EPA

United States Environmental Protection Agency | Office of Air Quality Planning and Standards | July 1990 EPA-450/4-90-014

Air/Superfund Coordination Program

# DEVELOPMENT OF EXAMPLE PROCEDURES FOR EVALUATING THE AIR IMPACTS OF SOIL EXCAVATION ASSOCIATED WITH SUPERFUND REMEDIAL ACTIONS

## PURPOSE

The purpose of this project was to identify and define the computational requirements for estimating the air impacts from the remediation of Superfund sites. Two example sites employing soil excavation were selected for investigation. The estimation of air impacts from these sites depend on such factors as source type (point, area, or volume), location, and movement of the sources.

## GENERAL APPROACH FOR CONDUCTING AIR IMPACT ASSESSMENTS

### Site Characterization

The nature and extent of the contamination at the sites was defined. This included the identification of the contaminants, their concentration, and their physical characteristics.

### Selection of Remedial Alternative

Excavation was selected as an option to be examined. The excavation alternative included excavating the soil cap, dumping the soil into a truck, excavating the highly contaminated soil zone, dumping it into a truck, transporting the contaminated soil, and providing temporary storage of the soil prior to its ultimate disposal.

### Estimation of Disposal Rates

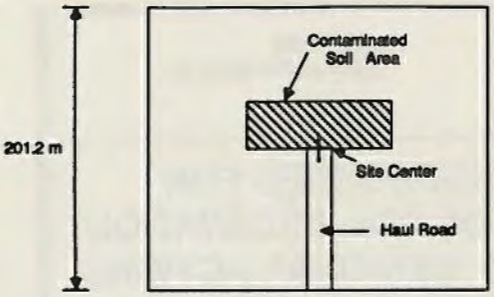
Emission rates for each of the contaminants were estimated for the remedial activities. The emission calculations for excavation were based on the use of the Research Triangle Institute's (RTI) Landtreatment equations modified to accommodate the various activities associated with excavation. The ratio of each chemical to the total VOC emissions was examined for each excavation activity, as well as its contribution to overall VOC emissions. These emission rates served as an input to the dispersion modeling analysis for determining ambient concentration estimates.

### Dispersion Modeling

The locations of remedial activities and their emission characteristics were input into the selected air dispersion models to estimate both long-term and short-term ambient concentrations at numerous offsite receptor locations. The SCREEN model was used to estimate 1-hour ambient contributions from individual sources. Long-term concentrations were computed using the ISCLT model.

### Risk Assessment

The dispersion model results for the site remediation activities were used to compute risks associated with the alternatives selected. Both short-term and long-term ambient concentrations of VOCs were used in the evaluation of the risks. Short-term values were used in evaluating acute effects, whereas the long-term values were used in evaluating chronic effects. Both carcinogenic and noncarcinogenic effects were considered in the analysis. The purpose of this effort, however, was not to produce a risk assessment at each site. Rather, it was to outline a set of procedures that could be used, with existing tools, to assist in the evaluation of air pathway effects.




Contaminated Zone Dimensions: 91.4 m x 22.9 m
Haul Road Length: 100.6 m

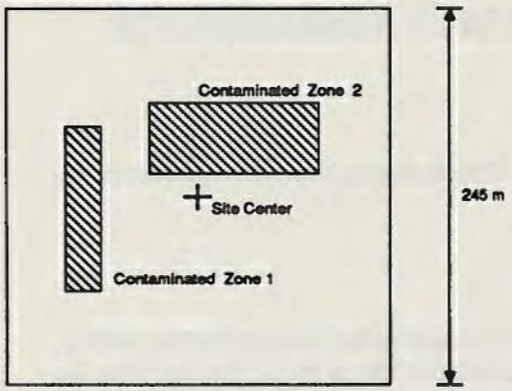
SITE A CONFIGURATION

## SITE A

Site A is a 10-acre site on which the contaminated soil zone is located near the center of the site. Soil in this area was contaminated by leakage from drums stored above ground. The contaminated zone is an area approximately 91 meters (300 ft) by 23 meters (75 ft), where the contamination extended to approximately 2 meters (6.8 ft) below the surface. This zone is considered homogeneous in soil type and contaminant concentration.

The initial remediation steps include removing all the stored drums and stopping the addition of more contamination to the site. A clay soil cap approximately 0.5 meters deep was placed on top of the contaminated soil to minimize rainwater penetration and infiltration through the soil.

The remedial alternative selected for Site A was soil excavation. The soil excavation would occur on an 8 hour/day, 6 day/week schedule. The average removal rate would be 885 $cm^3/s$ (24-hour average) during the 2 month remediation period. Based on its characteristics, the soil was treated as being in two distinct zones. The soil cap was treated as a relativly clean, low-moisture, and moderately compact soil. The contaminated soil was treated as a low-moisture compact subsoil.




Contaminated Area Dimensions
Zone 1: 91.4 m x 22.9 m
Zone 2: 91.4 m x 45.7 m

SITE B CONFIGURATION

## SITE B

Site B is a 15-acre site with two separate contaminated zones. Each zone has a distinct chemical composition, but each is considered homogeneous within itself.

Zone 1 of Site B encompasses an area of approximately 930 $m^2$ (10,000 $ft^2$) in which contamination reaches an average depth of 4.11 m (13.5 ft). The contaminated soil volume totals approximately 3823 $m^3$ (5,000 $yd^3$).

Zone 2, the larger of the two zones, encompasses an area and includes a volume of contaminated soil twice as large as those in Zone 1. The approximate area is 1860 $m^2$ (20,000 $ft^2$), and contamination reaches an average depth of 4.11 m (13.5 ft). The total contaminated soil volume is approximately 7646 $m^3$ (10,000 $yd^3$). The contaminant level within Zone 2 is considered homogeneous.

The remediation alternative investigated for this site includes excavation. The two contaminated zones will be removed sequentially, not simultaneously starting with Zone 1. The total time for soil remediation is estimated to be approximately 6 months -- 2 months for Zone 1 and 4 months for Zone 2. The excavation would call for excavation 8 hours/day, 6 days/week. The average soil removal rate would be 885 $cm^3/s$ (24-hour average).

## PROJECT OFFICER

James Durham
U.S. Environmental Protection Agency
MD-13
Research Triangle Park, North Carolina 27711
(919) 541-5672

## WHERE CAN I OBTAIN COPIES OF THIS REPORT?

Office of Air Quality Planning and Standards
Joseph Padgett
(919) 541-5589 (FTS 629-5589)
or
National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161
(703) 487-4650