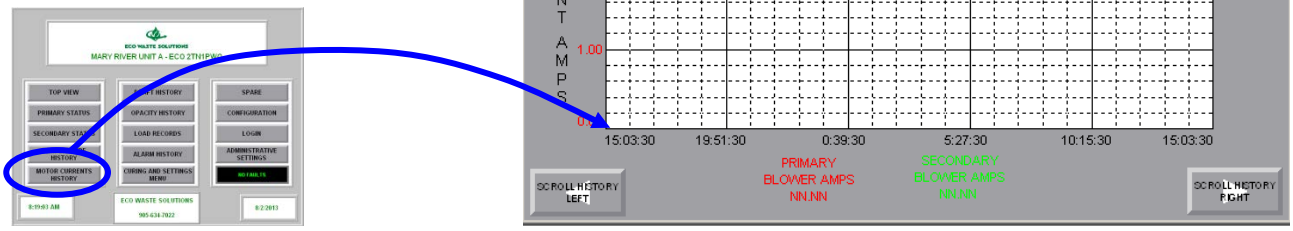
The operator can select **ALARM COUNT**, and view the specific number of alarm faults.

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



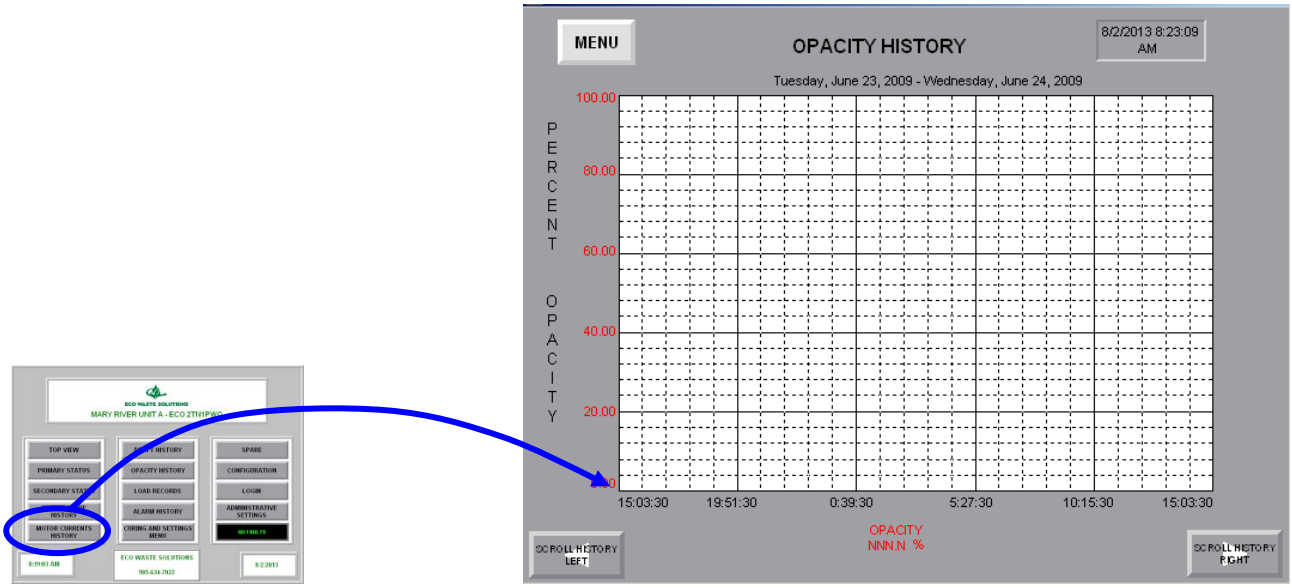
When the **DRAFT HISTORY** is selected the screen will display the draft history for the last burn showing data throughout the system. This information is stored for 30 days.

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.

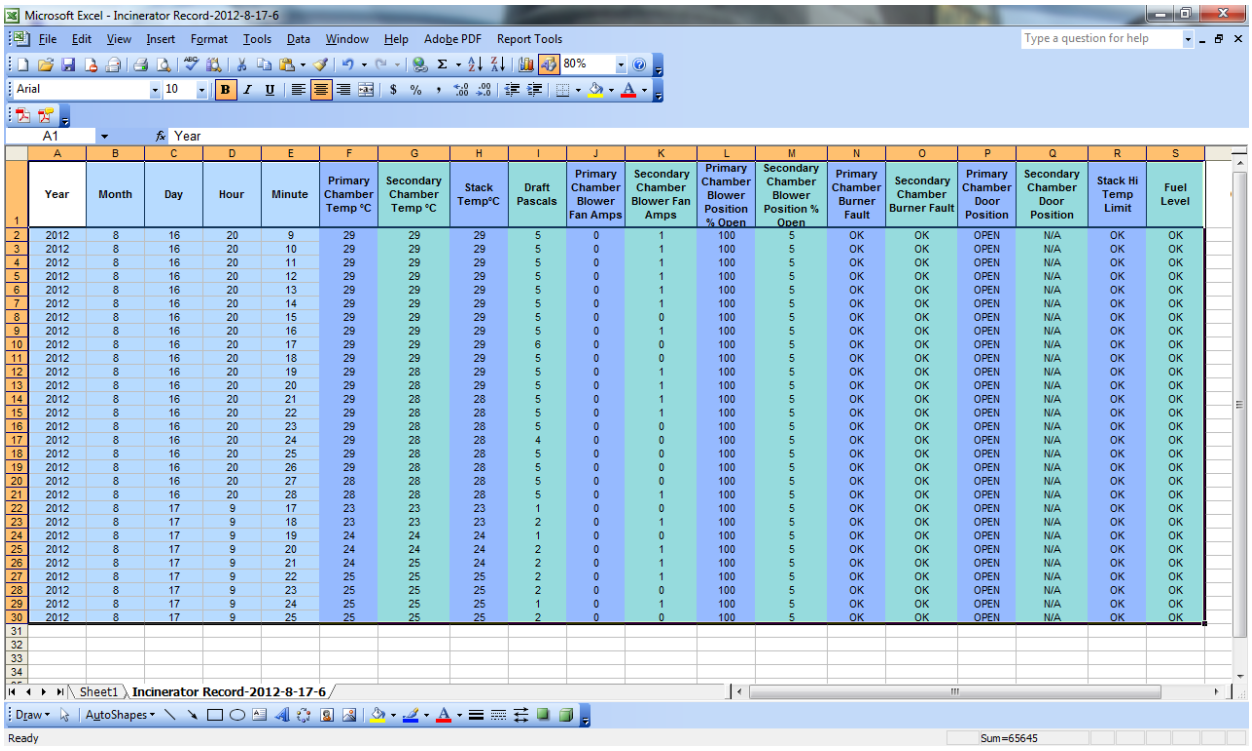
h. When RSLinx has finished starting up the screen can be minimized.

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)

NOTA

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

NOTA **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.

NOTA

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.

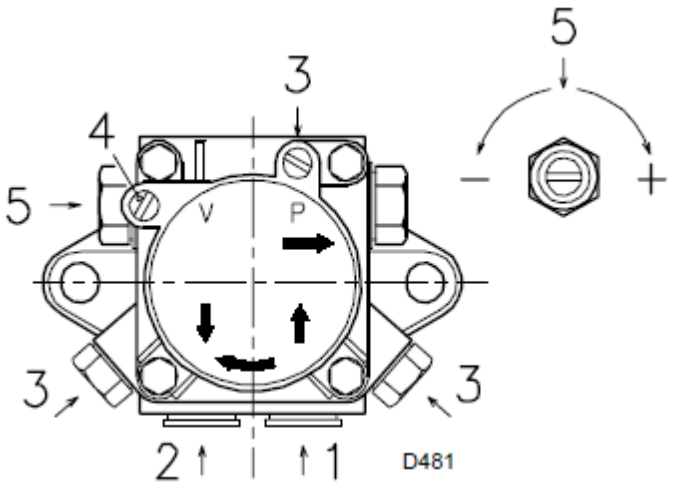


Figure A

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.

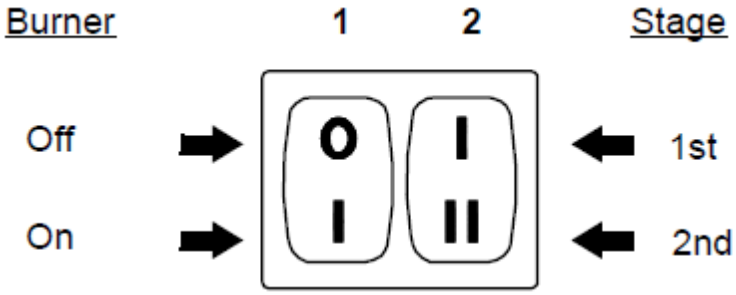


Figure B

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. **NOTA 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.

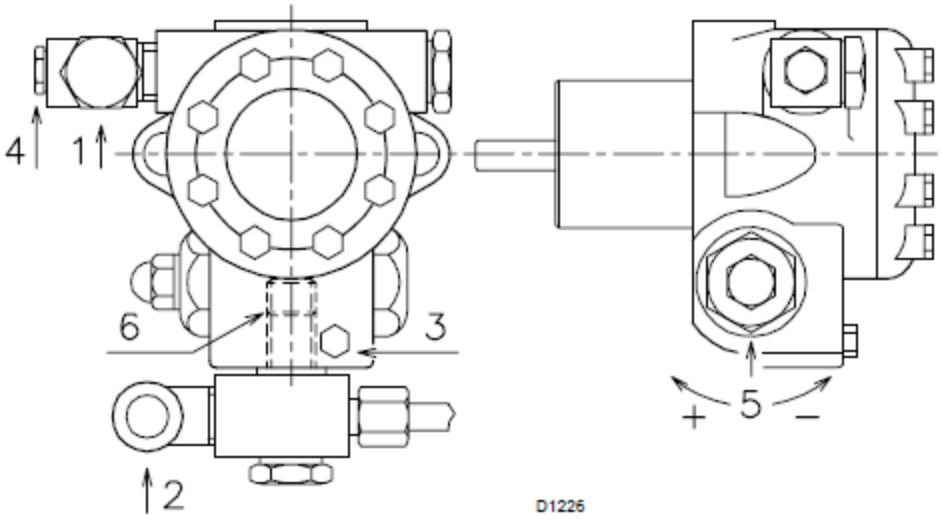


Figure C

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.

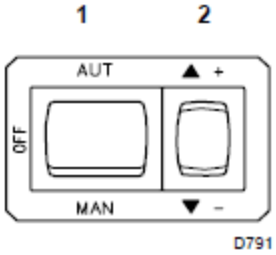


Figure D

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. **NOTA 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)

NOTA:
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.

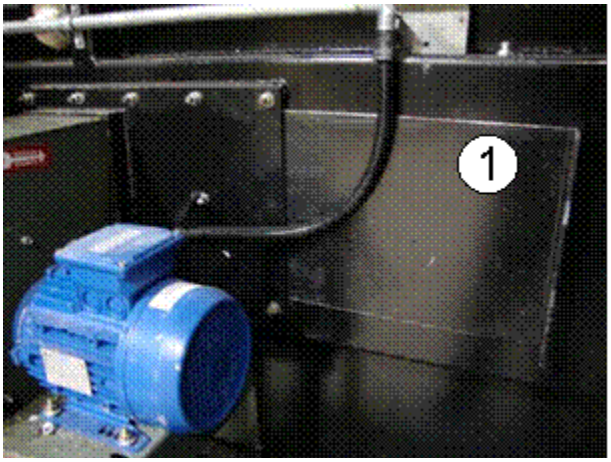
3.3.4 Standard Operating Procedures

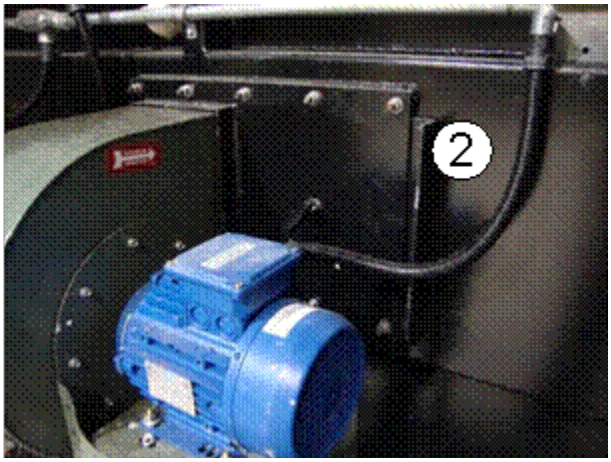
The following section details the procedures for the operation of the incinerator.

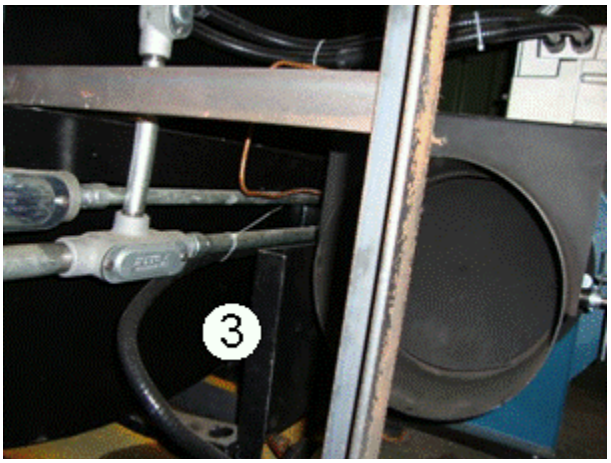
3.3.4.1 System Start up (solid waste only)

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.



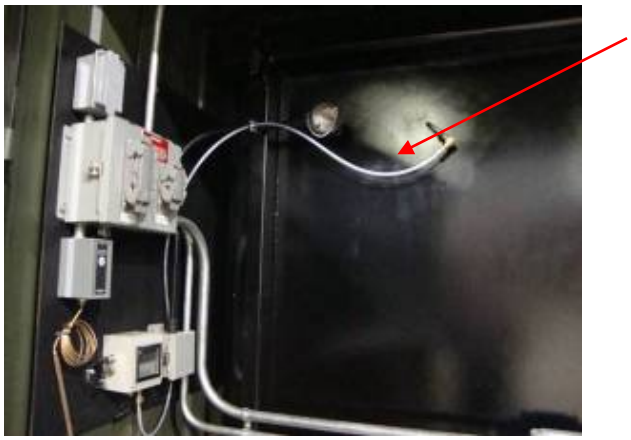




1. Primary Chamber blower Manual Slide Gate Open Position
2. Primary Chamber blower Manual Slide Gate Closed Position
3. Secondary Chamber blower Manual Slide Gate Open

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



Draft Gauge Hose connection

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

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

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

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

NOTA
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.

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

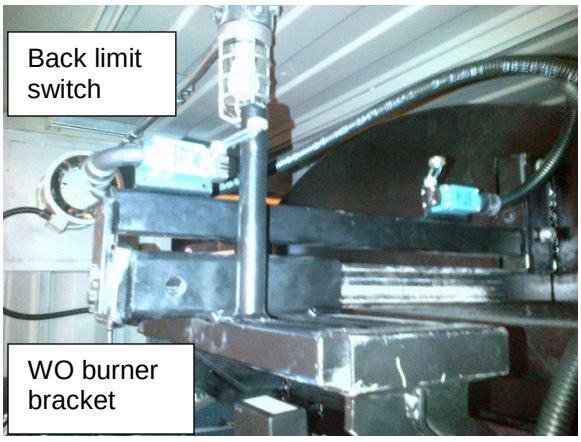
NOTA
Load only the waste stream that the unit has been rated for see Facility Manual Part II Section 4 Waste Processing Capabilities.

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

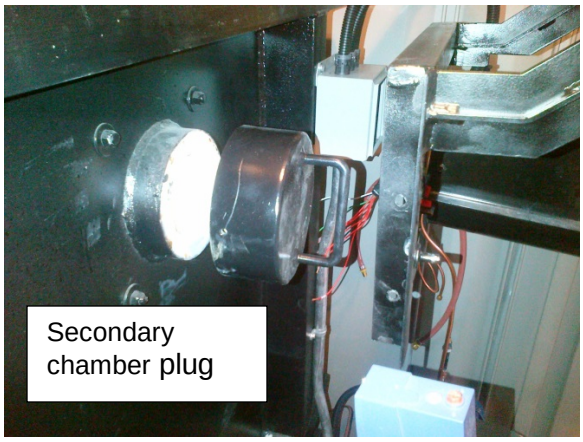
NOTA
Do not load the Primary Chamber such that the breech section is blocked in any way

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

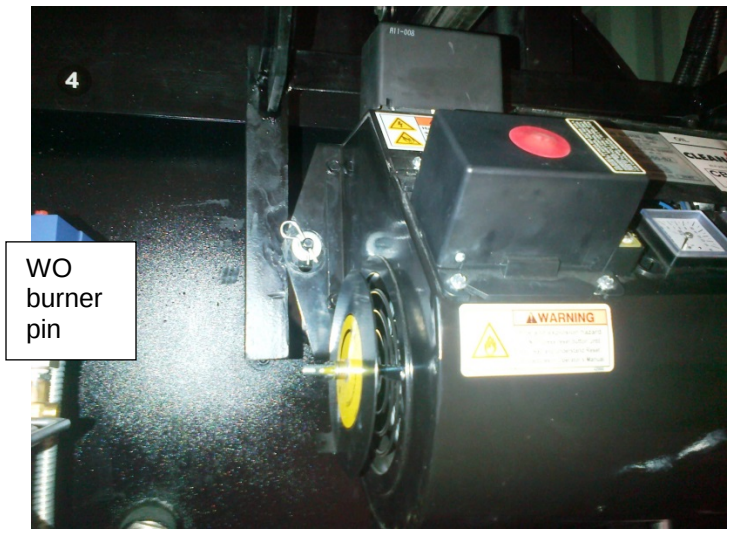
i. Ensure that the waste oil burner is all the way out (limit switch in the back of the bracket activated), insert the waste oil plug in place and insert the locking pin to avoid burner from swinging



Waste oil all the way out limit switch made



Secondary chamber plug being installed



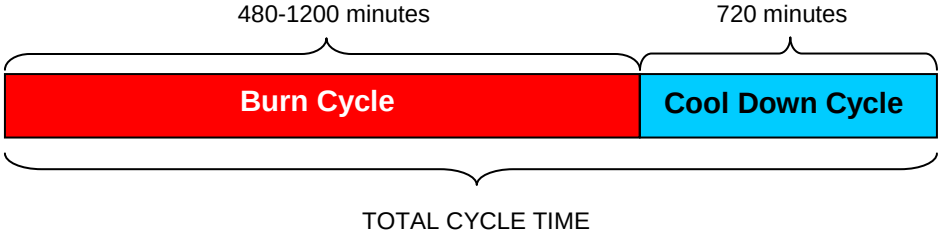
Waste oil burner secured with pin

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

k. 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

NOTA

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

NOTA

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

NOTA

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.

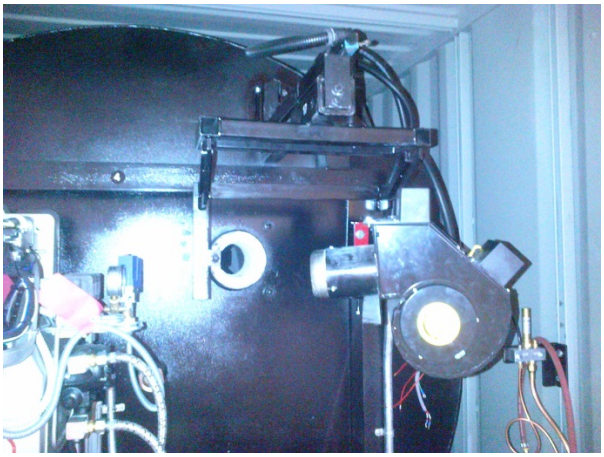
3.3.4.3 Burning Waste Oil

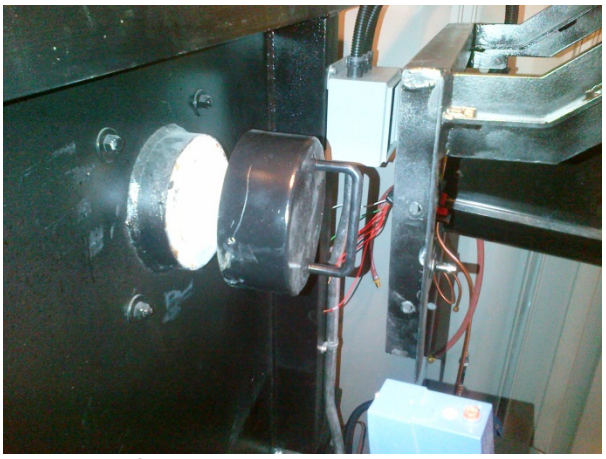
Do not use this incinerator to burn waste oil only. Always burn a complete load of solid waste when burning waste oil

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

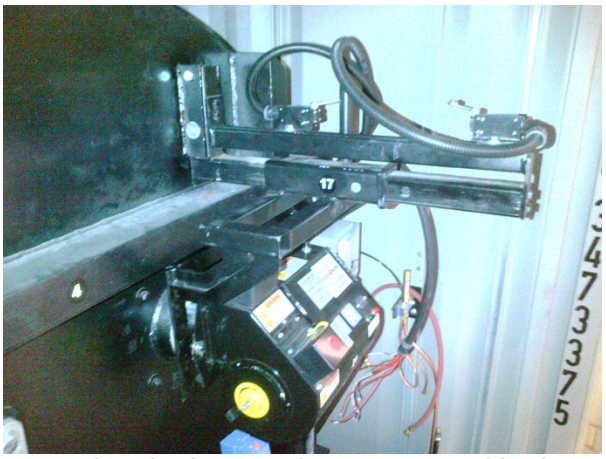
b. Ensure that the secondary chamber plug is removed, the burner cannot swing open by locking the pin and the waste oil burner is all the way in (limit switch in the front of the bracket activated).

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

NOTA

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.

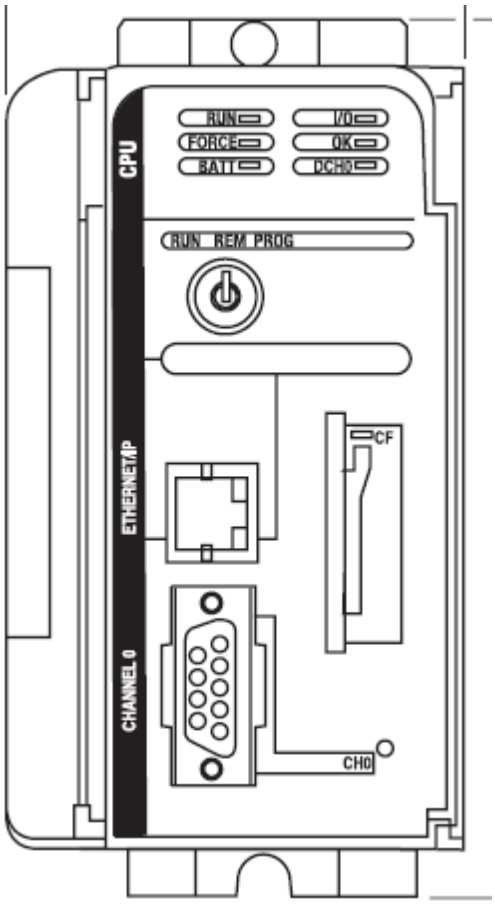
iii. The emergency stop is pushed in. Twist the emergency stop button to unlock, and then push the control power on button. The control power button should now be illuminated.

d. If on the “Top View” screen on the HMI the primary 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.

e. If on the “Top View” screen on the HMI the secondary 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.

f. 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.

g. PLC Processor Problem



i. Check the run light on the PLC processor. If the run light is on, the PLC is ready.

ii. “OK light” is green = Controller is OK

iii. “OK light” is Red Flashing = this is a recoverable fault, check the PLC processor. This fault is very unlikely to occur.

iv. OK light is Red = this is a non-recoverable controller fault. Cycle Power. The OK LED should change to flashing red. If LED remains solid red, repl*ace the PLC. This fault is very unlikely to occur.*

v. *"Default Channel Zero (DCH0) light" is green = this indicates the PLC processor has lost the* program. The PLC is equipped with a flash card that will automatically load the program back onto the PLC

3.3.6.2 Possible Problems/Causes/Solutions

Problem	Causes	Solutions
Blower Fails to start	Breaker tripped	Turn power off at Main Disconnect Open Panel and check which breaker has tripped, turn back on
	Motor starters or contactor coil is burnt out	Locate contactor for blower and visually observe if the contactor is pulled in. Use a multi 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. *See Part IV Section 4 CMI 4.4.4/01-001G*
Secondary Burner won't ignite	Bad Electrodes	*Refer to Part IV Section 2 Preventive Maintenance Instructions (PMI) 01/02-002.D.01*
	Low Oil Pressure	Adjust pressure setting on burner pump by turning the screw located at the bottom of the pump. Turn clockwise to increase pressure and counter clockwise to decrease pressure.
	Fuel Line Leak	Visually inspect the lines for the leak Tighten any fittings that are near the leak
	Door Switch not making contact	Make sure main door is closed and latched shut Make sure limit switch is hitting striker plate.
	Bad Thermocouple	Replace thermocouple see Section IV Part 4 CMI 4.4.1/05-002A
Primary Burner won't ignite	Bad Electrode	*Refer to Part IV Section 2 PMI 01/02-002.D.01*
	Low Oil Pressure	Adjust pressure setting on burner pump by turning the screw located at the bottom of the pump. Turn clockwise to increase pressure and counter clockwise to decrease pressure.
	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.

Problem	Causes	Solutions
	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
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.
	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
	Operation at too high a 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 (confirm by weighing), ensure the waste mix is correct.
	Primary Chamber temperature too high	Waste loaded may not be a good mix of heat value
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
Waste Oil Burner		
Pump fails to start	Breaker tripped	Switch Breaker into off position and then switch to on position again. If breaker continues to trip, check for short in the system.
	Motor Starter	Check motor starter
	Overload	Reset overload

Problem	Causes	Solutions
Waste Oil Nozzle not turning on	A ball valve is closed	Ensure all ball valves are open.
	Solenoid Valve has failed	Diagnose if valve has failed. Replace if necessary See Part IV Section 4 CMI 4.4.5/02-003B (page 451)
	Fuel Leak	Check all pipes and hoses
	Secondary Chamber not at temperature	Wait until Secondary Chamber reaches 982°C.
System will not start when Solid is selected	Waste Oil burner is inserted into the back of the Secondary Chamber	Remove Waste Oil burner assembly from the Secondary Chamber.

3.3.6.3 In Case of Alarm

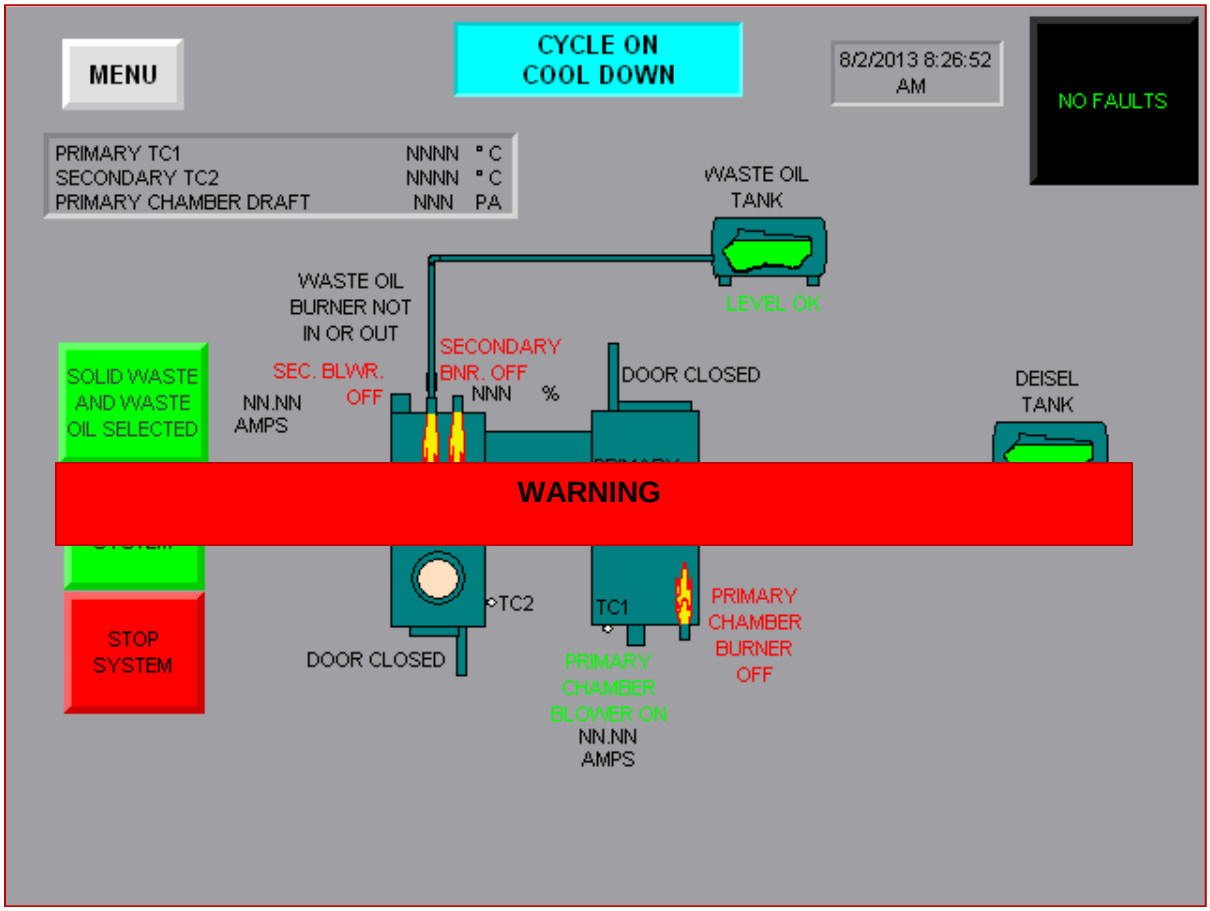
IF BURN IS IN PROGRESS DO NOT HIT EMERGENCY STOP BUTTON ON MAIN CONTROL PANEL.

a. Go to the 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 chamber out.

b. Check alarms to see what the problem is.

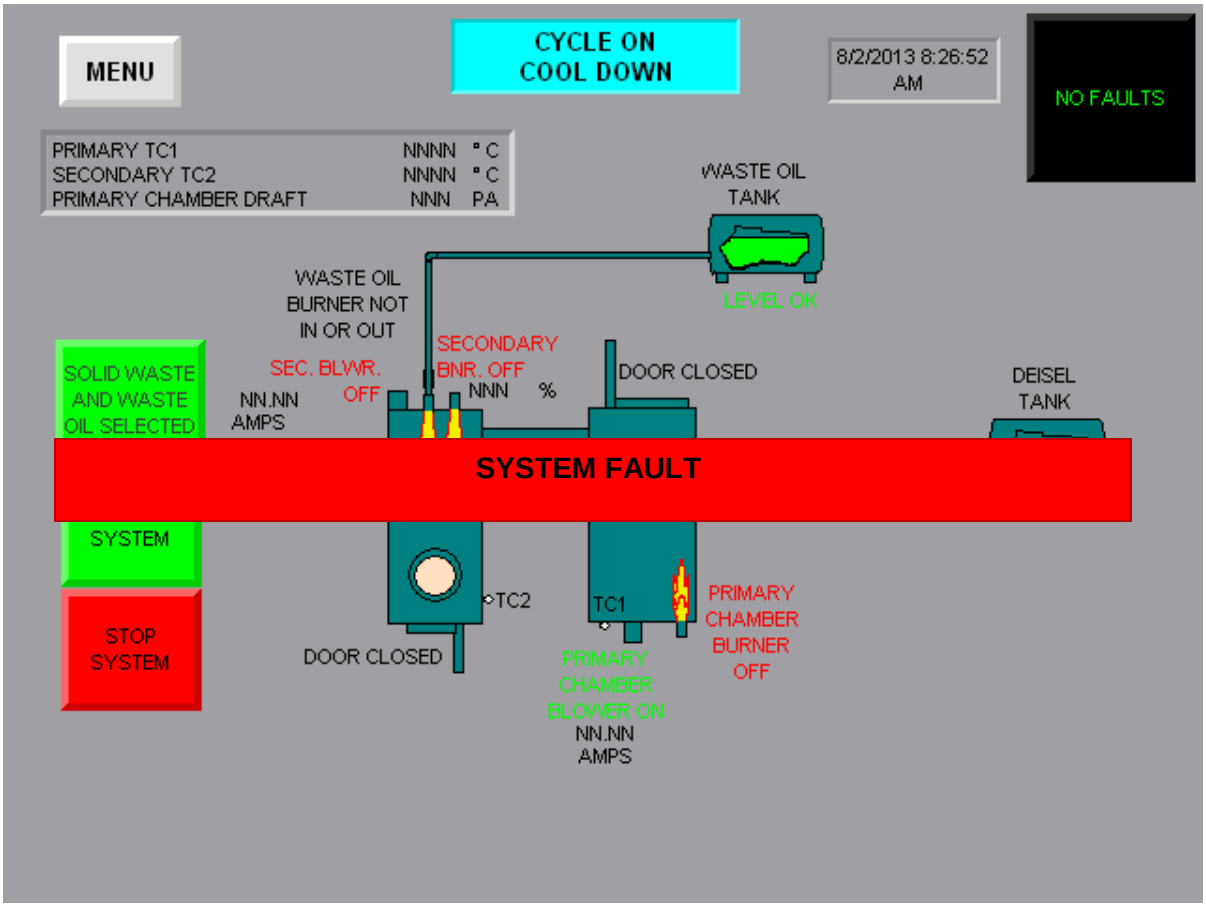
c. Do not open the doors of the Primary Chamber unless the temperature inside the chamber is below 90°C

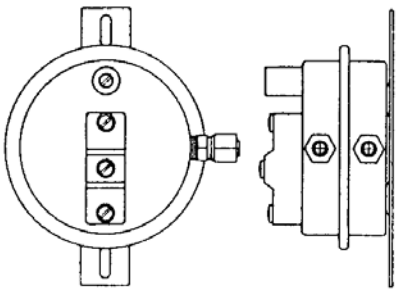
3.3.6.4 System Warnings

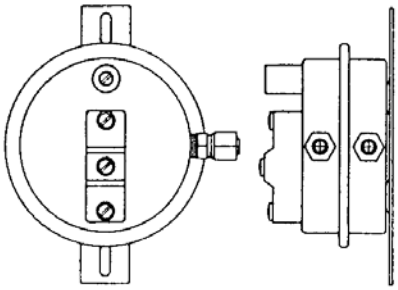


Warnings indicate that a non critical value or device has malfunctioned and requires an operator to review what may be causing this to occur. If not resolved some of the warnings may become a fault.

3.3.6.5 System Faults



ALARM	SOLUTION
The Primary Chamber thermocouple has faulted	Refer to *Part IV Section 2 PMI 05-002.W.01*
The Secondary Chamber thermocouple has faulted	Refer to *Part IV Section 2 PMI 05-002.W.01*
The primary burner is faulted	The primary burner has failed to light when it received a signal telling it to start. To reset the burner, press the reset button located on the Burner and look into sight glass for ignition:
	Check that the pressure is 1378 kPa
	If a spark is present and burner won't ignite: • Check fuel lines for leaks • Check that fuel pump is not clogged
	If no spark is present: • Clean electrodes
The secondary burner is faulted	The secondary burner has failed to light when it received a signal telling it to start. To reset the burner, press the reset button located on the Burner and look into sight glass for ignition:
	If a spark is present and burner wont ignite: • Check fuel lines for leaks • Check that fuel pump is not clogged
	If no spark is present: • Clean electrodes
The system has shut down due to primary blower low air flow.	Visually examine the primary blower for any obstructions that may be causing low air flow
	Check slide gate located between Primary chamber and blower, ensure it is open.
	Check damper assembly, ensuring modutrol crank arm is still connected and that butterfly damper is open, allowing air flow.
	Air proving switch may be defective. See *Part IV Section* 4 CMI 4.4.4/01-001A & 02-002A
	There are two ports on the air proving 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
	If no air restriction is observed (i.e. blockage in the tube) change the air proving switch see *Part IV Section* 4 CMI 4.4.4/01-001A & 02-002A
The primary blower motor breaker is tripped or open.	Turn power off on Control panel by turning the Main Disconnect to the off position CB1

ALARM	SOLUTION
	Open the main control panel and switch break switch to off and then to the on position “CB9”
The system has shut down due to secondary blower low air flow.	Visually examine the primary blower for any obstructions that may be causing low air flow
	Check slide gate located between Secondary chamber and blower, ensure it is open.
	Check damper assembly, ensuring modutrol crank arm is still connected *(if not see Part IV Section 2 PMI 01/02-001.W.01 Damper Crank Arm)* and that butterfly damper is open, allowing air flow.
	Air proving switch may be defective. See *Part IV Section* 4 CMI 4.4.4/01-001A & 02-002A
	There are two ports on the air proving 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
	If no air restriction is observed (i.e. blockage in the tube) change the air proving switch see *Part IV Section* 4 CMI 4.4.4/01-001A & 02-002A
The Secondary blower motor breaker is tripped or open.	Turn power off on Control panel by turning the Main Disconnect to the off position
	Open the main control panel and switch the breaker to off and then to the on position “CB10”
The Secondary blower variable frequency drive is faulted.	Push fault reset button on the Panel view
	If fault persist check the error code on the variable frequency drive and check OEM manual for troubleshooting alarm.
The burner fuel level is low.	Add fuel to the fuel tank and the alarm should reset itself
	If alarm persist replace the low level switch *as per* See *Part IV Section* 4 CMI 4.4.3/01-002G & 02-002G
Selected Solid & Waste Oil The waste oil burner is not in.	Check to see if the waste oil burner is pushed all the way into the Secondary Chamber. • Push waste oil burner all the way in, ensuring it makes contact with the limit switch • If the waste oil burner is all the way in and making contact with the limit switch, replace the limit switch. See Part IV Section 4 CMI 4.4.1/05-005A (page 436)

ALARM	**SOLUTION**
Solid Waste Only Selected The waste oil burner is not out.	Check to see if the waste oil burner is pulled all the way out of the Secondary Chamber • Pull waste oil burner all the way out, ensuring it makes contact with the limit switch • If the waste oil burner is all the way out and making contact with the limit switch, replace the limit switch. See Part IV Section 4 CMI 4.4.1/05-005A (page 436)
The waste oil burner is faulted.	The waste oil tank is empty, fill tank
	Check that the instrument air is going to the burner check the air pressure gauge on the burner and adjust regulator if necessary.
	Check that the fuel pump is in working condition
	Check that the waste oil breaker is not tripped “CB15”

4.0 MAINTENANCE INSTRUCTIONS

4.1 SUMMARY OF PREVENTIVE MAINTENANCE INSTRUCTIONS

IF APPLICABLE: The air compressor pump is shipped with break-in oil which should be changed after the first 8 hours of operation.

4.1.1 Daily Maintenance

Freq.	Routine	Component	Description
Daily	Inspection & Cleaning	Burners	Clean electrodes & HT Leads.
Daily	Inspection & Cleaning	Burners	Inspect fuel lines for leaks.
Daily	Inspection & Cleaning	Burners	Inspect nozzles in burners.
Daily	Inspection & Cleaning	Refractory	Check inside the Chambers for shrinkage or any exposed metal.

4.1.2 Weekly Maintenance

Routine	Component	Description
Inspection & Cleaning	Air compressor	Check oil level
Inspection & Cleaning	Air compressor	Check air filter
Inspection & Cleaning	Air compressor	Pull ring on safety valve and allow the ring to snap back to normal position (Check for free operation of the safety valve)
Inspection & Cleaning	Blowers and Assembly	Modutrol crank arm connected to damper.
Inspection & Cleaning	Blowers and Assembly	Slide gates are open.
Inspection & Cleaning	Burners	Clean photocell / UV Detector
Inspection & Cleaning	Burners	Clean the glass on the flame inspection window.
Inspection & Cleaning	Burners	Check diffuser disc.
Inspection & Cleaning	Waste Oil Burner Filter	Clean the canister filter
Inspection & Cleaning	Thermocouples	Remove and clean thermocouples as necessary – inspect for damage. Replace if necessary.

4.1.3 Monthly Maintenance

Routine	Component	Description
Inspection & Cleaning	Air compressor	Check all fasteners for proper tightness.
Inspection & Cleaning	Blowers and Assembly	Check the fan wheel for any wear or corrosion, as either can cause catastrophic failures
Inspection & Cleaning	Burners	Check flexible hoses to make sure that they are still in good condition.
Inspection & Cleaning	Burners	Pump delivery pressure must be stable. If the pressure is found to be unstable or if the pump runs noisily see manual for details.
Inspection & Cleaning	Burners	Check that no dust has accumulated inside the fan or on its blades.
Inspection & Cleaning	Burners	Check that all parts of the combustion head are in good condition, positioned correctly, free of all impurities, and that no deformation has been caused by operation at high temperatures.
Inspection & Cleaning	Refractory	Check the refractory in the Secondary Chamber for shrinkage, anything greater then 1.2cm should be patched (i.e. gaps between modules exposing metal surface)
Inspection & Cleaning	Waste Oil	Visually check all electrical components
Inspection & Cleaning	Waste Oil	Remove heater element from casing and inspect for build-up. Clean any deposits. When reinstalling the heater element always ensure the bundle will be restarted immersed. NEVER use the inline oil heater dry

4.1.4 Quarterly Maintenance

Routine	Component	Description
Lubrication Service	Air compressor	Change the oil
Inspection & Cleaning	Blowers and Assembly	Lubricate all bearings – lubrication intervals depend on operating speed (RPM). Clean cooling fan on motors.
Inspection & Cleaning	Blowers and Assembly	Check the V-belt drive (Secondary Blower) for proper alignment and tension (see manual). If belts are worn, replace them as a set, matched within manufacturer's tolerances.
Inspection & Cleaning	Burners	Check all components for heat damage.
Inspection & Cleaning	Refractory	Inspect door gasket for damage or heat damage. Replace segments, if necessary. Doors must close tightly and securely.
Inspection & Cleaning	Refractory	Check all refractory for damage. Patch or replace as needed. Patch if modules show a little gap and replace modules if the modules have shrunk excessively (greater than 1")
Inspection & Cleaning	Paint	Maintain paint exterior to protect metal from heat damage

4.1.5 Yearly Maintenance

Routine	Component	Description
Detailed Maintenance	Refractory	Replace door gasket
Inspection & Cleaning	Electrical	Check the limit switch

4.1.6 Level 2 and Level 3 Maintenance

Please refer to the OEM Manual for additional information regarding maintenance instructions for Level 2 and Level 3.

Periodicity	Level of Repair	Routine	Component	Description
24 Monthly	3	Detailed Maintenance	Refractory	Replace the door sills on Primary Chamber
24 Monthly	3	Detailed Maintenance	Refractory	Replace the door sills on Secondary Chamber
60 monthly	3	Detailed Maintenance	Refractory	Relining of Secondary Chamber.
60 monthly	3	Detailed Maintenance	Refractory	First stack section to be relined.
60 monthly	3	Detailed Maintenance	Fuel Tanks	Inspect Fuel tanks

4.2 PREVENTIVE MAINTENANCE INSTRUCTIONS

The following preventive maintenance instructions (PMI) are to be read in conjunction with the IPDs found in Section 4.3.

4.2.1 Instruction Classification

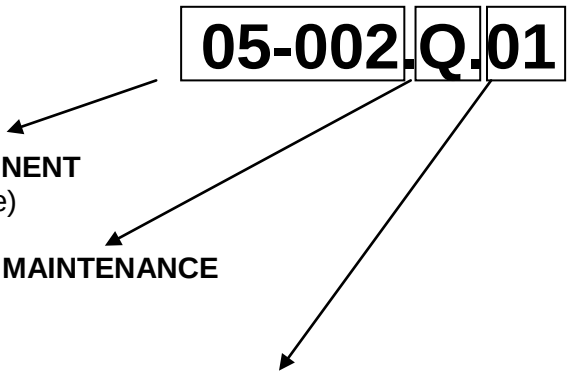
Each component is associated with an identification number, see table below:

System Component	Identification number
Primary Blower	01-001
Secondary Blower	02-001
Primary Burner	01-002
Secondary Burner	02-002
Air Compressor	03-001
Waste Oil Burner	02-003
Main Control Panel	03-010
Refractory	05-001
Thermocouple	05-002
Paint	05-003
Electrical	05-004
Limit Switch	05-005

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**,**



SYSTEM COMPONENT
(eg. Thermocouple)

FREQUENCY OF MAINTENANCE
(eg. Quraterly)

MAINTENANCE INSTRUCTION NUMBER
(eg. Maintenance Routine #1)

4.2.2 Zero Mechanical State & Lock Out Instructions

Proper maintenance of the equipment is essential to ensure long term, reliable operation of the EWS model Incinerator. The preventive maintenance instructions are outlined in this section of the Facility Manual.

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

4.2.2.1 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 Instructions

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 instructions in this Facility 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

4.2.2.2 Zero Mechanical State

Zero Mechanical State (ZMS) exists when the possibility of an unexpected mechanical movement has been eliminated. During maintenance, it is 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 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 instructions at site should require ZMS condition as a matter of course.

4.2.2.3 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.

4.2.2.4 Power Lock Out Instructions

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, strict discipline and constant supervision should be employed during any equipment maintenance work.

4.2.2.5 Power Lock Out Checklist

1. Alert the operator of the equipment.

2. Before starting the work on an engine, motor, line shaft or other power transmission equipment or power-driven machine, make sure it cannot 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 you are finished working, 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.

4.2.3 Daily Instructions

Primary & Secondary Chamber Burners: (01-002.D & 02-002.D)

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

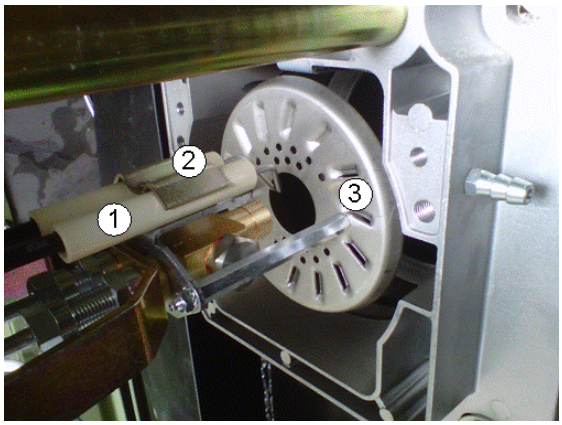
Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or death.

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

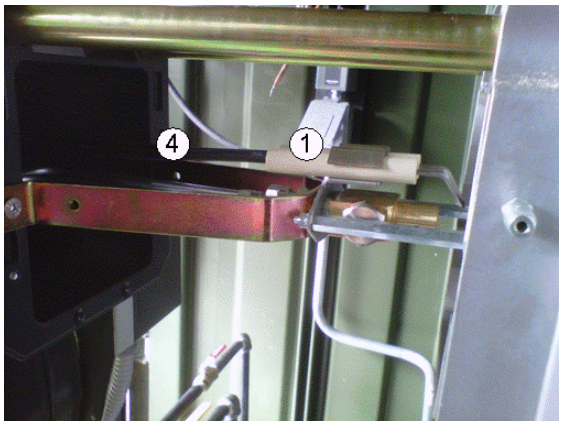
INSTRUCTION 01/02-002.D.01: INSPECTING AND CLEANING ELECTRODES AND HT LEADS

1. Remove the cover from the Burners as described in 01-002.W.01 and 02-002.W.01.

2. Inspect the electrodes for any soot build-up.



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

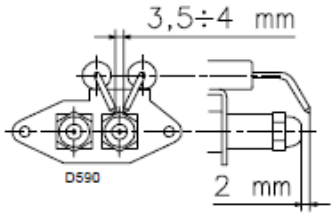


4. HT Leads

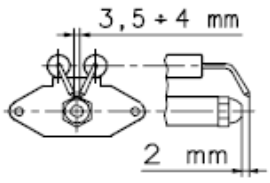
3. Clean/wipe down the ignition electrode with a cloth should there be a build-up of soot.

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

4. 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.
5.



Primary Burner



Secondary Burner

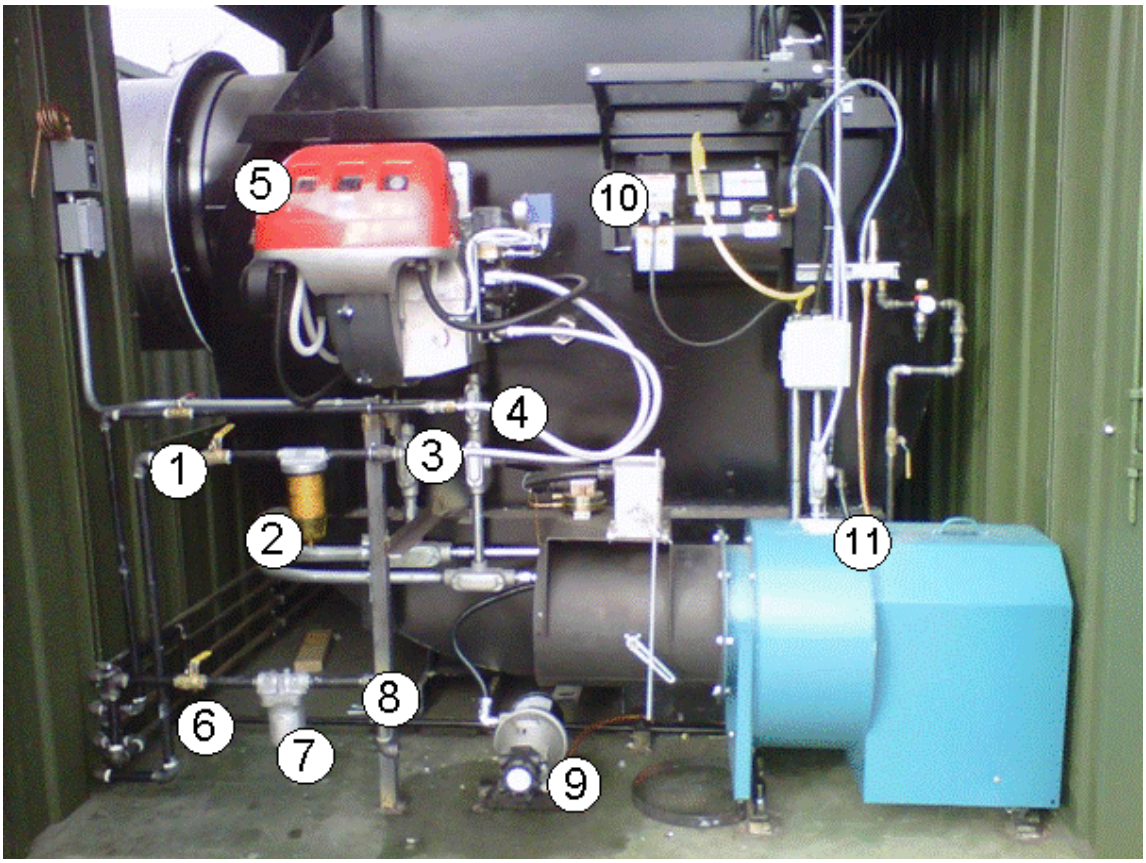
Check the High Temperature (HT) Leads for any heat damage. If HT Leads are severely damaged (i.e., you can see the wire beneath the sheathing) then replace. (See *Part IV Section 4 CMI 4.4.3/01-002A & 4.4.3/02-002A)*

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

1. Visually inspect all fuel lines to the Primary and Secondary Burner as well as to the Waste Oil burner for any leaks.

2. The Primary and Secondary Burner have two oil lines, one feed and one return. The Waste Oil Burner only has one feed line.

3. If any leaks are observed tighten or replace the fitting where the leak is occurring



1. Fuel In Ball Valve
2. Fuel Filter
3. Fuel Line In
4. Fuel Line Out
5. Secondary Burner
6. Waste Oil Ball valve
7. Waste Oil Filter
8. Waste Oil Line In
9. Waste Oil J-pump
10. Waste Oil Burner
11. Secondary Blower

INSTRUCTION 01/02-002.D.03: INSPECT AND CLEAN BURNER NOZZLES

Primary Burner:

1. Remove the burner cover as outlined in 01/02-002.W.01 REMOVAL OF BURNER COVERS
2. Remove the centre retaining bolt.
3. Slide burner out.
4. Check nozzle. If there is carbon, remove the nozzle and clean.
5. Reinstall or replace if necessary

Secondary Burner:

1. Remove the burner cover as outlined in 01/02-002.W.01 REMOVAL OF BURNER COVERS
2. Remove the 4 retaining bolts on either side of the burner.
3. Slide burner out.
4. Check nozzle. If there is carbon, remove the nozzle and clean.
5. Reinstall or replace if necessary

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 4.2.2 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 or new module (*Part IV Section 4 CMI 4.4.2/05-001A & 4.4.2/05-001B)*

4.2.4 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 4.2.2 Zero Mechanical State & Lock Out Instructions.*

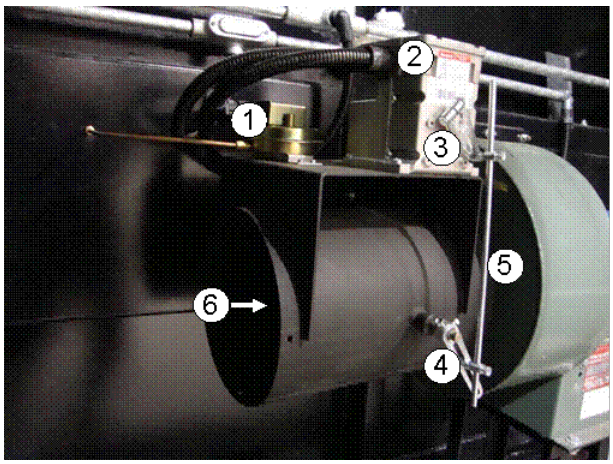
A fan can windmill despite removal of all electrical power therefore, take extra care when working with fans in the system.

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

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

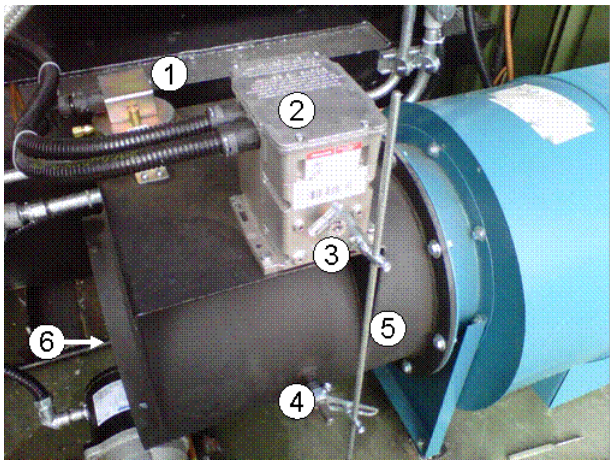
Check to see that the damper crank arm is connected to the damper and the rod.

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



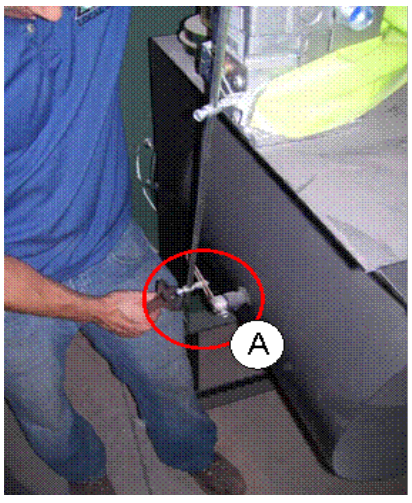
PRIMARY BLOWER

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



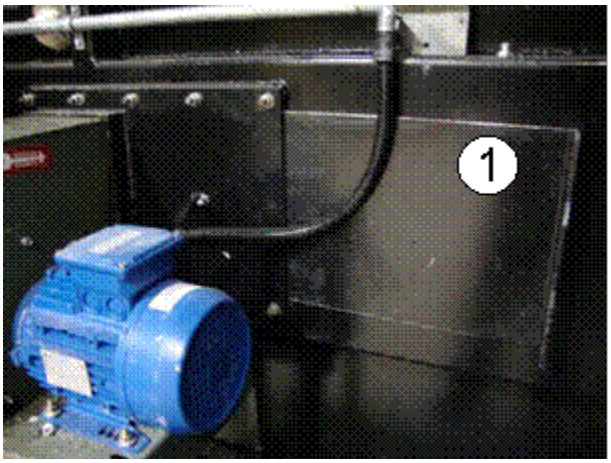
A. Damper Crank arm and connection to Damper and Rod

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

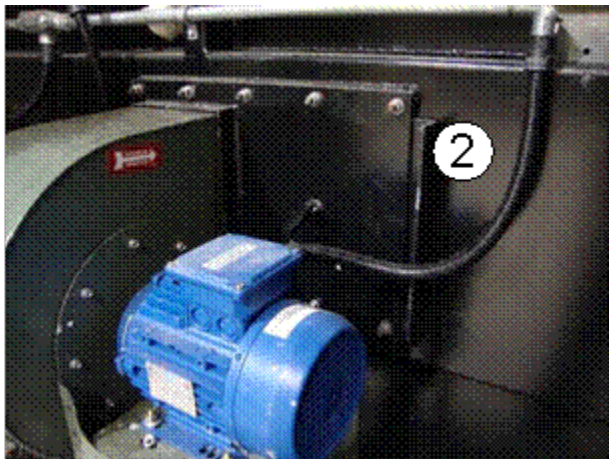
Check to see if slide gates move freely.

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.

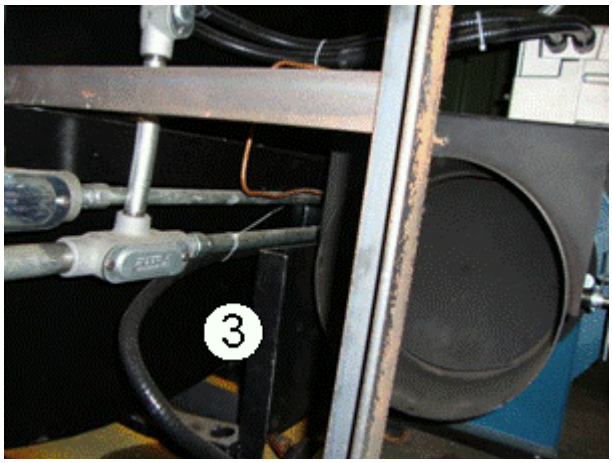
2. Gates must be opened to allow under fire air to enter the chamber. They should only be closed to reduce air in abnormal operating conditions.



1. Primary Chamber Slide Gate Open



2. Primary Chamber Slide Gate Closed



3. Secondary Chamber Slide gate Open

Primary & Secondary Chamber Burners: (01-002.W & 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 01/02-002.W.01: REMOVAL OF BURNER COVERS

Switch off the electrical power. Please follow all instructions outlined in *Section 4.2.2 Zero Mechanical State & Lock Out Instructions.* Cover must be removed to perform maintenance on burners.

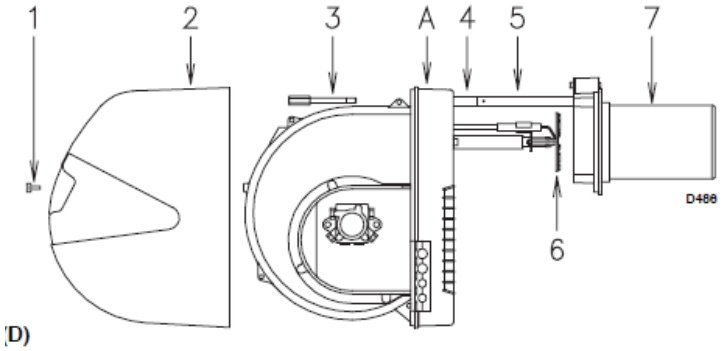
To remove the cover and to pull out the Primary or Secondary Burner, follow instructions below:

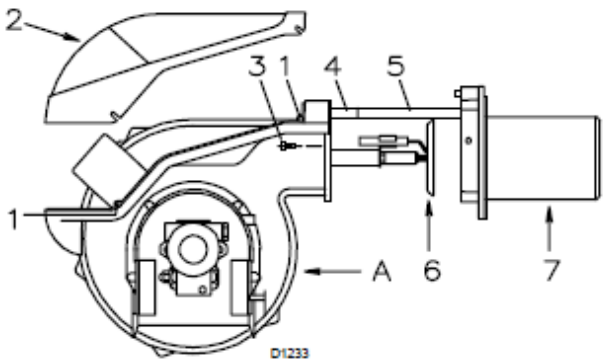
1. Loosen screw (Item #1, in the following diagrams) and withdraw the cover (Item #2, in the following diagrams)

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

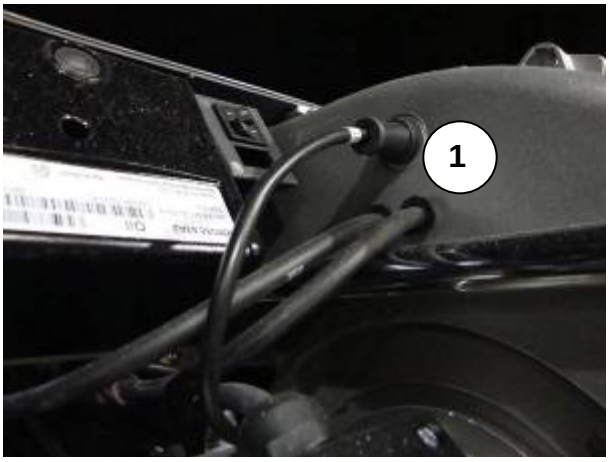
Primary

Secondary Burner has 4 screws (2 on each side)

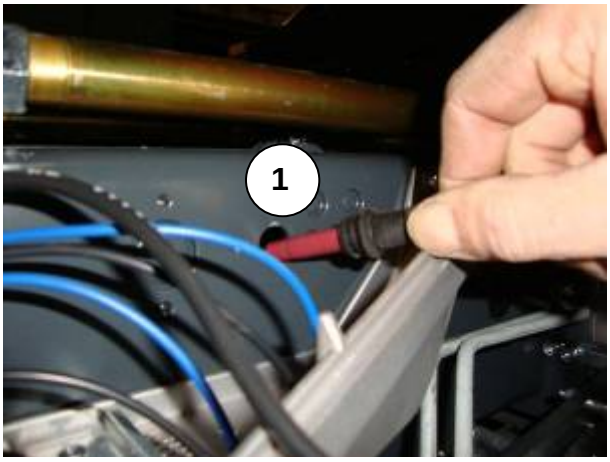
Secondary

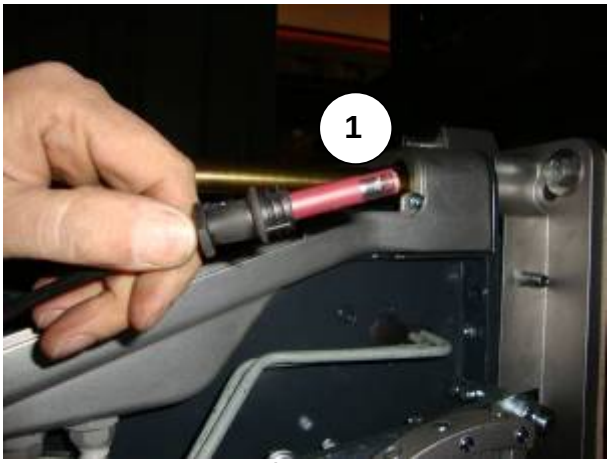
INSTRUCTION 01/02-002.W.02: CLEANING THE PHOTO CELL AND U.V. DETECTOR

1. Remove the cover from the Burners as described in Instruction 01/02-002.W.01.
2. Clean Photo Electric (P.E) cell with a wet cloth
3. P.E. cell (Item #1 on the Primary Burner photo) (Item #1 on the Secondary Burner photo) 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. Reinstall burner cover.



Primary Burner PE Cell

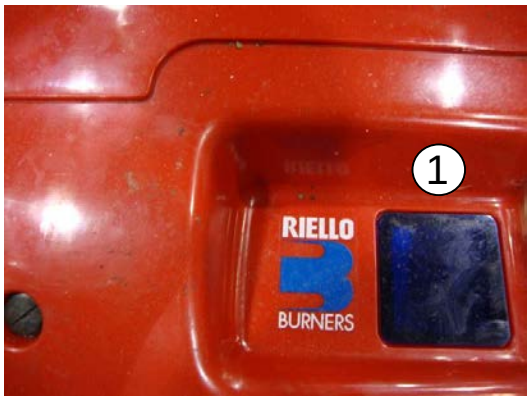




Secondary Burner

INSTRUCTION 01/02-002.W.03: CLEANING THE INSPECTION WINDOWS

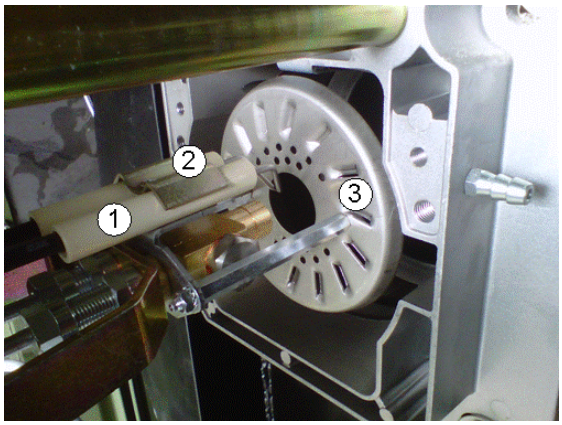
Clean the inspection windows with a wet cloth.



1. Primary Burner Inspection Window
2. Secondary Burner Inspection Window

INSTRUCTION 01/02-002.W.04: INSPECTING THE DIFFUSER DISC ASSEMBLY

1. Remove the cover from the Burners as described in 01/02-002.W.01.
2. Check the diffuser disc assembly and the diffuser disc for any heat damage
3. If any heat damage, deformation or excess rust is noted, replace. (*Part IV Section 4 CMI 4.4.3/01-002B)*



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

Air Compressor: (03-001.W)

INTAKE AIR. Can contain carbon monoxide or other contaminants. Will cause serious injury or death. This air compressor is not designed, intended or approved for breathing air. Compressed air should not be used for breathing air application.

HAZARDOUS VOLTAGE. Can cause serious injury or death. Disconnect power and bleed pressure from the tank before servicing.

MOVING PARTS. Can cause serious injury. Do not operate with guards removed. Machine may start automatically. Disconnect power before servicing.

HOT SURFACES. Can cause serious injury. Do not touch. Allow to cool before servicing. Do not touch hot compressor or tubing.

HIGH PRESSURE AIR. Bypassing, modifying or removing safety/relief valves can cause serious injury or death. Do not bypass, modify or remove safety/relief valves. Do not direct the air stream at body. Rusted tanks can cause explosion and severe injury or death. Drain tank before each use. Drain valve located at bottom of tank.

RISK OF BURSTING. Use only suitable air handling parts acceptable for pressure of not less than the maximum allowable working pressure of the machine.

Before maintenance is performed on electrical or rotating equipment make sure that the appropriate electrical disconnects are locked out/tagged out. Before removing the vessel access ports make sure that the equipment is off and cool.

NOTA
Too much or too little oil will harm the compressor.

INSTRUCTION 03-001.W.02: INSPECTING AIR FILTERS IN AIR COMPRESSOR

1. Remove both filter covers
2. Gently grab filter element and remove.
3. Visually inspect filter for damage or dirt.
4. If damaged, replace the filter. If dirty, blow out the filter with compressed air.
5. Reinstall the filters and their covers

INSTRUCTION 03-001.W.03: CLEANING AIR COMPRESSOR & CHECKING SAFETY VALVE

Cleaning

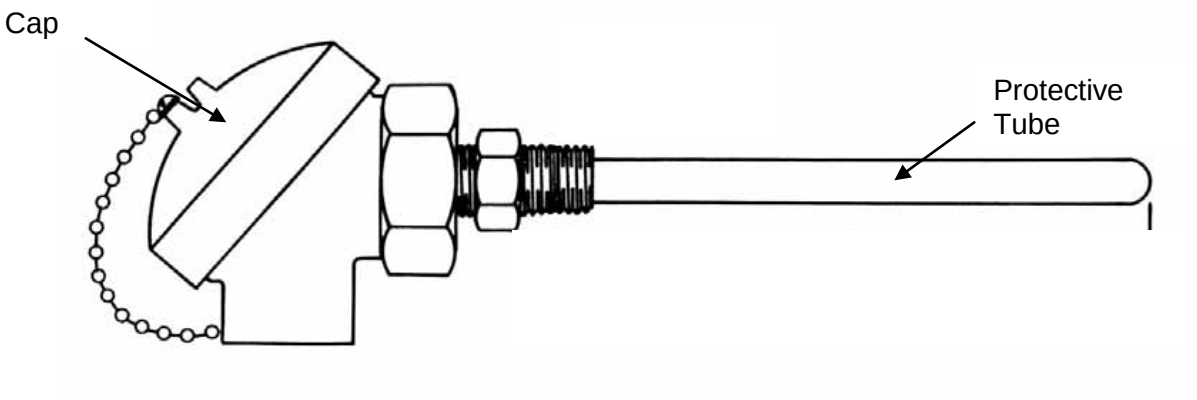
A dirty compressor will cause abnormally high temperature and result in oil carbonization on valve components. Clean all external parts of the compressor with compressed air. Concentrate the cleaning on the external fins where dirt can accumulate as cooling air is forced across them.

Check Safety Valve

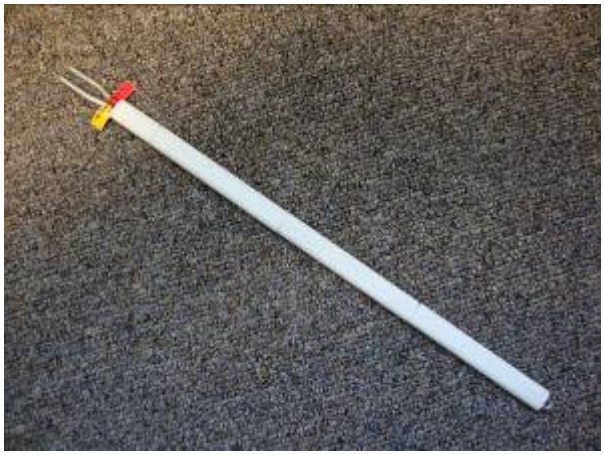
1. Check the safety valve manually by pulling ring or lever to make sure that it moves freely and is not siezed.
2. Allow the ring to snap back to normal position.

Thermocouple: (05-002.W)

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



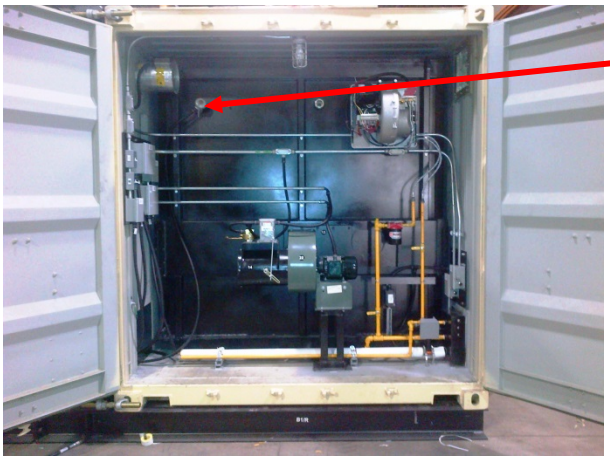
Thermocouple Assembly



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 *Part IV Section 4 CMI 4.4.1/05-002A*



1. Primary Thermocouple (TC1)

2. Secondary Thermocouple (TC2) on Secondary Chamber Container

4.2.5 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 4.2.2 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

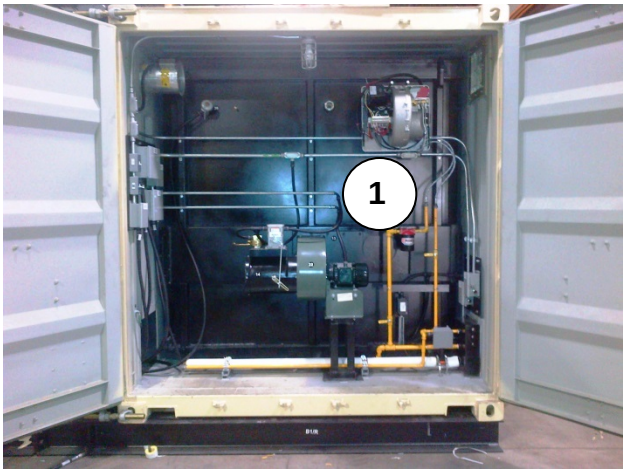
Primary & Secondary Chamber Burners: (01-002.M & 02-002.M)

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.

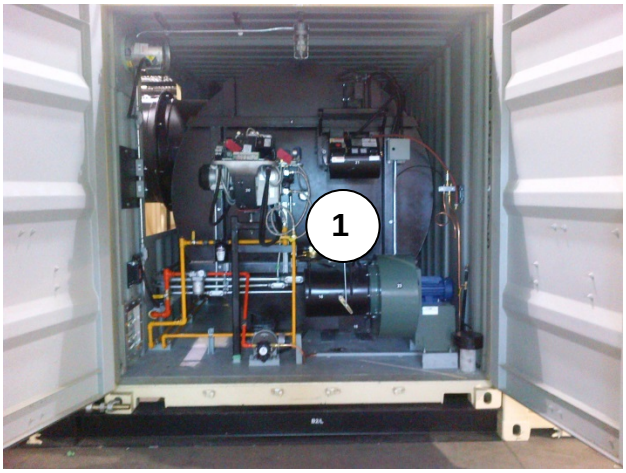
INSTRUCTION 01/02-002.M.01: CHECK FLEXIBLE OIL LINE

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 *Part IV Section 4 CMI 4.4.3/01-002F & 4.4.3/02-0002F*



Primary Chamber Burner Flexible lines (1 Above)



Secondary Chamber Burner Flexible Lines (1 Above)

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

1. Remove the cover from the Burners 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.

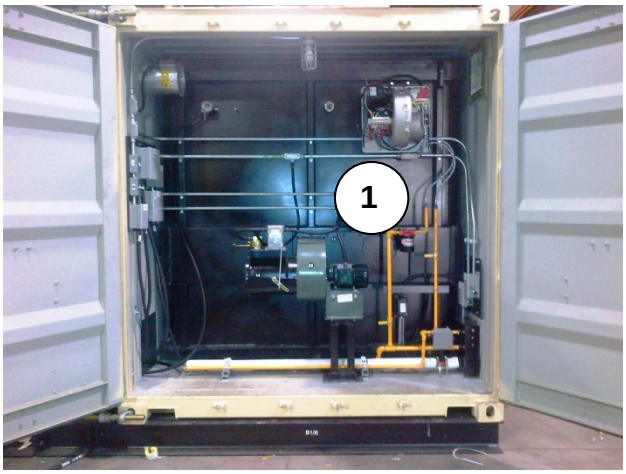
3. If the pressure is found to be unstable or if the pump is running noisily try the following:

a. Detach the flexible hose from the line filter (Shown below as #1).

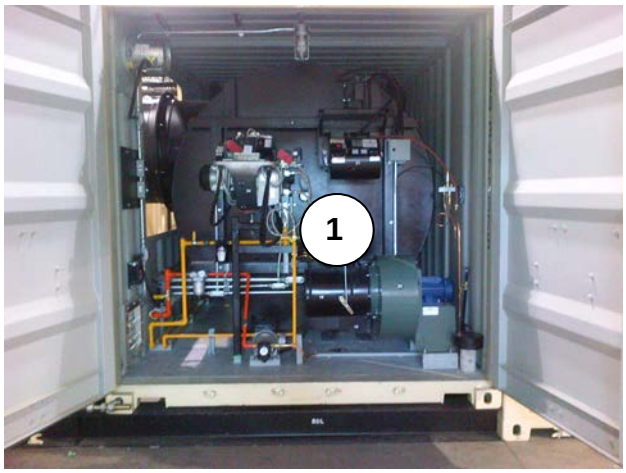
b. At the tank pour fuel into the supply line.

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.

d.



Primary Chamber Burner Flexible lines



Secondary 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: see *Part IV Section 4 CMI 4.4.7/01-002I or 4.4.7/02-002I.*

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 01/02-002.M.03: CLEAN BURNERS OF DUST

1. Remove the cover from the Burners as described in Instruction 01/02-002.W.01.

2. Check that no dust has accumulated inside the burner fan or on fan blades.

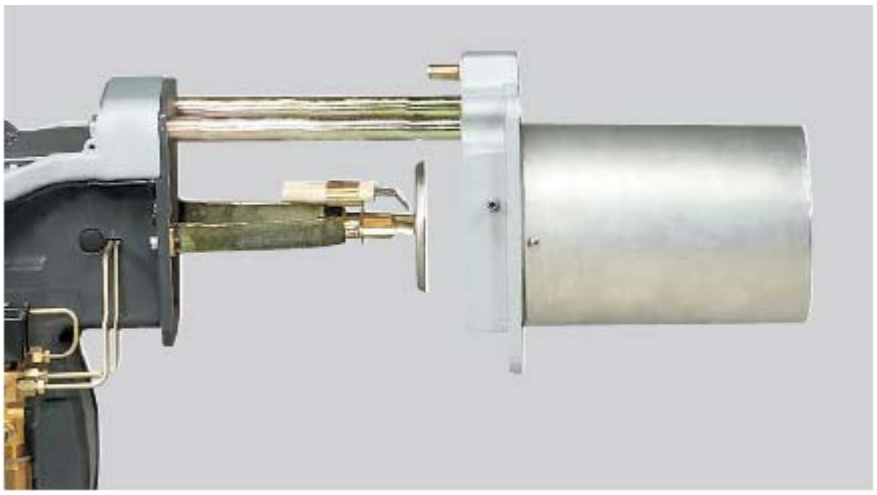
3. If any dust is visible take a clean soft cloth to the fan or the blades and wipe clean.

INSTRUCTION 01/02-002.M.04: CHECK BURNER COMBUSTION HEAD

1. Remove the cover from the Burners as described in Instruction 01/02-002.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 *Part IV Section 4 CMI 4.4.3/01-002D & 4.4.3/02-002D*

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 4.2.2 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 *Part IV Section 4 CMI 4.4.2/05-001A)*
6. Check for any exposed metal, if metal is exposed make sure to patch area with blanket material or new module. (See *Part IV Section 4 CMI 4.4.2/05-001A & 4.4.2/05-001B)*
7. Pay special attention to areas where the junction boxes are located, as any excessive heat may melt the wires within the box.

Some cracking is normal, however if pieces are missing or have fallen out, (See *Part IV Section 4 CMI 4.4.2/05-001E)*

Air Compressor: (03-001.M)

 **INTAKE AIR. Can contain carbon monoxide or other contaminants. Will cause serious injury or death. This air compressor is not designed, intended or approved for breathing air. Compressed air should not be used for breathing air application unless treated in accordance with all applicable codes and regulations.**

 **HAZARDOUS VOLTAGE. Can cause serious injury or death. Disconnect power and bleed pressure from the tank before servicing. Compressor must be connected to properly grounded circuit. Do not operate compressor in wet conditions. Store indoors.**

 **MOVING PARTS. Can cause serious injury. Do not operate with guards removed. Machine may start automatically. Disconnect power before servicing. Lockout/Tagout machine.**

 **HOT SURFACES. Can cause serious injury. Do not touch. Allow to cool before servicing.**

 **HIGH PRESSURE AIR. Bypassing, modifying or removing safety/relief valves can cause serious injury or death. Do not bypass, modify or remove safety/relief valves. Do not direct air-stream at body. Rusted tanks can cause explosion and severe injury or death. Drain tank before each use. Drain valve located at bottom of tank.**

RISK OF BURSTING. Use only suitable air handling parts acceptable for pressure of not less than the maximum allowable working pressure of the machine.

INSTRUCTION 03-001.M.01: CHECK FASTENERS FOR TIGHTNESS

1. Check all fasteners for tightness (tighten as required).

2. Check the safety valve manually, by pulling ring or lever, to make sure that it is not stuck. Allow the ring to snap back to normal position

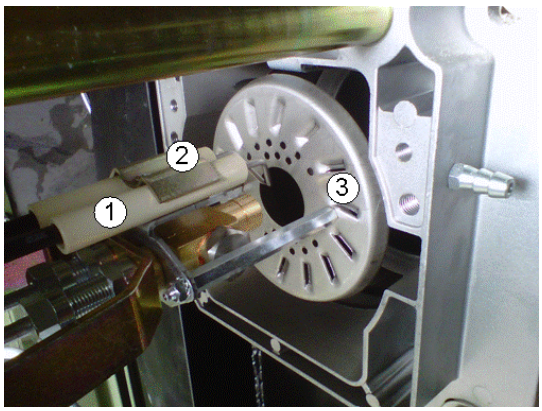
Quarterly Instructions

Primary & Secondary Chamber Burners: (01-002.Q & 02-002.Q)

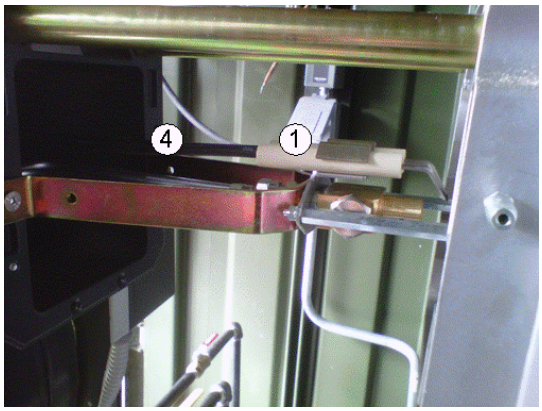
Do not store flammable or hazardous materials in the vicinity of fuel burning appliances. Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or death. Refer to the Burner manual for instructional or additional information.

INSTRUCTION 01/02-002.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 Lead.
    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

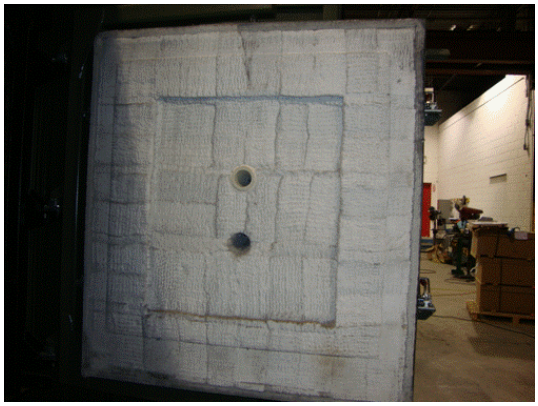
Refractory: (05-001.Q)

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 4.2.2 Zero Mechanical State & Lock Out Instructions.*

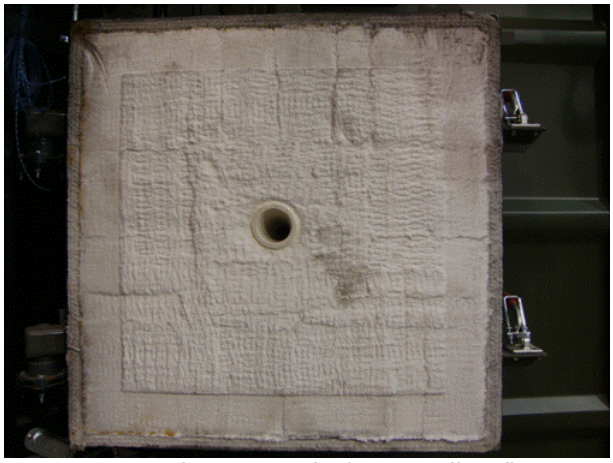
INSTRUCTION 05-001.Q.01: INSPECT DOOR GASKETS

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 if necessary. Cut out the damaged section and replace with new door gasket. See *Part IV Section 4 CMI 4.4.2/05-001C*.
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).

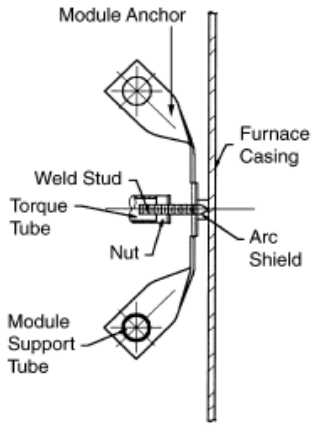


Figure 1: Side view of the Weld Loc Module

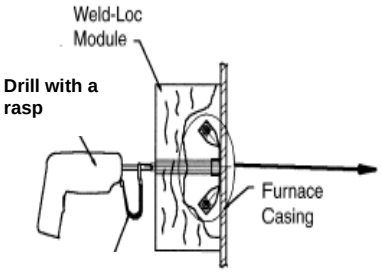


Figure 2: Stud Gun with rasp and Torque Tube.

A. INSTALLATION: Once the new module is in place take the stud gun with rasp to the Torque Tube and drill into place.

B. Once it has tightened the Torque Tube should come off with the drill.

Air Compressor (03-001.Q)

 **INTAKE AIR. Can contain carbon monoxide or other contaminants. Will cause serious injury or death. This air compressor is not designed, intended or approved for breathing air. Compressed air should not be used for breathing air application unless treated in accordance with all applicable codes and regulations.**

 **HAZARDOUS VOLTAGE. Can cause serious injury or death. Disconnect power and bleed pressure from the tank before servicing. Lockout/Tagout machine. Compressor must be connected to properly grounded circuit.**

 **MOVING PARTS. Can cause serious injury. Do not operate with guards removed. Machine may start automatically. Disconnect power before servicing. Lockout/Tagout machine.**

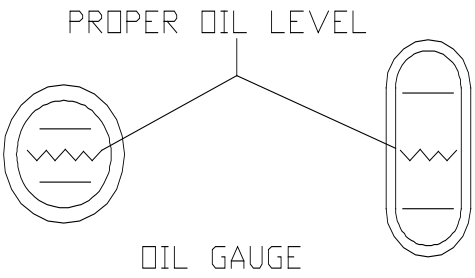
 **HOT SURFACES. Can cause serious injury. Do not touch. Allow to cool before servicing. Do not Touch hot compressor or tubing.**

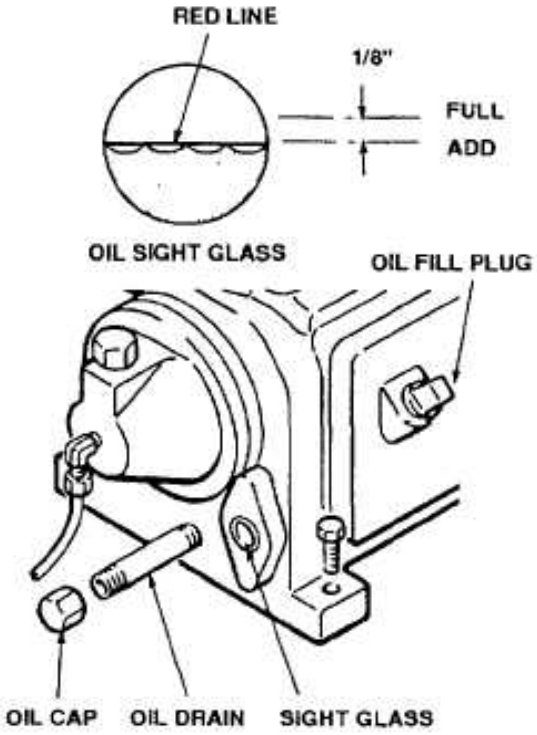
 **HIGH PRESSURE AIR. Bypassing, modifying or removing safety/relief valves can cause serious injury or death. Do not bypass, modify or remove safety/relief valves. Do not direct air-stream at body. Rusted tanks can cause explosion and severe injury or death. Drain tank before each use. Drain valve located at bottom of tank.**

 **RISK OF BURSTING. Use only suitable air handling parts acceptable for pressure of not less than the maximum allowable working pressure of the machine.**

INSTRUCTION 03-001.Q.01: CHANGE THE OIL

1. Change the oil





2. Remove the oil cap (above) to drain the oil.
3. Replace oil cap.
4. Refill the oil reservoir, using compressor oil, to the fill line as illustrated above.
5. Maintain oil level mid-way between the upper and lower lines of the crankcase sight gauge. See illustration above.

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.

Container Paint: Paint to conform to Customer outlined specifications.

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

4.2.6 Yearly Instructions

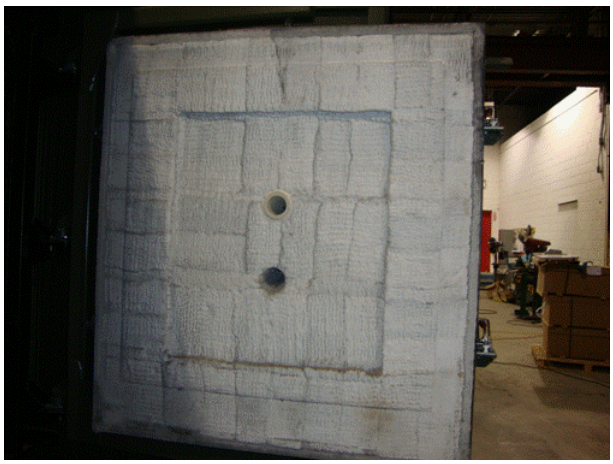
Refractory: (05-001.Y)

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

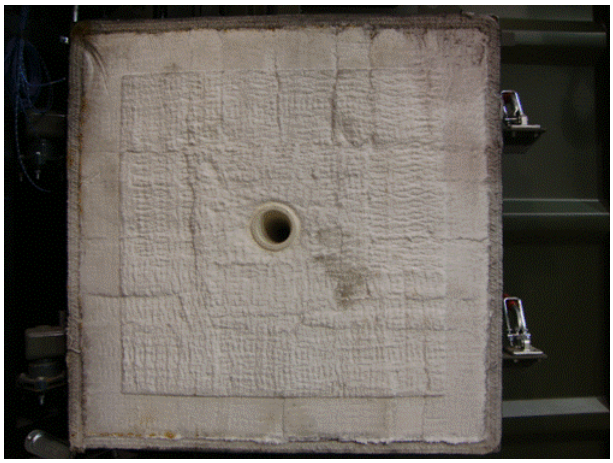
1. If required replace the door gasket. The gasket can last over 2 years but will depend on the careful use by the operator when loading and unloading.

2. Remove the damaged section of door gasket from door and reinstall new gasket



Primary Door (refractory lined)

Primary Door Gasket



Secondary Door (refractory lined)

Secondary Door Gasket

Electrical: (05-004.Y)

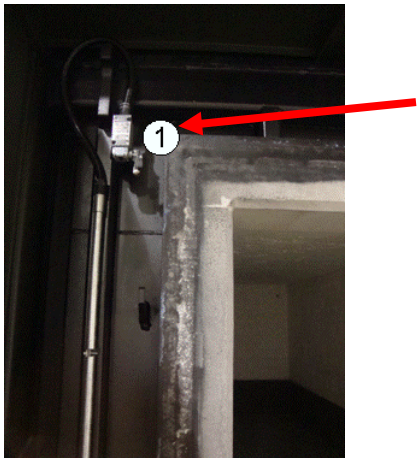
When working with electrical components ensure lock out instructions are being followed

Please follow all instructions outlined in *Section 4.2.2 Zero Mechanical State & Lock Out Instructions.*

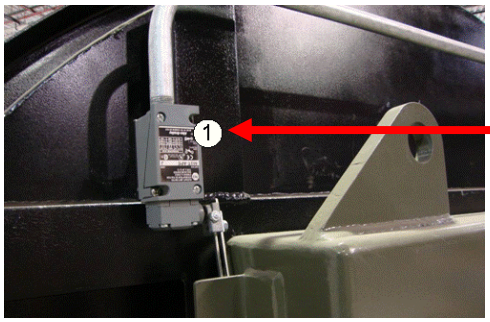
INSTRUCTION 05-004.Y.01: CHECK LIMIT SWITCHES

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 Panel view to ensure that it indicates door is open.
2. Close Primary and Secondary Chamber doors and check top view screen on the HMI Panel View to ensure that it indicates door is closed.
3. All limit switches located on the unit are checked this way.
4. Replace limit switches if necessary.



Primary Chamber Limit Switch



Secondary Chamber Limit Switch

5. See *Part IV Section 4 CMI 4.4.1/05-005A*.
6. Check all other limit switches in the system.

4.3 CORRECTIVE MAINTENANCE INSTRUCTIONS (CMI)

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

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

4.4.1 General Corrective Maintenance Instructions
4.4.2 Refractory Corrective Maintenance Instructions
4.4.3 Primary & Secondary Burner Corrective Maintenance Instructions
4.4.4 Primary & Secondary Blower Corrective Maintenance Instructions
4.4.5 Main Control Panel Corrective Maintenance Instructions

As per the *Preventive Maintenance Instructions Section 4.2* of this *Manual*, the following table is utilized to identify the components of the system that require corrective maintenance.

System Component		**Identification number**	
Primary Burner		**01-002**	
	Replacing Fuel Filter		4.4.1/01-002A
Secondary Burner		**02-002**	
	Replacing Fuel Filter		4.4.1/02-002A
Thermocouple		**05-002**	
	Replacing Thermocouple		4.4.1/05-002A
Limit Switch		**05-005**	
	Limit Switch Replacement		4.4.1/05-005A
Container Door Gasket		**05-006**	
	Replacement of Container Door Gasket		4.4.1/05-006A
Refractory		**05-001**	
	Wall Refractory: Gaps between the Modules		4.4.2/05-001A
	Wall Refractory: Replacement of the Modules		4.4.2/05-001B
	Door Gasket		4.4.2/05-001C
	Castable Refractory		4.4.2/05-001D
	Temporary Repair of Castable		4.4.2/05-001E
Primary Burner		**01-002**	
	HT Lead & Electrode Replacement		4.4.3/01-002A
	Diffuser Disc Replacement		4.4.3/01-002B
	Nozzle Replacement		4.4.3/01-002C
	End Cone Replacement		4.4.3/01-002D
	Nozzle Assembly Repair or Replacement		4.4.3/01-002E
	Burner Flexible Oil Line Replacement		4.4.3/01-002F
	Low Level Switch Replacement		4.4.3/01-002G
	Inspection Window Replacement		4.4.3/01-002H
	Fuel Pump Replacement		4.4.3/01-002I
	Control Box Replacement		4.4.3/01-002J
	Oil Tube Replacement		4.4.3/01-002K
	Burner PE Cell & UV Detector Replacement		4.4.3/01-002L
	Burner Fan Motor Replacement		4.4.3/01-002M
Secondary Burner		**02-002**	
	HT Lead & Electrode Replacement		4.4.3/02-002A

	Diffuser Disc Replacement		4.4.3/02-002B
	Nozzle Replacement		4.4.3/02-002C
	End Cone Replacement		4.4.3/02-002D
	Nozzle Assembly Repair or Replacement		4.4.3/02-002E
	Burner Flexible Oil Line Replacement		4.4.3/02-002F
	Low Level Switch Replacement		4.4.3/02-002G
	Inspection Window Replacement		4.4.3/02-002H
	Fuel Pump Replacement		4.4.3/02-002I
	Control Box Replacement		4.4.3/02-002J
	Oil Tube Replacement		4.4.3/02-002K
	Burner PE Cell & UV Detector Replacement		4.4.3/02-002L
	Burner Fan Motor Replacement		4.4.3/02-002M
Primary Blower		**01-001**	
	Air Proving Switch Replacement		4.4.4/01-001A
	Damper Calibration		4.4.4/01-001B
	Modutrol Resistor Replacement		4.4.4/01-001C
	Damper Crank Arm Replacement		4.4.4/01-001D
	Motor Replacement		4.4.4/01-001E
	Modutrol Motor & Transformer Replacement		4.4.4/01-001F
	Replace the Blower Contactor		4.4.4/01-001G
Secondary Blower		**02-001**	
	Air Proving Switch Replacement		4.4.4/02-001A
	Damper Calibration		4.4.4/02-001B
	Modutrol Resistor Replacement		4.4.4/02-001C
	Damper Crank Arm Replacement		4.4.4/02-001D
	Motor Replacement		4.4.4/02-001E
	Modutrol Motor & Transformer Replacement		4.4.4/01-001F
	Replace the Blower Contactor		4.4.4/01-001G
Main Control Panel		**03-010**	
	Main Control Panel		4.4.6/03-010A
	Reboot PLC		4.4.6/03-010B
	PLC Parts Replacement		4.4.6/03-010C

4.3.1 General Corrective Maintenance Instructions

LIMIT SWITCH REPLACEMENT (4.4.1/05-005A)

1. Loosen the 2 screws holding the limit switch in place.
2. Remove limit switch, replace with a new one.
3. Take arm off of old body and mount to new.
4. Tighten the 2 screws holding the limit switch body.

REPLACING THERMOCOUPLE (4.4.1/05-002A)

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 and protection tube

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. (I.e. 20°C would read as -20°C). If this is the case open the thermocouple housing and switch the wires.

REPLACING FUEL FILTER (4.4.1/01-002A 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 Red 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.

4.3.2 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 (4.4.2/05-001A)

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 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 (4.4.2/05-001B)

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.

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)

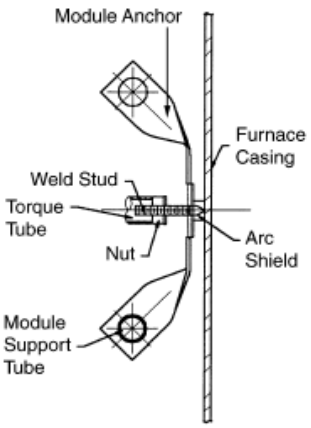


Figure 1: Side view of the Weld Loc Module

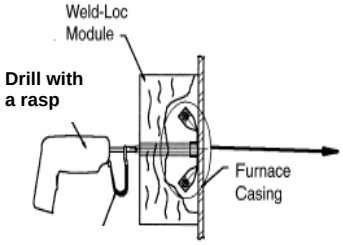


Figure 2: Stud Gun with rasp and Torque Tube (part of module assembly).

C. INSTALLATION: Once the new module is in place take the stud gun (PN: Eco-Stud; EIN: 11-E-S-01-04-016-016) with rasp to the Torque Tube and drill into place.

D. Once it has tightened the Torque Tube should come off with the drill.

DOOR GASKET REFRACTORY (4.4.2/05-001C)

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 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 (4.4.2/05-001D)

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 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.

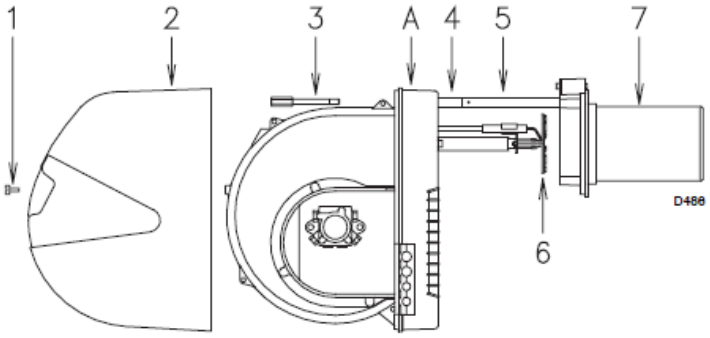
TEMPORARY REPAIR OF CASTABLE (4.4.2/05-001E)

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.

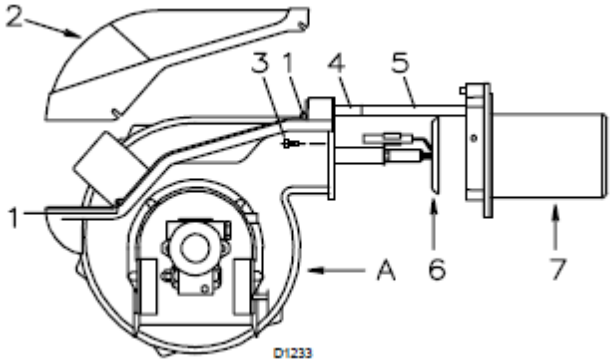
4.3.3 Burner Corrective Maintenance Instructions

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

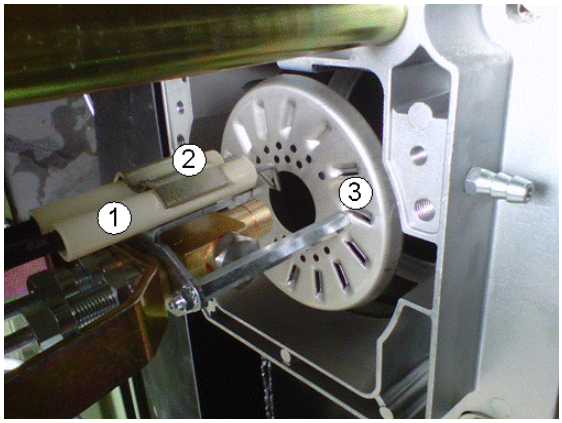
The Burners are pieces of equipment that will require routine corrective and preventive maintenance. Parts within this assembly will need to be repaired or replaced. The most common parts to be repaired or replaced are located at the front end of the burner where the parts are exposed to high temperatures.



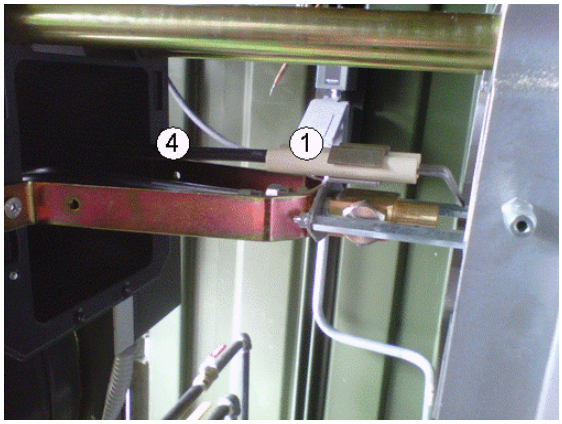
Front End Primary Burner



Front End Secondary Burner



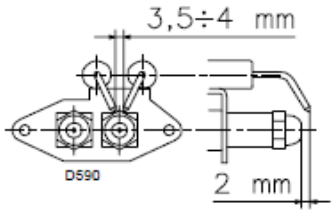
1. Electrode
2. U-bolt
3. Diffuser Disc



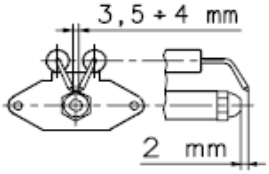
4. HT Leads

HT LEAD & ELECTRODE REPLACEMENT (4.4.3/01-002A & 02-002A)

1. In order to change out the HT leads or Electrode 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



Secondary Burner

DIFFUSER DISC REPLACEMENT (4.4.3/01-002B & 02-002B)

1. Locate 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
    - Secondary Chamber Burner diffuser disc
6. Reassemble.

NOZZLE REPLACEMENT (4.4.3/01-002C & 02-002C)

1. Locate 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
    - Secondary Chamber Burner nozzle

END CONE REPLACEMENT (4.4.3/01-002D & 02-002D)

The End Cone is marked Item #7 in the first diagram of Section 4.4.3. 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
    - Secondary Chamber burner end cone

5. Reinstall the burner.

NOZZLE ASSEMBLY REPAIR OR REPLACEMENT (4.4.3/01-002E & 02-002E)

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.

- Primary Chamber Burner nozzle assembly:
- Secondary Chamber Burner nozzle assembly:

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

- Primary Chamber Burner nozzle assembly:
- Secondary Chamber Burner nozzle assembly:

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

BURNER FLEXIBLE OIL LINE REPLACEMENT (4.4.3/01-002F & 02-002F)

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:
    - Secondary Chamber Burner flexible oil line

4. Open ball valve.

Primary Chamber Burner Flexible lines (1 Above)

Secondary Chamber Burner Flexible Lines (1 Above)

LEVEL SWITCH REPLACEMENT (4.4.3/01-002G & 02-002G)

The level switch is located in the Diesel Tank.

NOTA

Tanks do not have to be emptied to replace.

1. Unplug the level switch from tank.

2. Disconnect the cord and remove the level switch.

3. Replace level switch and reconnect the cord.

4. Plug in the level switch to tank.

INSPECTION WINDOW REPLACEMENT (4.4.3/01-002H & 02-002H)

The inspection window can be identified as Item # 7 on IPD-I03 for the Primary Burner and Item # 32 on IPD-I04 for the Secondary Burner. To replace the window simply remove the old inspection window and replace with a new one:

- Primary Burner inspection window
- Secondary Burner inspection window

FUEL PUMP REPLACEMENT (4.4.3/01-002I & 02-002I)

Identify the pump on the burner you wish to replace the pump on:

- Primary Burner:
- Secondary Burner :

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:
- Secondary Burner :

CONTROL BOX REPLACEMENT (4.4.3/01-002J & 02-002J)

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

- Primary Burner:
- Secondary Burner :

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

- Primary Burner:
- Secondary Burner :

OIL TUBE REPLACEMENT (4.4.3/01-002K & 02-002K)

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 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:
    - Secondary Burner Tubes

BURNER PE CELL & UV DETECTOR REPLACEMENT (4.4.3/01-002L & 02-002L)

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.

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

BURNER FAN MOTOR REPLACEMET (4.4.3/01-002M & 02-002M)

Identify the malfunctioning motor in the affected burner:

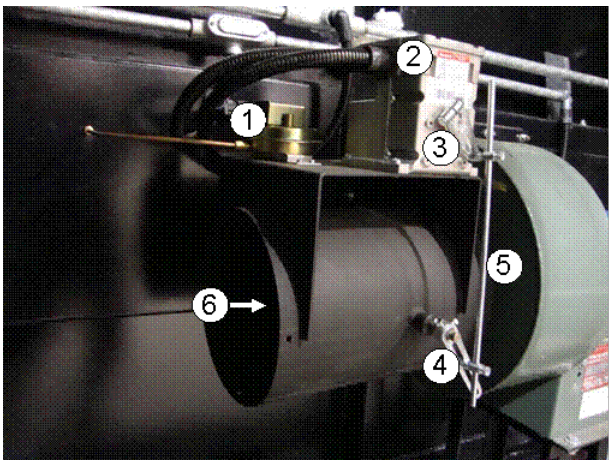
- Primary Burner –
- Secondary Burner -

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

4.3.4 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.

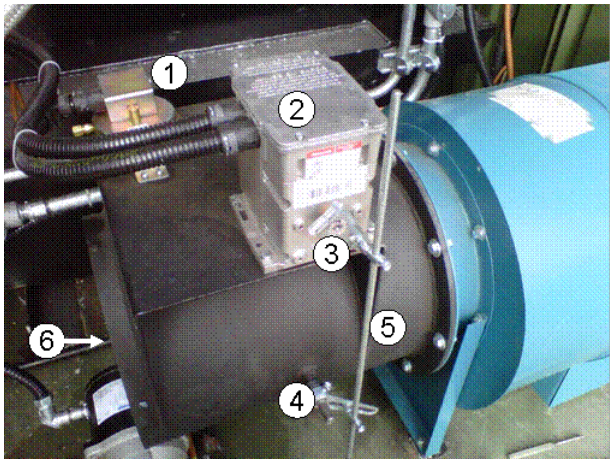
Primary Blower Assemblies are not a commonly repaired part on the incinerator. Parts within this assembly will need to be repaired or replaced. They are outlined below.



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

AIR PROVING SWITCH REPLACEMENT (4.4.4/01-001A & 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 complete with tubing and wiring and then retighten.
6. Turn power back on.

DAMPER CALIBRATION (4.4.4/01-001B & 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 (4.4.4/01-001C & 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. Jumpered 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 (4.4.4/01-001D & 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 and ensure it is in the same spot as the old one.

MOTOR REPLACEMENT (4.4.4/01-001E & 02-001E)

Replacing the motor requires a second level maintenance. This information can be found in the OEM manual New York Blower, Installation, Maintenance and Operating, IM-160 Junior Fans.

MODUTROL MOTOR & TRANSFORMER REPLACEMENT (4.4.4/01-001F & 02-001F)

To replace a Modutrol motor requires all power 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 and 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 4.4.4/01-001G

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

4.3.5 Main Control Panel Corrective Maintenance Instructions

MAIN CONTROL PANEL (4.4.6/03-010A)

All control panel diagnostics are to be completed by certified or trained technicians. Electrical drawings / diagrams are provided to aid electricians with any diagnostics. For reference the parts diagrams for the main control panels are drawings

REBOOT PLC (4.4.6/03-010B)

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

PLC PARTS REPLACEMENT (4.4.6/03-010C)

For detailed repair procedures, refer to the OEM Manual, Part IV Control Panel, PLC.

Read all warnings for procedures in each OEM Manual as they contain critical safety information. Disconnect the power from each component before starting each corrective maintenance procedure.

Component	Procedure	OEM Manual	Page No.
Panelview 1000-Series	Replacing the Battery	Panelview (2711P-T10C4A8)	130
Panelview 1000-Series	Replacing the Backlight	Panelview (2711P-T10C4A8)	126

Panelview 1000-Series	Load and SD card	Panelview (2711P-T10C4A8)	135
Panelview 1000-Series	Removing the Product ID Label	Panelview (2711P-T10C4A8)	134
Panelview 1000-Series	Replacing the Bezel	Panelview (2711P-T10C4A8)	124
Panelview 1000-Series	Cleaning the Display Window	Panelview (2711P-T10C4A8)	136
16 Point Relay Output Module	Replacing a Single Module	I/O Modules Compact 16-PointRelay Output Module (1756-OA16)	156
8 Channel Analog Output Module	Replacing a Single Module	Analog I/O modules Compact 1756-OF4 Analog Output Module	187
8 Channel Analog Input Card	Replacing a Single Module	Analog I/O Modules Compact 1756-IF8 Input Card	187
6 Channel Thermocouple Input Module	Replacing a Single Module	Analog I/O Compact 1756-IT6I Thermocouple Input Module	187

4.3.6 Additional Maintenance Instructions

For more detailed and additional maintenance instructions please refer to the OEM manuals for the Incinerator components.

Annex 4

Mary River Project Landfill Operating Manual

1. PURPOSE AND SCOPE

The purpose of this procedure is to ensure that non-hazardous solid wastes are disposed of in compliance with the Mary River Project landfill permits, and in an efficient, safe and environmentally sound manner.

This procedure applies to the handling, storage and disposal of all non-hazardous solid industrial waste at the Mary River Project Landfill at the Mine Site and Steensby Port.

This procedure does not apply to hazardous and liquid industrial wastes, hauled sewage or domestic waste.

This manual has been designed to be used both as a field reference document and as a training manual for classroom and self-instruction purposes. Every employee with accountabilities and responsibilities as required by this procedure is expected to be familiar with its use and location at each site. The manual has been divided into two sections: the General Overview; and Standard Operating Procedures. The General Overview contains basic knowledge regarding personnel responsibilities, safety practices, and the overall operations of the landfill. Part B focuses on Landfill Work Instructions and has been formatted to provide supervisors and their employees with a user-friendly method for training and implementation.

2. DEFINITIONS

Waste Management System

A waste management system includes all facilities equipment and operations for the collection, handling, transportation, storage, processing and disposal of waste.

Landfill Site

Controlled site where no hazardous wastes are accepted and only specific wastes as outlined in the Mary River Project Landfills approval permit are allowed. At landfill sites, the waste is regularly compacted and covered.

Mary River Project Landfills

For the purpose of this document, the Mary River Project Landfill and the Mary River Project Non-Hazardous Solid Waste Landfill are one and the same and refer to the landfill at Steensby Port or the Landfill at the Mine Site.

Non-Hazardous Solid Waste

Non-Hazardous Solid Industrial Waste means a solid waste that is not a liquid and is not hazardous and includes and includes:

a) General Waste (cardboard, treated wood, plastics, etc.)
b) Scrap tires
c) Bulky waste such as heavy equipment, trucks, snowmobiles & appliances. These items will be drained of all fluids (oil, fuel, hydraulic fuel; ozone depleting substances must be removed by a licensed technician prior to disposal).
d) Concrete
e) Glass (industrial)
f) Non-toxic incinerator ash
g) Non-Hazardous Solid Spill Clean-up Material
h) Scrap Steel (Non-recyclable)
i) Pallets (Non-recyclable)

A detailed description of these products is contained in the Appendix A

Hazardous Waste

Material that, given its quantity, concentration and composition or its corrosive, inflammable, reactive, toxic, infectious or radioactive characteristics, presents a real or potential danger to human health, safety and public well-being or poses a danger to the environment if it is not stored, treated, transported, eliminated, used or otherwise managed. Includes all material regulated by the Transportation of Dangerous Goods Regulation and those materials requiring a Material Safety Data Sheet. Examples include paint, solvents, propane tanks, waste oil, batteries, electronic equipment, and fuel drums (205 litter barrels) or other material previously containing fuel or other hydrocarbons are considered hazardous waste. A detailed description of these products is contained in the Appendix A

Recyclable

The ability of a secondary material to be re-used in the manufacture of a new product or to be re-used

Domestic Waste

Domestic waste includes waste such as office paper, lunchroom supplies, washroom supplies, food waste, containers contaminated with food. Domestic waste can be considered all bagged & boxed waste originating from offices, kitchens and camps, generally suitable for disposal in the incinerator. A detailed description of these products in contained in Appendix A

Scrap Steel

Scrap steel includes scrap steel material that contains no other non-steel component.

Liquid Industrial Waste

Liquid industrial waste includes “waste that is both liquid waste and industrial waste”.

Empty Container

A container that has been emptied, to the greatest extent possible, using regular handling procedures, but its content shall not exceed 1% of the container's original capacity or 2 liters, whichever is less. This does not include containers which previously contained:

i. Mercury or other heavy metals
ii. Compressed gas cylinders (TDG Class 2.1-2.4)
iii. Oxidizing substance containers, (TDC Class 5.1)
iv. Poisonous substances containers (TDG Class 6.1)

Part A – Mary River Project Landfills General Overview

I. Responsibilities

Designated Mary River employees & contractors have specific accountabilities that must be met to ensure the Mary River Project Landfills are operated in compliance with this procedure and its permit. The following roles and responsibilities of the various employees who work at the disposal site are described below but are not necessarily inclusive of all duties that may required to safely and successfully operate a non-hazardous solid waste landfill.

1. Site Manager

The Site Manager is accountable for the overall operation of the landfill. Specifically, he/she shall:

a) Organize, oversee and administer the operation of the landfill in accordance with current permits, regulations and all appropriate procedures,
b) Plan and coordinate the most efficient use of landfill areas to conserve landfill space,
c) Help develop, implement and enforce landfill specific safety regulations
d) Meet routinely with the Site Services Supervisors to maintain proper control of the site and to determine what, if any, problems exist or may be anticipated. Consider the following:
    i. Operational issues,
    ii. Regulatory Requirements,
    iii. Equipment issues,
    iv. Special operating instructions; e.g., inclement weather, special waste, emergencies.
    v. Schedule routine work as required, e.g., drainage channel cleaning, landfill surface repairs and litter control, etc,
    vi. Ensure that the need for any special operating conditions have been planned for in advance; e.g., identification of features with steaks in advance of winter and the ground freezing,.
    vii. Handle user complaints or problems that the Site Services Supervisor cannot handle,
    viii. Perform all the duties of the Site Services Supervisor in his absence.

2. Site Services Supervisor

The Site Services Supervisor, under the general supervision of the Site Manager, is responsible for supervising refuse disposal and associated activities at the landfill in accordance with this procedure. Specifically, the Site Services Supervisor shall:

a) Regularly brief the Site Manager on the status of routine operations and any special problems,
b) Implement and enforce the landfill safety regulations and operating procedures
c) Install grade control stakes for landfill operators
d) Check grades and contours to ensure that refuse placement and compaction conforms to engineered specifications and designs,
e) Maintain thorough, accurate and detailed records of landfill operations, and other related matters,
f) Ensure through regular inspection that specified fill cover, spill response equipment etc. is present at the landfill,
g) Respond to incidents, complaints and inquiries promptly to ensure the landfill is operated in compliance with this procedure,
h) Inspect waste and direct site users to proper disposal areas according to waste type,
i) Conduct monthly inspection of berm & cover material for cracks & settlement.
j) Set up and monitor traffic patterns to allow maximum traffic flow and safe working conditions.
k) Instruct all contracted crews on critical landfill procedures and areas of concern and monitor progress, keeping records daily & bi- weekly as required this procedure,
l) Perform all the duties of the Landfill Operator/Labourer in his absence.
m) Perform other duties that may be required as determined by the Site Manager

3. Mary River Project Landfill Operator/Labourer

The Landfill Operator/Labours, under the general supervision of Site Services Supervisor, is responsible for executing the following tasks at the landfill. Specifically the Operator/Labourer shall:

a) Work in conjunction with the Site Services Supervisor in executing general landfill operations
b) Perform daily pre-use equipment checks on landfill mobile equipment ,
c) Maintain a level landfill base at the working face dumping area,
d) Cut, maintain and finish grades as indicated on grade stakes or as directed by the Site Services Supervisor,
e) Construct landfill cells according to this procedure,
f) Spread and compact refuse according to this procedure,
g) Cover refuse efficiently according to this procedure, have area covered walked in tight and surface smooth using no more fill than necessary. Leave surface area smooth with no refuse exposed,
h) Inspect waste and direct site users to proper disposal areas according to waste type,

i) Assist in site maintenance work as required; e.g. grade roads, drive water trucks, resurface roads, construct refuse lifts, and other duties as assigned,

j) Ensure the landfill is maintained free of litter, including the relocation of portable litter fences as necessitated by operational requirements and wind conditions,

k) Complete daily report forms as required, know how to respond appropriately to all emergencies utilizing the emergency procedures listed in Section B of this manual,

4. HSE Manager – Landfill Waste Designated Inspector

On occasion when a Mary River Project has a large quantity of waste destined for the landfill, the HSE manager may be provided with specific training to allow he/she to become a designated Mary River Project Landfill waste inspector to facilitate the source segregation, improve the productivity of the project resources and meet the landfill requirement for waste inspection prior to dumping.

Specifically, the HSE Manager - Landfill Waste Designated Inspector shall:

a) Be provided with the necessary training to allow him/her to properly segregate waste by type at the source and pre-inspect waste destined for the landfill

b) Inspect waste and direct site users to proper disposal areas according to waste type,

c) Complete daily report forms as required, know how to respond appropriately to all emergencies utilizing the emergency procedures listed in Section B of this manual,

d) Correct any waste management deficiencies related to the project as identified by landfill staff.

II. Landfill Operations

The Mary River Project non-hazardous solids landfills area permitted area method modified landfill as described in the Guidelines for the Planning, Design and Operations and Maintenance of Modified Solid Waste Sites in the Northwest Territories. The landfill has a design life of approximately 20 years and its operation and maintenance is based on the Guidelines to ensure protection of the environment and the health and safety of individuals. The estimated capacity of the current landfill design is 53,000 m^3 of waste and cover material at Mary River and 30,000 m^3 at the Steensby Port. If additional capacity is required in the future, an extension to the current design capacities will be developed. The extension(s) will be submitted for approval as required at the time.

A. Area Method Landfill Waste Cell Construction

Due to the presence of permafrost, the area method will be used to place waste in the landfill. Waste will be deposited on the ground, worked with appropriate heavy equipment, and packed against a constructed berm. Construction of the berm will be advanced with the advancing face of the landfill. The waste cell is the basic building block of the landfill. It is composed of several layers of solid waste compacted on a slope by heavy equipment and enclosed on all sides by soil. The general placement of waste will progress down-slope. Basic instructions for

constructing waste cells with the materials accepted at the Mary River Project Landfills are described below in Figure 1.

1. Control of Working Face

The working face is the portion of the uncompleted cell on which additional waste is spread and compacted. The optimal working face width varies depending on the number of vehicles bringing wastes to the site and the equipment available for spreading and compacting. It should be wide enough to prevent a backlog of trucks and productively work; however, the width should not be so wide as to be impractical to operate or to expose an undue amount of refuse to the wind.

The face width should be reduced by compacting and covering portions of the face as soon as a section of the cell meets the grade design. For control of the waste exposure to wind, the width of the face should not exceed 12m at any time.

2. Equipment Movement

Solid waste should be dumped at the toe of the working face by the collection trucks and pushed up the slope. For safety reasons, keep a minimum of 3m separation between the trucks and the dozer. The unloading area is to be maintained level and clear of waste materials.

3. Spreading Waste on a Slope

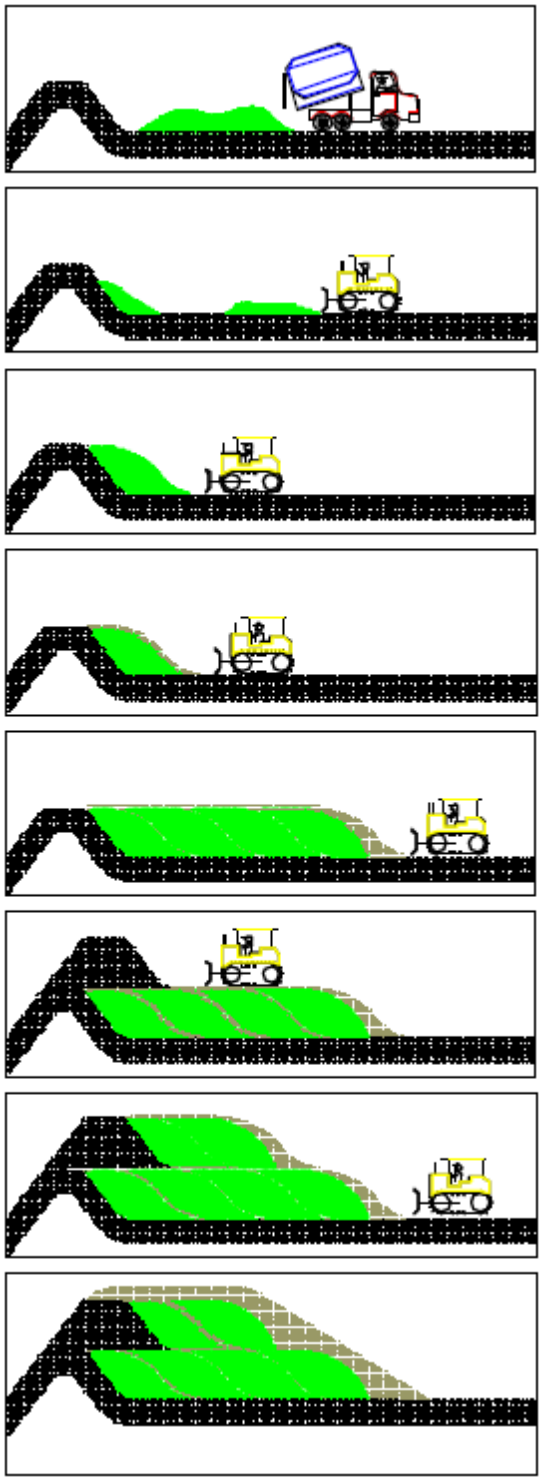
To maximize compaction, and to provide an optimal weight distribution of the dozer, the waste should be spread up a 3:1 slope in 0.3-0.6 meter layers. Fill in any holes that develop in the face with loose waste.

4. Using Grade Stakes

Use grade stakes to aid operators in keeping the slope of the final top fill surface of at a grade of 0.5%, the slope of the cell face 3:1 and the grade of the landfill base to 0.5%. Grade stakes should be set according to instructions given by the Engineering Staff. Stakes should be checked frequently enough to allow operators to make sightings to them as required.

5. Waste Compaction

A high degree of compaction extends the fill life, reduces cover material and long-term land requirements, reduces litter problems, and results in other beneficial effects. Good compaction is achieved by operating the dozer up and down the working face between 3 and 5 times on 0.3-0.6 meter layers of waste until no further compaction occurs. The top deck of the cell must also be compacted by running the landfill compactor dozer across the top, keeping it as level as possible. Compaction of the waste will be undertaken if required, depending on the nature of the waste. This will typically occur once per week or in combination with collection frequency and nature of the waste.



1. Build berm, 2 m high. Dump garbage near the berm. The maximum width of the working exposed face used for dumping should be as small as practical and not exceed 12m

2. Drive over the garbage 3 to 5 times with a dozer. Work the garbage up the berm a little at a time to pack it. Do this daily when material is deposited in the landfill.

3. Alternate between dumping and packing garbage until packed garbage is 2 m high

4. When garbage at the working face is 3 m wide, cover garbage with 0.3m of granular material over the deck of the cell and 0.1m between cells to complete a partial cell. Repeat steps 1 to3 across the width of the landfill until a cell is completed.

5. Repeat steps 1 to 4 until site is full. Then cover all garbage with 0.3 m of granular material. Pack and add more granular material until top is level.

6. Build new 2 m berm on top of cells.

7. Repeat steps 1 to 5.

8. To close out site, put 0.6 m of granular material on cells then pack with bulldozer so that water runs off.

Figure 1. Waste Cell Construction for Mary River Area Method Landfill

6. Cell Completion

Cover soil will be placed over exposed compacted waste cells or portions of waste cells. A minimum of 0.3m of cover shall be placed over the deck and 0.1 meters over the slope of the cell. Use no more fill than necessary. When the cell is completed, no waste should be visible.

B. Cover Soil

1. Excavation

Excavation of soil for cover material shall only be made from designated "borrow" areas. Working cover stockpiles are to be placed within the perimeter of the approved landfill pad where they will be accessible to the working face. However, they are not to be located where they may block truck travel or filling operations.

2. Placement of Final Cell Cover

Use of soil for intermediate and final cover should be placed in the following manner:

a) When using a dozer, push cover soil up the slope and feather it out as evenly as possible. Do not permit the tracks of the equipment to spin as you traverse the compacted slope. This action will tear up the waste and it may be necessary to compact the waste again in order to reapply the cover material.

b) When filling of cell or portion of the cell has reached the final planned grade and width, a final cover of compacted soil should be placed. A minimum of 0.3m of cover shall be placed over the deck and 0.1 meters over the slope of the cell. Use no more fill than necessary.

C. Hard to handle Wastes

Certain wastes acceptable at the Mary River Project Landfills require special handling. The following are basic methods to be used when managing hard-to-handle waste:

1. Bulky Waste

a) Crushable Items – such as furniture and appliances

Such items should be dumped at the toe of the working face if traffic permits. Use the dozer to crush the item on solid ground, and then push it into the toe of the fill. Fill in any holes with regular waste.

b) Demolition Debris

Spread out bulkier pieces of concrete, lumber, and other debris evenly at the toe of the working face. Place regular wastes on top of the demolition wastes.

c) Long Items

Long, awkward items, such as pipe, rolls of paper and plastic should be dumped at the toe of the face, placed parallel to the working face, and covered with regular waste. The dozer should be driven over these items slowly to prevent overturning.

d) Rubber Tires

Place rubber tires at the toe of the fill, spread them out, and cover them with other wastes. Tires are less likely to work their way to the surface if placed at the bottom of the cell. Do not try to compact unreduced rubber tires.

e) Large Metal Wastes

Metal wastes, such as pipes, rolls of cable, and wires should be placed directly at its position of disposal and covered by household or demolition wastes (bridged). This will prevent unnecessary machine damage and shutdown.

2. Low Density Wastes

Waste types such as synthetic fibers, loose plastic film or foam, and rubber and plastic scraps or shavings, require special handling. These materials present problems because they rebound after being run over by the dozer. Spread the lightweight material into 1 to 2 foot deep layers, and then cover it with regular waste, compacting as usual at base of cell. These wastes should be compacted until the operator can no longer detect that the surface of the waste layer is being depressed more than it is rebounding. The weight of the regular waste tends to keep the low-density material down.

3. Powdery Wastes

Wastes such as sawdust and other dusts also require special handling. These wastes are problems because they are stirred up by the equipment and blown by wind. Once in the air, they may be harmful to personnel if they are inhaled or contact the skin. Personnel not working in enclosed cabs should wear protective clothing and respirators if dust becomes airborne. Some powdery wastes may be wetted down with water from a water truck and then covered immediately with soil or regular refuse. This procedure will help reduce blowing and dusting of the powdery waste. If water is not available, cover the powdery wastes with soil or refuse to reduce blowing and dusting of the waste.

D . Maintenance of Completed Areas

1. Inspection of Completed Areas

A bi-weekly inspection of the berm walls and completed cell will be completed each month for signs of cracks and depressions due to settlement. Cracks and settlement will be filled and compacted back to the original grade

2. Groundwater Protection System

Due to the permafrost in the area, no groundwater protection system has been included.

3. Landfill Gas Assessment

Landfill gas is not expected as the deposited waste will be non-hazardous, non-organic and inert. Also, all chemicals will be diverted for proper hazardous waste disposal. Therefore a landfill gas collection system will not be installed in the landfill site.

4. Leachate Characteristics

Leachate is not expected as the waste to be deposited in the landfill will be relatively dry, inert and non-hazardous. Therefore no leachate collection system has been included in the design. In addition, a perimeter berm will be constructed surrounding the landfill site. This will redirect surface runoff originating upstream of the landfill site, thereby minimizing the amount of water which might infiltrate the deposited waste.

E. Traffic Control and Unloading of Waste

1. Proper Spotting and Traffic Control

a) Traffic Flow

Traffic should be kept moving at a safe steady rate to avoid backlogs and congestion working face. Drivers are to back to the toe of the slope before he/she starts to dump. The driver is to pull straight away slowly from the slope while s/he is dumping.

b) Aids to Traffic Control

Directional signs, pylons and barricades are to be provided to help control traffic and direct customers to unload the waste at the base of the cell and have them drive their vehicle straight out when unloading is complete. Ensure proper signage and barricades are in the required locations at the beginning of each day. Relocate signs and barricades as required at the end of each day so that they will be in place and ready for the next day's operation.

c) Separation of Vehicles

Due to the risk of dump trucks and trailers overturning, only one vehicle is to be unloaded at the face at a time, this includes vehicles being unloaded by hand.

d) Logging of Unloaded Wastes

A waste unloading logging station will be located in proximity of the working face. The operator of every vehicle that unloads any quantity of waste is required to log the specifics of the load – Date, time, waste type, vehicle type, approximate quantity, etc....

e) Load-on-Fire Procedures

Loads-on-fire are wastes that are either on fire or that are smouldering or smoking within a vehicle or when deposited at working face. All site personnel should be familiar with procedures for handling such loads. Refer to the Emergency Work Instruction in Section B of this manual for proper response procedures.

f) Prevention of Scavenging

Scavenging by employees, visitors and local people travelling through is not permitted. Scavenging in a waste pile is a safety hazard with a high risk of injury and is strictly prohibited

g) Site User Rules

Landfill staff should know all site user rules and watch for violations. User rules (Appendix C) and wastes acceptable for disposal in the landfill (Appendix A) are to be posted at the entrance to the landfill and at the working face. All violation of land fill user rules shall be recorded in the daily log by landfill staff and reported to the Site Manager.

h) Emergency Procedures

Site personnel shall be familiar with proper fire and accident procedures and are expected to know their role in all possible emergency situations. See the Emergency Work Instructions in Section B of this manual.

F. Landfill On-Site Roadways

1. Road Construction

On-site access roads for use as a thoroughfare for transporting waste to the working face shall only be constructed under the approval of the Camp Manager and according to engineered design specifications. Landfill maintenance access roads are only to be constructed under the approval of the Site Manager.

2. Road Maintenance

a) Maintenance of Gravel Roadways

Roadways that are made in native or filled soil and are heavily travelled required maintenance. These roads should be graded and re-compacted as required to re-establish proper road grades.

b) Filling of Areas Where Settlement Occurs

When all-weather roads are constructed on the tundra, settlement of the filled area may cause cracks to appear in a road or cause the slope of a road to change. Cracks should be filled with material that is compatible with the roadbed. For an area of a sloped road, where the slope has changed drastically, it should be built-up with material compatible with the roadway until the desired elevation is achieved.

c) Maintenance of Drainage Culverts

All drainage culverts should be kept free of obstructions and debris. All drainage crossings should be identified with staking prior to winter such that they can be found and opened in advance of freshet. Prior to the onset of freshet, all drainage culverts shall be opened and ready to accept water flow.

G. Inclement Weather

1. Preparation for Weather Conditions Affecting Landfill Operation

Wind, white out conditions caused by blowing storms in winter and spring freshet may have an impact on landfill operations. The following precautions shall be followed:

a) Wind

In preparation for wind storms, the working face shall be compacted and covered as practical to reduce width of the exposed face. Litter fences should be installed prior to windy weather and relocated as required.

b) White Out Conditions Caused by Winter Storms

Under severe white out condition caused by some winter storms, the Site Manager may declare the landfill temporarily closed if conditions at the landfill cannot be made safe to operate.

c) Freshet

Prior to the spring melt of freshet the site services supervisor will take the following precautions to minimize the impact of the water flow from freshet:

i. Ensure all culverts are cleared prior to freshet
ii. Remove all excess snow from the landfill pad and completed cell slope to minimize water accumulation on the pad.
iii. Install silt fencing or other control devices if required on drainage that contain silt as a result of landfill erosion

H. Surface Water Flow and Quality

Flowing surface water will be prevented from entering the landfill site by the construction of a berm along the upper end of the site (i.e. the berm constructed above for waste placement) and berms along the sides of the site. The landfill site area will be graded 0.5% to promote drainage away from the landfill and to prevent pooling of water within the landfill or against the berms.

Appropriate erosion and sediment control measures will be implemented as required through the use of silt fences, etc. Temporary sediment control measures will be used during all construction activities at the site.

I. Inspections and Reporting

a) Reporting

The *landfill daily unloading volume & operations log (see Appendix C)* is completed daily and logs waste volumes, compaction and cover application.

b) Routine Inspections

Records of all site operations, including inspections, maintenance, and monitoring will be recorded on designated forms and kept together in the Baffinland office (or

other on-site facility used for such purposes). This will be performed and maintained by the landfill Operator.

Routine visual inspections will be completed every two weeks on the *Mary River Project Landfills bi-weekly Inspection form* (See form attached below) by the Site Services Supervisor or designate for various components of the landfill, including:

- General site area
- Landfill berm and cover survey
- Litter control
- Storm water runoff control
- Vector attractants
- Wildlife observations
- Wildlife signs.

III. Landfill Safety Practices

A. General Safety Practices

1. Know Procedures

   All employees at the landfill are responsible for knowing the proper procedures for reporting accidents, injuries, and fires. Employees must know the procedure to be followed for each type of emergency and be aware of their particular role. Work Instructions for various situations are documented in the Work Instructions section of Part B of this manual.

2. Signage for Traffic Control and Direction

   Road boundaries and speed limits on each road shall be clearly posted.

3. Site User Rules

   Site user rules are available at the entrance to the landfill and at the working face. Employees are to watch for violations of site user rules and indicate those rules to violators, stressing that the rules are imposed to ensure the safety of people & equipment. Site User Rules are attached in Appendix C.

4. Level Dumping Area

   For safe operations, the dumping area shall be kept as flat as possible at all times and kept clear of debris.

B. Safety Precautions for Equipment Operators

1. Heavy Equipment Operation

   All mobile equipment in use at the landfill is to be operated in accordance with general Baffinland procedures associated with light truck and heavy equipment.

2. Keep Debris from Cab

   Keep operator's compartment, stepping points, and hand holds free from oil, grease, mud, loose objects, and trash.

3. Look in All Directions before Moving

   The landfill is a high traffic area - Protect personnel and other equipment in the area by looking to the front, rear, and sides before moving equipment. If the operator is unsure of surrounding conditions, he/she shall dismount and inspect the area.

4. Safety Devices

   Proper safety devices, such as safety belts and roll over protection systems, must be installed on all equipment and maintained or replaced to original equipment manufacturer specifications.

5. Carry Blades Low

   Equipment attachments such as loader buckets and tractor blades should be set low to improve visibility and enhance breaking capability. Otherwise, collisions may occur, the vehicle may go over an embankment, or it may roll over.

6. Check Blind Areas

   Never push waste until you are sure that no person or equipment is in the blind area ahead of the refuse. If the operator is not sure of surrounding conditions, he/she shall dismount the equipment and personally inspect the area.

7. Maintain Adequate Clearance

   When pushing waste, maintain adequate clearance from ground personnel, patrons and other vehicles or obstructions to ensure that objects will not strike other equipment or persons. As a rule of thumb use 5 meters as a minimum safe distance to keep away from all people, vehicles, and equipment.

8. Constantly Check Work Area

   The operator must constantly check the work area for the location of other persons or equipment. Be especially cautious when several private vehicles are in the area. Remember that many site users are not familiar with the dangers of heavy equipment.

9. Operate Up and Down Slope

   Operate up and down slopes. Avoid side hill travel whenever possible to reduce the chance of rolling over.

10. Avoid Excessive Speed

    Operating conditions generally determine the speed of heavy equipment. Under no circumstances should heavy equipment be driven at excessive speeds or operated recklessly. Heavy equipment is difficult to control at high speeds and must only be operated at a speed that is safe for existing conditions.

11. Move Cautiously Over Bulky Objects

    When compacting or traversing bulky items, such as vehicles and utility poles, the operator must proceed with extreme caution to avoid tipping or sudden lurching movements.

12. No Scavenging

    Scavenging will not be permitted. Scavengers are subject to a number of potential injuries and possible death.

C. Personal Protection Equipment

Landfill staff is required to wear the standard Mary River Project personal protective equipment, including:

a) Hard hats,
b) Eye protection,
c) Work boots,
d) Work gloves,
e) Reflective vest

D. Emergency Contact Information

All emergencies shall be reported to the site services supervisor and Site Manager immediately.

Appendix A

Classification of Refuse

1. Acceptable Wastes

Non-Hazardous Solid Waste means a solid waste that is not a liquid and is not hazardous The following wastes are examples of Non-hazardous solid wastes acceptable for disposal at the Mary River Project Landfills:

a) Wood products (Clean untreated wood should be diverted to the Burn Area)
b) Plastics
c) Cardboard
d) Scrap Tires
e) Bulky waste such as heavy equipment, trucks, snowmobiles & appliances. These items will be drained of all fluids (oil, fuel, hydraulic fuel; ozone depleting substances must be removed by a licensed technician prior to disposal).
f) Concrete
g) Glass
h) Metal
i) non-toxic incinerator ash
j) Non-Hazardous Solid Spill Clean-up Material
k) Empty Container (as defined in this procedure)

2. Inert Wastes & Recyclable material

The following are examples of inert wastes that the Mary River Project Landfills will accept for disposal. However, these types of materials can generally be recycled and/or reused and it is better to divert this waste stream for reuse when applicable:

a) Clean fill dirt
b) Rock
c) Steel (suitable for reuse)
d) Pallets (suitable for reuse)

3. Hazardous Material / Unacceptable Wastes

There are six general types of materials that are unacceptable for disposal at the Mary River Project Landfills. They are:

a) Chemicals
b) Liquid Wastes including sewage
c) Radio-nuclides (Radioactive waste)
d) Batteries
e) Infections or medical waste
f) Electronic waste – TVs, computer CRTs (screens) and computer hard drives

In addition, Hazardous Wastes, including household hazardous wastes, are NOT accepted at the Mary River Project Landfills. The following list of waste, though not all inclusive, is considered hazardous:

a) All material regulated by the Transportation of Dangerous Goods Act,
b) All material requiring a Material Safety Data Sheet,
c) Paint,
d) Chemicals,
e) Solvents,
f) Propane tanks,
g) All pressurized gas cylinders,
h) Fuel drums (205 liter barrels) or other material/container previously containing fuel or other hydrocarbons,
i) Acids,
j) Waste oil,
k) Cleaning solvents,
l) Gasoline, diesel, Jet A and other Petroleum products,
m) Insecticides,
n) Lube Oil,
o) All heavy metals such as Beryllium, Cadmium, Mercury, etc.

Appendix B

Potential Pollutant Source and Best Management Practices Summary Table

Area	Activity	Pollutant Source	Pollutant	Best Management Practices
Landfill	General landfill operations	Soil Erosion	Sediment	- Maintain design slopes - Repair all berm & cover areas experiencing settling or erosion - No cuts permitted in to the tundra during landfill civil construction or operation - Silt fences installed at any drainage experiencing sediment from soil erosion
Landfill	Fuelling of heavy equipment	Diesel fuel	Diesel fuel	- Fuelling is completed in accordance with Baffinland fuelling procedure. - Personnel are trained on the procedure for fuelling
Landfill	Unloading waste at landfill	Improper segregation or direction of non-permitted wasted	Hazardous waste or non-permitted waste	- Baffinland Waste management system includes waste type source segregation - Landfill operations procedure contains requirement for waste inspection prior to unloading.
Landfill	Unloading waste at landfill	Hazardous material spill	Hazardous waste	- Baffinland Spill Response Plan in place to respond to spills
Landfill & surrounding area	General landfill operations	Landfill working face	Litter	Landfill operations manual contain best management practices including: - Minimizing active working face - Compaction & cover plan - Use of litter fences

Appendix C
Bi- Weekly Inspection Log Table

Mary River Landfill Bi-Weekly Inspection

Date: **Inspector:** **Role:**

Time:

Inspection	Y N N/A	Comments
General Site		
Access Roads in good condition?	Y N N/A	
Unloading area at working face is level?	Y N N/A	
User rules & classification of waste signs in good condition?	Y N N/A	
Is the tundra around the outside perimeter of the landfill berm stable?	Y N N/A	
Landfill Berm & Cover Survey		
Visible signs of settlement (low spots or poolling water)?	Y N N/A	
Visible cracks?	Y N N/A	
Visible signs of erosion from wind or runoff?	Y N N/A	
Does the most recent cell cover have 0.1 m on the face & 0.3 m on the deck	Y N N/A	
Cover material is stockpiled?	Y N N/A	
Litter Control		
Working face length is as small as practical & <12m?	Y N N/A	
Perimeter litter fences established	Y N N/A	
Working face litter fence established (at end of day operation)?	Y N N/A	
Are the litter fences capturing the litter?	Y N N/A	
Has the site been cleaned of litter in the last two weeks?	Y N N/A	
Storm water Runoff Control		
Is general water drainage working?	Y N N/A	
Are Culverts draining?	Y N N/A	
Are water flows silt free?	Y N N/A	

Inspection Description

Circle Y or N as appropriate, or N/A for any questions that are not applicable.

A “yes” answer generally denotes compliance with that requirement.

A "No" or "N/A" should be explained further in the comments

Survey of Vector Attractants at the Working Face

Attractants	Attractant Levels (cirlce one)				
Food	None	1 piece	2-5 pieces	6-10 pieces	>10 pieces
Food Packaging	None	1 piece	2-5 pieces	6-10 pieces	>10 pieces
Oil products containers	None	1 piece	2-5 pieces	6-10 pieces	>10 pieces
Oil contaminated waste	None	1 piece	2-5 pieces	6-10 pieces	>10 pieces
Aerosol cans	None	1 piece	2-5 pieces	6-10 pieces	>10 pieces
Batteries	None	1 piece	2-5 pieces	6-10 pieces	>10 pieces
Other _____	None	1 piece	2-5 pieces	6-10 pieces	>10 pieces
Other	None	1 piece	2-5 pieces	6-10 pieces	>10 pieces

Wildlife Observations

Species	#	Comments

Wildlife Signs (tracks, scats, borrow holes or chews)

Species	Type of sign	#	Comments

Additional Comments: _____

Daily Unloading Log Table

Baffinland Iron Mines Corporation

Baffinland Iron Mines Corporation

/ River Non-Hazardous Solid Waste Landfill Daily Unloading & Operations Log

Working Face - Status at End of Day
WF – Working Face, CW – Compacted Waste, C - Cover
Admin Use Only

Day of the Week: _____ **Date:** _____

			Volume Estimate								
			Vehicle					Other			
Time	**Source Location of Waste**	**General Description of Waste**	**Light Truck**	**Kenworth**	**Kenworth +Pup**	**%Full**	**Volume**	**Other Vehicle**	**Volume Estimate (m3/Cubes)**	**Driver's Name**	**Waste Unloading Approver's Name**
9:40 AM	Mary River Laydown Area	Scrap Wood			√	80%				John Smith	Site Services Supervisor
					Daily Totals:						

General Description Of Waste: Wood, Plastics, Cardboard, Scrap Tires, Bulky waste such as heavy equipment, trucks, snowmobiles & appliances, Concrete, Glass, Metal, non-toxic incinerator ash, Non-Hazardous Solid Spill Clean-up Material

Daily Grand Total:

Appendix D

Mary River Non-Hazardous Solid Waste Landfill

User Rules

1. All waste is to be inspected prior to dumping – Contact the Site Services Supervisor prior to delivery

2. No liquid or hazardous waste is accepted at this landfill

3. Vehicles shall follow posted speed limits and directions to unloading area - Unloading in other areas is strictly prohibited

4. Dump waste immediately behind the vehicle as close to the toe of the working face as possible

5. No Unloading by Rapid Acceleration or Deceleration

6. Each vehicle operator is to complete the unloading log for each load

7. No Scavenging is permitted

8. No open fires or the burning of waste is allowed on the site

9. All spills are to be stopped if safe to do so, and immediately reported to the Site Services Supervisor.

10. PPE required to be worn at landfill area

11. In case of Emergency – Immediately contact the Site Services Supervisor or Site Manager

Part B – Mary River Project Landfills Work Instructions

Part B focuses on work instructions and has been formatted to provide supervisors and their employees with a user-friendly method for access, training, and implementation of these procedures

Specific work instructions concerning landfill operations and emergencies and have been documented in order to establish standard policies and practices for the Operations staff. These topics will be reviewed periodically in routine safety meetings, which will allow operators to keep up-to-date on any changes in standard operations. Site services personnel are expected to be familiar and comply with the work instructions relating to their areas of responsibility.

Work Instructions

General Site Maintenance
Work Instructions

Landfills require general maintenance throughout the year in order to keep them orderly and clean. Much of this maintenance is in anticipation of permit requirements and seasonal weather changes

Guidelines:

1. Access roads on the site are to be maintained and graded to eliminate ruts and repaired to eliminate cracks and settling.

2. Maintain drainage, keep road culverts and landfill drainage free of debris.

3. Define critical landfill perimeter and spot locations with stakes and signs prior to winter to facilitate identification

Off-Road Vehicular Traffic
Work Instructions

"Off-Road" refers to any vehicle traveling off of any defined roadway or access-way or landfill pad, regardless of the road surface. Permitted roads are identified on the attached landfill plan and include the gravel access road and the landfill berm perimeter road.

- All off-road vehicular traffic is strictly prohibited without clearance from Mine Manager
- Prior approval is required for any vehicles engaging in off-road activities while on site
- New road construction is not permitted without approval from the Mary River Project Operations Manager

Benefit of Compliance to Instruction:

- Avoid disturbances and impacts to sensitive tundra

Dust Control
Work Instructions

1. Place dusty loads at the toe of the face of the trash and bridge over as quickly as possible.

Benefit of Compliance to Instruction:

- Creates a cleaner, safer work environment
- Ensures compliance with permit requirements and reduces the impact on the natural environment

Landfill Equipment Fluid Releases
Work Instructions

1. Complete a visual “walk around” inspection of all landfill motive equipment prior to starting. Inspect for damaged hoses and for puddles or stains from leaking fluids under your machine. If fluid leaks are evident, do not start equipment. Notify your Supervisor and the mechanic.

2. Periodically scan the equipment management system on the dashboard of the machine for flashing lights and warning horns that may indicate a system failure. Move to a safe area, stop and inspect the machine systems for leaks and malfunctions as necessary.

3. Routinely glance through the windows at the machine components that are susceptible to damage, for example, lift cylinders, hydraulic hoses, grease and oil seals. Listen as you operate your machine for unusual noises that may be an indication of a mechanical failure. If so, move to a safe area, stop the machine and notify your Supervisor and the mechanic.

4. As you make a “pass” in a forward direction and prepare to change direction, look over your shoulder and inspect the ground for streaks of oil or anti freeze. If leaks are observed, move machine to a safe area, shut machine down, contain spill using a bucket or pan and notify supervisor and mechanic.

5. All discharges of fluids from heavy equipment in the landfill are to be treated as a spill. All spills are to be addressed as per the Spill Response Plan. Key points are:
   - If safe to do so, stop the source of the spill.
   - Immediately report the spill to your supervisor.
   - For large spills initiate the Spill Response Plan.
   - Initiate cleanup of the spilt material using the emergency spill kits
   - Document the spill by the end of shift with a Spill Report Form – these are available from the Operations Department or your supervisor, provide spill report to Environment Department within 12 hrs.

Benefit of Compliance to Instruction:

• Regulatory Compliance

• Operator safety

• Environmental protection

Litter Control
Work Instructions

The control of litter is an essential part of our permit conditions and readily evident to all who drive by or onto the landfill. In an effort to maintain compliance with our permit and reduce the amount of time and effort required for this task the following procedures are to be followed:

Prevention of Litter at Working Face:

1. Minimize the length of the working face to reduce the size of the face exposed to wind. The maximum length of the exposed cell face shall not exceed 12 meters at any time.

2. Keep waste well confined at the working face to reduce the amount of waste susceptible to wind.

3. Deposit waste at the toe of the fill slope face and spread it upward.

4. Cover the compacted waste as soon as possible to minimize blowing litter

Control with Litter Fences

1. Position fences near the working face as wind and fill operations change.

2. Move or lengthen semi-permanent litter fences that are strung around the area to conform to filling operations and prevent migration of litter off the site.

Litter Pickup

1. Litter crews are to pick any litter off the fences to prevent the fence from being clogged and subject to overturning by the wind.

2. Promptly pick up any litter not trapped by the fences to prevent off-site migration.

Litter in Heavy Wind Conditions

1. Install litter fences prior to windy weather and relocate as required.

2. If lightweight material cannot be contained within the site, place intermediate cover over the material to prevent it from blowing.

Benefit of Compliance to Instruction:

- Compliance with operating permit
- Reduction in amount of litter migrating out of waste cell
- Minimize impact to native habitat
- Reduce the rework for picking up litter

Vector Control
Work Instructions

Vectors (any animals that carry diseases) are generally not present at a properly operated and maintained non-hazardous solid waste landfill (No domestic waste). The provisions of source segregation and waste inspection at the landfill prior unloading waste will safeguard against vector problems. Well-compacted wastes and cover material effectively prevent vectors from emerging or burrowing into waste materials. The following are basic guidelines to ensure proper vector control on site:

1. All waste is to be inspected at the landfill prior to unloading to confirm no domestic or food waste is present.
2. Maintain a narrow working face and cover all un-worked areas to minimize animal foraging at the site.
3. Cover waste on all unused slopes.
4. Ensure good compaction of the cover material to discourage animals from burrowing through it.
5. Keep equipment, storage and leisure areas free of debris and food waste to prevent vectors from establishing residence in or near areas where employees, support personnel work.

Benefit of Compliance to Instruction:

- Protects the health and safety of employees
- Eliminates potential exposure pathways to employees
- Reduces risk of contact with vectors and scavengers
- Maintains compliance with operating permit

Building and Equipment Fires
Work Instructions

Fire

1. Attempt to extinguish a small, controlled fire with equipment on site *WITHOUT* endangering yourself or other personnel. When in doubt, evacuate area and notify your supervisor & security immediately, providing all the required information (Your name, fire location, type, size etc…).

2. Keep all unauthorized people away from the area on fire.

3. Report the details of the fire in the *Special Occurrence Log* and, if applicable, complete an investigation report form (see your supervisor for these materials).

Benefit of Compliance to Instruction:

- Safety of all employee's is protected

Fire in Load
Work Instructions

Fire in Load refers to a vehicle load of wastes that are either on fire and/or smoldering or smoking prior to discharge to the landfill. All site personnel are expected to be familiar with the following procedures for handing such loads:

1. Direct the driver to dump the material in a clear area that is away from the fill face and clear of any vegetation and/or debris.

2. Notify your immediate Supervisor or the Site Manager of the fire.

3. Spread out the load and extinguish the fire with water or soil

4. Once fire is determined to be completely out, allow the material to remain in the cleared area for the remainder of the working day.

5. If no fire is detected at the end of the working day, place the load into the fill.

6. If fire is discovered after the load has been dumped at the working face, the equipment operator will push the material away from the face (if it is safe to do so) to a cleared area where it can be covered with soil or extinguished with water.

Benefit of Compliance to Instruction:

- Health & safety of employees is protected
- Reduce the risk of a landfill fire

Hazardous Materials Spill Response and Reporting Work Instructions

The responsibility for implementing this procedure begins with the person(s) responsible for the chemical spill (spill) or the first person(s) to discover the spill. They will be responsible for reporting the spill and completing cleanup actions (small spills) or requesting assistance for large spills.

Spill Reporting:

1. Report all spills of hazardous materials to your supervisor and the camp manager as soon as possible, regardless of the quantity of spilled material.

2. Be sure to provide the following information:

    • Type of spilled material
    • Quantity of spilled material
    • Location where spill occurred
    • Time and date the spill occurred
    • Description of the actions taken to contain and clean up the spilled material

3. The Site Services Supervisor will record the above information in the Log of Special Occurrences.

Spill Response:

All spills are to be addressed as per the Spill Response Plan. Key points are:

- If safe to do so, stop the source of the spill. Employees may attempt to contain the spill, provided their personal safety or the safety of others is not jeopardized by their actions
- Immediately report the spill to your supervisor.
- For large spills initiate the Spill Response Plan.
- Initiate cleanup of the spilt material using the emergency spill kits
- Document the spill by the end of shift with a Spill Report Form – these are available from the Operations Department or your supervisor, provide spill report to Environment Department within 12 hrs.

Benefit of Compliance to Instruction:

- Employees are trained to safely respond to spills, minimizing the potential impact to personnel or the environment
- Spills documented in accordance with regulatory requirements
- Regulatory Agency notified in a timely manner

Subsurface Landfill Fires
Work Instructions

Warning signs may include:

- Smoke and/or heat waves emanating from cracks and/or fissures;
- Localized settlement (sinkholes up to several meters in diameter);
- The odor of burning plastic/refuse may be present

BEWARE!

*The surrounding area may not be stable. The rapid decomposition of refuse by burning may have created large voids underground.
*Fumes may be toxic!

Safety Procedures

1. If an area is suspected of having an underground fire, block further access to the area and keep people away. Make sure anyone near the suspected fire is notified and/or vacated as may be necessary. If flames are present above ground, immediately notify the site services supervisor and camp manager through radio dispatch. (Note: Pumping water into the ground may not stop the smoldering and will not prevent future fires. Smothering with dirt is the preferred option).

2. Try to stay upwind of any smoke and not breathe fumes, if any.

3. Secure the site with cones, barricades, survey ribbon, etc. If voids are suspected the ground may be unstable – Do not walk or use heavy equipment on the waste pile.

4. The site services supervisor, camp manager and other staff will evaluate the conditions and develop a plan to safely deal with the fire (almost always smothering with dirt).

5. Notify the Baffinland environment department to evaluate the incident and confirm the repair plan is in compliance with permits

6. Once the fire is extinguished and the situation secured, look for other cracks and/or depressions in the area and schedule their repair. (They could be the source of air that allowed the fire to start originally).

7. Complete repairs to the landfill structure. Note completion of work in site log along with fire location for future reference.

Benefit of Compliance to Procedure:

- Employee's safety protected
- Environment is protected

Annex 5

Landfarm Operation Information

- Hydrocarbon Impacted Soils Storage and Landfarm Facility Operations Maintenance and Monitoring Plan (EBA, 2010)

BAFFINLAND IRON MINES CORPORATION

PRELIMINARY HYDROCARBON IMPACTED SOILS STORAGE AND LANDFARM FACILITY
OPERATIONS, MAINTENANCE AND MONITORING PLAN
MILNE INLET, MARY RIVER PROJECT, NUNAVUT

SEPTMEMBER 2011
EBA FILE: E14101092
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FIGURES

APPENDICES

1.0 INTRODUCTION

Baffinland Iron Mine Corporation (Baffinland) retained EBA, a Tetra Tech company (EBA) to evaluate hydrocarbon-impacted soils within the Milne Inlet lined bladder farm at the Mary River Project located in the Qikiqtani Region of Nunavut.

The original scope of work included post-decommissioning characterization of the hydrocarbon-impacted protective layer of sands in the bladder farm and the development of a soil remedial action plan. It was anticipated that the fuel-impacted soil would be treated with a landfarm to be constructed at Milne Inlet. Baffinland's requirements changed after the original work scope was developed, and the bladder farm remained in service through 2010. For this reason, the bermed soils were not characterized in 2010.

EBA's work scope for the 2010 period was modified to develop a preliminary landfarm design concept for Milne Inlet along with an operations and monitoring manual. A soil sampling and ground truthing program was conducted in the summer of 2011 to determine the volumes and concentrations of soil requiring treatment, to confirm the location of the facility, and to finalize the design details required to issue construction drawings. Preliminary design is based on the assumption that the petroleum hydrocarbon remediation objectives will be met within two to three treatment seasons.

The Milne Inlet landfarm will initially be used to treat sandy soils that were impacted by petroleum hydrocarbons when a fuel bladder ruptured in 2008. An estimated 8,000 L of Jet A diesel fuel was released into the lined containment berm. Contact water within the berm has been collected and treated since 2008, although no soil remediation has yet been conducted.

As per the Nunavut Water Board renewal of Baffinland's Licence No. 2BB-MRY0710, soils affected by hydrocarbons from normal fuel transfer procedures require treatment to meet the objectives included in the 2010 Government of Nunavut's Environmental Guideline for Site Remediation. Also, the Mary River Project Draft Environmental Impact Statement (December 2010) NIRB File No. 08MN053 indicates that a description of how petroleum-impacted soils will be handled on the site is required. Documents provided within the future application to amend the current Nunavut Water Board (NWB) license will consider the relevant Mining and Milling and Industrial Undertaking Hydrocarbon Impacted Soil Storage and Landfarm Treatment Facilities Supplemental Information Guidelines (2010, draft).

2.0 SITE DESCRIPTION

2.1 Project Location

The Milne Inlet facility is located on the northern end of Baffin Island, Nunavut at approximately 71 53' 03" N and 80 54' 12". The nearest communities are Pond Inlet, to the east of the site, and Arctic Bay, to the west. A key plan showing the location of the Milne Inlet Facility is Figure 1. Marine access and shipping through the construction phase and periodically during operation occurs seasonally through Milne Inlet and the existing Milne Inlet Tote Road provides access to the proposed Mary River mine site.

The current facilities at Milne Inlet include an airstrip with tarmack, docking facilities, fuel farm (75 fuel bladders with 113,560 L capacity each), temporary bulk sample ore stockpiles, Shanco Camp, an incinerator, a wastewater treatment facility, a polishing/waste stabilization pond, and laydown areas.

There are currently two alternative locations proposed for the landfarm facility (Figure 2). Both proposed locations are situated south of the camp, within till veneer areas along the tote road from Milne Inlet to Mary River. Proposed Site A is within an existing quarry area approximately 3 km along the tote road. Site A is advantageous because it is within a pre-disturbed area. Proposed Site B is closer, about 1 km from camp along the tote road, and offers an advantage of being less likely to accumulate large quantities of snow that would require treatment after melting in the spring.

Based on aerial photo interpretation, it appears that the aggregate materials in both locations would be suitable for the construction of a landfarm.

2.2 Authorizations

Much of the Mary River site and the land between Mary River and Milne Inlet is located on Inuit-owned land administered by the QIA. Existing permits include Type B Water License number 2BB-MRY0710 issued by the Nunavut Water Board (NWB), valid from February 20, 2007 to February 28, 2010, and extended by amendment to December 31, 2010. The Nunavut Impact and Review Board (NIRB) file number is 08MN053. NIRB is conducting ongoing review of the Mary River Project including the application for pre-development work planned for 2012, including the construction and operation of landfarm facilities.

3.0 MILNE INLET PRELIMINARY LANDFARM DESIGN

3.1 Design Intent

Sandy soils used as a protective layer over the liner system were affected when a fuel bladder at the Mine Inlet fuel facility ruptured on June 16, 2008 (Spill Report # 2008-347), spilling an estimated 8,000 L of Jet A fuel into the containment area. The concentrations of F1 to F4 fractions is unknown, but based on the nature of the fuel spill (Jet A), it is anticipated that the soils require treatment for the F2 and F3 petroleum hydrocarbon fraction.

Figure 3 provides the preliminary plan and sections of the purpose-built facility to treat these designated soils. The preliminary design will be finalized to accommodate the actual construction site topography, borrow material properties, and landfarm sizing requirements.

3.2 Landfarm Dimensions and Components

The landfarm is sized to accommodate an approximate 2,000 m^3 of soil, assuming a treatment soil depth of 0.3 m. Using these assumptions, the preliminary inner dimensions of the facility are 70 m by 100 m. The assumed berm height ranges from 1.3 m to 2.1 m above the natural ground, with a liner keyed in to the soils with at least 1 m of soil, as shown on Figure 3. The crest of the berms maintain a width of 3 m, and slopes will be 2H:1V or less, as shown on the drawings.

Depending on actual site conditions, the foundation base may be constructed directly by grading the natural ground. The proposed liner system consists of 60 mil textured HDPE between two layers of 12 oz. non-woven geotextile. The protective sand layer over the liner is 0.3 m. The less-impacted materials from the bladder farm may be re-used as the protective layer in the newly-constructed landfarm facility.

The final location, shape and overall size of the landfarm will be determined following the site characterization fieldwork to be completed during the summer of 2011. The landfarm access will be selected during the construction works.

3.3 Contact Water Containment

The foundation base will be sloped at 2% towards a sump with preliminary dimensions of 10 m by 70 m. The sump is designed to contain approximately 245 m^3 water, or approximately half the expected snowmelt volume. Based on the landfill dimensions and precipitation assumptions, a narrow strip of soils undergoing remediation adjacent to the sump may be saturated or have free standing water after the freshet. On this design basis, the maximum head on the liner is 1.0 m.

4.0 OPERATION AND MAINTENANCE PROCEDURES

4.1 Safety and Environmental Protection

In addition to adherence to Baffinland's Heath and Safety Plan, staff in charge of operating the landfarm must have valid WHMIS and TDG training and be trained in the procedures associated with landfarm operation, including the use of safety equipment (first aid supplies, eyewash station, fire extinguisher, spill response materials etc), emergency response procedures, soil tilling, record-keeping, soil and water sampling, and groundwater monitoring. It is recommended that activities involving contaminated soils be conducted under the supervision of site staff having a 40-hour Hazardous Waste Operations and Emergency Response Standard (HAZWOPER) or Canadian Hazardous Waste Workers Program.

Before work starts, personnel must be provided with a clear explanation as to the nature of the contamination and the specific personnel protective equipment required to complete the assigned tasks. Personnel should be trained how to decontaminate equipment and personal protective equipment. Personal hygiene, including showering at the end of the day and washing prior to eating, smoking, etc. is important after handling contaminated soils. Workers should be encouraged to watch for and immediately report any unsafe conditions, or to report any damage to the facility, especially any tears in the liner that could occur during operations such as tilling.

If the nature/degree of contamination is such that respiratory protection is required, the workers must be properly fit-tested prior to starting work at the facility. The selection of personal protective equipment is the responsibility of the site Occupational Hygienist, Corporate Safety Officer, or equivalent.

The facility must have warning signs posted in English and local dialect, both to prohibit the dumping of soil materials without the permission of the Site Manager, and to warn personnel of the dangers and risks posed by the facility (slip/trip, hydrocarbon-contaminated material, open water). The sump area should be clearly demarcated to avoid any personnel from breaking through ice at the start and end of the season, when snow cover may conceal the underlying thin ice.

4.2 Soil Acceptance Procedures

Rock fragments and cobble exceeding 100 mm in diameter should not be accepted in the landfarm. The soil originating from the bladder farm is anticipated to consist principally of sand and gravel.

Chemical acceptability criteria include the following parameters:

- Total petroleum hydrocarbons less than 4%,
- Electrical conductivity <4 dS/m; sodium adsorption ratio (SAR) <6,
- pH greater than 5 and less than 10, and
- CCME metals up to Tier 1 values or up to natural background concentrations.

4.3 Landfarming Operations

Landfarming is an ex situ bioremediation treatment that uses naturally-occurring microorganisms to metabolize or breakdown petroleum hydrocarbons in impacted soils. This is achieved by spreading contaminated soil in a thin layer across the landfarm area.

End products of bioremediation are microorganism protein, carbon dioxide and water. Stimulation of microbial growth and activity for hydrocarbon removal is accomplished primarily through the addition of air and nutrients. In a landfarm, the metabolism of hydrocarbon is mediated predominantly through aerobic microbes.

The effectiveness of landfarming depends on three main parameters:

- Soil characteristics; grain size, soil texture, bulk density, moisture content and permeability;
- Type of petroleum hydrocarbon; and
- Climatic conditions.

Climatic conditions including rainfall, snow, wind effects and temperature influence landfarm efficiency. Rain and snow melt will change the moisture content of the treated soil. Runoff and wind also has the potential to cause soil erosion.

The anticipated operational period of the landfarm will depend on the weather conditions, but it is anticipated to be from June to the end of September.

After excavation and transport of contaminated soil to the landfarm area, the soil should be dumped and spread with a front-end loader or bulldozer. The soil should be tilled as it is spread, continuing until all of the soil has been deposited to ensure that the material is well-mixed and aerated. Material placement should maintain a minimum 2 m offset from the inside berm toe.

Soils will be placed in a layer of approximately 0.3 m and should not exceed 0.45 m in any location. At the start of season, the soils should be evaluated for optimal nutrient, moisture and pH conditions. Microorganisms that degrade hydrocarbons require optimal quantities of water, oxygen, and macronutrients (carbon, nitrogen, hydrogen, oxygen, sulphur, phosphorus, potassium, and magnesium), and the soil pH should be between 6 and 8. In addition, excessive salt compounds reduce the osmotic

potential and can slow or even halt biodegradation. Salts that are harmful to biodegradation in excessive concentrations include sodium chloride as well as fertilizer amendments.

Most soil microorganisms that breakdown petroleum hydrocarbons on a landfarm require an aerobic environment. Tilling is conducted to aerate the soils and enhance microbial degradation. The landfarmed soil should be loose and moist. During the summer months, the soils should ideally be tilled every week.

Optimizing the moisture content will enhance biodegradation and to avoid dust generation. Very dry soils should not be tilled. If soils are excessively dry, the landfarm should be irrigated prior to tilling to increase the soil moisture content to 40% to 85% of the water-holding capacity.

Soils that are wet also do not benefit from tilling. Passing equipment over wet soils could compact the material. If the soil appears muddy, or sticks to the tires of the tilling equipment, it is too wet to process.

Tilling could damage the underlying liner so it should be carried out with care by an experience operator. Only tilling equipment should be permitted on the landfarm soil, and only during tilling. Trucks or other vehicles should not drive on the landfarm soil as this will pack the soil down making it difficult to handle, and may prolong the soil remediation timeframe.

During the winter months, soil can be stockpiled to minimize contact with freshet water, although the piles should be no higher than 5 m.

5.0 WATER MANAGEMENT PLAN

5.1 Plan Considerations

All irrigation water, precipitation and snowmelt that collects in the landfarm sump is considered contact water. Average monthly temperatures that are above 0°C occur between July and September, so it is expected that runoff will need to be managed for these three months of the year. Based on historical climate data for Pond Inlet, it is expected that 190 mm of precipitation will fall annually, approximately 50% of which will accumulate as snow. The preliminary landfarm design could accommodate over 4,000 m^3 of water while maintaining a minimum 0.5 m of freeboard.

The yearly monthly wind speed averages are between 5 and 6 m/s during the frost-free months, and the average monthly relative humidity is between 70% and 80%. Ignoring losses (evaporation) or gains to the landfarm (snow drifts), it is expected that approximately 1,150 m^3 of precipitation (snow and rain) will collect annually in the landfarm. The annual quantity of contact water may be higher depending on whether external irrigation water is required to maintain optimal soil moisture conditions during the period of active treatment. The sump is designed to contain approximately 245 m^3 of water, or approximately half the volume of the expected snowmelt.

5.2 Contact Water Recycling and Water Use Minimization Procedures

During the treatment process, contact water that accumulates in the sump may be recycled as irrigation water to add nutrient amendments, to increase soil moisture or to supress dust within the landfarm area during dry periods. Recycled water from the sump should preferably not contain any petroleum

hydrocarbon sheen, which could be removed by using absorbents, or avoided by drawing water from beneath the water surface.

Should external water inputs be required during the landfarm soil treatment operations, consumption of fresh water at Milne Inlet could be minimized by recycling water from other processes, such as waters from the sewage lagoon polishing cell or sewage sludge. Treated wastewater and/or sludge is potentially a valuable source of nutrients (especially nitrogen), and reclaimed water irrigation of the landfarm could reduce or possibly eliminate dry chemical nutrient amendment requirements. In addition to reducing freshwater consumption, recycling nutrients already available in treated sewage use benefits the environment by offsetting greenhouse gas emissions that otherwise would have been generated in the production and shipment of dry chemicals to site.

Such use of reclaimed water would require authorization from the NWB and other stakeholders, and is contingent on the chemistry of the proposed amendment (especially with respect to metals loadings) as well as the effectiveness of the amendment to achieve the remediation targets, such as through a bench-scale or plot tests. The proposed amendment would need prior characterization for suitability, including the COD:N:P ratios, metals, and routine chemistry parameters.

5.3 Contact Water Discharge

To maintain adequate freeboard and avoid flooding the soils undergoing treatment, the landfarm sump contact water should be removed prior to freeze up in September. Water that does not meet the discharge requirements provided in the amended Water Licence 2BB-MRY0710 requires treatment or off-site disposal. Nunavut Water Board (NWB) landfarm discharge limits for mine sites are provided in Section 7.3, as well as monthly testing of chemical parameters.

If reclaimed wastewater is used during the treatment process, the contact water discharge parameters may need to include BOD_5 and faecal coliforms in addition to the standard Water Licence discharge requirements.

After water analyses confirm the water is suitable for release and the AANDC Inspector has been notified of the intended discharge, the water will be released to a nearby Monitoring Station, the location of which will be confirmed on the as-built drawing. The landfarm Monitoring Station discharge point should be at least 30 m away from any surface waterbody, and water discharges should be conducted in a manner that avoids soil erosion.

6.0 SOIL QUALITY REMEDIATION OBJECTIVES

Remediation objectives for the F1 to F4 hydrocarbon fraction will depend on the subsequent use of the treated soils. As per the Nunavut Water Board renewal of Baffinland's Licence No. 2BB-MRY0710, soils affected by hydrocarbons from normal fuel transfer procedures require treatment to meet the objectives included in the 2010 Government of Nunavut's Environmental Guideline for Site Remediation. Industrial criteria are suitable if the treated soils are to remain in place until the landfarm is decommissioned or the term of the commercial lease expires. Without a site-specific risk assessment, agricultural/wildland Tier 1 F1 to F4 hydrocarbon criteria must be met if the soils are to be returned to the environment, or at such time that the commercial lease expires.

Soils that do not respond to bioremediation treatment may be disposed of off-site or, with prior approval, the materials could be used as intermediate fill within an engineered on-site facility (landfill).

7.0 MONITORING PROGRAM

7.1 Soil Sampling

Soil sampling will be conducted to determine acceptability criteria, to monitor the progress of soil remediation, and to verify that soils meet the remediation objectives at the end of treatment.

Chemical analyses for soil acceptance at the landfarm were listed in Section 4.2. For the designated soils, analysis of F1 to F4 hydrocarbon fractions will not be required if sufficient data density is obtained during the soils characterization. Soil bulk density, moisture content, field capacity, and nutrients (nitrogen, phosphorus) are also required testing parameters.

Unless the soils are chemically unsuitable for bacteriological growth, it is highly unlikely that there will not be sufficient microorganisms in the accepted soil to initiate effective bioremediation. For this reason, heterotrophic plate count analyses are generally not necessary.

Soil sampling to verify interim treatment includes the CCME F1 to F4 soil fraction and soil nutrients. Periodic measurement of hydrocarbon vapour emissions by measuring headspace, using a small quantity of soil and a photoionization detector (PID), is a useful indicator of the progress of remediation but should not be substituted for remediation verification sampling.

Soil sampling to verify the completion of the treatment process includes the CCME F1 to F4 soil fraction. Testing for metals is not required at the end of remediation since soils will be tested prior to acceptance at the landfarm, and any landfarm treatment inputs will have known chemistry.

Other soil sample parameters may be added, such as poly-aromatic hydrocarbons (PAH), if the landfarm is retained after the two-year remediation program, or for treatment of other types of hydrocarbon-impacted materials.

7.2 Contact Water Sampling

During the frost-free months, and only if contact water is present in the sump, one or two sets of water samples will be collected and submitted to an accredited laboratory and for the analysis of the following parameters:

- Oil and grease and visual observations of sheen
- F1 and F2 hydrocarbon fraction and BTEX
- Phenols
- Dissolved nutrients: ammonia, nitrate, nitrite, phosphate
- Total nutrients: total phosphorus, total kjeldahl nitrogen
- Solids: total suspended solids, total dissolved solids

- Major Ions/Anions: calcium, magnesium, sodium, potassium; hardness, chloride, sulphate
- Routine chemistry pH, alkalinity, conductivity
- Metals: CCME list including As, Ba, Be, Cd, Cr, Co, Cu, Pb, Mo, Ni, Sb, Se, Ag, Tl, Sn, V, Zn, Hg
- Routine Physical : turbidity, temperature

Parameters including temperature, pH, TDS, and electrical conductivity are to be measured in the field as well as the laboratory.

Other water sample parameters may be added, such as PAH, if the landfarm is retained after the remediation program, for treatment of hydrocarbon-impacted materials that do not originate from the fuel bladder farm.

7.3 Contact Water Discharge Limits

Contingent on the acceptance proposed landfarm and future amendment of the Water Licence, the proposed contact water discharge limits at the additional Monitoring Program Station are as follows:

Parameter	Maximum Concentration of any Grab Sample (mg/L)
pH	6.0-9.5
Total Suspended Solids	15
Oil and Grease	15 and no visible sheen
Total lead	0.001
Benzene	0.370
Toluene	0.002
Ethylbenzene	0.090

Depending on the design life of the landfarm, the installation of permanent groundwater monitoring facilities may be warranted. Alternately, temporary drive point (sand point) wells may be installed in the unconsolidated material using a hardened drive point and a screen (perforated pipe). The point is hammered into the ground, usually with a tripod and "driver" (weighted pipe that is repeatedly dropped).

Experience in similar latitudes in the Arctic indicates that free water will not be available for sampling until mid to late August. Groundwater will be monitored once per year in two downgadient and one upgradient location.

Water samples are to be collected and submitted to an accredited laboratory for the analysis of the following parameters

- F1 and F2 hydrocarbon fraction and BTEX
- Dissolved nutrients: ammonia, nitrate, nitrite, phosphate
- Total nutrients: total phosphorus, total kjeldahl nitrogen
- Solids: total suspended solids, total dissolved solids

- Major ions/anions: calcium, magnesium, sodium, potassium; hardness, chloride, sulphate
- Routine chemistry: pH, alkalinity, conductivity
- Routine physical : turbidity, temperature

Parameters including temperature, pH, TDS, and electrical conductivity are to be measured in the field as well as the laboratory.

7.4 QA/QC

The general quality assurance and quality control are to follow *QA/QC Guidelines for Use by Class "B" Licensees in Meeting SNP Requirements* (INAC, 1996). All samples are to be collected using best industry practices and shall be submitted under a Chain-of-Custody protocol. Sampling protocols adhered to include the following:

- Disposable sampling gloves to be worn during the collection of samples, and discarded between sampling events. Sampling tools are to be decontaminated between sampling points.
- Any sampling and inspection events should be documented in field notes including identification of the person conducting the work. It is beneficial to photograph any work that is conducted.
- For small batches of soil samples (less than 10 samples), at least one blind duplicate should be analyzed per batch of samples. For larger batches of soil samples (greater than 10 samples), 10% duplicates should be analyzed. For groundwater samples, a blind duplicate and field blank sample should be collected and analyzed with each batch of samples tested.
- Samples collected for laboratory analysis are to be placed in coolers and transported to the laboratory via courier.
- Sample holding times are to be adhered to, and water samples are to be preserved for specific analyses.
- All water and soil samples are to be collected in laboratory-supplied bottles and jars, and analyzed at a Canadian Association of Environmental Analytical Laboratories (CAEAL) accredited laboratory. All analytical reports are to include QA/QC reports.

7.5 Summary of Inspections and Reporting

Table 2 provides a summary of inspections and reporting associated with the operation of the landfarm:

Table 2: Monitoring Summary and Documentation

Item	Purpose	Frequency	Type of Record(s)
Landfarm Treatment Operations Inspection	Record keeping of treatment operations and berm performance for due diligence.	Once per day during spring freshet and after rainfall events. Weekly at other times.	• Inspection checklist and field notes including date, weather, facility condition including, any repairs required, odour noted, quantity of water in sump and amount of freeboard. • Record of berm performance with emphasis on observations of cracking or any signs of instability. • Check soils to see if they are too dry or too wet to till. • Record of any unauthorized discharges and follow-up action taken. • Photographic record.
Soil Sampling for Soils Acceptance at Facility	To determine if soils are acceptable for treatment at facility.	For this purpose-built facility, only one time per year at the start of season. Otherwise as circumstances require.	• Soils origin and associated spill report number, • Field notes including frequency of sampling, soil texture, moisture content, colour, odour. • Laboratory-issued reports including QA/QC • Summary tabulation of results. • Documentation of fate of rejected soils. • Record of any treatability tests done.

Table 2: Monitoring Summary and Documentation

Item	Purpose	Frequency	Type of Record(s)
Soil Sampling for Remediation Progress Monitoring	To provide interim indications of how remediation is progressing.	Monthly during the frost-free months.	• Field notes and sketch of location/depth of samples taken. • Photographic record. • Laboratory-issued reports including QA/QC and chain of custody. • Summary tabulation of results. • Analysis of percent removal of hydrocarbon constituent treated and treatment time, evaluation should include weather information, soil texture and soil moisture.
Soil Sampling for Verification of Remediation	To determine if remedial objectives have been met.	For this purpose-built facility, only one time per year at the end of season. Otherwise as circumstances require.	• Field notes and sketch of location/depth of samples taken. • Photographic record. • Laboratory-issued reports including QA/QC • Summary tabulation of results. • Analysis of percent removal of hydrocarbon constituent treated and treatment time. • Documentation of fate of treated soils. • Annual quantities in cubic metres of all soil and types of contaminants.
Contact Water Sampling During Remediation	Due diligence operations monitoring.	One or two times per treatment season	• Field notes and observations made at time of sampling. • Laboratory-issued reports including QA/QC and summary tabulation of results.
Contact Water Sampling prior to Discharge	To conform to Water License Requirements.	As required prior to discharge.	• Document notification of INAC Inspector (written notification at least 10 days prior to discharge). • Record depth of water in sump. • Calculate approximate water volume to be discharged. • Laboratory-issued reports including QA/QC and summary tabulation of results.
Groundwater Monitoring and Sampling	Date, time, weather, water level, in-well parameters (temperature, pH, electrical conductivity), visual observations of water colour and turbidity, odour.	Water sampling one time per year, between mid-August to mid-September.	• Laboratory-issued reports including QA/QC and summary tabulation of results, trend analysis (after a minimum of four years of data, if applicable).

Table 2: Monitoring Summary and Documentation

Item	Purpose	Frequency	Type of Record(s)
Construction Summary Report	As-built and construction report as per Water Licence.	Submit to Nunavut Water Board within 90 days of completion of construction	• Construction field notes and observations • Record and as-built drawings • Monitoring well installation details. • Summary of any geotechnical testing, compaction, moisture content, particle size analysis.
Site Safety Inspections	To identify any new or previously unnoticed physical/chemical hazards.	Monthly, or when conditions change, or when an unsafe condition is reported by a worker.	• Any unsafe condition/near-miss/incident reports and records. • Any unsafe conditions reported by workers must be reported to the Site Manager immediately for prompt action.
Geotechnical Inspection	To ensure facility has not been degraded or damaged, and to identify any maintenance requirements.	Annually	• Inspection of geotechnical performance of facility. • Document recommendations of any repair/maintenance work. • Record of any repair work made to the facility.

8.0 CLOSURE

We trust this report meets your present requirements. Should you have any questions or comments, please contact the undersigned at your convenience.

EBA, A Tetra Tech Company

REGISTERED PROFESSIONAL ENGINEER
W. T. HORNE
LICENSEE
Sept 13, 2011
N.W.T.

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/dlm

PERMIT TO PRACTICE
EBA ENGINEERING CONSULTANTS LTD.
Signature
Date Sept 13/2011
PERMIT NUMBER: P 018
The Association of Professional Engineers, Geologists and Geophysicists of the NWT / NU

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FIGURES

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MILNE INLET CAMP AND PORT

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MILNE INLET TOTE ROAD

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AND PROPOSED PORT

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NOTES
BASED ON DRAWING PROVIDED BY BAFFINLAND IRON MINES CORPORATION

CLIENT
Baffinland Iron Mines Corporation

Hydrocarbon Impacted Soils Storage and Landfarm Facility

Site Location Plan

PROJECT NO.	DWN	CKD	REV
E14101092	RH	DF	0

OFFICE	DATE
EDM	September 13, 2011

eba A TETRA TECH COMPANY

Figure 1

NOTES
BASED ON 2005 AERIAL PHOTOGRAPH

0 250
Scale: 1: 5 000 (metres)

CLIENT
Baffinland Iron Mines Corporation

eba A TETRA TECH COMPANY

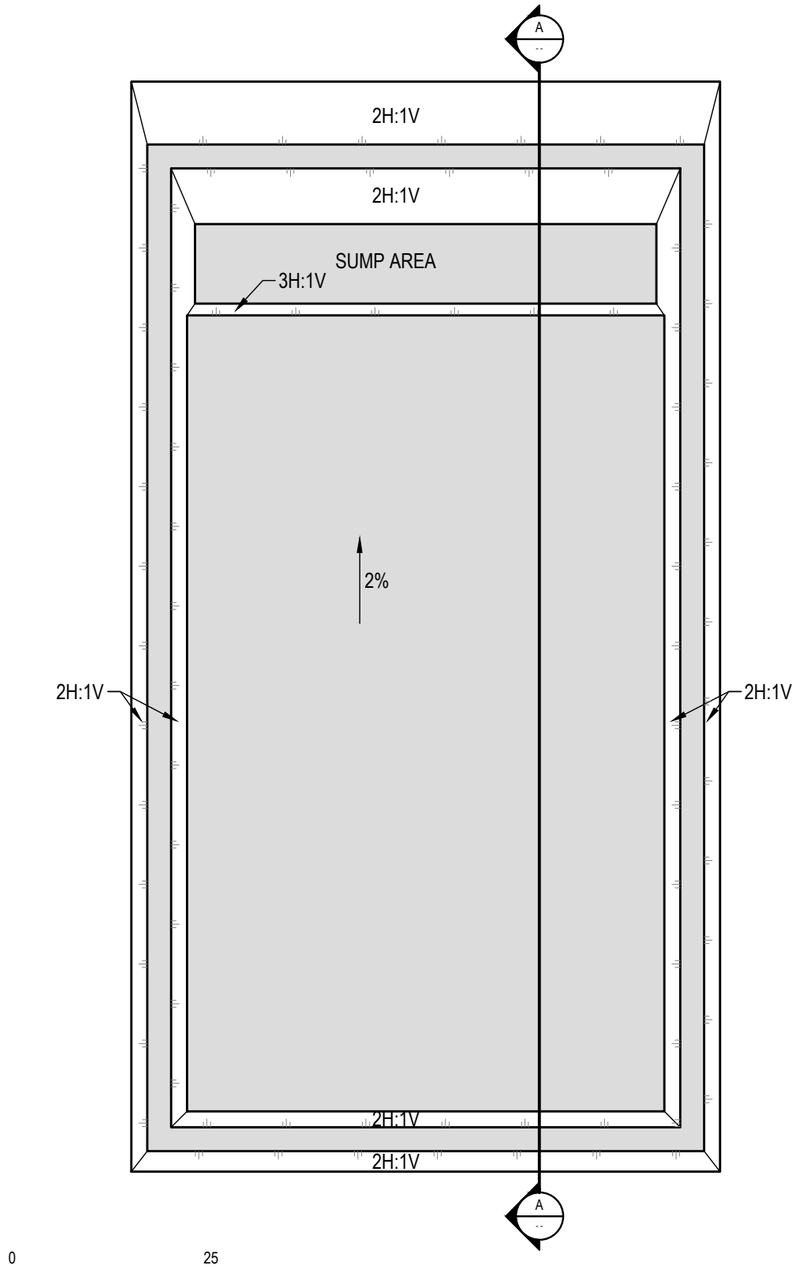
Hydrocarbon Impacted Soils Storage and Landfarm Facility

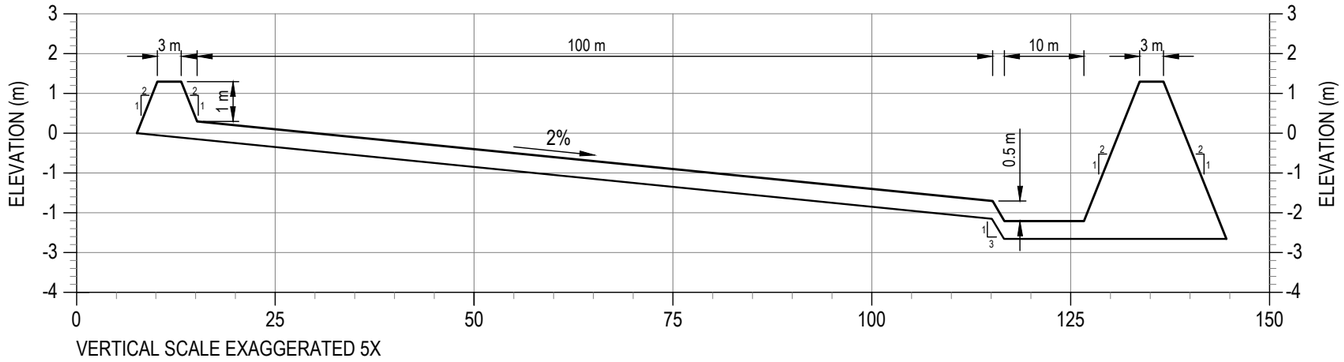
Proposed Landfarm Locations

PROJECT NO.	DWN	CKD	REV
E14101092	RH	DF	0

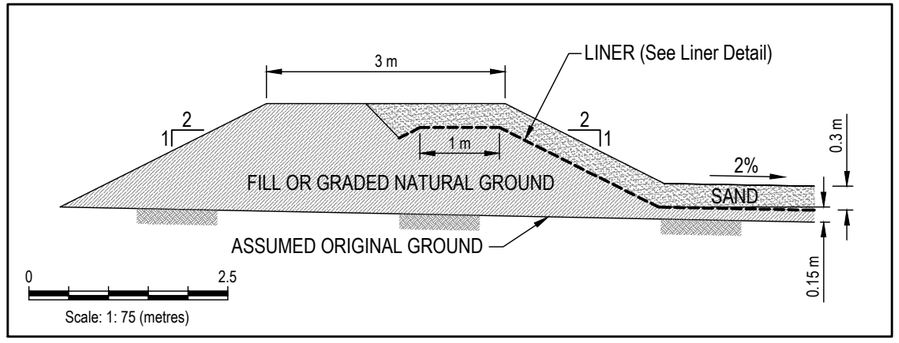
OFFICE	DATE
EDM	September 13, 2011

Figure 2

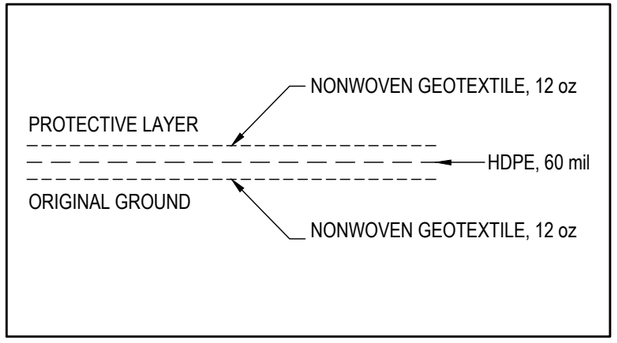




SECTION A



TYPICAL SECTION DETAIL



LINER DETAIL

NOT FOR CONSTRUCTION

NOTES
BERM HEIGHTS AND GRADES TO BE ADJUSTED BASED ON ACTUAL TOPOGRAPHY

CLIENT
Baffinland Iron Mines Corporation

Hydrocarbon Impacted Soils Storage and Landfarm Facility

Preliminary Design of Landfarm Facility

eba A TETRA TECH COMPANY

PROJECT NO.	DWN	CKD	REV
E14101092	RH	DF	0

OFFICE	DATE
EDM	September 13, 2011

Figure 3

APPENDIX A

APPENDIX A EBA'S GENERAL CONDITIONS

GENERAL CONDITIONS

GEOTECHNICAL REPORT

This report incorporates and is subject to these “General Conditions”.

1.0 USE OF REPORT AND OWNERSHIP

This geotechnical report pertains to a specific site, a specific development and a specific scope of work. It is not applicable to any other sites nor should it be relied upon for types of development other than that to which it refers. Any variation from the site or development would necessitate a supplementary geotechnical assessment.

This report and the recommendations contained in it are intended for the sole use of EBA’s Client. EBA does not accept any responsibility for the accuracy of any of the data, the analyses or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than EBA’s Client unless otherwise authorized in writing by EBA. Any unauthorized use of the report is at the sole risk of the user.

This report is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of EBA. Additional copies of the report, if required, may be obtained upon request.

2.0 ALTERNATE REPORT FORMAT

Where EBA submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed EBA’s instruments of professional service), only the signed and/or sealed versions shall be considered final and legally binding. The original signed and/or sealed version archived by EBA shall be deemed to be the original for the Project.

Both electronic file and hard copy versions of EBA’s instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except EBA. EBA’s instruments of professional service will be used only and exactly as submitted by EBA.

Electronic files submitted by EBA have been prepared and submitted using specific software and hardware systems. EBA makes no representation about the compatibility of these files with the Client’s current or future software and hardware systems.

3.0 ENVIRONMENTAL AND REGULATORY ISSUES

Unless stipulated in the report, EBA has not been retained to investigate, address or consider and has not investigated, addressed or considered any environmental or regulatory issues associated with development on the subject site.

4.0 NATURE AND EXACTNESS OF SOIL AND ROCK DESCRIPTIONS

Classification and identification of soils and rocks are based upon commonly accepted systems and methods employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Where deviations from the system or method prevail, they are specifically mentioned.

Classification and identification of geological units are judgmental in nature as to both type and condition. EBA does not warrant conditions represented herein as exact, but infers accuracy only to the extent that is common in practice.

Where subsurface conditions encountered during development are different from those described in this report, qualified geotechnical personnel should revisit the site and review recommendations in light of the actual conditions encountered.

5.0 LOGS OF TESTHOLES

The testhole logs are a compilation of conditions and classification of soils and rocks as obtained from field observations and laboratory testing of selected samples. Soil and rock zones have been interpreted. Change from one geological zone to the other, indicated on the logs as a distinct line, can be, in fact, transitional. The extent of transition is interpretive. Any circumstance which requires precise definition of soil or rock zone transition elevations may require further investigation and review.

6.0 STRATIGRAPHIC AND GEOLOGICAL INFORMATION

The stratigraphic and geological information indicated on drawings contained in this report are inferred from logs of test holes and/or soil/rock exposures. Stratigraphy is known only at the locations of the test hole or exposure. Actual geology and stratigraphy between test holes and/or exposures may vary from that shown on these drawings. Natural variations in geological conditions are inherent and are a function of the historic environment. EBA does not represent the conditions illustrated as exact but recognizes that variations will exist. Where knowledge of more precise locations of geological units is necessary, additional investigation and review may be necessary.

7.0 PROTECTION OF EXPOSED GROUND

Excavation and construction operations expose geological materials to climatic elements (freeze/thaw, wet/dry) and/or mechanical disturbance which can cause severe deterioration. Unless otherwise specifically indicated in this report, the walls and floors of excavations must be protected from the elements, particularly moisture, desiccation, frost action and construction traffic.

8.0 SUPPORT OF ADJACENT GROUND AND STRUCTURES

Unless otherwise specifically advised, support of ground and structures adjacent to the anticipated construction and preservation of adjacent ground and structures from the adverse impact of construction activity is required.

9.0 INFLUENCE OF CONSTRUCTION ACTIVITY

There is a direct correlation between construction activity and structural performance of adjacent buildings and other installations. The influence of all anticipated construction activities should be considered by the contractor, owner, architect and prime engineer in consultation with a geotechnical engineer when the final design and construction techniques are known.

10.0 OBSERVATIONS DURING CONSTRUCTION

Because of the nature of geological deposits, the judgmental nature of geotechnical engineering, as well as the potential of adverse circumstances arising from construction activity, observations during site preparation, excavation and construction should be carried out by a geotechnical engineer. These observations may then serve as the basis for confirmation and/or alteration of geotechnical recommendations or design guidelines presented herein.

11.0 DRAINAGE SYSTEMS

Where temporary or permanent drainage systems are installed within or around a structure, the systems which will be installed must protect the structure from loss of ground due to internal erosion and must be designed so as to assure continued performance of the drains. Specific design detail of such systems should be developed or reviewed by the geotechnical engineer. Unless otherwise specified, it is a condition of this report that effective temporary and permanent drainage systems are required and that they must be considered in relation to project purpose and function.

12.0 BEARING CAPACITY

Design bearing capacities, loads and allowable stresses quoted in this report relate to a specific soil or rock type and condition. Construction activity and environmental circumstances can materially change the condition of soil or rock. The elevation at which a soil or rock type occurs is variable. It is a requirement of this report that structural elements be founded in and/or upon geological materials of the type and in the condition assumed. Sufficient observations should be made by qualified geotechnical personnel during construction to assure that the soil and/or rock conditions assumed in this report in fact exist at the site.

13.0 SAMPLES

EBA will retain all soil and rock samples for 30 days after this report is issued. Further storage or transfer of samples can be made at the Client's expense upon written request, otherwise samples will be discarded.

14.0 INFORMATION PROVIDED TO EBA BY OTHERS

During the performance of the work and the preparation of the report, EBA may rely on information provided by persons other than the Client. While EBA endeavours to verify the accuracy of such information when instructed to do so by the Client, EBA accepts no responsibility for the accuracy or the reliability of such information which may affect the report.

Annex 6

Waste Sorting Guidelines

Baffinland
Iron Mines Corporation

WASTE SORTING GUIDELINES

Why sort waste?

To protect the health and safety of site personnel.

To minimize contamination, wildlife attraction, and other adverse environmental impacts.

Where to sort waste?

Workplaces and the Waste Sorting Area, located next to the incinerator.

Who should sort waste?

Everyone.

All who manage, handle, store and/or dispose of any of the materials mentioned in these guidelines.

- ➡ *All employees and contractors generating the waste are responsible for ensuring that it is labelled and sorted correctly.*
- ➡ *Employees and contractors are also responsible for contacting Site Services Manager on channel 2 when waste containers are full and ready for pick-up.*
- ➡ *For unusual or hard to segregate waste types, please contact the Environment Office.*

INCINERATOR WASTE

Disposal Instructions

Indoors: Black garbage bags in rubbermaid waste bins.

Outdoors: Black garbage bags in 45 gal. drums, consolidation in steel containers with lid.

Acceptable Waste

Cardboard
Food Scraps
Oily Rags
Paper
Scrap Wood
Small Plastic

LANDFILL WASTE

Disposal Instructions

Outdoors: Steel Containers.

Access to the landfill is for Authorized Personnel Only. Landfill Operators should refer to the landfill user rules for more information.

Acceptable Waste

Concrete
Corrugated Cardboard
Empty Clean Container
Glass
Metal
Bulky Wastes (after approval by Environment Office)
Wood Products

HAZARDOUS WASTE

Waste Type	Disposal Instructions
Absorbent (used)	White Quatrex or overpack drums
Aerosol Cans	Labelled bins outside bathrooms; overpack drums outdoors
Antifreeze	Cubes or drums (closed top)
Batteries (AA, 9V, etc)	Labelled bins outside bathrooms
Batteries (vehicle)	Black Quatrex
Contaminated Soils	White Quatrex or overpack drums
Contaminated Water	Drums (closed top)
Electronic Waste	White Quatrex
Fluorescent Bulbs	20L pails outside bathrooms
Mixed Waste Containers	White Quatrex (antifreeze, grease, oil and polymer)
Waste Fuel	Drums (closed top)
Waste Grease	Overpack drums
Waste Oil	Cubes or drums (closed top)
Waste Oil Filters	Drums (open top)

Annex 7

2013 Work Plan and Site Layout Drawings

2013 WORK PLAN

1.0 Introduction

The following document presents the activities Baffinland intends to undertake as part of its 2013 Work Plan. In the event the Project does not advance, all work items described and constructed as per the 2013 Work Plan will be subject to reclamation, as per relevant regulatory and permit obligations.

2.0 Overview of Site Activities for March 2013 to December 2013

This 2013 Work Plan provides for:

1) The development and construction of infrastructure required for site capture at Milne Port and the Mine Site for the launching of the 18 MT Mary River Project.
2) Ongoing environmental baseline data collection and geotechnical drilling in order to sustain the development of the 18 MT Project. These activities will resume at the Milne Port site, along the Tote Road, at the Mine Site, at numerous quarry sites and at other Project development areas.

The specific scope of activities to be undertaken at each Project site is presented in Section 3 of this Work Plan. The Work Plan is presented within the context of the applicable regulatory authorizations and schedule.

Baffinland holds, or will soon hold, all the permits and authorizations required to carry out the 2013 Work Plan. The main regulatory instruments that allow for the 2013 Work Plan activities include:

- Project Certificate
    - All works and activities proposed have been screened by the NIRB and have been considered in the Project Certificate issued by the NIRB on December 28, 2012.
- Type B Water Licence
    - The current Type B Water Licence (2BB-MRY1114) authorizes Baffinland to operate the existing sewage treatment plants, incinerators, landfill, wastewater treatment and other facilities regulated by the Nunavut Water Board. A request for a modification to this licence will be submitted shortly, for the construction of an additional 5ML fuel tank construction within the existing secondary containment as well as for the construction of a second PWSP pond at Milne Port (these work items are discussed in section 3.1.2 of this letter). The Type B Water Licence also authorizes Baffinland to undertake mineral exploration and geotechnical drilling programs. Prior to March 31st 2013, Baffinland will submit to the NWB an update of all the environmental management plans associated with the Type B water Licence.
- Type A Water Licence
    - The final hearings for the Type A Water Licence associated with the Project Certificate are scheduled for April 23 to 25, 2013, in Pond Inlet. Baffinland expects that the Type A Water Licence will be granted by mid June 2013. The scope of the Type A Water Licence exceeds the requirement of the 2013 Work Plan for all

activities considered in this 2013 Work Plan. Following the issuance of the Type A Water Licence, Baffinland will submit to the NWB updates for the environmental management plans associated with this Water Licence.

- Use and Storage of Explosives
  - Baffinland's Explosives Contractor will obtain the necessary permits and authorizations from NRCan for the use and storage of explosive at the Project sites. It is anticipated that these permits will be obtained prior to commencement of the 2013 Work Plan (expected in mid April 2013).
- Quarry Permits
  - Schedule 'B' Quarry Concession Agreement under IOL Commercial Lease Q10C3001.
    - It is anticipated that quarrying of rock and gravel from permitted quarry locations (as shown on Schedule "A1") of this Lease will continue. In addition, Baffinland will be applying for access and quarry permits to extract rock and gravel material adjacent and near the existing Milne Inlet Tote Road by means of an Amendment to the existing Schedule 'B' to the Lease.
  - The Project Certificate included the detailed assessment of 5 quarries. Two of these quarries will be developed at the onset of the 2013 Work Plan:
    - Quarry Q1 located at Milne Inlet – a site specific Quarry Management Plan was provided in the FEIS (Volume 3, Appendix 3B, Attachment 6: Operation and Management Plan Milne Inlet Quarry). The surface area of the quarry is 200,000 m^2 and the volume of material to be extracted is approximately 300,000 m^3.
    - Quarry QMR2 located at the Mary River Mine Site - a site specific Quarry Management Plan was provided in the FEIS (Volume 3, Appendix 3B, Attachment 6: Operation and Management Plan Mary River Mine Site Quarry). The surface area of the quarry is 252,700 m^2 and the volume of material to be extracted is approximately 538,000 m^3.
  - AANDC Land Use Permit and Quarry Permit to access existing and possibly new borrow and rock quarries adjacent and near the Tote Road.

3.0 Scope of 2013 Construction Activities

3.1 Pre-Sealift Activities – mid April to June 30, 2013

Construction activities will commence in April 2013. Equipment already on site will be used to begin earthworks and site preparation. Beginning in April 2013, key activities will include:

3.1.1 Mary River Mine Site

- Operate the Mary River Exploration Camp and increase occupancy as of mid April 2013. The camp with its associated sewage treatment plant and incinerator will operate in accordance to the terms and conditions of Baffinland's Type B Water Licence.

- Fly in pre-packaged explosives to the Mary River airstrip and transport to explosives magazines at Milne Port for storage and use in quarry operations.
- Construct camp pad and begin installation of construction camp.

3.1.2 Tote Road

Routine maintenance of the Tote Road will continue in 2013. The following activities will be undertaken prior to the sealift:

- Open the Tote Road (snow clearing) in early April;
- Relocate crusher train from the Mary River mine site to Milne quarry site (the crusher will be transported across river ice at four locations where box culverts are now in place);
- Follow up on the requirements pursuant to the Fisheries Authorization for the Tote Road Net Loss and Monitoring Program, QIA lease, and AANDC land permit and quarry permit requirements;
- Implementation of a freshet management plan for the Milne Inlet Tote Road to minimize associated environmental risks;
- Develop laydown areas for storage of explosive magazines (3 areas) in proximity of Q1 quarry at Milne Inlet. Position explosive magazines.

Milne Port

- Open the Milne Port camp site (mid April) and operate at full capacity (60 beds). Restart and operate the existing sewage treatment plant at Milne Port and the camp incinerator. The camp will operate in accordance with the terms and conditions of Baffinland's Type B Water Licence.
- Construct a second polishing waste stabilization pond (PWSP) at Milne in preparation for larger off-specification sewage treatment capacity during construction ramp up.
- Begin development of quarry Q1 1+100 (submitted with FEIS) to generate crushed and screened aggregate for the development of the Milne Port site. An estimated aggregate volume of 100,000 m^3 will be required for Milne Port site development.
- Earthworks at Milne Port prior to the sealifts will focus on the following areas:
    - Develop laydown area B (used for Owner/Contractor laydown);
    - Develop laydown area A for storage of material and equipment to be received during the 2013 sealift;
    - Develop pad for the expanded camp facilities;
    - Upgrade (extend) the airstrip runway;
    - Construct fuel tank farm secondary containment area;
    - Construct one 5ML diesel fuel storage tank within the secondary containment constructed in 2011 (same construction as existing 5 ML tank);
    - Construct laydown area for waste storage/transfer;
    - Development of parking areas for heavy equipment and rolling stock fleet to be delivered during the sealifts.

3.2 2013 Sealift – July 1st to October 1st, 2013

For Milne Port, it is expected that sealifts will occur between July 1st and October 1st, 2013. An estimated 14 barges/ships (dimension of barges approximately 35 m x 140 m) will be necessary to transport the equipment and material required for the execution of the 2013 Work Plan and execution of the work planned for January to June of 2014.

Material, equipment, fuel and supplies required for construction activities at the Mine Site and the operation of the Mary River facilities will be transported to the Mine Site via the Tote Road during the fall of 2013 and the winter of 2014.

The material, equipment, supplies, buildings and machinery received at Milne Inlet during the sealifts will consist of the following:

3.2.1 Prefabricated Buildings and Fold-away Structures

- Camps complete with dormitories, kitchen facilities, washrooms, laundry facilities;
- Pre-assembled sewage treatment facilities;
- Camp incinerators;
- Emergency services building;
- Power generation equipment with electrical distribution system (several generators ranging from 50 kW to 500 kW);
- Two concrete batch plants;
- Boiler modules;
- Temporary emulsion plant;
- All modular buildings and fold-away structures to be used for offices during the 2013-2014 period. A preliminary list is presented in the table below:

Facility	Quantity
Maintenance shops	3
Trade shops (electrical, carpentry, piping, mechanical)	3
Warehouses	3
Parking garages	3
Tire shops	3
Office complexes	3
Lunchrooms	3
Wash cars	13
Field offices and lunch rooms	10
Fold-away structures	5

3.2.2 Heavy Equipment and Rolling Stock

- All heavy equipment and rolling stock required for the construction activities scheduled from July 2013 to July 2014 (next sealift). An overview of the rolling stock is presented in the table below:

Preliminary list of Rolling Stock and Heavy Equipment			
Description	Quantity	**Description**	Quantity
Loader	26	Emulsion Delivery Trucks	3
Grader	7	Loader Snow Blower Attachments	5
Track Dozer	13	Development Rock Drills	2
Excavator	11	Production Rock Drill	2
Haul Trucks	23	Crusher 6000 Ton/Day 6" (Cone Crusher)	2
Service trucks (pick-ups)	27	45ft Van Trailer Generator	2
Skidsteer	5	Hot Box	4
Highway Tractor Truck	4	Frost Fighters	12
Low Boy Trailers	8	Drive on Compactor	8
Boom Truck	3	Walk Behind Compactor	4
80 Ton Mobile RT Crane	2	Plate Compactors	4
200 Ton Track Mount	2	Trash Pumps	8
Crane RT	1	Development Drills	4
Crawler Crane	1	Roll Off Truck	2
Vac Truck - Roll Off	2	Potable Water Tank	1
Potable Water Tanks	2	Water Truck	2
Raw Water Tanks	2	Snow Cat	2
Sewage Vac Tanks	4	Fuel and Lube Truck	4
Garbage Bins	25	Tractor Truck	2
Container Handler	2	Low Boy Float	2
Telehandler	4	Low Boy Drop Deck	2
Ambulance	2	Portable Concrete Batch Truck	2
Fire Truck	2	10 cu.yd Mixer Truck	6
Dewatering Pump	4	100ft Pump Trucks	2
Plow/Sand Truck	4	320000BTU Frost Fighter	20
Buses	8	8kW Light Towers	10
Manlift	6	20kW Whisper Watt Gen Set	7
Scissor Lifts	4	185cfm Air Compressor	2
Maintenance Truck c/w Pick	2	400 Amp Welding Machines	
Fuel Delivery Truck - B-Train	2	Portable Grout Plant (3 off Sea Cans)	
Camp Power-Genset(1250)	10	Ice Profiler	
Boiler Modules	1	4" Ice Auger	
Solution Modules	1	4 ton Propane Bullet c/w Refill Station	
Bob Cat	1	10,000 L Gasoline ISO Container	
Air Compressors	2	Rock Breaker	
Magazines	15	Spray Equipment	

3.2.3 Fuel Delivery

At least two bulk fuel deliveries will occur during the 2013 sealift. At the onset of the shipping season, arctic diesel will be delivered to fill the existing 5 ML storage tank and the newly constructed 5 ML steel tank located at the Milne tank farm. In addition, 1.5 ML of jet A fuel will also be included in the initial fuel delivery.

Throughout the summer months, construction will continue on two additional 10 ML steel tanks (within the confine of the tank farm secondary confinement) for the storage of diesel fuel.

Towards the end of the open water season, a second fuel delivery will occur to fill all tankage available at Milne Port. It is expected that this second fuel delivery will consist of 25 ML of arctic diesel and 1.5 ML of jet A fuel.

In addition to bulk fuel delivery, an estimated twelve 100,000L double wall isocontainer fuel storage tanks will be delivered to Milne Port. These isocontainers will provide the fuel storage at various quarry sites and construction sites for the execution of the 2013 Work Plan and the work scheduled for the Tote Road upgrade and bridge construction during the winter of 2014.

3.2.4 Material and Supplies

To the extent practicable, all materials and supplies required to execute the 2013 Work Plan and the work scheduled for January to June 2014 will be received during the 2013 sealifts. This includes:

- Delivery of ammonium nitrate (1.5 million kg);
- Delivery of pre-package explosives;
- Delivery of cement (12,000 tonnes);
- Delivery of construction material (generators, cabling, control centres, etc.);
- Delivery of consumables (lubricants, grease, detergents, dry goods, food, household supplies, etc.);
- Delivery of twelve 100,000L double wall isocontainers for fuel.

3.3 Construction Activities from July 1 to December 31, 2013

As mentioned in Section 2.1, Baffinland expects to be granted its Type A Water Licence by mid June 2013. As equipment and material is delivered by sealifts, additional construction activities will begin. These include:

3.3.1 Milne Port

During the sealift, most of the activities at Milne Port will focus on unloading the barges and positioning received equipment and material in designated laydown areas. In addition, the following construction activities will continue:

- Install emergency response building;
- Construct and commission two 10 ML diesel fuel steel tanks at the tank farm (construction completion before the end of sealift season);
- Construct and commission two additional 10 ML diesel fuel steel tanks at the tank farm;
- Install and commission fuel dispensing system for bulk fuel facility;
- Install and commission camp extension (100 person camp) including sewage treatment plant and incinerator;
- Install concrete batch;
- Construct landfarm;

- Ongoing decommission of the bladder farm;
- Install maintenance shops;
- Install trade shops;
- Install warming shed and parking garage;
- Install warehouses;
- Install administration buildings and field offices.

3.3.2 Tote Road

During the second half of 2013, all equipment, material, fuel, and supplies required for construction activities at Mary River will be transported from Milne Port to the Mine Site via the Tote Road.

The upgrade of the road will commence late in 2013 and is expected to take 8 to 10 months. In order to improve construction efficiency, contractors have expressed the need for establishing a temporary 49 person camp mid-way along the Tote Road.

Should this camp be required, it will be erected in the later part of 2013. Water required for the camp operation would be trucked to this camp from the Mine Site or Milne Port water supply (approved under Type A and current Type B). All sewage generated from this camp would be trucked to either the Mine Site or Milne Port sewage treatment plants. Finally, all waste generated at the camp would also be transported to either the Mine Site or to Milne Port for ultimate disposal. There will be no local discharge from this camp.

3.3.2 Mine Site

Construction activities at the Mine Site will begin shortly after the first sealift. The activities will consist of:

- Development of the quarry QM2 at Mine Site (submitted with FEIS). The expected volume of aggregate required at the Mine Site for the 2013 work is 200,000 m^3;
- Complete construction camp pad and installation of the 400 person construction camp facility including sewage treatment plant, incinerator and treated sewage storage pond(s) and discharge pipeline to Mary River;
- Upgrade (extend) of the Mary River airstrip;
- Development of equipment laydown areas for Owner/Contractor;
- Development of parking area for mobile equipment. Mobile equipment fleet will include:
    - Flat bed trucks;
    - Boom trucks;
    - Fuel Tanker trucks;
    - Water tanker trucks;
    - Cranes;
    - Excavators;
    - Graders;

    - Pick-up trucks;
- Erect/install:
    - Emergency response building;
    - Concrete batch plant;
    - Emulsion plant;
    - Maintenance shop (including truck wash facility);
    - Trade shops;
    - Warming shed and parking garage;
    - Warehouses;
    - Administration buildings and field offices.
- Construct fuel tank farm secondary containment structure;
- Install 4 x 500,000L double wall diesel fuel tank (tank complete with fuel dispenser);
- Install one 50,000L double wall jet A fuel tank;
- Transfer fuel from Milne Port tankfarm to newly install fuel tanks at the Mine Site;

4.0 Ongoing Exploration and Geotechnical Activities

It is anticipated that the 2013 field work program would include the following items:

- Potentially seasonal occupation of Steensby Inlet and Mid-Rail Camps;
- Fixed wing aircraft and helicopter to support general site activities including environmental monitoring and potentially additional exploration drilling and regional exploration;
- Geotechnical drilling and surveys at project development areas, as required to support Project design requirements:
    - The Tote Road alignment and bridge crossings, a portion of the drilling for bridge design being on ice as well as near water bodies;
    - Port site(s), with land based drilling as well as possible barge based and ice based drilling on the sea ice in Steensby Inlet;
    - Waste rock and ore disposal areas;
    - Milne Inlet Tote Road and bridge crossings, a portion of the drilling for bridge design being on ice as well as near water bodies;
    - Prospective quarry sites and borrow areas along the Tote Road.
- Continue archaeological surveys at project component areas as required.

5.0 Progressive Reclamation of the Exploration and Bulk Sample Project

There will be continued progressive reclamation of areas of current and past use in association with drilling, bulk sample, and historical exploration programs. In addition, progressive reclamation plans will include:

- Development of an action plan to address concerns from stakeholders about long term salt storage;

- The completion of a program to test and dispose of incinerator bottom ash and the development of a plan to management and dispose of ongoing generation of ash;
- Continuing with the ongoing decommissioning of the existing bladder farm at Milne Inlet and the transport of hydrocarbon impacted soils to the planned landfarm facility;
- Development and implementation of a long term multi-year plan to address localized areas of permafrost melting associated with current borrow areas, and taking into consideration the longer term plans for Tote Road upgrades and new quarry development;
- Continued progressive reclamation of areas of current and past use in association with drilling, bulk sample, and historical exploration programs;
- Demobilization of equipment and supplies not required for near term activities, as well as the current inventory of hazardous waste and other materials by means of sealift from Milne Port;
- Continued development of the Mine Site landfill and deposition of non-hazardous wastes in accordance with the landfill operations and maintenance manual; and,
- Discharge of treated sewage stored in PWSPs at Mary River Camp and Milne Inlet after treatment as required. Two periods of discharge are planned, the first corresponding to freshet (May-June), and the second later in the summer if required.

6.0 Workforce and Employment Opportunities

The site work program is expected to begin in April 2013. Until material and equipment are received by sealifts, to a large extent, development activities are limited by availability of equipment currently on site. The work force is expected to peak during the sealifts period. Current estimates of the work force are as follows:

- Milne Port:
    - Pre-sealift period: 70 person
    - Sealift period; 60 to 120 persons
    - Post sealift period: ramp up to 150 person (full camp capacity)
- Mine Site Construction personnel:
    - Pre-sealift period: 8 to 12 persons
    - Sealift period; ramp up to 250 persons
    - Post sealift period: ramp up to 180 person

The 2013 work program will offer employment opportunities for many residents of northern Baffin Island. Baffinland will endeavor to maximize Inuit employment throughout 2013. Baffinland's "Work Ready Program" along with site specific training will prepare potential Inuit employees for these job opportunities. Job advertisements for a number of positions are currently posted in all the North Baffin communities. In addition, Baffinland will provide guidance to all its Contractors for training requirements and Inuit employment in the contract documents.

7.0 Early Revenue Phase (ERP) Environmental Impact Assessment

As stated in correspondence to the NIRB on January 13, 2013, due to various business drivers, Baffinland proposes to make changes to the schedule and some activities in the initial stages of project development associated with the Mary River Project Proposal for which the NIRB recently issued Project Certificate No. 005 (the 'Project Certificate').

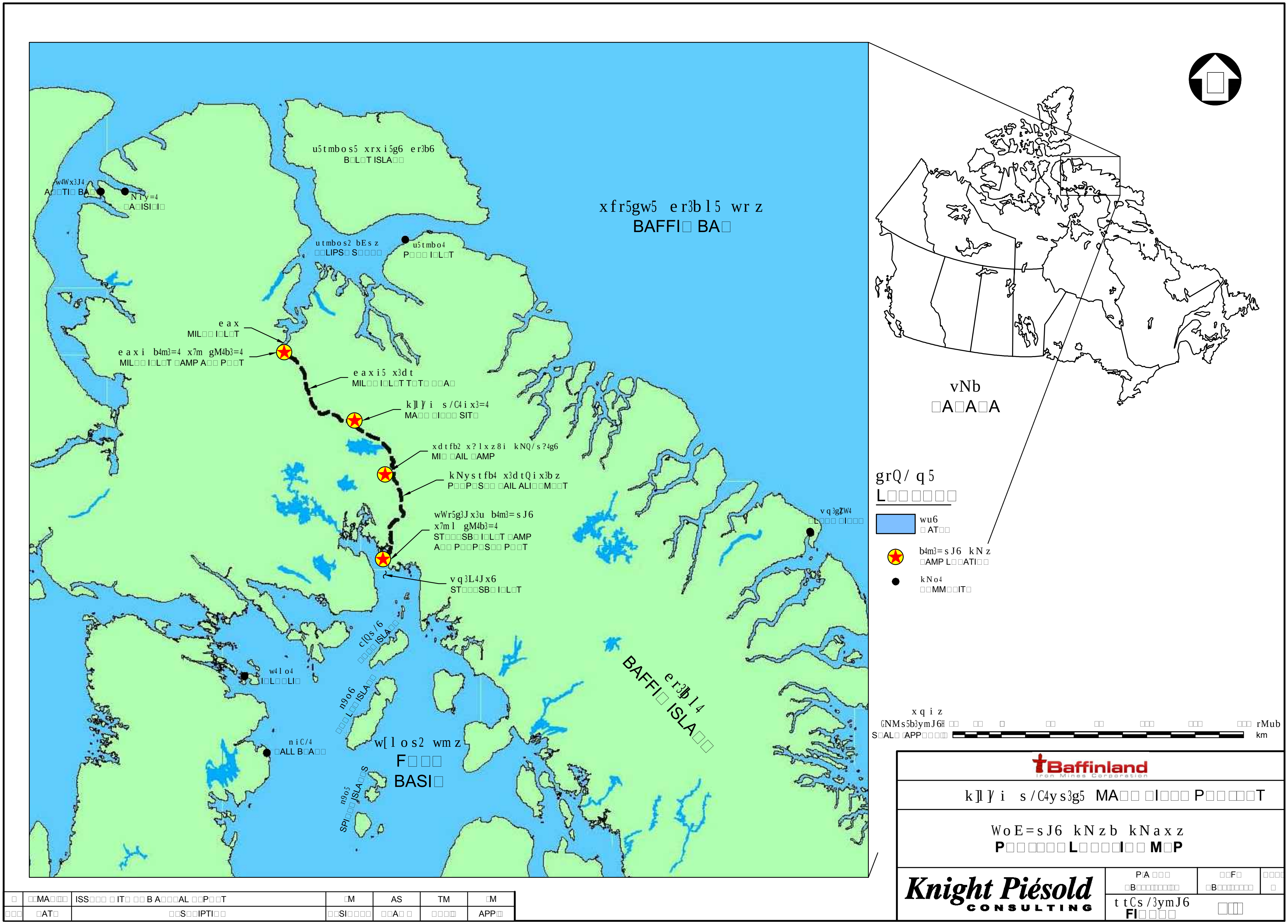
In its request to the NIRB, Baffinland indicated that although the Proponent remains committed in the long-term to developing the Project as authorized in the Project Certificate, in the short term Baffinland proposes to change some development activities and project timelines to accommodate a proposed "Early Revenue Phase" which would include development of a nominal 3.5 million tonnes per annum (Mt/a) road haulage operation from the Mary River mine site to a port facility at Milne Inlet for shipping of iron ore during the open water season. As noted by Baffinland, this development option was presented previously as a project alternative, and was included within the initial technical review of the Draft Environmental Impact Statement for the Mary River Project Proposal.

Baffinland recognizes that this Early Revenue Phase will require an amendment to the Project Certificate which in turn requires the submission and review of an Environmental Impact Assessment. In accordance to the directives issued by the NIRB, Baffinland expects to complete its Environmental Impact Assessment for the Early Revenue Phase (ERP) of the Project by June 2013. It is anticipated that this EIA will be submitted to the NIRB by June 30, 2013, and the proposal will be subjected to the NIRB review process which is expected to be completed by the first quarter of 2014.

Once a favorable decision is granted from the Minister of AANDC with respect to the ERP, and subject to obtaining any amendments (if any) which might be necessary to the Water Licence, Baffinland will proceed with the construction of facilities required for the completion of the ERP. This work will be included in the 2014 Work Plan, once the Project Certificate has been amended.

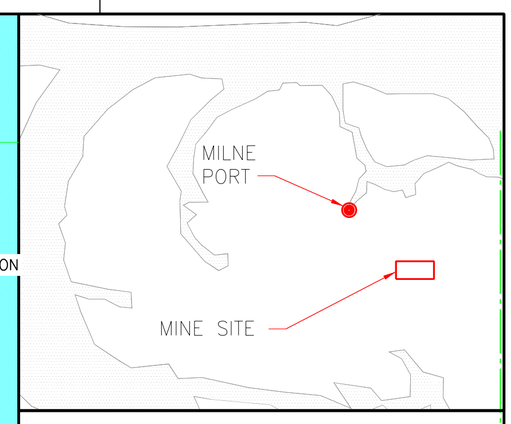
8.0 Potential 2014 Bulk Sampling Campaign

In addition to the scope of activities described herein, Baffinland is also considering the undertaking of a second "bulk ore sampling" campaign. This campaign would consist of mining up to 500,000 tonnes of ore for shipment to potential customers via Milne Port during the 2014 open water season. A feasibility study is in progress and a decision by Baffinland's Board of Directors on whether to proceed with this bulk sampling campaign is expected by the end of March 2013. Should the decision of the Board be favorable, an addendum to this 2013 Work Plan will be submitted in April 2013. This addendum will highlight additional activities that must be undertaken in 2013 in order to execute the 2014 bulk sampling campaign.


km
Baffinland
Iron Mines Corporation
Knight Piésold
CONSULTING

H349000-2000-00-015-0002

MILNE INLET



KEYPLAN

EFFLUENT DISCHARGE LOCATION TO RECEIVING ENVIRONMENT
N:7976482.047
E:503211.450

SEALIFT BARGE LANDING AREA

DRAINAGE DIVERSION DITCH

FUEL TANK FARM

RAMP TO BEACH

LAYDOWN A1 EARTHWORKS CONTRACTOR YARD

10 ML P-50 DIESEL

5 ML P-50 DIESEL

EXISTING HTO CABIN

LAYDOWN B1

LAYDOWN A1 AREA

SERVICES AREA PAD B3
SITE FACILITIES, INCLUDING:

- MAINTENANCE/WAREHOUSE BUILDING
- OILY WATER TREATMENT PLANT
- WELDING SHOP BUILDING
- WORKSHOP OFFICE BUILDING

EXISTING POLISHING WASTE STABILIZATION POND

750,000L JET A FUEL

INCINERATOR

POWER GENERATORS

POLISHING WASTE STABILIZATION POND

HAZARDOUS WASTE BERM

EXISTING BLADDER FARM

TENT CAMP

LINED STORAGE AREA

EXISTING TRAILER CAMP

CAMP INFRASTRUCTURE PAD B2
SITE FACILITIES, INCLUDING:

- ACCOMMODATION COMPLEX
- EMERGENCY RESPONSE OFFICE
- EMERGENCY RESPONSE GARAGE
- SEWAGE TREATMENT PLANT
- POTABLE WATER TREATMENT PLANT
- WASTE MANAGEMENT FACILITY

LINED STORAGE

EXISTING WASTE WATER TREATMENT FACILITY

LAYDOWN AREA

AIRSTRIP

WASTE DISPOSAL LAND FARM

EXISTING LAND LEASE BOUNDARY

ROCK QUARRY NO.1

PROJECT DEVELOPMENT AREA

POTABLE WATER SUPPLY

CONSTRUCTION PAD C CONCRETE BATCH PLANT

TOTE ROAD

PROPOSED EXTENT OF QUARRY

PERMITTED OPEN BURN PIT AREA

BORROW PITS

BORROW SOURCE NO.1

MILNE INLET TOTE ROAD

BORROW PITS

PHILLIPS CREEK

0 50 100 150 200 250
SCALE IN METERS

NOTES:

1. TOPOGRAPHY PROVIDED BY TERRAPOINT CANADA INC.
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 1.5 METRES.
4. AS-CONSTRUCTED INFORMATION PROVIDED BY GENIVAR IN 2008.

LEGEND:

- WATER
- PROPOSED QUARRY
- LAYDOWN AREA (CONSTRUCTION PHASE)
- ADVANCED EXPLORATION UNDER EXISTING TYPE 'B' WATER LICENSE
- EARLY WORKS (MAY TO JULY 2013) UNDER NEW TYPE 'B' WATER LICENSE (IN PROCESS)
- CONSTRUCTION PHASE UNDER FUTURE TYPE 'A' WATER LICENSE (JULY TO DECEMBER 2013)
- EXISTING BORROW AREA (IOL COMMERCIAL LEASE)
- EXISTING ROCK QUARRY (IOL COMMERCIAL LEASE)
- RIVER/STREAM/DRAINAGE
- PROJECT DEVELOPMENT AREA
- BAFFINLAND'S COMMERCIAL LEASE ON INUIT OWNED LAND
- ROAD

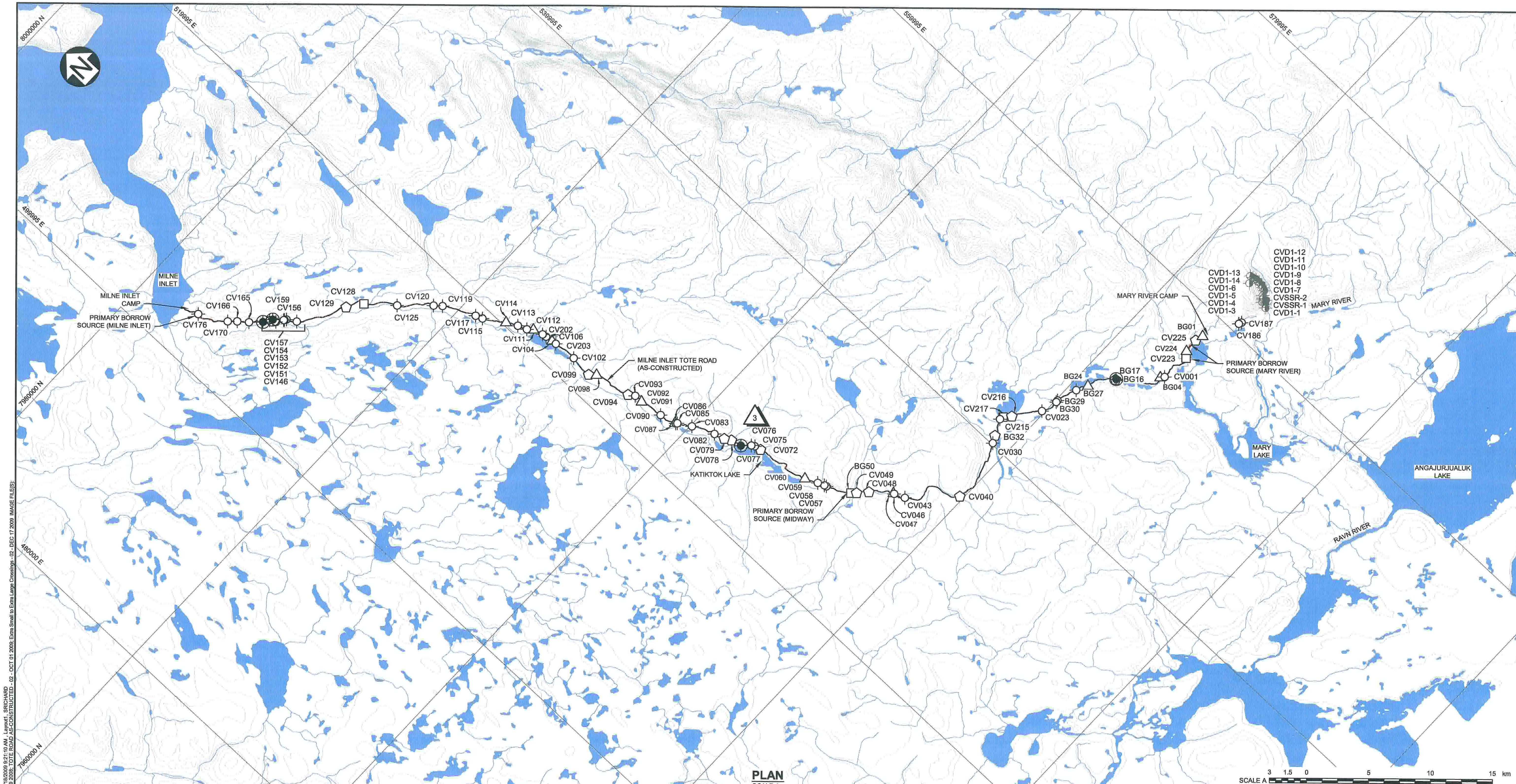
Baffinland Iron Mines Corporation

MARY RIVER PROJECT

MILNE PORT

SITE LAYOUT

SCALE	DWG. NO.	REV.
1:5000 OR AS NOTED	H349000-2000-00-015-0002	A



LEGEND:

- WATER
- MILNE INLET TOTE ROAD
- AIRSTRIP
- EXPLORATION CAMP LOCATION
- CULVERT LOCATIONS
- EXTRA SMALL CROSSING
- SMALL CROSSING
- MEDIUM CROSSING
- LARGE CROSSING
- EXTRA LARGE CROSSING

NOTES:

1. BASE MAP: © HER MAJESTY THE QUEEN IN RIGHT OF CANADA, DEPARTMENT OF NATURAL RESOURCES, (2004). ALL RIGHTS RESERVED.
2. CONTOURS ARE IN METRES. CONTOUR INTERVAL VARIES.
3. COORDINATE GRID IS SHOWN IN UTM (NAD 83) ZONE 17 AND IS IN METRES.
4. MILNE INLET TOTE ROAD ALIGNMENT SURVEY PROVIDED BY GENIVAR (SURVEY COMPLETED IN JULY 2008).
5. (3) EXTRA SMALL CROSSINGS DISPLAYED ARE DFO CROSSINGS REGULATED.

DRG. NO.	DESCRIPTION
REFERENCE DRAWINGS	

REV	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
REVISIONS						

REV	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
3	DEC 18'09	NOTE 5 ADDED - DUPLICATE CV049 REMOVED	EV	SIR	[signature]	[initials]
2	DEC 19'08	UPDATED WITH AS-BUILT INFORMATION	CAP	MD/BSP	AP	KE
1	JUL 31'07	ISSUED FOR CONSTRUCTION	KH/BP	MD	AP	KE
0	JUL 13'07	ISSUED IN FINAL	KH/BP	MD	AP	KE

REVISIONS

Knight Piésold
CONSULTING

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT - BULK SAMPLE PROGRAM

DRAINAGE CROSSING LOCATIONS PLAN (ALL CROSSINGS)

P/A NO.	DRAWING NO.	REVISION
NB102-181/10	400	3

SAVED: I:\1102\00181\10\A\Acad\Dwg\400\400 , 12/18/2009 9:20:46 AM PRINTED: 12/18/2009 9:21:10 AM, Layout1, SRICHARD
XREF FILE(S): Base Map, Milne Route; TOTE ROAD AS-CONSTRUCTED - 01 - JAN 29 2008; TOTE ROAD AS-CONSTRUCTED - 02 - OCT 01 2009; Extra Small to Extra Large Crossings - 02 - DEC 17 2009 (IMAGE FILE(S):

DWG. NO. H349000-4000-00-015-0002

TOM RIVER

CAMP LAKE

SHEARDOWN NW LAKE

MARY RIVER

WASTE ROCK DUMP BOUNDARY AT THE END OF OPERATION

PROJECT DEVELOPMENT AREA

DEPOSIT NO.1 MINING LEASE 2484

PROPOSED OPEN PIT OUTLINE

NEW HAUL ROAD

EXISTING WEATHERED ORE AND WASTE ROCK STOCKPILE

2008 BULK SAMPLE PIT

OPEN PIT DEVELOPMENT

EXISTING HAUL ROAD

BORROW PIT #3

BORROW PIT •2

BORROW PIT •1

BORROW PIT •5

BORROW PIT •4

STORAGE AREA

INCINERATOR

POTABLE WATER PUMP HOUSE

HAZARDOUS WASTE CONTAINMENT BERM

BARRELED FUEL LINED CONTAINMENT

SEALIFT LAYDOWN AREA

EXISTING LAYDOWN AREA

LAYDOWN AREA

BULK FUEL STORAGE FACILITY

NEW AERODROME APRON

QUARRY QMR2

RAW WATER INTAKE

ORIGINAL CAMP

EXISTING CAMP FACILITIES

WASTE WATER TREATMENT FACILITY

HELIPAD

EXISTING POLISHING WASTE STABILIZATION PONDS (PWSPs)

EXISTING AERODROME

AERODROME RUNWAY AND APRON

CRUSHER AND STOCKPILE PAD

CONSTRUCTION LAYDOWN AREA

CAMP INFRASTRUCTURE
- ACCOMMODATION COMPLEX
- EMERGENCY RESPONSE
- MEDICAL CENTRE
- SEWAGE TREATMENT PLANT & OFF-SPEC POND
- POTABLE WATER TREATMENT PLANT

PIT 1 HAUL ROAD

EXISTING HAUL ROAD

ROCK QUARRY NO.2

EXISTING EXPLOSIVES MAGAZINES

UTILITY BERM

ORE CRUSHING AND LOADING

EXISTING SEWAGE DISCHARGE PIPELINE

SITE SERVICE FACILITIES, INCLUDING:
- POWER PLANT
- MINE TANK FARM & DYKE
- MAINTENANCE BUILDING
- WAREHOUSE
- TRUCK WASH FACILITY

EXISTING LAND ROAD

EXISTING LANDFILL

EXPLOSIVES PADS
EXPLOSIVES MAGAZINE
EMULSION PLANT

RAIL PHASE PRIMARY AND SECONDARY CRUSHING

RAIL PHASE STOCKPILE AND INFRASTRUCTURE

EXISTING HAUL ROAD

TREATED EFFLUENT POND

0 200 400 600 800 1000
SCALE IN METRES

MILNE PORT

MINE SITE

KEYPLAN

LEGEND:

- WATER
- PROPOSED QUARRY
- LAYDOWN AREA (CONSTRUCTION PHASE)
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- PROJECT DEVELOPMENT AREA
- BAFFINLAND'S COMMERCIAL LEASE ON INUIT OWNED LAND
- ROAD

Baffinland Iron Mines Corporation

MARY RIVER PROJECT

MINE SITE

SITE LAYOUT

SCALE	DWG. NO.	REV.
1:15000 OR AS NOTED	H349000-4000-00-015-0002	A

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28/05/2013 4:57:57 PM
eis59970

DWG. NO. H349000-4000-00-015-0003

CAMP INFRASTRUCTURE
- ACCOMMODATION COMPLEX
- EMERGENCY RESPONSE
- MEDICAL CENTRE
- SEWAGE TREATMENT PLANT & OFF-SPEC POND
- POTABLE WATER

CONSTRUCTION LAYDOWN AREA

SHEARDOWN NW LAKE

PROPOSED OPEN PIT OUTLINE

DEPOSIT NO. 1
MINING LEASE 2484

EXISTING ROAD

NEW HAUL ROAD

ORE CRUSHING AND LOADING

SITE SERVICE FACILITIES, INCLUDING:
POWER PLANT
MINE TANK FARM & DYKE
MAINTENANCE BUILDING
WAREHOUSE
TRUCK WASH FACILITY

EXISTING EXPLOSIVES MAGAZINES

UTILITY BERM

RAIL PHASE STOCKPILE AND INFRASTRUCTURE

EXISTING LAND FILL ROAD

EXISTING LANDFILL

EXPLOSIVES PADS
EXPLOSIVES MAGAZINE
EMULSION PLANT

TREATED EFFLUENT POND

0 50 100 150 200 250
SCALE IN METRES

MILNE PORT

MINE SITE

KEYPLAN

NOTES:

1. TOPOGRAPHY PROVIDED BY TERRAPOINT CANADA INC.
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 1.5 METRES.
4. AS-CONSTRUCTED INFORMATION PROVIDED BY GENIVAR IN 2008.
5. FOR RAIL PHASE OVERALL GA SEE DWG. H340960-4000-00-014-0001

LEGEND:

- WATER
- PROPOSED QUARRY
- LAYDOWN AREA (CONSTRUCTION PHASE)
- ADVANCED EXPLORATION UNDER EXISTING TYPE 'B' WATER LICENSE
- EARLY WORKS (MAY TO JULY 2013) UNDER NEW TYPE 'B' WATER LICENSE (IN PROCESS)
- CONSTRUCTION PHASE UNDER FUTURE TYPE 'A' WATER LICENSE (JULY TO DECEMBER 2013)
- EXISTING BORROW AREA (IOL COMMERCIAL LEASE)
- EXISTING ROCK QUARRY (IOL COMMERCIAL LEASE)
- RIVER/STREAM/DRAINAGE
- PROJECT DEVELOPMENT AREA
- BAFFINLAND'S COMMERCIAL LEASE ON INUIT OWNED LAND
- ROAD

Baffinland Iron Mines Corporation

MARY RIVER PROJECT

MINE SITE

ENHANCED LAYOUT

SCALE	DWG. NO.	REV.
1:5000 OR AS NOTED	H349000-4000-00-015-0003	A

N

5994,000
596,000
598,000
600,000
602,000
604,000

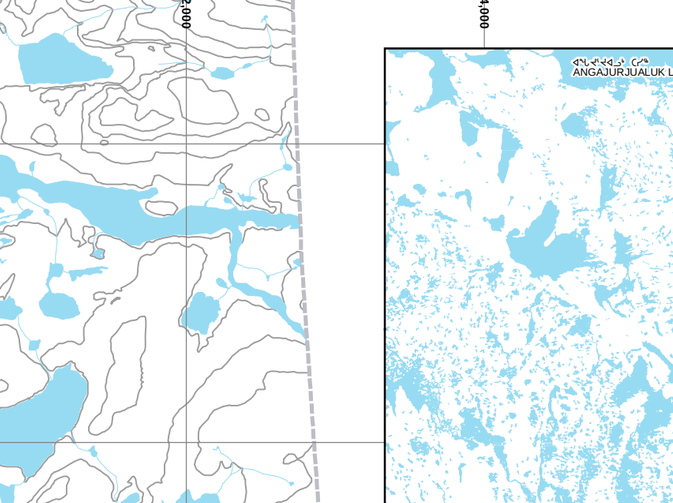
7,878,000
7,876,000
7,874,000
7,872,000
7,870,000

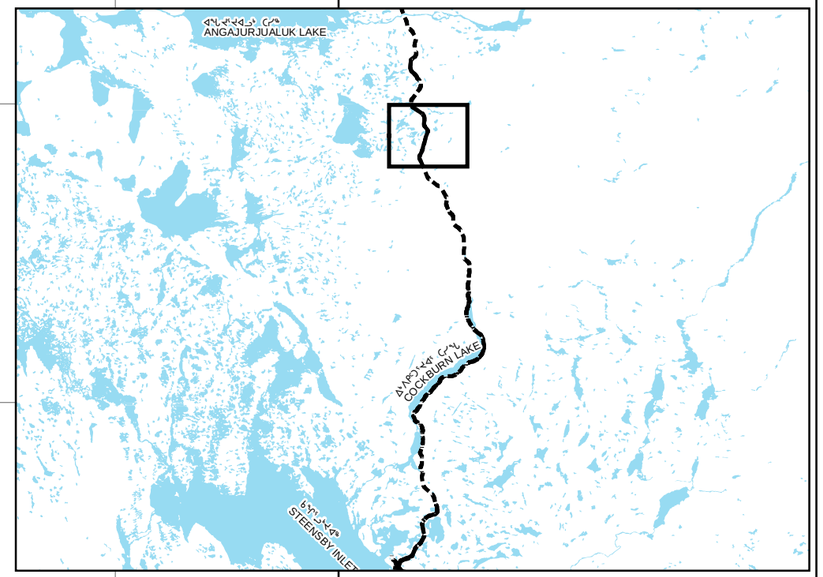
ᓄᓇᕗᑦ ᐃᓕᓴᕐᓂᖅ
2008 WATER SUPPLY INTAKE

ᐊᒻᒪᓗᑦ ᐊᓯᓪᓚᓂᖅ ᓄᓇᕗᒻᒥᐅᑦ
MID-RAIL DRILL CAMP LOCATION

ᐃᓕᓴᕐᓂᖅ ᐊᓯᔾᔨᖅᑎᓂᒃ 10.5 ᒥᑦ
MAX. DEPTH 10.5m

ᓄᓇᕗᑦᑐᖅ ᐊᒻᒪᓗᑦ ᐊᑐᖅᑐᒥᓂᒃ
PROPOSED RAILWAY ALIGNMENT





ᑐᑭᓯᐊᖅᑐᑦ
LEGEND:

- ᐃᒥᒃ WATER
- ᐅᖃᐅᓯ/ᓂᓚᒡᒐᓱᐃᓐᓇᖅᑐᒥᒃ RIVER/STREAM/DRAINAGE
- ᓄᓇᕗᑦᑎᓂᒃ ᐊᒻᒪᓗᑦ PROPOSED RAIL ALIGNMENT
- ᐱᓕᕆᔨᒃᑯᑦ ᑕᒪᓐᓇᖅ EXISTING CAMP (CAMP NOT OCCUPIED DURING 2012)

ᖃᐅᔨᓴᓕᖅᓯᒪᔪᑦ
NOTES:

1. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
   ᓄᓇᒧᐊᓕᓵᔨᑦ EAGLE MAPPING (2005)
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
   ᓄᓇᒧᐊᖅ ᑎᑎᕋᒪᓂᖅ ᒪᓕᒐᒃ UTM (NAD83) ZONE 17
3. CONTOUR INVTERVAL IS IN METRES. CONTOUR INTERVAL IS 2.5 METRES.
   ᑎᑎᕋᒪᓕᑦ ᒥᑦ ᐊᖏᓂᔪᑦ ᑲᒪᔨᓴᑎᑦᑎᓂᑦ 2.5 ᒥᑦ
4. PROPOSED RAIL ALIGNMENT PROVIDED BY CAINARAIL CONSULTANTS INC.
   ᓄᓇᕗᑦᑎᓂᒃ ᐊᖏᓚᑎᓪᓗᒍ CANARAIL CONSULTANTS INC

ᐊᔪᓂᖅ SCALE 500 250 0 500 1,000 1,500 2,000 ᒥᑦ m

Baffinland
IRON MINES CORPORATION

ᓄᓕᒋᓂ ᐅᓴᖏᓱᐅᑦᑐᑦ MARY RIVER PROJECT

ᒪᑐᓇ ᖃᓄᐃᓕᖅᑐᓂᖅ ᐊᖏᓚᑎᑦ ᐊᐅᓚᐊᖅᑐᓂ ᓄᓇᕗᒻᒥᐅᑦᑐᖅ
EXISTING SITE LAYOUT AT MID RAIL CAMP

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB102-181/33	NB13-00093

ᑎᑎᕆᐅᕐᓯᒪᔪᓂᒃ **FIGURE** 1.6 REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	26MAR'13	ISSUED WITH NWB ANNUAL REPORT	JM	AS	TM	JM

SAVED: I:\1\02\00\181\133\AVGIS\Figs\B04_r0.mxd; Mar 27, 2013 10:26 AM;

ᑲᖏᕐᓗᓵᕆᔨᖅ
STEENSBY INLET

ᒪᓕᓇ ᐃᖅᑭᑦᓯᐊᖏᑦ ᓄᓇᒃᑎᓂᖅ ᑲᓇᖅ ᐊᖏᖁᑎᓂᖅ (ᑕᐃᓚᐅᔪᓂ)
EXISTING STEENSBY INLET CAMP LIMITS (APPROX.)

ᑲᑎᑦᓴᓚᐃᓂᖅ
FUEL DRUM STORAGE

ᐃᓂᒃᑎᖅ
LAYDOWN AREA

ᑲᓇᖅ ᐃᒥᑦᑕᕐᓂᖅ ᑕᑭᓐᖏᑐᖅ 3 ᑭᓚᒥᑕ
3 Km LAKE WATER SOURCE

ᒪᓂᖅᓯᓐᓂᖅ
METEOROLOGY STATION

7803750 N
7802500 N
7801250 N
7800000 N
7798750 N

5937 E
596000 E
596250 E
597500 E
598750 E

ᑐᑭᓯᐅᖅ
LEGEND:

- ᐃᒥᖅ WATER
- ᓄᑖᒃ/ᓂᓚᑦᑐᒃᓴᓂᖅ RIVER/STREAM/DRAINAGE
- ᓴᖅᓂᖅ ᓄᓇ WETLAND

NOTES:

1. COORDINATE GRID IS UTM (NAD83) ZONE 17 AND IS IN METRES.
2. CONTOUR INTERVAL IS 5 METRES.
3. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
4. PROPOSED RAIL ALIGNMENT PROVIDED BY CANARAIL CONSULTANTS INC. OCTOBER 7, 2008.
5. STEENSBY INLET INFRASTRUCTURE PROVIDED BY GENIVAR. DECEMBER 9, 2008.

ᖃᐅᔨᓪᓚᕆᐊᓕᑦ

1. ᓄᓇᕗᑦ ᑎᑎᕋᓚᖓ ᒪᓕᒐᖓ UTM (NAD83) Zone 17
2. ᑎᑎᕋᓚᐅᑦ ᑕᑦ: ᐊᖑᓂᓕᑦ ᑲᖏᕐᕋᑎᒋᑦ 5 ᑕᑦ
3. ᓄᓇᕗᐊᓕᓴᓂᑦ Eagle Mapping (2005)
4. ᓄᓇᕋᐅᑎᓄᑦ ᑭᖑᓂᖓᖏᖓ Canarail Consultants Inc
5. ᐅᐅᕐᑦᕕᐅᔭᖅ ᑎᑎᕐᐅᕐᕋᓚᖓ Genivar

ᓴᕐᓂᖓ SCALE 250 12.5 0 250 500 750 1000 1250 ᑕᑦ m

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	27MAR'13	ISSUED WITH NWB ANNUAL REPORT	JM	AS	TM	JM

Baffinland Iron Mines Corporation

ᓄᓇᕗᑦ ᐅᕙᖓᓄᑦ MARY RIVER PROJECT

ᐃᐅᐱᑦᑐᓴᐊᑦ ᓄᓇᕐᖏᖓ ᖃᓄᐃᑐᓚᖓᑦ
EXISTING SITE LAYOUT AT STEENSBY PORT

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB102-181/33	NB13-00093

ᑎᑎᕋᐅᔨᕆᓚᐅᖅ FIGURE **1.7** REV 0

SAVED: \\1\V2\00\18\13\AA\acad\FIGS\BRB r0 3/26/2013 8:31:55 AM - ASIMPSON, PRINTED: 3/26/2013 8:33:02 AM, Layout1 - ASIMPSON
XREF FILE(S): STEENSBY PORT AREA 01 APRIL 22 2008, steensby lakes 1MGE FILE(S): Bathymetrytopography.dwg Pg 24

Annex 8

Table of Concordance

- Concordance Table with Type A Water Licence (2AM-MRY1325) Conditions
- Concordance Table with Nunavut Impact Review Board (NIRB) Project Certificate.

Table A.8-1 shows the Part, number and Condition of the Type A water License (Water Licence No: 2AM-MRY1325) and the location within the Waste Management Plan for Construction, Operation and Closure.

Table A.8-1. Concordance Table with Type A Water Licence (2AM-MYR1325) Conditions

Part	Number	Condition	Section
D	18	The Licensee shall submit a Construction Monitoring Report to the Board, within ninety (90) days following the completion of any structure designed to contain, withhold, divert or retain Waters or Wastes. The construction summary report shall be prepared by an Engineer(s) in accordance with Schedule D, Item 1.	Within 90 days the completion of any structure designed to contain, withhold, divert or retain Waters or Wastes
D	20	The Licensee shall prevent any chemicals, fuel or wastes associated with the undertaking from entering any Water body.	Section 4.3.3 Section 4.3.4
F	1	The Board has approved with the issuance of the licence, the Plan entitled “Baffinland Iron Mines Corporation Mary River Project Waste Management Plan for Construction Operation, and Closure”, dated April 2013.	N/A
F	4	The Licensee shall provide a revised Waste Management Plan, as required under Part B, Item 15(d), that takes into consideration for this and future revisions under this Licence, the following: a. A Quality Assurance and Quality Control Plan for open burning procedures under this Licence; b. Provide a section and information on the proposed land disposal of dredging waste for the purposes of construction at Milne Port Site and Steensby Port Site, with information on location, amount of materials, method of disposal and any mitigation measures required for the protection of water.	a) Section 8.9 b) Prior to dredging an update of the management plan will be done and provided to the NWB as per the annual reporting requirements
F	6	The Licensee shall locate areas designated for waste disposal at a minimum distance of thirty-one (31) metres from the ordinary High Water Mark of any water body such that the quality, quantity or flow of water is not impaired, unless otherwise approved by the Board in writing.	Section 4.3.3 Section 4.3.4
F	7	The Licensee is authorized to dispose of all acceptable food waste, paper waste and untreated wood products in an Incinerator System;	Section 4.2 Section 4.5
F	8	The Licensee shall test the bottom ash generated by all Incinerator Systems, by using the acceptable test procedures for analyzing residuals, prior to being disposed of at any Landfill Facility. If the composition of the ash makes it unsuitable for disposal at the Landfill facilities, the Licensee shall direct the Waste to an appropriate facility for disposal. The records of analysis results and volumes of ash shall be maintained and provided to an Inspector upon request.	Section 4.5.3

Part	Number	Condition	Section
F	9	The Licensee shall not open burn plastics, wood treated with preservatives, electric wire, Styrofoam, asbestos or painted wood, to prevent the deposition of waste materials of incomplete combustion and/or leachate from contaminated ash residual, from impacting any surrounding waters, unless otherwise approved by the Board in writing.	Section 4.4.3
F	11	The Licensee shall submit to the Board and the Inspector, thirty (30) days prior to the removal and transfer of waste, a declaration of authorization from any community receiving waste from the project, which clearly states that authorization has been granted for the deposit by the Licensee at the Hamlet's appropriately licensed facilities.	Section 4.3.3 Section 4.3.4
F	12	The Licensee shall provide at least ten (10) days' notice to the Inspector prior to planned Discharges from any Waste Management Facility, Oily Water/Wastewater Treatment Facilities, Sewage Treatment Facilities, and any other relevant facilities associated with the Project. The notice shall include the estimated volume proposed for Discharge and the location and description of the receiving environment.	Section 4.3.4
F	14	The Licensee shall remove any waste generated from temporary and permanent shelters along the tote road and along the railway corridor for treatment at appropriately licenced Waste Management Facilities.	Section 4.3.3
F	30	The Licensee shall maintain records of all Waste backhauled from the Mary River Project and confirmation of proper disposal through the use of Waste manifest tracking systems and registration with the Government of Nunavut, Department of Environment. These records shall be made available upon request, to an Inspector or the Board.	Section 4.3.3 Section 4.3.4

Table A.8-2 shows the number and Condition of the NIRB Project Certificate and the location within the Waste Management Plan for Construction, Operation and Closure.

Table A.8-2. Concordance Table with NIRB Project Certificate

Number	Condition	Section
11	The Proponent shall develop and implement an Incineration Management Plan that takes into consideration the recommendations provided in Environment Canada's Technical Document for Batch Waste Incineration (2010).	Appendix 3
12	Prior to commencing any incineration of on-site Project wastes, the Proponent shall conduct at least one stack test immediately following the commissioning of each temporary and permanent incinerator.	Section 4.5
64	The Proponent shall ensure that its Environment Protection Plan incorporates waste management provisions to prevent carnivores from being attracted to the Project site(s). Consideration must be given to the following measures: a) The Proponent shall ensure that its Environment Protection Plan incorporates waste management provisions to prevent carnivores from being attracted to the Project site(s). Consideration must be given to the following measures: Installation of an incinerator beside the kitchen that will help to keep the food waste management process simple and will minimize the opportunity for human error (i.e. storage of garbage outside, hauling in a truck (odours remain in truck), hauling some distance to a landfill site, incomplete combustion at landfill, fencing of landfill, etc.); and b) Installation of solid carnivore-proof skirting on all kitchen and accommodation buildings (i.e., heavy-duty steel mesh that would drop down from the edge of the buildings/trailers and buried about a half meter into the ground to prevent animals from digging under the skirting).	This Condition has been addressed in the Construction Environmental Protection Plan (H349000-1000-07-126-0001)