CLOSURE OF A DIOXIN INCINERATION FACILITY

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ABSTRACT

The EPA Mobile Incineration System treated approximately six million kilograms of dioxin wastes when it was in operation at the Denney Farm site in southwestern Missouri between 1985 and 1989. At the conclusion of operations, the site soils, equipment, and buildings were decontaminated in accordance with the approved closure plans.

INTRODUCTION

The U.S. Environmental Protection Agency (EPA) developed the Mobile Incineration System (MIS) for the on-site destruction or decomposition of hazardous wastes. The system incinerated dioxin-contaminated materials from the eight southwestern Missouri dioxin sites when it was in operation at the Denney Farm site between 1985 and 1989. At the closure of operations in 1989, the site and incinerator were decontaminated to acceptable levels. Closure activities included excavation and incineration of dioxin-contaminated soil, decontamination or incineration of contaminated debris, decontamination of buildings and equipment, and disassembly of buildings and the MIS.

Approximately 1.5 million kilograms of dioxin-contaminated soil and debris were incinerated during closure. The debris included: the wooden loading dock, high efficiency particulate air filter and associated ducting, wooden pallets, metal drums, and plastic sheeting used to protect excavated areas. The buildings used for storage and handling of the waste were decontaminated. Equipment used to handle the waste, soil moving equipment and the MIS feed system, was decontaminated. All other buildings and equipment on the site, including the MIS itself, were cleaned and wipe tested to ensure that they were not contaminated.

Final MIS closure activities consisted of dismantling the unit and preparing its components for shipment and storage at the EPA facility in Edison, New Jersey, a distance of 2000 kilometers from the Denney Farm site. Final Denney Farm closure activities included disassembly of the buildings and final grading of the site. The site was covered with a minimum of one foot of soil and seeded. Closure of the MIS and site were certified by an independent professional engineer registered in the State of Missouri.

CLOSURE PLANS AND CLEANUP CRITERIA

Procedures outlined in approved closure plans for the MIS and Denney Farm site were executed at the conclusion of operations. The plans were approved by the appropriate regulatory authorities, EPA and the Missouri Department of Natural Resources (MDNR). Besides procedures for decontaminating and decommissioning the MIS and site, the plans included sampling procedures for soil, buildings and equipment, scope of the decontamination work, and action levels to trigger decontamination work. The Agency for Toxic Substances and Disease Registry provided health advisories used by EPA to develop the decontamination criteria, and the criteria were approved by MDNR. The criteria for site closure are provided in Table 1. Equipment was decontaminated to the levels required for building surfaces.

Table 1. Action Levels or Cleanup Criteria for Denney Farm Closure

Contaminant	Surface Soils (0 to 3 inches depth)	Subsurface Soils (>3 inches depth)	Buildings (a) (Wood Framework/Sheet Metal/Foundations)
2,3,7,8-TCDD	<1 ppb	<10 ppb + 12 inches soil cover or if >10 ppb, excavate 4 ft soil at most and cover with 4 ft clean soil	10 ng/m^2 or if >10 ng/m^2 use sealant
PCBs	<2 ppm	<10 ppm + 12 inches soil cover	100 ng/cm^2 or if >100 ng/cm^2, sealant
Volatiles/ Semivolatiles	<50 ppm	< 50 ppm	no significant contamination
Heavy Metals	non-E.P. Toxic	non-E.P. Toxic	no significant contamination

(a) Foundations had an additional criterion. Core samples were taken and the dust from the samples had to show 2,3,7,8-TCDD concentrations <10 ppb.

SOIL DECONTAMINATION

Sampling was conducted prior to the start of site closure activities to determine the extent of contamination of the site soil. This sampling and analysis was primarily for dioxin using a statistical procedure to guarantee that the dioxin levels reported were within 95% confidence limits (Exner et. al., 1985). The highest levels of dioxin found

were between 100 and 700 parts per billion (ppb) in the areas of the site where waste was handled. It was found at levels between non-detect and 20 ppb on areas of the site used less frequently or areas that received runoff from the heavily contaminated areas. In addition to this dioxin sampling procedure, grab samples were taken and analyzed for all the constituents listed in Table 1. PCBs and other organics were found in the waste handling areas. Chromium was found in the ash storage area.

Contaminated soil was scraped in layers of at least three inches and incinerated. After each scraping, the underlying soil was sampled and analyzed for dioxin. Dioxin was selected as the indicator chemical for the soil decontamination/excavation process due to its prevalence at the site and the stringent action level for it. Scraping and incineration continued until sampling and analysis showed that the contamination of the remaining soil was below the action level for dioxin. Once an area was below the dioxin action level, it was sampled and analyzed for the other constituents listed in Table 1. Decontaminated areas were covered temporarily with plastic sheeting to prevent the spread of contamination from contaminated areas until the excavation was completed and the entire site was covered with clean soil in accordance with the cleanup criteria.

BUILDINGS AND EQUIPMENT SAMPLING AND DECONTAMINATION

Wipe sampling of the sheet metal walls, concrete foundations, and wood framework of the buildings was conducted in order to determine the level and extent of contamination in the buildings. The metal, wood, and concrete were each wipe tested separately. Coring samples of the foundations were also taken. (Stumbar et. al., 1990)

Buildings and equipment were decontaminated by scrubbing with brushes using a detergent solution and rinsing with high pressure water or steam cleaning. This was preceded by scraping when necessary. The decontamination process was repeated until sampling and analyses showed that residual contamination was below the action levels. All building materials were decontaminated to the action levels except for some of the wood, which was incinerated. The buildings were disassembled and removed from the site. The foundations remained and were covered with a minimum of one foot of clean soil.

Wastewater generated during the decontamination process was passed through a filter train consisting of 50 micron and 20 micron paper cartridge filters, a sand filter, and two activated carbon filters. The filters were mounted in series. The filters were incinerated periodically when they could no longer be used. All water was discharged in accordance with the discharge permit for the site. Some contaminated filter materials, wastewater sludge, and floor sweepings were generated after the incinerator was shut down and were sent to a permitted storage facility.

DISASSEMBLY AND TRANSPORT OF INCINERATION SYSTEM

The major components of the MIS; kiln, secondary combustion chamber, and mass transfer scrubber; were originally mounted on flatbed trailers. However, the ancillary equipment had to be placed and secured onto trailers for shipment. The EPA-owned equipment was disassembled to the extent necessary for shipment. This equipment required a total of 21 trailers.

LESSONS LEARNED

The sampling results showed where contamination resulted over the course of operating the MIS at Denney Farm. Discovery of the contamination provided valuable lessons that could be used in future incinerator operations to prevent the spread of contamination and make closures more efficient. Materials handling should be contained to buildings designed for spill control as much as possible to prevent soil contamination. If it is necessary to use outside areas, the land being used should be surrounded by a dike to prevent the spread of soil contamination by runoff. Soil sampling and equipment and building wipe sampling should be conducted regularly during the course of operations to allow early discovery of any contamination. Knowing about contamination sooner allows for its timely remediation and prevention of its spreading.

ACKNOWLEDGEMENTS

Closure activities were conducted under the direction of EPA by Foster Wheeler Enviresponse, Inc., and Riedel Environmental Services, Inc. The authors would like to acknowledge the contributions by all those who worked on closure, especially Robert Sawyer, Richard Martone, and James Stumbar of Foster Wheeler Enviresponse, and Bill Jaekel and Lois Mumma of Riedel Environmental Services. The authors would also like to acknowledge the support received from numerous EPA and MDNR personnel, especially Joseph Galbraith, Paul Doherty and Thomas Pauling.

DISCLAIMER

This is a summary of a proposed presentation and does not necessarily reflect EPA policy.

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