ESI/SCHOLER

ESI-182 Containerized multi waste incinerator for Simberi Gold Co.

Design scope:

To design a hazardous waste incinerator suitable to destroy a wide range of solid wastes such as cyanide boxes, grease drums, medical waste and industrial wastes, as well as liquid wastes such as waste oils and HFO sludge.

The complete unit is to be permanently fixed and to fit within a 40'container. The front of the incinerator will be placed at the rear end of the container with the rear wall cut out and replaced by a metal roller door. The side of the container will have two swing up panels to form awnings and giving total side access to the incinerator. The control panel, blower and system control valves will be situated in the enclosed work room behind the incinerator unit.

The incinerator is to be supplied totally assembled and ready to fire by simply connecting power, fuel and water to the connection points. The external stack will be supplied loose in sections inside the container and simply bolted together and erected at site.

Design Notes:

1. The preferred type of incinerator is a 2-chamber starved air (semi-pyrolisis) type. Experience has shown that during the first stage of each batch cycle, operating the primary combustion chamber (PCC) at low temperature and zero air will cause the highly volatile materials to release slowly and ignite at a controlled rate in the secondary combustion chamber (SCC). During the second stage once most of the volatiles have been exhausted, the temperature in the PCC is raised and a limited amount of combustion air is admitted burning out the carbon at a steady rate. During the third stage the temperature is allowed to raise further, and more air is introduced ensuring total burnout and leaving a white sterile ash.

2. To handle the range of daily generated wastes as well as backlog of wastes in storage, it is envisaged that the PCC will operate with 4 burn cycles per day with the final load including a burndown cycle which will operate automatically overnight and turning itself off on cycle completion.

3. Most wastes on site are already loaded into containers such as IBC cages, empty IBC containers and drums. The IBC's and drums can be loaded by forklift onto the dedicated rail mounted fork system which then can insert a whole load into the PCC. It can also

4. remove empty cages and drums after each burn cycle as well as remove ash from the ash pit each morning before starting up.

5. List of wastes:

Waste type		Fresh	Backlog
	unit	per day	store
Cyanide boxes	ea	4	
Bulker bags	ea	24	
Grease drums	220 lit	1.30	380
Waste oil	liter	267	235,190
HFO Sludge	liter	3,000	638,000
Oily rags	IBC	1	
Filters/hoses	IBC	1	

6. Incinerator size option.
   Two sizes are being considered for this duty. The first can take 3 units of either cyanide boxes or IBC cages per load in volumes are 12m3 PCC with 9.0m3 SCC for 3 box unit and 16.5m3 PCC with 9.0m3 SCC for 4 box unit.
   Both units have the larger SCC to handle the large load of sludge and waste oil.

Incinerator specification:

Primary Combustion chamber (PCC):

Outer shell fabricated in mild steel sections and plate, sand blasted and coated with high temperature primer and silicone final coat.

Internal refractory with 5cm ceramic fiber blanket and 10cm of dense castable suitable for operation at 1300oC impregnated with stainless steel needles and fixed with stainless steel refractory anchors at 200mm centers welded to the steel casing.

Base of PCC is fitted with 2 outer and one central air distribution manifolds which introduce combustion air during firing and give total ash burnout and cooling. A blower fitted behind the PCC provides combustion air to both PCC and SCC and quantity of air supply is regulated through automatic dampers. The air supply is controlled by PLC and is varied during the various stages of burning and cool down.

Two diesel fuel fired automatic package burners each rated at 500kW are fitted to the PCC to provide ignition of the waste.

A water spray manifold with 2 fogging nozzles is fitted to the top of the PCC to control over-temperature and flare up conditions during firing.

A thermocouple is fitted to the top of the PCC to monitor chamber temperature and control burner and water spray operation.

The PCC internal dimensions are basically 1900mm diameter x 4000mm long for 3 box unit and 6000mm long for 4 box unit.

A single main loading and ash clean out door is fitted to the front of the PCC and is 1300mm wide x 2000mm high giving total access to the PCC.

Secondary combustion chamber (SCC):

The shape of the SCC is a horizontal cylinder with outer shell fabricated in mild steel sections and plate, sand blasted and coated with high temperature primer and silicone final coat.

Internal refractory with 5cm ceramic fiber blanket and 10cm of dense castable suitable for operation at 1300oC impregnated with stainless steel needles and fixed with stainless steel refractory anchors at 200mm centers welded to the steel casing.

Two diesel fuel fired automatic package burners rated at 750kW are fitted to the SCC to preheat the SCC before operation and provide ignition of gas emanating from the PCC, and to ensure minimum SCC temperature during operation.

Combustion air jets are fitted to the side of the SCC to introduce the required combustion air and sufficient excess air to ensure total burnout of the gas. The jets connect to a central air manifold which connects back to the blower behind the PCC and is fitted with its own flow control valve.

A thermocouple is fitted to the SCC to monitor temperature and control the SCC burner.

The SCC internal dimensions are 1900mm diameter x 2000mm long for 3 box unit and 3000 for 4 box unit. A single access door is fitted for inspection and ash cleanout if required.

Fork loading trolley:

Heavy duty steel fabricated and rail mounted trolley is provided for waste loading either cyanide boxes or cages to the primary chamber. Once loaded, the trolley is pushed into the primary chamber, trolley fork is lowered by hydraulic cylinder, trolley removed, and door closed.

At the end of cooling cycle, door is opened, and trolley inserted to retrieve the cages. Loose waste can be loaded manually into cages or directly to near fill the primary chamber. The rail system is delivered fully assembled with base sleepers and fixing onto concrete slab.

The loading system can be operated manually. A self-contained electric drive for forward and reverse as well as ball screw for up and down is offered as an option. This incorporates a brake gear motor drive on the trolley and cabling contained in an energy chain fitted within the rail system. A push button station to drive the trolley and lift would be located at the container door adjacent to the incinerator front.

Exhaust stack:

An exhaust stack fabricated in high temperature stainless steel is supplied loose in the container and requires simple bolting on site. It is fitted with a venturi at the bottom to allow dilution air to be drawn into the stack so as to reduce exhaust temperature in the stack.

The stack is 500mm diameter and 8.0m high.

Electrical control panel:

An electric control panel is located just inside the container door and is fitted with an Allen Bradley PLC with temperature controls for both PCC and SCC and all the necessary switchgear for the correct automatic operation of the unit.

This control panel will be the same as the panel fitted on the large incinerator at Ridge and will have identical software and programming.

Warranty.

A conditional warranty period of 12 months exists on Scholer/ESI products against faulty workmanship and/or materials.

This warranty period commences from our point of delivery despatch date. Notification of fault is to be in writing within 7 days of being discovered or known. (A full Warranty is available on request)

To design, manufacture and supply the above described incinerator complete, fitted inside a 40’ Hi-cube shipping container.

Supply… ex works Bangkok

3 box unit	US$
4 box unit	US$
Option for electric motor drive on trolley	US$
Delivery time	16 to 18 weeks
Payment terms	40% deposit on order 60% payment before delivery following inspection and FAT.
Provision of supervisor for installation, Commissioning & Operator Training	US $ per calendar day