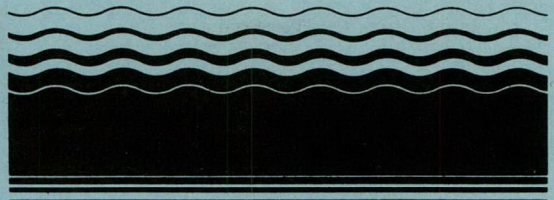




SITE

SUPERFUND INNOVATIVE
TECHNOLOGY EVALUATION



Demonstration Bulletin

Electric Infrared Incineration

Shirco Infrared Systems, Inc.

TECHNOLOGY DESCRIPTION: The electric infrared incineration technology is a mobile thermal processing system which uses electrically powered silicon carbide rods to bring the organic waste to combustion temperatures and then, to incinerate any remaining combustibles in an afterburner. The mobile system is comprised of four components: the electric-powered infrared primary chamber, a gas-fired secondary combustion chamber, an emission control system, and a process management and monitoring control center.

Waste is fed into the primary chamber on a wire mesh conveyor belt and exposed (at temperatures of up to 1850°F) to infrared radiant heat provided by the horizontal rows of electrically-powered silicon carbide rods above the belt (Figure 1). A blower provides air at selected locations along the belt and can be used to control the burning rate of the waste feed and its location while burning on the belt.

The ash material which drops off the belt in the primary chamber is quenched by water sprays utilizing scrubber effluent. The ash is held until the PCE content is determined to be less than 1 ppm.

Gaseous volatiles from the primary chamber are destroyed in the fired secondary chamber. Gases are ducted through the emissions control system, which consists of a venturi scrubber for particulate matter and a packed tower to neutralize acid vapor. An induced draft blower draws the cleaned gases from the scrubber into the free standing exhaust stack.

The scrubber liquid effluent then flows into a clarifier where scrubber sludge settles out for disposal. Finally, the scrubber effluent flows to an effluent tank,

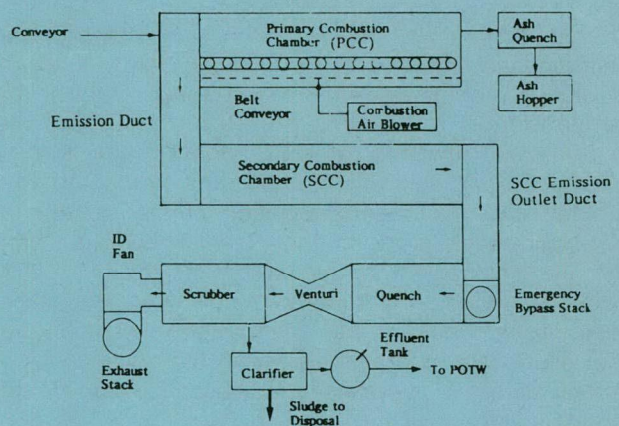


Figure 1. Peak oil Incineration unit process diagram.

through an activated carbon filter for reuse, or to a POTW tank for disposal.

WASTE APPLICABILITY: This technology is suitable for organic wastes contained in soils or sediments. Liquid organic wastes can also be handled once they are mixed with sand or soil.

DEMONSTRATION RESULTS: Demonstration of the electric furnace was carried out at full-scale at an oil refinery site near Tampa, Florida, from August 1 to 4, 1987. As part of the removal operation by EPA Region IV, a nominal 100-ton per day Shirco

Table 1. Peak Oil Test Summary

Run	Test Results										
	Waste Feed					Stack Gas			Ash		
	Feed-rate (kg/hr)	PCB (ppm)	Pb (ppm)	EP Tox (Pb) (ppm)	TCLP (Pb) (ppm)	Particulates (mg/dscm)	DRE (wt. %)	PCB (ppb)	Pb (ppm)	EP Tox (Pb) (ppm)	TCLP (Pb) (ppm)
1	3328	5.85	5900	27.00	8.60	358	99.99967	10	7100	25.0	0.01
2	3287	3.85	4900	29.00	2.50	211	99.99880	240	6000	28.0	0.01
3	3626	5.34	5000	--	3.00	173	99.99972	900	6400	36.0	0.02
4	3600	3.48	4400	24.00	3.50	171	99.99905	54	6200	36.0	0.01

Table 2. Rose Township Test Summary

Run	Test Results									
	Waste Feed				Stack Gas			Ash		
	PCB (ppm)	Pb (ppm)	EP Tox (Pb) (ppm)	TCLP (Pb) (ppm)	Particulates (mg/dscm)	DRE (wt. %)	PCB (ppb)	Pb (ppm)	EP Tox (Pb) (ppm)	TCLP (Pb) (ppm)
1	10.20	3000	0.15	0.67	23	>99.9922	37	1100	0.05	ND
2	35.20	1400	0.20	0.35	--	>99.9976	112	1300	ND	ND
3	20.40	550	0.35	1.30	68	>99.9953	3	1100	0.13	0.05

Infrared System was set up at the site. The site was contaminated with nearly 7,000 cubic yards of waste oil sludge containing PCBs and lead. During the demonstration, the SITE program evaluated the system for reliability of PCB destruction and to determine if the solubility of lead compounds could be reduced. A second demonstration of the system, at pilot-scale, took place at the Rose Township Dump Site in Michigan, from November 2 to 11, 1987. Organics, PCBs, and metals in soil were the target waste compounds to be destroyed or immobilized. The pilot-scale operation allowed the evaluation of several different operating conditions. Results of the two tests were similar.

- In both tests, at standard operating conditions, PCBs were reduced to less than 1 ppm in the ash with a DRE greater than 99.99% (based on detection limits).
- In the full scale demonstration, the air pollution control system did not reduce particulate emissions to the regulatory level and several adjustments were needed to bring it into compliance with regulations.
- Lead was not immobilized; however, it remained in the ash and was not transferred to the scrubber water or emitted to the atmosphere.

- The pilot-scale unit demonstrated that blending fuel oil with the feed reduced the primary chamber temperatures and thus lowered energy costs without decreasing performance.
- The unit requires a feed having one inch or less diameter and care must be exercised in design and construction of material handling systems prior to feeding the material to the unit.

A report and summary has been published on the Peak Oil test:

EPA/540/5-88/002a - September 1988
Technology Evaluation Report SITE
Program Demonstration Test Shirco Infrared Incineration System

The report and summary for Rose Township and the Application Analysis Report for the infrared technology will be published in Spring 1989.

FOR FURTHER INFORMATION:

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