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1. Introduction

1.1 This specification is for incinerators to be installed as part of the Mary River Iron Ore Project for Baffinland Iron Mines Corporation, located on North Baffin Island, in the Qikiqtani Region of Nunavut, Canada.

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~~1.2~~ ~~.[1]The scope of work is outlined in Section 01 11 00 – Summary of Work.~~

~~1.3~~ ~~This specification to be used in conjunction with the reference specifications listed in:~~

- ~~Section 01 10 00 – Enquiry Package Specification Index~~
- ~~Section 01 11 00 – Summary of Work~~

2. Regulations, Standards and Codes

2.1 The International System (SI) will be used for all design calculations and on all drawings.

2.2 The equipment shall comply with all applicable Canadian and territorial standards, codes and regulation as appropriate to project location.

2.3 The equipment shall comply with all appropriate standards, codes and regulation, including, but not limited to, those listed below:

Number/Acronym	Title	Revision
Department of the Environment, Government of Nunavut	Guideline: Burning and Incineration of Solid Waste	October, 2010
IFC/World Bank Environmental, Health & Safety Guidelines	Guidelines for Waste Management Facilities	December 10, 2007
IFC/World Bank General Environmental, Health & Safety Guidelines	Air Emissions and Ambient Air Quality	December 10, 2007

2.4 The equipment manufacturer shall comply with all appropriate certifications, including, but not limited to, those listed below, in addition to all the ones listed in the standard specifications and specification index:

Number/Acronym	Title	Revision
IFC/World Bank Environmental, Health & Safety Guidelines	Guidelines for Waste Management Facilities	December 10, 2007
IFC/World Bank General Environmental, Health & Safety Guidelines	Air Emissions and Ambient Air Quality	December 10, 2007
IFC/World Bank Performance Standard 3: Pollution Prevention & Abatement	EHS Guidelines: Environmental Waste Management	April 30, 2007

[1] References removed.

2.5 Bidder must provide documentation to prove under expected operating conditions that the unit will perform in accordance with section 2.2, 2.3 and 2.4.

2.6 All test method details, timing, sampling protocols and procedures and tolerances shall be developed by the Vendor, submitted with the bid package and agreed upon with the Owner before issue of a purchase order.

3. Design Requirements

3.1 General

3.1.1 For design requirements and conditions, refer to the Specification Index and Summary of Work attached with this specification. Additional specific requirements are provided below.

3.1.2 All incinerators performance and design must comply with H337697-4060-07-109-0001 – Design Basis for Incinerator.

3.1.3 Equipment and components shall be the Vendors standard design for the service and conditions specified, with readily available replacement parts. No new technology shall be applied to the design of the equipment without examples of operating equipment using the technology in similar design conditions.

3.1.4 The equipment shall be designed considering exposure and operating under the following:

- Extremely low temperatures in arctic climate conditions. The climate conditions are listed in H337697-0000-10-107-0001 – Site Conditions Data Sheet, and reach temperatures of -50 degrees C in winter.
- Operation on board a vessel at sea.

3.1.5 Vendor must meet and/or specify all requirements listed in section D118219 – Technical Data Sheet. Vendor must provide completed copy of Technical Data Sheet, in native format, on bid submittal.

3.1.5.1 The Vendor shall notify the Buyer if any specific requested component or requirement is unsuitable for the required service and present alternatives, along with the technical justifications.

3.2 Operational Requirements

3.2.1 Incinerator units must have the capacity to process 2.70kg (2.25kg + 20% contingency) of waste per person per day on board.

3.2.2 Incinerators must be able to achieve greater or equal to 90% volume reduction after process completion.

3.2.3 Waste will include food waste, hydrocarbon and solvent contaminated waste and dewatered sewage treatment sludge.

3.2.4 Bidder to assume estimated densities for waste streams at 160-240kg/m^3.

3.2.5 The units must be designed with an appropriate secondary combustion design and emission controls to ensure off-gas emissions meet Canadian and Nunavut requirements and the IFC's General EHS Guidelines for air emission standards for all waste streams listed in 3.2.3 and 3.2.4 above. The Vendor will be required to provide a letter confirming that the unit will meet those standards under normal operating conditions for this environment.

3.2.6 Incinerators are to be diesel operated with the option of recycled oil from the maintenance shop being added into the fuel stream. Vendors are to provide operating efficiency and performance information for both options (diesel fuel only or diesel fuel plus recycled oil) and provide diesel to oil ratios where appropriate.

3.2.7 Bidder to provide specifications on power requirements, fuel requirements and tie-in requirements.

3.2.8 Bidder to provide price breakdowns for units sized for project and specific site needs.

3.2.9 Bidder to provide layout and elevation drawings for each unit proposed.

3.2.10 Wastes will be sorted by others prior to loading of the units.

3.3 Site Conditions

3.3.1 See attached Site Conditions Data Sheet, H337697-0000-10-107-0001.

3.4 Duty

3.4.1 The equipment shall be designed for continuous service under the specified process and operating conditions.

3.4.2 The equipment will be designed to operate as batch units operating at full load, 360 days per year without requiring excessive maintenance.

3.4.3 Design all equipment components such that corrosion and wear are minimized.

3.4.4 The equipment shall be designed to operate at sea.

3.5 Material Characteristics

3.5.1 The Bidder shall fabricate the equipment using only new materials of first grade quality, free from defects impairing strength, durability and appearance.

3.5.2 After the Purchase Order is issued, the Vendor shall not substitute materials after the bid has been accepted, without prior written approval from the Buyer.

3.5.3 Materials of construction shall be suitable for the specified duty and operating conditions.

3.5.4 Use the lowest material density for volumetric capacity calculations. Use this volume and the highest material density for power calculations.

3.6 Mechanical Requirements

3.6.1 General

3.6.1.1 All equipment and all components shall be the Vendor's standard heavy-duty design and fabrication suitable for the climatic and operating conditions, and shall have been proven effective and reliable under similar operation. No new or unproven design is acceptable.

3.6.1.2 Not all parts and materials are specified in this specification. For those that are not specified, the Vendor shall use their standard parts and materials suitable for the specified conditions, which will be subject to the approval of the Buyer.

3.6.1.3 The Vendor shall notify the Buyer if any specific requested component is unsuitable for the required service and present alternatives, along with the technical justifications.

3.6.1.4 The Vendor shall notify the Owner if any specific requested component is unsuitable for the required service and present alternatives, along with the technical justifications.

3.6.2 Materials

3.6.2.1 A certificate of material compliance is required where special alloys other than carbon steel are used.

3.6.2.2 The incinerator assembly shall be made of carbon steel plate and adequately reinforced with structural steel members.

3.6.2.3 Heat resistant type paint shall be used for all parts to be painted.

3.6.2.4 For sheet steel hot dip galvanised coating to ASTM B852-94 and for irregular shaped articles 380 g/m^2 zinc coating to CSA G164 standard shall be applied.

3.6.3 Fabrication

3.6.3.1 The entire incineration system with its components shall be fabricated and packaged in the Vendor's shop as much as possible to minimize field work.

3.6.3.2 Vendor shall fabricate and layout the whole system within the maximum dimensions permissible for transportation. The system shall be ready for start-up with minimal field assembly, except for interfacing with the required site facilities.

3.6.3.3 Equipment shall be built square, true, straight and accurate to required size, with joints closely fitted (weather-tight) and properly secured.

3.6.3.4 Exposed welds shall be continuous for length of each joint, welding shall be in accordance with CSA W59 and welds shall be filed or ground to give a smooth finish.

3.6.3.5 The primary and secondary chambers shall be seal welded completely to prevent the inclusion of incoming air.

3.6.3.6 The design and construction of the incinerator and all associated components shall be such that, in service, they will not crack, warp, or otherwise fail structurally so as to permit flame passage or emission of combustion gases or sparks into the building.

3.6.3.7 Explosion relief shall be provided as per National Fire Protection Association NFPA 82.

3.6.4 Spark Arrester

3.6.4.1 Spark arrester shall be installed on incinerator stack. Exceptions shall be as per NFPA 82.

3.6.5 Access for Inspection and Maintenance

3.6.5.1 Primary and secondary chambers shall be provided with adequate access doors for waste loading, inspection, maintenance and ash discharge.

3.6.5.2 Door assembly shall include a sealing device adequate to stand the internal temperature of the chambers and to prevent air leakage from outside. The door assembly shall be designed to hold a minimum of 12.5mm (0.5 inch) water negative pressure.

3.6.5.3 Vendor shall provide adequate ladder and platform for easy access and personal safety guards to perform regular operations, inspection and maintenance of incinerator and ancillary equipment.

3.6.6 Sampling Ports

3.6.6.1 The incinerator stack design shall incorporate appropriate sampling ports (with caps where necessary) at appropriate locations to allow for stack testing to be undertaken when required during incinerator operation.

3.6.7 Refractories

3.6.7.1 The calculated cold face temperature of the exterior surface of the casing shall not be more than 82°C based on ambient temperature outdoors.

3.6.7.2 The castable refractory shall be secured to the inside of the steel casing with anchors made of stainless steel.

3.6.8 Waste Loading and Ash Removal Facilities

3.6.9 Vendor shall provide incinerator units with an efficient method to measure waste prior to unit loading.

3.6.9.1 Vendor shall provide a system with related facilities to ensure the operation can be carried out efficiently and safely with minimum involvement of the operator. A complete description of the ash removal system including operator requirements shall be included in the bid.

3.6.9.2 Vendor shall design such that ash removal from the primary chamber will be initiated automatically or manually at the end of the cool-down cycle.

3.6.10 Stack and Breeching

3.6.10.1 Vendor shall design, fabricate and supply a stack, to conform with CSA and local code requirements.

3.6.10.2 Outer shell shall be of galvanized sheet steel formed to required thickness and diameter with appropriate heat resistant paint suitable for galvanized steel. Vendor shall include an option to supply stainless steel shell.

3.6.10.3 Spark-arrester screen shall be provided at top of stack with 2.9 mm steel wire in 12 mm mesh, formed around 10 mm diameter reinforced bar frame. Galvanized finish shall be applied after fabrication.

3.6.10.4 A stack sampling station shall be included.

3.6.11 Specific Mechanical Requirements

3.6.11.1 Insulation is to be provided in accordance with all applicable health, safety and environmental standards as appropriate to buyers needs and are to be included to isolate personnel from heat produced by the incineration process.

4. Electrical Requirements

4.1 Electrical design shall comply with the following:

- Section S26 00 50 – Electrical Requirements for Packaged Equipment

4.2 Vendor package will be fed at 600V, resistance grounded.

4.3 Vendor to identify the ampacity and number of required feeds.

4.4 Vendor is responsible for all downstream electrical equipment including MCCs, motor feeders, lighting and auxiliary transformers and panels, lighting fixtures, heaters welding outlets, etc.

4.4.1 Vendor shall provide complete Burner Management Package (BMP) for fuels used. BMP shall monitor pilots, main burners, fans, fuel supplies, combustion chambers, stack and all other required control parameters. BMP shall also shutdown the incinerator upon a system failure and/or detection of a hazardous condition.

4.4.2 Temperature control shall be segmented per burner gallery. Temperature control of the stack shall be included in the control scheme, as required to meet waste incineration requirements.

4.4.3 Other control parameters to be considered are:

- Burn time
- Residence time in secondary chamber.

4.4.4 Vendor shall provide the power requirement details for the operation of the incinerator as well as all ancillary facilities.

5. Instrumentation and Controls Requirements

5.1 General

5.1.1 The Vendor must supply a fully integrated and functional system for the optimal, safe and reliable operation of all equipment.

5.1.2 Instrumentation and controls design shall comply with the following:

- Section S25 00 50 – Instrumentation Requirements for Packaged Equipment.

5.1.3 Local control panel shall include, but not limited to, switches, pushbuttons, local indication, indicator lights, and main disconnect switch.

5.1.4 All control wiring within the battery limits shall be provided by the Vendor.

5.1.5 Generally, the control system will integrated by the Buyer. The Vendor shall list any exceptions if necessary for the proper operation of supplied equipment.

5.1.6 The Vendor shall supply a detailed functional description complete with loop narratives for each equipment system and sub-systems to allow the system integrator to configure the plant control system.

5.1.7 The Buyer must approve all exceptions or deviations from these requirements.

5.2 Specific Instrumentation Requirements

5.3 The Vendor shall provide a list of signals (alarms, monitoring and interlocks) to be monitored and/or controlled from the Buyer's Plant Control System.

5.4 The Buyer shall provide a written narrative functional description of all process control requirements that will allow the Buyer to develop software for the Plant Control System.

6. Sound Level and Vibration Requirements

6.1 Sound levels and vibration shall comply with all applicable Standards and Regulations listed in section 2 of this document.

7. Painting

7.1 All exterior metallic surfaces of equipment shall be prepared and painted according to buyers use. In the case of Vendor standard items, the Vendor may propose the manufacturer's standard paint system with justification, subject to approval by the Buyer.

7.2 Painting shall not be required for parts of equipment that are manufactured of or coated with corrosion resistant materials, that are machine finished or normally left unpainted.

7.3 Machine finished parts that are not manufactured of corrosion resistant materials and are not painted, shall be given a heavy coat of rust-inhibiting compound that can be easily removed at installation by the use of solvents and hand wiping.

8. HSEC Requirements

8.1 General

8.1.1 [2]Protection designed for the valid codes and standards must be installed in order to avoid operator injury. Minimum required protection as follows:

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- Operation point protection
- C22.1-09 Canadian Electrical Code, Part 1 with hazard classifcation where required
- CSA-S432-04 Safequarding of Machinery
- Hot spots protection
- Dust emission protection
- Tools protection
- Collision detection system (between machines)
- ~~Fire protection and detection system as per National Fire Protection Association (NFPA) 82 – Standard on Incinerators and Waste and Linen Handling Systems and Equipment.~~

8.2 Specific Requirements

8.2.1 Must comply with all applicable Canadian and Territorial regulations and guidelines.

8.2.2 Must comply with the IFC/World Bank EHS Guidelines for Waste Management.

[2] Reference removed, hazard classification requirement added

9. Performance Requirements

9.1 Guarantees

9.1.1 The Vendor shall provide a written Guarantee that:

- All equipment is designed and supplied to meet the duties and conditions specified.
- All equipment will, in plant operation as outlined in the equipment data sheets, perform to the requirements specified herein and on the equipment data sheets.

9.1.2 Instrument and systems (Boiler Management System) certification to comply with Section S25 00 50 – Instrumentation Requirements for Packaged Equipment.

9.2 Warranty

9.2.1 The Vendor shall warrant the equipment in accordance with the requirements of the Buyer's Terms and Conditions, attached, Document number DOC-GCCP-03-2006.11

9.3 Test Methods and Procedures

9.3.1 Standard emissions testing protocols or Buyer agreed upon equal.

9.3.2 All test method details, timing, sampling protocols and procedures and tolerances shall be developed by the Vendor, submitted with the bid package and agreed upon with the Buyer before issue of a purchase order.

10. Assembly and Testing

10.1 Critical Dimensions

10.1.1 All critical dimensions shall be checked prior to shipment. All ancillaries shall be assembled and all motions tested in accordance with manufacturers standard procedures. Prior to disassembly all components shall be match marked, where practical, for ease of field assembly. The Vendor shall describe the extent of field assembly required.

10.2 Equipment Assembly

10.2.1 All equipment shall be shipped assembled to the maximum extent possible consistent with shipping limitations indicated below. The Buyer shall be consulted prior to the shipment of large components.

10.3 Pre-Assembly

10.3.1 All pre-piped and pre-assembled lube oil and hydraulic oil systems shall be tested for their output pressures and motions to the maximum extent possible

10.4 Specific Testing Requirements

10.4.1 Instrumentation systems testing to comply with Section S25 00 50 – Instrumentation Requirements for Packaged Equipment.

10.4.2 Complete incinerators shall be tested for operation under simulated service conditions to verify temperature monitoring, status indication, alarm and operating functions.

10.5 Control System Components

10.5.1 At the Buyer's option, Vendor-furnished control systems components shall be subject to Buyer-witnessed Factory Acceptance Test (FAT) in accordance with test procedures that shall be submitted by the Vendor and reviewed by the Buyer. All input/output signals and control functions shall be simulated. If required, the Vendor-furnished components may be subject to integration testing with the main project PCS system.

10.5.2 The Vendor shall submit a Site Acceptance Test procedure that will be subject to the Buyer's review and permission to proceed. Items such as proper equipment grounding, powering up, checking for correct software installed, etc. shall be included in the procedure.

11. Shipping, Construction, Commissioning and Operator Training

11.1 Shipping

11.1.1 The equipment will be shipped to an assembly site in the largest feasible sections that allow transportation by road and water. Protective coatings and coverings shall be applied to ensure that the equipment is not damaged during shipment. The Vendor shall provide match-marking of all parts to facilitate field assembly and shall provide shipping dimensions and weights of all components and assemblies.

11.2 Construction Supervision, Testing and Commissioning

11.2.1 The Vendor shall make available qualified personnel to advise and assist with on-site supervision of construction and assist with testing and commissioning. The Vendor's expense policy must be outlined in the bid document. The Buyer, and/or his representative and any Authorities having jurisdiction over the equipment shall witness all tests.

11.3 Operator Training

11.3.1 If requested, the Vendor shall train operators and supervisors in the operation of the supplied equipment. Such training shall include:

- Training lectures and lecture notes.
- On-the-job training during commissioning and plant operation.

11.3.2 The Vendor will supply rates and terms for such training.

12. Spare Parts

12.1 This specification details the required information that the Vendor shall supply as part of its bid, a detailed list of the following recommended types of spare parts:

12.2 Spare Parts Recommended for Installation, Commissioning And Start-Up: Spares required specifically due to initial high wear and which may fail due to abnormal operating conditions during start-up, commissioning, but are not considered normal operating spares.

12.3 Spare Parts Recommended for 2 Year Continuous Operation: Spares required during first two years of operation due to normal wear and tear, and/or parts which may fail due to abnormal operating conditions.

12.4 Capital Spare Parts: These are major replacement components that would be required as spares on hand when undertaking a periodic major refit operation, or are required to be on hand to avoid a major production stoppage in the event of an unexpected failure or damage to a critical component.

12.5 Consumables And Special Tools. These are as follows:

- These lubricants, i.e., specific type of graphite blocks, grease, oils, hydraulic fluids and etc. cleaning fluids, specials wearing surfaces for seals.
- Replaceable wearing components for such as brake linings, rotating seal linings, or customized gaskets.
- Jig, tools, and other specialized devices required to install spares/parts.
- Lifting gear or support jigs and specialized tools required to service the units.

13. Quality Assurance

13.1 The equipment will be subject to Quality Surveillance Level 1 as indicated Section S01 43 00 – Quality Management.

13.2 The Vendor must prepare a quality assurance and inspection/ test plan and submit for Buyer's approval. No changes to the plan will be allowed during implementation without prior consent from the Buyer. Refer to Section S01 43 00 – Quality Management for the requirements of this plan.

END OF SECTION