CHAD DEVELOPMENT PROJECT

TECHNICAL SPECIFICATION

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1.0 SCOPE

1.1 This specification covers the general requirements for design, fabrication, inspection, testing, supply and installation of a waste incinerator system and its associated equipment to be used for on-site incineration of municipal and construction debris, and crude oil/solids.

1.2 The system will be located outdoors in an oil and gas production facility. The system shall be capable of safely incinerating construction debris, construction personnel waste including kitchen waste and bio-sludge, medical waste, municipal waste, and industrial waste.

1.3 The system shall provide (with proper maintenance) long term (30-years project life) reliable operation (incinerator may not run continuously).

*1.4 The incinerator shall be designed to process a minimum of 5 million BTU/hr for 8 hours a day. Additional design capacity shall be determined by Contractor in order to ensure incineration capacity for its wastes as required by its waste management plan and to incinerate all combustible camp/office and industrial wastes during operation.

1.5 No chlorinated wastes will be feed to incinerator and waste feed mixture will have a minimum heat content of 6000 BTU/LB.

1.6 The incinerator should be designed to comply with US EPA regulations for municipal waste incineration (40CFR240), at a minimum, to insure long term quality of operation. Design shall also be appropriate for any solvents or hazardous wastes that may be incinerated as per Contractor's Waste Management Plan.

1.7 The system shall be a complete package of the Supplier's standard design suitable for the application as described in this specification. This package may include, but not necessarily be limited to, the following items:

- primary and secondary combustion chambers
- blowers, drivers, coupling, guards, ducts and equipment shelter
- built-in stack
- trays or containers for solids or sludge
- refractory lining
- fuel handling equipment capable of firing diesel fuel
- automatic ash removal facilities

- burner management controls system
- pollution control equipment, as required
- waste pre-processing (e.g., shredding) and loading system
- start-up and commissioning of the system

1.8 A pound sign (#) indicates that ESSO review/approval is required before design is finalized or equipment is purchased.

1.9 An asterisk (*) indicates that additional information is required. This additional information is provided in other project documents or will be furnished during the detailed engineering phase.

2.0 SUMMARY OF ADDITIONAL REQUIREMENTS

2.1 All codes, standards, regulations and specifications referred to in this specification shall form an integral part of this specification.

2.2 Table 1 lists the other CCS specifications, codes and standards which shall be used as a part of this specification:

TABLE I

SPECIFICATIONS	
CCS	
2-1-1	Equipment Noise Level Data Requirements
3-4-1	Piping for Fired Equipment
3-18-1	Piping Fabrication
3-19-1	Piping Erection Testing
4-1-2	Structural Steel Design, Fabrication and Erection
4-1-3	Design Loads for Structures
4-2-1	Auxiliary Structures for Operation & Maintenance
15-0-100	General Instrument Specification
15-2-1	Temperature Instruments
15-3-1	Pressure Instruments
15-6-2	Environmental Protection for Electronic Devices
15-6-3	Programmable Logic Controllers
15-11-1	Instrument Control Panels
16-9-1	AC Motors
20-1-1	Inspection of Equipment and Materials
20-1-3	Quality Programs and Quality Assurance Plans
21-20-108	Environmental Impact Mitigation
CODES AND STANDARDS	
ASME	
B31.3	Chemical Plant and Petroleum Refinery Piping
B16.5	Steel Pipe Flanges and Flanged Fittings
B16-47	Large Diameter Steel Flanges NPS 26 through NPS 60
	Richard A. Connery and N.D. Ross Handbook of Industrial Waste Disposal , Van Hostrand and Reinhold 1980

3.0 DOCUMENTATION

3.1 Supplier shall supply drawings and data in sufficient detail to define interface requirements, describe all systems including accessories, define operational requirements, necessary foundation and other related installation and support services needed for the waste incinerator system.

4.0 DESIGN/CONSTRUCTION FEATURES

4.1 The incinerator design must address the following:

- Unit must provide a safe and low maintenance feed system. Feed door system must provide adequate seals.
- System must provide excellent burn out of all organics. The destruction removal efficiency (DRE) for organics shall be >99% for a resulting ash organic content <1.0% carbon by wt.
- Minimum combustion temperature 815 °C (1500°F) in primary stage and 982 °C (1800°F) in secondary stage.
- Thermal NO_x <45 ppm
- Particulate loadings $\leq$ 0.10 grains/dSCF corrected to 12% CO_2
- Unit must have a minimum of two combustion stages.
- Flue Gas residence time $\geq$ 1.5 seconds.
- Unit will be operated 8 hours/day.
- % opacity $\leq$ 5.
- Input material density 2000 lbs/yd^3.
- A shredder shall be provided to reduce all waste feed to 3 in. max. (widest dimension)

4.2 Incinerator will be provided with low fire system capable of maintaining a unit temperature of 105 °C (220°F) minimum.

4.3 The incinerator instrumentation must be kept to a minimum for long term maintainability and ease of operation. The unit will be designed for manual operation to the extent possible.

4.4 Waste Classification

The classification of potential wastes to be incinerated shall be as per the following table.

TABLE 2

Waste Type	Description	Typical Analysis	Moisture wt. %	Density kg/m³	Heat Content kJ/kg
0	Dry industrial & commercial rubbish	Cardboard, dry paper, wooden pallets, floor sweepings, plastic bags	10	5	8500
1	General industrial commercial & domestic rubbish	Cardboard, paper, floor sweepings, up to 20% kitchen waste	25	10	6500
2	Refuse	Kitchen & domestic wastes, wet paper, floor sweepings, garden waste	50	15	4300
3	Pathological materials	Hospital dressing, disposable bedding, gowns, etc.	10-30	5-15	4500-8000
4	Pathological remains	dead animals, human tissue, etc.	85	25-75	1000
5	Industrial wastes/oil sludge	Industrial process wastes	-	850-960	40,000
6	Semi-solid and solid wastes	Combustibles requiring hearth, retort, or grate burning equipment	-	Variable according to waste survey	Variable according to waste survey

Note: Waste classification based on Handbook of Industrial Waste Disposal, Tables 9-1 & 9-3.

#4.5 Design Basis

The design basis, waste production rate, required incinerator capacity, operational features and fuels supplied shall be specified in a waste incinerator data sheet to be supplied to ESSO for approval. Capacity will be as indicated in 1.4. Contractor may use the incinerator during construction provided the system is fully refurbished, operational and does not show unreasonable wear when turned over to ESSO in accordance with paragraph 7.4.

4.6 Body Casing

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

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

4.7 Access for Inspection and Maintenance

a. Both primary and secondary chambers shall be provided with adequate access doors for waste loading, inspection, maintenance and ash removal.

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

c. Supplier shall provide adequate ladder(s) and platform(s) for easy access to perform inspection and maintenance.

4.8 Sight Glasses

a. Both primary and secondary chambers shall have sight ports or sight glasses permitting safe observation of the combustion process throughout the operation.

4.9 Refractories

All refractory design and material shall be suitable for this service.

b. The calculated cold face temperature of the exterior surface of the casing shall not be more than 82 °C (180°F) based on a design maximum ambient temperature of 42 °C (108°F).

c. The castable refractory shall be acid gas resistant and secured to the inside of the steel casing with anchors made of stainless steel.

4.10 Waste Loading and Ash Removal Facilities

Supplier shall propose a system with related facilities to ensure the operation can be carried out efficiently and safely with minimum involvement of the operators. Supplier shall provide design such that ash removal from the primary chamber will be initiated automatically at the end of the cool-down cycle.

4.11 Burner and Ignition System

a. Supplier shall provide only designs that have been in service for at least 2 years.

b. The primary and secondary burners shall be flange mounted on the incinerator casing and piped to a single fuel supply line for ease of installation.

c. All burners shall be capable of firing diesel. Electric ignition system shall be provided.

d. All burner combustion air shall be supplied by air blowers. These air blowers shall be mounted on the incinerator casing with ducting leading to the ports of the combustion chambers.

e. Blowers and motors shall be provided with external lubrication. Lubrication facilities shall be grouped together for easy access for maintenance.

f. Burners with high turndown ratio shall be used for the purpose of warming up combustion chambers, good modulation of control and fuel efficiency.

4.12 Instrumentation and Controls

a. Instrumentation shall follow the requirements outlined in CCS 15-1-200 for Small Oil Fired Heaters.

b. Supplier shall provide a complete Burner Management Package (BMP) for fuels as outlined on data sheets. 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.

c. 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 including medical, municipal and industrial wastes.

d. Other control and monitoring parameters to be considered are:

- flow rate of waste to be incinerated
- proper/complete incineration
- emission concentration and levels allowable of incinerated products including NO_x, CO, CO_2, O_2 , SO_2, PM_{10} and HCl.

e. Control shall be stand-alone electronic (PLC) per CCS 15-6-3.

f. Local panels shall be suitable for outdoor and tropical use and meet CCS 15-11-1.

g. Supplier shall submit with its bid the restrictions of controls/control panel and if control room environment is required.

h. Supplier shall supply the control system completely coordinated, constructed, wired, and checked out at factory.

i. Supplier shall route/terminate locally mounted instruments through a skid edge junction box, to the control panel. Local control panel may have the junction box integral.

j. Input and output signals shall be provided via a PLC Serial Communications Port for the following:

1. Stack temperature
2. Stack temperature set point
3. Incinerator common alarm.

4. Incinerator/component running status.
5. Incinerator shutdown.
6. Emergency Shut Down input.
7. Low fire state (control input).
8. Permissive to start (control input).
9. Local ESD
10. Any other available PLC register information.

#k. Contractor's selected Supplier's standard package shall be accepted provided that it meets or exceeds ESSO standards.

l. All instruments shall appear on a P&ID in compliance with Supplier ISA Standards, tag numbers shall be assigned by ESSO.

m. All instruments shall have ISA type data sheets.

#n. All control devices and systems shall be rated for IP66 and submitted to ESSO for approval.

o. Instrument tagging shall follow these guidelines: in-line equipment and major components such as PLCs shall have a nameplate with the following information equipment identification number (instrument tag number), pressure rating of pressure containing parts, supplier's name, model, serial number, operating range, materials, size of outer and inner components, voltage appraisal class, type, and range as applicable.

p. Information plates and name tags shall be securely attached by mechanical means with threaded fastener or fluted rivets. Adhesive fastening method is not acceptable. Only the instrument number tag may be fastened by stainless steel cable connected with stainless steel crush clamps, or 18 gauge stainless steel wire.

q. PLC shall have a communications port using Allen Bradley Data Highway Plus for interfacing to the Pipeline Automation System.

r. All transmitters shall be Honeywell Smart Transmitters.

s. All electrical/electronic equipment and devices must be listed and labelled by a Cenelec recognized testing agency for their intended use.

4.13 Noise Requirements

The incinerator contribution to sound level shall be in accordance with CCS 2-1-1.

4.14 Emission Requirements

a. The air quality standards of CCS 21-20-108 shall be met.

4.15 Area Classification

Area classification for the location of the incineration system shall be specified in accordance with contract documents associated with this specification.

5.0 MATERIALS

5.1 Unless otherwise stated in this specification, the materials of construction shall be the Supplier's standards that are suitable for the process and environment and have been proven successful in similar services.

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

6.0 FABRICATION

6.1 The entire incineration system with its components shall be fabricated and packaged prior to shipment to the field site as much as possible to minimize field work.

6.2 Supplier shall fabricate and layout the whole system within the maximum dimensions permissible for transportation and be ready for start-up with minimal field assembly except to interface with the required site facilities.

7.0 INSPECTION AND TESTING

#7.1 The inspection and quality control program shall be carried out and executed in accordance with CCS 20-1-1 and as approved by ESSO.

7.2 Contractor shall furnish ESSO with copies of all inspection and quality control documents in accordance with CCS 20-1-1 and CCS 20-1-3.

7.3 Instrument and control devices/systems shall be factory acceptance tested and approved prior to shipping.

7.4 Contractor shall refurbish, reinspect and acceptance test the incinerator as approved by ESSO if the incinerator is used during construction per paragraphs 4.5 and 9.2

8.0 INSTALLATION

#8.1 Once approved by ESSO, Contractor shall install the incinerator system described in Section 4, above, including any accessories, interfaces and other related support services required to start-up and operate the incinerator system.

9.0 PERFORMANCE

9.1 Contractor shall guarantee that the system meets the requirements stated in this specification. It shall be the responsibility to correct any deficiencies at a time agreeable to ESSO.

9.2 Contractor may operate the incinerator system as needed until construction activities have been completed. Contractor shall incinerate its domestic, industrial and construction wastes as specified in Contractor's approved Waste Management Plan, as well as any start-up wastes generated during this period as approved by ESSO. Waste incinerated prior to Facility Acceptance may be incinerated in a Temporary Incinerator(if Contractor elects to use as per GPS 006) or in the incinerator installed for ESSO (provided that the condition of the incinerator meets requirements of ESSO and paragraphs 4.5 and 7.4.

10.0 OPERATIONS MANUALS

10.1 Supplier shall provide ESSO with complete manuals for operation and maintenance of the incinerator system and related accessories, interfaces, and support services.