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Project Summary

Incineration of Creosote and Pentachlorophenol Wood-Preserving Wastewater Treatment Sludges

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Wastewater treatment sludges from two wood-preserving operations were incinerated to provide data for the EPA's land disposal restriction regulations under the Resource Conservation and Recovery Act (RCRA). The untreated wastes, incinerator ash, and stack gas samples were analyzed for organic and metal compounds. A report was prepared to document the effectiveness of the incineration tests.

This Project Summary was developed by EPA's Risk Reduction Engineering Laboratory, Cincinnati, OH, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Introduction

RCRA Waste Code K001 is defined as the bottom sediment sludge from the treatment of wastewaters from wood-preserving processes that use pentachlorophenol (PCP) or creosote (C). Pentachlorophenol is a synthetic organic compound manufactured by reacting chlorine with phenol. Creosote is a derivative of coal containing creosols, phenolic compounds, naphthalene, and a wide range of polynuclear aromatics. An estimated 400 facilities in the United States have wood-preserving processes that could generate K001 wastes. Many of these facilities are more than 25 years old and some are more than 75 years old.

The wood-preserving process generally consists of two steps: 1) pretreatment of the wood to reduce its natural moisture content, and 2) impregnation of the wood with preservatives. Drippings and condensed vapors generated during treatment are sent to an oil/water separator, where chemicals are recovered and recycled to the process. The contaminated wastewater from the separator may be collected in surface impoundments, and sludges are periodically removed from these impoundments for offsite disposal (Figure 1).

Waste Characteristics

The K001 used for the incineration tests was obtained from wood-preserving facilities. Samples of each waste were analyzed for the constituents of interest (Table 1). Table 2 shows the selected parameters of the test wastes that would affect incinerator performance.

Description of Incineration Facilities

Pentachlorophenol Test

The incineration system at the Combustion Research Center in Jefferson, Arkansas, consists of a primary combustion chamber, a transition section, and a fired afterburner chamber (Figure 2). The air-pollution-control system includes a venturi scrubber and a packed-column scrubber. A carbon adsorption bed and a high-efficiency particulate air (HEPA) filter are used to

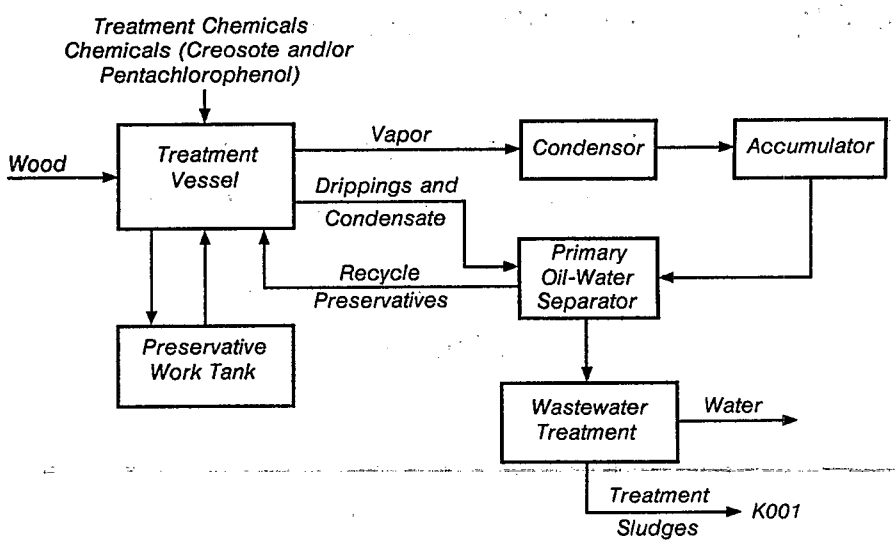

Figure 1. *Schematic of wood-preserving process.*

Table 1. *Analytical Results of K001 Wastes*

Waste	*Constituent*	*Concentration, percent*
K001-PCP	*Soil*	*40*
	Water	*30*
	Wood chips	*10*
	Organics	*20*
		100
K001-C	*Soil*	*30*
	Water	*20*
	Wood chips	*10*
	Naphthalene	*4*
	Phenanthrene	*3.5*
	Fluoranthene	*2.5*
	Other organics	*34*
		100

back up the scrubbers. The rotary kiln was operated in a temperature range of 980° to 1102°C and at a feed rate of about 80 lb/h. The afterburner temperature range was 965° to 1108°C. (See Figure 2.)

Creosote Test

The incineration system at John Zink Company in Tulsa, Oklahoma (Figure 3) consists of a rotary kiln with continuous ash removal, an afterburner, a cyclone separator for solids, and an adjustable venturi scrubber. A second afterburner, required by the Oklahoma State Department of Health, followed the air pollution equipment. The kiln was operated at 923° to 1109°C, and the afterburner was operated at 1056° to 1145°C. The feed rate was 180 lb/h.

Conclusions

Both the K001-PCP and the K001-C wastes were incinerable. The incinerator ash from neither test contained detectable volatiles or semivolatiles. The K001-PCP test ash contained low levels of arsenic, lead, chromium, copper, and zinc; the scrubber water contained low levels of arsenic, copper, lead, and zinc. The K001-C test ash contained moderately higher levels of arsenic and zinc; lead and zinc were detected in the scrubber water samples. The destruction/removal efficiency standard of 99.99% was achieved for both tests. Based on these tests, incineration was promulgated on August 17, 1988, as best demonstrated available technology (BDAT) for the organic constituents of K001 (naphthalene, pentachlorophenol, pyrene, phenanthrene, toluene, and xylenes).

The full report was submitted in fulfillment of Contract No. 68-03-3389 by PEI Associates, Inc., under the sponsorship of the U.S. Environmental Protection Agency.

Table 2. *Parameters Affecting Incinerator Performance*

Waste	*Parameter*	*Range*
K001-PCP	*Ash*	*12 to 51%*
	Heating value	*3800 to 8300 Btu/lb*
	Water	*8 to 41%*
	Pentachlorophenol	*970 to 3000 ppm*
K001-C	*Ash*	*10 to 35%*
	Heating value	*10,000 to 11,000 Btu/lb*
	Water	*5 to 20%*
	Volatile matter	*57 to 81%*

Sample ID	Site Description	Sample Description
A	Drums	Waste Feed Before Packing
B	Ash Bin	K001-PCP Ash
C	Venturi Scrubber	Scrubber Makeup
D	Recirculation Tank	Scrubber Blowdown

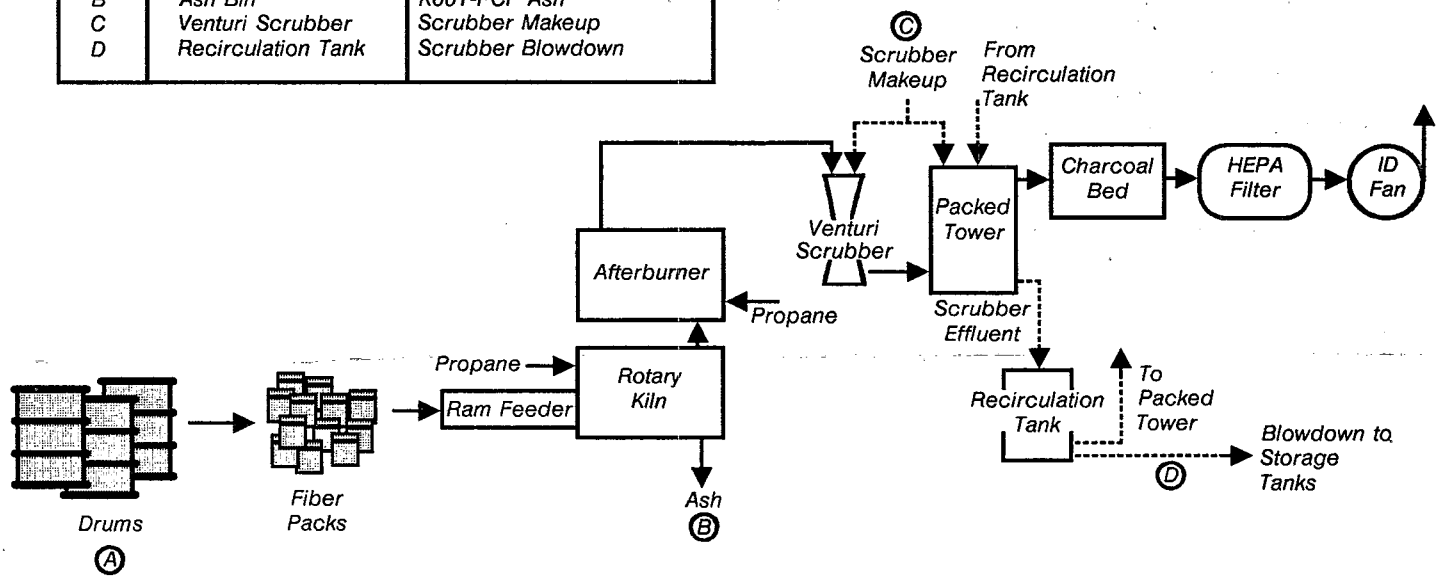

Figure 2. *CRF rotary-kiln incineration system and sampling points.*

Sample ID	Site Description	Sample Description
A	Drums	Waste Feed During Packing
B	Ash Bin	Bottom Ash
C	Solids Separator	Fly Ash
D	Water Separator	Scrubber Water Before Waste Feed
E	Water Separator	Scrubber Water During Waste Feed

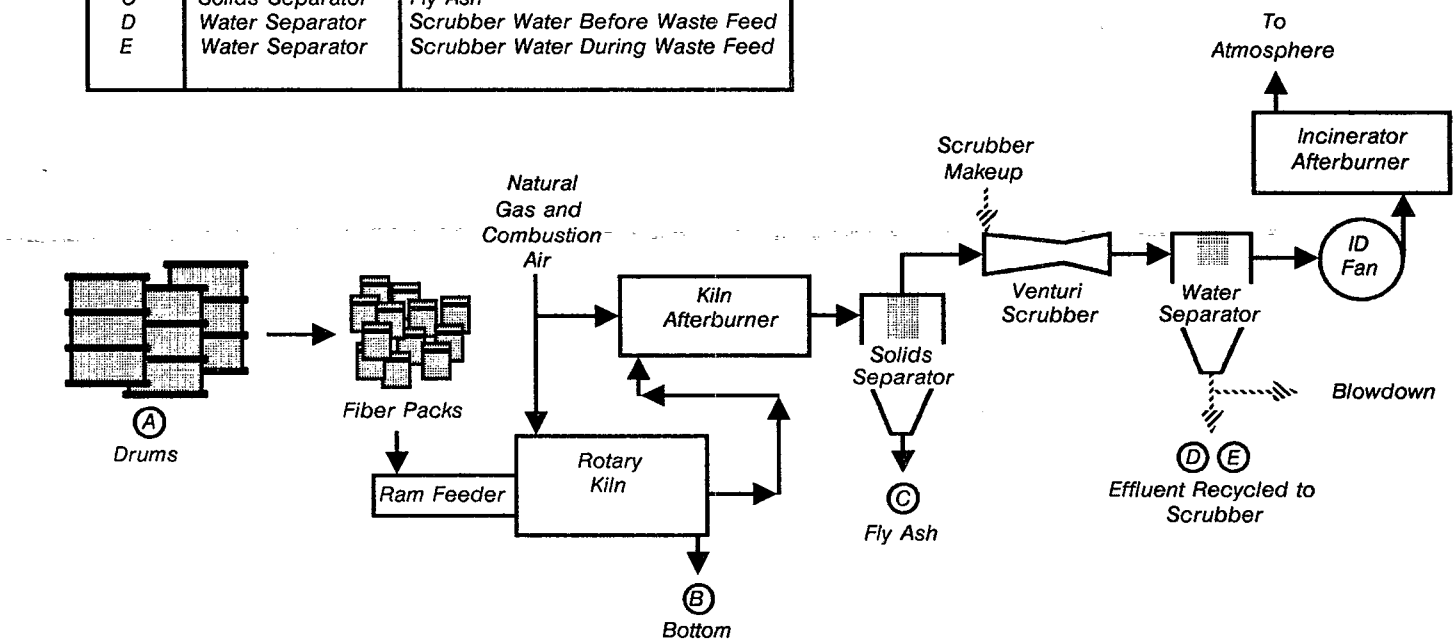

Figure 3. *John Zink rotary-kiln incineration system and sampling points*

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***Ronald J.Turner** is the EPA Project Officer (see below).*
The complete report, entitled "Incineration of Creosote and Pentachlorophenol Wood-Preserving Wastewater Treatment Sludges," (Order No. PB 90-130 493/AS; Cost: $23.00, subject to change) will be available only from:
National Technical Information Service
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