Rose Disp. ... 5.4

Record of Decision
Remedial Alternative Selection

Site Name and Location

Rose Disposal Pit
Lanesborough, Massachusetts

Statement of Purpose

This Decision Document presents the selected remedial action for this site developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Contingency Plan (NCP); 40 CFR Part 300 et seq., 47 Federal Register 31180 (July 16, 1982), as amended.

In accordance with CERCLA Section 121(f)(1)(E) and (G), EPA has provided the Commonwealth of Massachusetts with the opportunity to review and comment on the Remedial Investigation, the Feasibility Study, and the Proposed Plan for Remedial Action.

Statement of Basis

This decision is based on the administrative record which was developed in accordance with Section 113(k) of CERCLA and which is available for public review at the information repositories (index attached). The attached index identifies the items which comprise the administrative record upon which the selection of a remedial action is based.

Description of the Selected Remedy

The selected remedy for the Rose site is a comprehensive approach for site remediation which includes both a source control and a control/management of migration component.

The source control component entails the following:

- Excavation and on-site incineration of approximately 15,000 yd^3 of contaminated soil and sediment. Excavation will be to 13 ppm of PCBs to the water table and will include limited excavation in the saturated zone to remove the subsurface free product portion of the disposal area.

- On-site incineration is a technology which has been proven to be effective in the treatment of PCB and VOC-contaminated soils. Extensive design work will be required, however, to design a transportable incinerator that is suitable for the Rose site.

SDMS Doc ID 212932

- It is estimated that it will take approximately two (2) years to treat 15,000 cubic yards of PCB and VOC-contaminated soil and sediment. This estimate is for construction/operation time only, and does not include the time for design, bidding and awarding of the construction contract.

The control/management of migration component will be implemented as soon as possible. This component entails:

- Active restoration of the shallow overburden aquifer contaminated with volatile organic compounds (VOCs) using on-site treatment involving air stripping and carbon adsorption. A bedrock well will be installed in the vicinity of the free product area to prohibit migration into fractured rock. Groundwater will be treated to reduce contaminants to levels which will meet drinking water standards or other appropriate guidelines. Rose's pond sediments and surface water will also be treated and the pond will be restored to its original wetlands character after remediation.

- EPA has determined that remediation of sediments located in the saturated zone of the disposal area is not cost effective and would potentially entail unacceptable impacts on the adjacent wetlands. However, treatment of VOCs will render the PCBs relatively immobile, thus restricting subsurface PCB contamination to below the water table in the disposal area. Since PCBs will be present in groundwater in excess of the cleanup level upon completion of groundwater remediation, it will be necessary to implement institutional controls to prevent groundwater use and excavation into the saturated zone within the disposal area.

The estimated present worth cost for the source control component is $5,200,000 and the groundwater remediation component is $1,256,000. The total estimated cost for the selected remedy for the Rose site is $6,450,000.

Declaration

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate, and is cost-effective. This remedy satisfies the statutory preference for treatment that permanently and significantly reduces the volume, toxicity and mobility of the hazardous substances, pollutants and contaminants as a principal element. It is determined that this remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

Sept 23, 1988
Date

Paul S. Keough, Acting
Michael R. Deland
Regional Administrator, EPA Region I

ROD Decision Summary

Rose Disposal Pit Superfund Site

Lanesborough, Massachusetts

September 23, 1988

U.S. Environmental Protection Agency

Region I

ROSE DISPOSAL PIT
TABLE OF CONTENTS

Contents | Page Number

Rose Disposal Pit

Record of Decision Summary

LIST OF FIGURES

<u>Figure Number</u>

LIST OF TABLES

<u>Table Number</u>

APPENDICES

ROD DECISION SUMMARY

I. SITE NAME, LOCATION AND DESCRIPTION

SITE NAME: Rose Disposal Pit

SITE LOCATION: Lanesborough, Massachusetts

SITE DESCRIPTION: The Rose Disposal Pit Site (Rose site) is located on Balance Rock Road in Lanesborough, Massachusetts approximately four (4) miles north of Pittsfield. The Rose property was the site of waste oil and solvent disposal from the General Electric Company (GE) during the 1950's and possibly later. The one and one-half acre disposal area occupies the northern section of a 14-acre residential lot and was formerly a trench into which the waste oils and solvents were dumped. The property encompassing the site is bounded on the north and northeast by the deciduous forest of Balance Rock State Park, on the east and southeast by cropland and pasture, on the west by mixed forest, and on the southwest by a residential area. A small wetland exists west of the disposal area and a larger forested wetland exists to the southeast of the property on the southern side of Balance Rock Road. A small man-made pond is located approximately 200 feet south of the disposal area. The site, currently owned by Mr. F.T. Rose, is located on a small hill north of the Rose's house. The areal extent of the disposal area is approximately 200 feet by 350 feet and the depth of contaminated soil varies between 10 and 30 feet.

A more complete description of the site can be found in the Remedial Investigation Report entitled "1986 Supplementary Investigation at the Rose Site; February 1987" in Chapter 2 of Volume I. See Figure 1 for a site location map.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

A. Response History

The General Electric Company (GE) has performed the majority of the technical activities at the site. After the preliminary assessment (PA), site inspection (SI), and field investigation (FI) were performed by EPA between 1980 and 1982, all subsequent site activities have been conducted by GE. Subsequent to EPA's studies, Geraghty and Miller (G&M) investigated the site further and produced a Remedial Investigation report (RI) and Blasland & Bouck (B&B) developed the Feasibility Study (FS) as consultants to GE.

GE provided a permanent potable water supply for the Rose household in August 1983 by connecting the residence to the Lanesborough Municipal Water System. In May 1984, EPA issued GE an Administrative Order under Section 106(a) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980

(CERCLA). In compliance with this Order, GE performed the following activities in 1984:

- secured the disposal area by installing a perimeter fence and posted signs warning unauthorized persons to keep out;
- covered the contaminated soil within the fenced-in disposal area with a polyethylene film and stabilized this cover against wind movement;
- initiated recovery of a localized free oil layer found beneath the surface of the disposal area through a recovery well; and
- provided the adjacent (Allard) residence west of the site property with a permanent potable water supply by connection to the Lanesborough Municipal Water System. The former Balance Rock Cafe located to the east of the site property also tied in to the permanent water main provided for the Rose property by GE.

B. Enforcement History

Three Administrative Orders (A.O.) have been issued to GE for this site. In May 1984 a Unilateral A.O. was issued to GE by EPA to conduct the removal activities as outlined in the previous Response History section. GE performed all activities in compliance with the A.O.

In November 1984 a Unilateral A.O. was issued to GE by EPA to conduct a FS for the site. GE subsequently submitted an Initial Screening of Alternatives and several revisions to this document, in compliance with the A.O.

In March 1988 an A.O. on Consent was signed by GE and EPA for GE to conduct a detailed FS for the site. With the passage of SARA, several modifications to the November 1984 A.O. were needed. The current A.O. includes several new items:

- a schedule for submission of interim deliverables and a complete detailed FS by 6/30/88;
- references to SARA and current OSWER guidance; and
- a requirement that GE reimburse EPA for oversight costs.

Other than GE, EPA has not formally notified any parties of potential responsibility for the Rose site.

GE, as the generator, has been very active at the site. Other than the preliminary investigations that were conducted by EPA, GE has conducted and financed all removal activities as well as the RI and the FS for the Rose Site.

Special notice has not been issued in this case to date.

III. COMMUNITY RELATIONS

Through the Site's history, community involvement has been minimal. EPA has recently apprised the community and other interested parties of the Site activities through an informational meeting, fact sheets, press releases and a public hearing.

In July 1988, EPA released a community relations plan which outlined a program to address community concerns and keep citizens informed during remedial activities.

The Agency published a notice and brief analysis of the Proposed Plan in the Berkshire Eagle on July 18, 1988 and made the plan available to the public at the Lanesborough Town Library in the Town Hall.

On July 20, 1988, EPA held an informational meeting to discuss the results of the Remedial Investigation, the cleanup alterna- tives presented in the Feasibility Study, and EPA's Proposed Plan. During this meeting, EPA answered questions from the public. From July 21 to August 19, 1988, EPA held a 30-day public comment period to accept public comment on the alterna- tives presented in the Feasibility Study and the Proposed Plan and on any other documents previously released to the public. On August 3, 1988, EPA held an informal public hearing to accept any oral comments. A transcript of this meeting and the comments and EPA's response to comments are included in the attached responsiveness summary as Appendix A.

IV. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

The selected remedy was developed by combining components of a source control alternative and a control/management of migration alternative to obtain a comprehensive approach for site remediation. In summary, the remedy calls for excavation and on-site incineration of approximately 15,000 yd^3 of contaminated soil and sediment. (See Appendix D for the calculation of the soil volume to be excavated.) Excavation will extend laterally to remove all contamination down to 13 ppm PCBs, and vertically to the seasonal low water table (defined below) and will include excavation to a deeper level into the water table to remove the subsurface free product portion (also defined below) of the disposal area. The remedy also includes active restoration of the shallow overburden aquifer utilizing air stripping followed by carbon adsorption for groundwater treatment. A bedrock well will be installed in the vicinity of the free product area to prohibit migration into fractured rock.

V. SITE CHARACTERISTICS

The significant findings of the Remedial Investigation are summarized below.

A. General

Field investigations conducted in 1981 and 1982 by the Region I Field Investigation Team (FIT) contractor, Ecology and Environment (E&E), revealed high concentrations of polychlorinated biphenyls (PCBs) in surface and subsurface soils and indicated the presence of volatile organic compounds (VOCs) in groundwater sampled from a network of wells. Remedial Investigation studies conducted in 1983 and supplemented in 1986 by Geraghty and Miller (G&M), under contract to General Electric, indicate that contaminated groundwater is leaving the disposal site in two plumes. One plume is flowing eastward toward Balance Rock State Park and one is flowing southward toward Rose's pond. The G&M study also further delineated the extent and magnitude of PCB contamination. It determined that the highest concentration of PCBs is located in the primary disposal area. The G&M study estimated that approximately 60,000 cubic yards of soil contains greater than 50 ppm of PCBs.

This original estimate of 60,000 yd^3 of soil includes soil both above and below the water table. The water table depth fluctuates seasonally. EPA estimates the soil volume above the seasonal low water table to be approximately 8,000 cubic yards. This estimate is based on the site topography and the depth to the water table as was measured during the November 1986 sampling round. Appendix D provides the estimates that were used and includes the calculation of approximately 3500 cubic yards of material below the water table to address the free product portion of the site. Since the 11,500 cubic yard estimate does not include any side slope contingencies for actual excavation nor the bottom sediments from Rose's pond, 15,000 cubic yards is used as the total soil volume estimate. Refer to Appendix D for a complete explanation and calculations.

Although high levels of PCB contamination are found throughout the disposal area, the highest levels of contamination are generally found directly below the western portion of the disposal area. An area of "free product" in the saturated zone exists. This material continues to be recovered from one well located in the disposal area. This "free product" is a mixture of oil, water, and solvents. Recent analysis of the mixture shows 350,000 ppm of total PCBs and 57,000 ppm of trichlorpethane in the oil fraction. GE sends this mixture to their stationary TSCA incinerator located in Pittsfield for thermal destruction.

B. Soil

Drilling logs indicate that up to 90 feet of glacial sediment overlie bedrock on the Rose Site. On the basis of field observations, the majority of this material is described as dense, basal till. Driving resistances within the basal till were extremely high (blow counts of 50 to 100 per 1 to 6 inches). Samples of this till were very tight and dense. Till extended upward to a depth approximately 15 to 20 feet below the ground surface. A less compacted mixture of sand, silt, and gravel overlies the dense till. At the Rose Site, much of this overlying layer may have been disturbed during disposal operations. A radar survey indicated that a significant trench up to 25 feet deep may have once occupied the western portion of the disposal area. Historical aerial photographs support the existence of a trench. It is the western portion of the trench that was historically the deepest and this is the area in which the free product is found.

E&E (1982) analyzed soil samples from the Rose Site to determine the character of PCB and VOC contamination. Analyses indicate that VOC contamination is moving with groundwater above or along the upper surface of the basal till. Some infiltration into the till has occurred, but data from wells screened at different depths indicate that this is not a primary route of contaminant transport.

G&M (1983) sampled subsurface soils at over 100 locations to more accurately determine the extent and severity of PCB contamination. G&M also sampled groundwater from an expanded network of monitoring wells for the presence of VOCs (1983 and 1986). Analyses indicate that the highest concentrations of PCBs and VOCs are still in the immediate disposal area. There is a localized area of free product in the western portion of the disposal area that GE continues to recover through a recovery well. The VOCs, however, are migrating from the disposal area, presumably contaminating soils below the water table.

The PCB contamination generally has not migrated from the disposal area. However, PCB contamination is found in the sediments in Rose pond (and low levels of PCBs are found in the groundwater taken from wells near the disposal area). EPA believes that the PCB contamination in the pond spread from the disposal area by overland transport via rain and snowmelt prior to the placement of the synthetic cap over the disposal area in 1984. See Figure 2 for PCB soil contamination profiles in the disposal area.

Regional mapping and limited on-site information from sample cores indicate dolomitic marble underlies the Rose site. Bedrock was encountered by eight borings on or near the site at depths between 34 and 100 feet below the ground surface. Much of the bedrock recovered during drilling by E&E (1982) was significantly weathered.

C. Groundwater

E&E (1982) installed 8 wells and sampled for priority pollutants. G&M (1984) conducted a more extensive investigation which included the installation of 67 wells on or near the Rose property and conducted 3 sampling rounds for VOCs from selected locations. In 1986 G&M provided a supplement to the RI. This update included sampling 34 wells for VOCs, 3 wells for full hazardous substance list (HSL) analysis, and sediment and surface water sampling in the western and southern wetlands and in Rose's pond.

Groundwater flow in the site area is largely controlled by topography and the vertical and horizontal hydraulic conductivities of the soil matrix. A groundwater mound is well defined in the area of the source, with groundwater flowing radially from the source disposal area. Although downward vertical gradients exist in nested wells screened at varying depths in the area of the mound, groundwater quality data indicate the majority of contaminant transport is restricted to the upper 15 to 20 feet of overburden. Dense, impermeable till, which is thought to exist at depths approximately 20 feet below the ground surface appears to restrict contaminant transport. Groundwater in the shallow overburden flows radially from the source area, with the Rose pond as a discharge area. At deeper depths, groundwater is likely to migrate under the pond, ultimately discharging into the wetland located to the south or possibly west into the Daniels Brook Basin.

Two plumes of VOCs emanate from the site. One plume flows eastward toward Balance Rock State Park. The other plume flows southward and discharges into Rose's Pond which has low levels of VOC contamination. In addition, low levels of PCBs are present in the groundwater. See Table 1 for a summary of field investigations and Figure 3 for well locations and total VOCs in shallow groundwater.

The groundwater contamination is concentrated in shallow overburden soils and does not pose a threat to the municipal wells located approximately two miles east of the site. Specific information on residential wells within one-half mile of the site is not available, but records for other wells in the area and discussions with a local well driller suggest that all private wells obtain water from the bedrock aquifer.

A complete discussion of site characteristics can be found in the Remedial Investigation Reports.

VI. SUMMARY OF SITE RISKS AND CLEANUP GOALS

A. GE's Endangerment Assessment

GE performed an Endangerment Assessment (EA) to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with the site. Seven (7) contaminants of concern, listed in Table 2, were selected for evaluation in the EA. These contaminants constitute a representative subset of the more than nineteen (19) contaminants identified at the Site during the Remedial Investigation. The 7 contaminants were selected to represent potential on-site hazards based on toxicity, level of contamination, and mobility and persistence in the environment.

Potential human health effects associated with the contaminants of concern in soils and groundwater were estimated quantitatively through the development of several hypothetical exposure scenarios. Incremental lifetime cancer risks and the potential for noncarcinogenic adverse health effects were estimated for the various exposure scenarios. Exposure scenarios were developed to reflect the potential for exposure to hazardous substances based on the characteristic uses and location of the site. Factors of special note that are reflected in GE's Endangerment Assessment are that although the site area is residential, GE treats it as a rural area without a large amount of pedestrian traffic on the property.

GE's EA examined potential risks to public health and the environment posed by the presence of PCBs in soil as well as VOCs in groundwater at the site. The study found that dermal contact with and ingestion of PCB-contaminated soil in the disposal area poses an unacceptable lifetime maximum cancer risk of approximately 6.9×10^{-2} and a lifetime average cancer risk of 2.6×10^{-3}. GE's calculations assumed a PCB cancer potency factor of 4.34 $(mg/kg/day)^{-1}$ and a "lifetime" exposure of 52 years. GE assumed 36 visits per year. The cancer potency factor that is now used by EPA is 7.7 $(mg/kg/day)^{-1}$ which would increase the above risk numbers.

The CPF used by GE was formerly used by EPA, but the Agency has revised the factor based on the results of studies on the cancer-causing potential of PCBs, reflecting the Agency's conclusion that the cancer-causing potential is greater than previously believed. EPA's Drinking Water Quality Criteria Document for PCBs sets forth the data which supports this factor. Even using the CPF used by GE, the risks posed are unacceptable.

According to GE's calculations, ingestion of contaminated groundwater in the vicinity of the disposal area poses an unacceptable lifetime average cancer risk of 1.4×10^{-2}. This vicinity also has a hazard index for non-carcinogenic effects of greater than 1.0. GE's EA also found that VOCs in Rose's pond present an unacceptable lifetime cancer risk of 7.3×10^{-4} to animals with a hazard index of 1.8 for potential non-carcinogenic effects.

The fencing and temporary cover on the site temporarily reduce the risk posed to humans and to animals by contact with soils in the disposal area. No contaminated shallow groundwater is presently used as a drinking water supply since municipal water was extended to the immediate area in 1984. However, there is residential use of groundwater within one-quarter mile of the site and groundwater contamination is migrating off-site.

Table 3 presents a summary of potential exposure routes and Table 4 is a summary of potential human and animal health risks for the corresponding potential exposure routes and are taken from GE's EA. A complete discussion of site risks can be found in the Endangerment Assessment.

B. EPA PCB Soil Cleanup Level

PCBs are the most significant component of soil contamination at the Rose site. A PCB soil clean-up level is developed using exposure scenarios based on potential human exposures to contaminated soils by direct contact and ingestion. The exposure scenarios reflect hypothetical future site use. That is, they represent the level of soil cleanup that would be acceptable without the need for long term management of contamination at the site.

The assumptions that were used by GE have been revised by EPA to develop the site-specific cleanup goal. At this site the zoning is residential and the use of the area is residential. Although the area is not densely populated at present, EPA expects that residential and recreational use of the area will grow in the future. See Appendix E for the assumptions used by EPA in the calculation of the 13 ppm PCB cleanup goal.

The source management component of the selected remedial action entails excavation and treatment of soils contaminated with PCBs at a concentration of 13 ppm or greater located in the unsaturated zone. This clean-up level corresponds to a 10^{-5} risk level for the average case under future site use conditions. EPA is establishing the clean-up goal for PCBs in the unsaturated zone. However, the area containing free product in the western portion of the saturated zone will also be excavated to facilitate groundwater cleanup. During the excavation and treatment of soil, air quality will be monitored to ensure that site specific ambient action levels are not exceeded.

In applying this approach to estimate health-based soil clean-up levels, it is important to recognize the inherent uncertainties. Uncertainties are associated with the value of each exposure parameter and the overall set of exposure assumptions. EPA believes that the assumptions used to estimate the cleanup level are reasonable, and that it is necessary to use this approach, in spite of its uncertainties, in order to assure that the cleanup goals will be adequately protective of public health. See Appendix E for EPA's calculation and references for the PCB soil cleanup level.

C. EPA Groundwater Cleanup Goals

VOCs are the most significant component of groundwater contamination at the Rose Site. Groundwater cleanup goals for certain contaminants have been set at or below U.S. EPA Maximum Contaminant Levels (MCLs), where available. These contaminants include: vinyl chloride; 1,1-dichloroethylene; trichloroethylene; benzene; and p-dichlorobenzene.

For compounds without MCLs, EPA's proposed Maximum Contaminant Level Goals (MCLGs) have been used to define groundwater cleanup goals for the following contaminants: t-1,2-dichloroethylene; o-dichlorobenzene; ethylbenzene; toluene; and xylenes. For chlorobenzene, the Lifetime Health Advisory (LHA) of 300 ppb is used which reflects the current data being considered by the Agency. For m-dichlorobenzene, the LHA of 620 ppb is the cleanup goal. The proposed MCLG for PCBs and tetrachloroethylene is zero (0), which is not considered to be technically measurable.

The cleanup goals for methylene chloride, tetrachloroethylene, and 1,1,2-trichloroethane are set at 5, 1, and 1 ppb respectively, corresponding to a 10^{-6} cancer risk, assuming lifetime exposure. Based on EPA's 1987 Drinking Water Criteria for PCBs, the health-based cleanup level is 0.005 ppb which corresponds to a 10^{-6} cancer risk.

It is likely that the groundwater treatment system for the Rose Site will be able to reduce groundwater contaminant concentrations to levels lower than the cleanup goals. Groundwater treatability tests were conducted by GE for the Rose site in November 1987. Effluent concentrations from two air stripper tests were lower than the groundwater cleanup goals for 11 of the 16 contaminants listed in Table 5. These results were for a single air stripper with a 10-foot packing height. In the full-scale groundwater treatment system, packing height will be increased to increase collection efficiency. In addition, the air stripper will be followed by two granular activated carbon (GAC) beds in series to remove contaminants passing through the air stripper. As a result, the effluent concentrations are anticipated to be lower for the full-scale air stripper-GAC system than for the treatability test.

Refer to Table 5 for a summary listing of potential contaminant-specific ARARs, guidelines, and cleanup goals for groundwater.

VII. DOCUMENTATION OF SIGNIFICANT CHANGES

EPA issued a Proposed Plan (preferred alternative) for remediation of the site in July 1988. The source management portion of the preferred alternative included excavation and on-site incineration of soils in the disposal area both above and below the seasonal low water table. The management of migration portion of the preferred alternative included groundwater treatment by air stripping followed by carbon absorption. All costs and soil volumes were taken directly from GE's draft FS and were not modified.

The proposed plan did not specify the PCB cleanup goal and approximated the extent of excavation required. The ROD defines these. The ROD sets a PCB cleanup goal of 13 ppm for PCBs above the seasonal low water table. Extensive soil borings which were analyzed for PCBs (data presented in the 1984 RI report) in and around the disposal indicate that there is not a significant difference between the extent in areas contaminated to the 13 ppm and 50 ppm levels. Therefore, the areal extent of contamination is assumed to be approximately equal to the portion of the disposal area that is fenced and covered (see Appendix D).

Rose's pond shows PCB contamination in the sediments that exceed 13 ppm (one sample taken from the pond bottom contained 65 ppm of PCBs). Rose's pond will be drained and the water will be treated by the groundwater treatment system if this surface water does not meet the groundwater cleanup goals. Once the pond is drained, the bottom sediments will be excavated for treatment and it will be backfilled to restore the area to its original (wetland) condition.

Extent of PCB Removal

The depth to the water table varies across the disposal area. EPA estimates the volume of soil above the water table to be excavated is 8,000 yd^3. In addition to soils in the unsaturated zone, the free product area in the western portion of the saturated zone will also be excavated and is estimated to be 3,500 yd^3 of saturated soil. A total soil volume of approximately 15,000 yd^3 (which includes side slopes) will be excavated. See Appendix D for calculation of the soil volumes to be excavated.

Actual soil volumes will be determined during remedial design, particularly the extent of the free product area. If this free product area is found to extend beyond the area originally assumed, additional saturated soil may need to be removed.

Another change from the proposed plan concerns the approach taken to PCBs in the groundwater in the disposal area. Both PCBs and VOCs are found at high concentrations in the saturated zone in the disposal area. Each class of chemicals has distinct characteristics. VOCs are highly soluble in groundwater, whereas PCBs are of extremely low insolubility and have a tendency to adsorb onto soils. Although PCBs may desorb from saturated zone soils and solubilize in groundwater, PCBs have a chemical tendency to adsorb onto the next available and less contaminated soil particle since the soil-water partitioning coefficient for PCBs favors soils. The solubility of PCBs is enhanced, however, in the presence of VOCs and appears to increase as the concentration of VOCs increase. Although significant concentrations of PCBs will remain in the saturated zone, VOCs will be reduced by the groundwater treatment system. This reduction of VOC levels will reduce the solubility and mobility of PCBs in the groundwater.

Nevertheless, PCBs will still be present at low concentrations in the groundwater in the disposal area and are assumed to be in excess of the 0.005 ppb health-based level for a 10^{-6} cancer risk for PCBs. However, if the VOCs in groundwater are remediated to the cleanup goals, the PCBs remaining in the saturated zone following remediation in effect will not migrate.

In order to attain a PCB level of 0.005 ppb in groundwater within the disposal area, essentially all PCBs in the saturated zone would need to be excavated. This would require the excavation and treatment of approximately an additional 45,000 cubic yards (and possibly more) of PCB contaminated soil in the saturated zone. Excavation to achieve the groundwater PCB goal in the saturated zone would be technically difficult, costly, and for all practical purposes, infeasible. In addition, a large dewatering effort could potentially have unacceptable impacts on the adjacent wetland by significant lowering of the water table. In light of these implementation problems, EPA has determined that it is technically impracticable and not cost-effective to remediate the PCBs that will remain below the water table in the disposal area. Instead, to achieve a protective remedy in the disposal area, EPA has concluded that dermal exposure and ingestion of PCBs in the saturated zone can and will have to be prevented through capping of the disposal area and institutional controls.

In addition, because PCBs will still be present in groundwater within the disposal area in excess of the cleanup goal, institutional controls will be required for this area to prevent ingestion of groundwater. However, for the reasons stated above, EPA has determined that this remedy will be protective.

VIII. DEVELOPMENT AND SCREENING OF ALTERNATIVES

A. Statutory Requirements/Response Objectives

Prior to the passage of the Superfund Amendments and Reauthorization Act of 1986 (SARA), actions taken in response to releases of hazardous substances were conducted in accordance with CERCLA as enacted in 1980 and the revised National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300, dated November 20, 1985. Until the NCP is revised to reflect SARA, the procedures and standards for responding to releases of hazardous substances, pollutants and contaminants shall be in accordance with Section 121 of CERCLA and to the maximum extent practicable, the current NCP.

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences, including: a requirement that EPA's remedial action, when complete, must comply with applicable or relevant and appropriate environmental standards established under federal and state environmental laws unless a statutory waiver is granted; a requirement that EPA select a remedial action that is cost-effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and a statutory preference for remedies that permanently and significantly reduce the volume, toxicity or mobility of hazardous wastes over remedies that do not achieve such results through treatment. Response alternatives were developed to be consistent with these Congressional mandates.

A number of potential exposure pathways were analyzed for risk and threats to public health and the environment in the Endangerment Assessment and the Wetlands Assessment (Appendix A of the FS). Guidelines in the Superfund Public Health Evaluation Manual (EPA, 1986) regarding development of design goals and risk analyses for remedial alternatives were used to assist in the development of response actions. As a result of these assessments, remedial response objectives were developed to mitigate existing and future threats to public health and the environment. These response objectives are:

- prevent exposure to contaminated soils and groundwater
- protect uncontaminated groundwater and surface water for current and future use
- restore contaminated soils and groundwater for future use

B. Technology and Alternative Development and Screening

CERCLA, the NCP, and EPA guidance documents including, "Guidance on Feasibility Studies Under CERCLA" dated June 1985, and the "Interim Guidance on Superfund Selection of Remedy" [EPA Office of Solid Waste and Emergency Response (OSWER)], Directive No. 9355.0-19 (December 24, 1986) set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements and guidance documents, treatment alternatives were developed for the site. These alternatives range from an alternative that, to the degree possible, would eliminate the need for long-term management (including monitoring) at the site, to alternatives involving treatment that would reduce the mobility, toxicity, or volume of the hazardous substances as their principal element. In addition to the range of treatment alternatives, a containment option involving little or no treatment and a no-action alternative were developed in accordance with Section 121 of CERCLA.

Section 121(b)(1) of CERCLA presents several factors that at a minimum EPA is required to consider in its assessment of alternatives. In addition to these factors and the other statutory directives of Section 121, the evaluation and selection process was guided by the EPA document "Additional Interim Guidance for FY '87 Records of Decision" dated July 24, 1987.

This document provides direction on the consideration of SARA cleanup standards and sets forth nine factors that EPA should consider in its evaluation and selection of remedial actions. The nine factors are:

1. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs).

2. Long term Effectiveness and Permanence.

3. Reduction of Toxicity, Mobility or Volume.

4. Short term Effectiveness.

5. Implementability.

6. Community Acceptance.

7. State Acceptance.

8. Cost.

9. Overall Protection of Human Health and the Environment.

The Initial Screening of Alternatives Report identified, assessed and screened technologies based on engineering feasibility, implementability, effectiveness, and technical reliability. These technologies were combined into source control (SM for "source management") and control/management of migration (GW for "groundwater") alternatives. Section 5 of the Feasibility Study presented the remedial alternatives developed by combining the technologies identified in the previous screening process in the categories required by OSWER Directive No. 9355.0-19. The purpose of the initial screening was to narrow the number of potential remedial actions for further detailed analysis while preserving a range of options. Each alternative was then evaluated and screened in the initial screening report. In summary, of the over 100 original source management technologies and management of migration technologies screened in the initial report, 10 source management options and 4 groundwater options were retained for detailed analysis. Table 6 identifies the alternatives that were retained through the screening process. The initial screening report lists those alternatives that were eliminated from further consideration.

IX. DESCRIPTION/SUMMARY OF THE DETAILED AND COMPARATIVE ANALYSIS OF ALTERNATIVES

This section presents a narrative summary and brief evaluation of each alternative according to the evaluation criteria described above. A detailed assessment of each alternative can be found in Section 6 of the Feasibility Study.

A. Source Management (SM) Alternatives Analyzed

The source management alternatives analyzed for the site include a no action alternative (SM-0), as well as 10 other alternatives. For alternatives where soil volume is a cost consideration, estimates of costs are lower than those in the draft FS, which are based on the original soil volume estimate of 60,000 yd^3. Actual soil excavation will be limited to approximately 15,000 yd^3 and corresponding volume-sensitive cost estimates are lower. Since the cost estimates in the draft FS were not specific enough to allow for calculation of exact values, it was assumed that for purposes of comparison of the alternatives, the relative cost reductions of the different alternatives are essentially the same. Pro-rated cost estimates are included here based on the unit costs that were provided in the draft FS, to the extent possible. See Appendix F for calculation of these adjusted cost estimates.

SM-0

<u>No Action</u>

This alternative for soil contamination is included in the FS to serve as a basis for comparison with the other remedial alternatives considered. A no action alternative is selected only if the site poses little or no risk to public health and the environment. For the Rose site, the no action alternative would entail leaving contaminants untreated on site, maintaining the existing synthetic cover and fence, continuing the ongoing program to recover the product layer located beneath the disposal site, and monitoring surface and groundwater for 30 years.

The no action alternative would not provide overall protection of human health and the environment, and it would not comply with ARARs. It is not a permanent remedy that would have long term effectiveness since it would not reduce the toxicity or mobility of the contaminants. This alternative would require a 5-year review since contaminants would remain on-site.

Estimated Time for Construction and Operation: Minimum of 30 Years
Estimated Capital Cost: $0
Estimated Present Worth of Operation and Maintenance Costs: $210,000
Estimated Total Cost: $210,000

SM-1

<u>In-Situ Containment with Impermeable Cap and Barriers</u>

"In-situ" refers to a technique the occurs "in place" without excavating the disposal area. This alternative would require the construction of an upgraded cap of synthetic material to cover the 1.5-acre site. Capping helps minimize the movement of contaminants by reducing the amount of precipitation (i.e., rain and snow melt) that could filter through the wastes and allow contaminants to migrate from the site. In addition, this alternative would require construction of a groundwater cutoff wall to limit groundwater from coming in contact with contaminated soils. Construction of the cutoff wall would entail digging a trench around the entire disposal area and creating a wall of impermeable material inside the trench.

Capping is a widely-used technique that reduces the mobility of contaminants, but it does not reduce toxicity or volume. Because capping would contain the contamination untreated on site, future site use would have to be restricted. Capping does not meet the statutory preference for a permanent remedy. This alternative would require a 5-year review since contaminants would remain on-site.

Estimated Time for Construction: 13-18 months
Estimated Period of Operation: 30-year lifetime for cover and cutoff wall
Estimated Capital Cost: $710,000
Estimated Present Worth of Operation and Maintenance Costs: $200,000
Estimated Total Cost: $910,000

SM-2

<u>In-Situ Soil Flushing with (a) Incineration or (b) Biodegradation of Recovered Liquids</u>

This alternative would involve pumping a solvent or surfactant solution through the contaminated soil. As the solution percolates through the ground, PCBs and VOCs are released from the soil and carried with the solution to a groundwater collection system that would be installed surrounding the site. Once the groundwater is collected, the chemical solution and contaminants would be extracted from the water and then either (1) incinerated at an approved hazardous waste incinerator, or (2) treated by biodegradation. EPA does not consider this alternative to be a feasible project for the Rose site because of the low soil permeabilities for in-situ application and the long time frame required for development. GE states that a 4 to 6 year period is required to develop the process prior to any design or implementation activities.

Short term impacts would be minimal since no excavation would be required, and long term environmental or health impacts were not determined in the draft FS. This alternative has been tested on an experimental level only; extensive additional laboratory and on-site testing would be required to determine the cost, cleanup duration and overall effectiveness of this technology. EPA concludes that this alternative does not meet the criteria for implementability and effectiveness.

Estimated time for Construction and Operation: Undetermined
Estimated Total Cost: Undetermined

SM-3

KOHPEG Dechlorination

This alternative consists of excavating contaminated soil and sediments and mixing them in a stainless steel chamber with a combination of chemicals forming a reagent, KOHPEG, capable of destroying PCBs. The mixture is heated (to approximately 150°C) to increase the rate of destruction of PCBs, and to drive off VOCs in the soil. The VOC vapor is then captured with carbon filters. Decontaminated soils would be replaced on site.

KOHPEG dechlorination would provide long term protection of public health and the environment, compliance with ARARs, and would reduce the toxicity, mobility and volume of site contamination permanently. Implementation of KOHPEG dechlorination would require construction of a mobile treatment unit. This alternative would require the use of engineering controls to prevent the emission of contaminants during the excavation of contaminated soil and sediments and during the actual treatment process. The implementability and effectiveness of this technology at full-scale is unproven at this time.

Estimated Time for Construction: Uncertain
Estimated Period of Operation: 2 years
Estimated Total Cost: $4,000,000 - $7,200,000

SM-4

On-Site Incineration

This alternative has been chosen as the remedy for the site. Please see Section X for details.

SM-5

Off-Site Incineration

Under this alternative, contaminated soil and sediments would be excavated and transported to an off-site hazardous waste incinerator. Several incinerators currently licensed to received PCB-contaminated wastes include: Calumet, Illinois; El Dorado, Arkansas; and Deer Park, Texas. Similar incineration and pollution control processes that are used off-site would be used at an on-site incinerator. The GE incinerator in Pittsfield is licensed to receive PCB-contaminated liquid wastes only and cannot be used to destroy PCB-contaminated soil from the Rose site.

While off-site incineration would remove the risk of contamination at the site, permanently destroy the contaminants, and would meet ARARs, this alternative would present increased risk to human health and the environment through increased traffic and off-site shipment of contaminated wastes. These impacts will not occur with on-site incineration. This alternative also would require engineering solutions to prevent the emission of contaminants during excavation and transportation of contaminated soil and sediments over long distances.

It is possible that the limited capacity and high demand for the existing off-site incinerators could result in a longer-term operation than would on-site incineration. Costs associated with this alternative would be much higher due to both transportation and off-site charges. Therefore, EPA concludes that this alternative is less cost effective than on-site incineration.

Estimated Period of Operation: 2 years
Estimated Total Cost: $44,000,000

SM-6

<u>On-Site Disposal in an Approved Hazardous Waste Landfill</u>

This alternative would require construction of a federally-approved TSCA hazardous waste landfill on the Rose property. The landfill would include a synthetic liner as well as a leachate collection system to prevent potentially contaminated liquids from migrating from the area. Contaminated soil and sediments would be excavated and placed in the landfill. Groundwater monitoring would be conducted to ensure the integrity of the landfill and leachate collection system.

Landfilling is a proven technique for containing PCBs and other hazardous wastes. Although mobility of the wastes is reduced, landfilling does not reduce the toxicity or volume of the wastes. Also, should the disposal facility fail, this alternative would present a risk to public health and the environment. This alternative, therefore, would not provide long-term effectiveness nor meet the statutory preference for a permanent remedy. TSCA regulation 761.75(b)(3) requires that the bottom of a landfill be at least 50 feet above the groundwater table. This requirement could not be met at the Rose site, therefore, it would not provide compliance with ARARs. This alternative also would require engineering solutions to prevent the emission of contaminants during excavation of contaminated soil and sediments and during placement of the contaminated material into the landfill.

Estimated Time for Construction: 2 years
Estimated Time of Operation: 30 years
Estimated Capital Cost: $3,450,000
Estimated Present Worth of Operation and Maintenance Costs: $255,000
Estimated Total Cost: $3,700,000

SM-7

Off-Site Disposal in an Approved Landfill

This alternative would involve excavating contaminated soil and sediments, reducing the moisture content, and disposing of the waste at an approved off-site TSCA hazardous waste landfill. There are currently several facilities in the United States approved for disposal of PCB-contaminated wastes including: Model City, NY; Niagara Falls, NY; Cincinnati, OH; Emelle, AL; Deer Park, TX; and Grassy Mountain, UT. After the contaminants are removed, clean soil would be hauled in to fill in the excavated areas.

Off-site disposal removes the risk of contamination at the site. However, since contaminants remain untreated, it is not a permanent remedy. In addition, off-site disposal of untreated wastes is the least favored alternative under CERCLA. This alternative would present a risk to public health and the environment due to increased traffic and off-site shipment of contaminated wastes, or if the off-site disposal facility were to fail. Off-site disposal would not provide long term effectiveness. This alternative would require engineering solutions to prevent the emission of contaminants during excavation and transportation of contaminated soil and sediments to the off-site facility.

Estimated Time for Removal: 2 years
Estimated Total Cost: $7,000,000

SM-8

Chemical Fixation/Stabilization of Excavated Wastes

This alternative involves a process in which contaminated soil and sediments would be excavated and mixed with a material such as cement, flyash, or various polymers to bind or "fix" the contaminants into a solid material. After stabilization of the soil and sediments, the material would be used to regrade the site.

This alternative has the potential to greatly reduce the mobility of the contaminants (with resultant increase in volume), minimizing long term environmental effects. The toxicity, however, would not be affected and the stabilized material would still be a hazardous substance since the contaminants would not be destroyed.

A number of stabilization technologies for soils with varying levels of organic contamination are currently under development under EPA's Superfund Innovative Technology Evaluation (SITE) program. (Descriptions of these development programs and the EPA SITE program are included in the Administrative Record and are discussed in Response 24 of the responsiveness summary.) On the basis of the information that is currently available, EPA is unable to determine that this alternative would satisfy the statutory preference for a permanent remedy since the effectiveness of stabilization has not been demonstrated for the levels and type of contamination found at the Rose site. For these reasons, EPA finds that stabilization does not meet the criteria of implementability and long term effectiveness for the Rose site.

This alternative would require engineering solutions to prevent the emission of contaminants during excavation and treatment of contaminated soil and sediments. In addition, air emissions of the fixed material may be of concern and would require monitoring. This alternative would require a 5-year review since contaminants would remain on-site.

Estimated Period of Operation: 2 years
Estimated Total Cost: $3,000,000

SM-9

<u>Chemical Extraction with Incineration of Recovered Liquids (Soil Washing)</u>

This alternative is similar to alternative SM-2 in that contaminants are extracted chemically from the soil and sediments. In this alternative, however, excavation would be required prior to treatment. Excavated materials are mixed in a chamber with acetone, a solvent that releases PCBs and VOCs from the soil. Steam is then injected into the system, separating the acetone/contaminant mixture from the soil. At this point, the cleaned soil is returned to the site. The acetone/contaminant water mixture is then combined with kerosene, which draws the VOCs and most of the PCBs out of the acetone and water. Contaminated kerosene is removed from the site and incinerated. The acetone/water mixture remains in the system and is distilled to recycle the acetone for reuse in the treatment process. All vapor emissions would be treated prior to release to the atmosphere. This alternative may be used in combination with selected remedy to enhance the efficiency of the incineration process.

This alternative has been proven effective in laboratory testing. Field testing would be required to determine the cost, implementability, and short and long term effectiveness at the Rose Site. GE's consultants estimate that testing and development of the full-scale treatment system would take 3 to 5 years. It would need to be demonstrated that ARARs and long term environmental and public health protection would be met by this alternative. This alternative would require engineering solutions to prevent the emission of contaminants during excavation and treatment of contaminated soil and sediments. Additional precautions for handling kerosene and acetone, both of which are flammable, also would be required. EPA may give this alternative further consideration as a demonstration project.

Estimated Time for Construction and Operation: Undetermined
Estimated Total Cost: Undetermined

SM-10

On-Site Biodegradation

A biodegradation process uses naturally-occurring or laboratory-tailored bacteria to degrade, or break down, organic compounds such as PCBs and VOCs into harmless materials such as carbon dioxide, water, and humus. In essence, this alternative is a specialized form of composting. While biodegradation has been shown to be effective treating other types of hazardous waste, the effectiveness and implementability of this alternative for destruction of PCBs at the Rose site has not been demonstrated. This alternative has not been retained by EPA for further consideration for a demonstration project because long times frames are anticipated in GE's research and development program that would be applicable at the Rose site.

This alternative has been tested on an experimental level; additional laboratory and on-site testing would be required to determine the cost, cleanup duration, and short and long term effectiveness of this technology at the Rose site. This alternative also would require engineering solutions to prevent the emission of contaminants during excavation and treatment of contaminated soil and sediments. Because the effectiveness has not been demonstrated, EPA cannot determine that this alternative would destroy contaminants, meet ARARs, or satisfy the other selection criteria.

Estimated Time for Operation: Undetermined
Estimated Total Cost: Undetermined

B. Management of Migration (GW) Alternatives Analyzed

Management of migration alternatives address contaminants that have migrated from the original source of contamination. At the Rose site, VOC contaminants (and PCBs to a lesser extent) have migrated from the disposal area, predominantly via groundwater. The management of migration alternatives evaluated for the Site include a minimal no action with monitoring alternative (see Alternative SM-0), as well as 4 other groundwater alternatives.

Massachusetts DEQE has stated that it will require Best Available Control Technology (BACT) on the air stripper as a new source, regardless of the size of the (new) groundwater treatment equipment, based on 310 CMR 7.00. Therefore, a carbon filter will have to be placed on the air stripper. This addition adds to both the capital and operating and maintenance costs that the draft FS estimated for any alternative which includes an air stripper (GW-1 and GW-1A).

The estimated time for construction and operation is stated as 10 years, the estimate used in the draft FS. The 10-year period was an estimate only to provide a basis for cost comparison of the various GW alternatives. It should be noted, however, that the actual time required for groundwater treatment to meet the cleanup goals is directly related to removal/treatment of the source area and particularly the free product which exists in the saturated zone. EPA estimates that if no action is taken to remediate the source area than the groundwater treatment system would have to operate indefinitely.

GW-1

<u>Air Stripping/Carbon Treatment</u>
This alternative has been chosen as the groundwater remedy for the site; see Section X for details.

GW-1A

<u>Air Stripping/Carbon Treatment with Hydrogen Peroxide Pretreatment</u>

This alternative would utilize the same process as alternative GW-1 with the addition of hydrogen peroxide (H_2O_2) pretreatment. In this process, extracted groundwater would be mixed with H_2O_2 and then passed through a sand filter. Use of this pretreatment process would remove approximately 75% of the VOCs in the groundwater rather than depending predominantly on the air stripper for VOC removal. After pretreatment, groundwater would follow the same treatment path described in alternative GW-1 in Section X. Spent carbon would be handled in a manner similar to that as described in alternative GW-1 in Section X.

Air stripping is a proven technology for the removal of volatile organic compounds of the types that have been found at the Rose site. Air stripping with pretreatment has been used successfully at several hazardous waste sites. This technology would provide overall long term effectiveness and compliance with ARARs. It would provide permanent reduction in the site contamination. Short term effects, such as air emissions, could be minimized through engineering controls. Spent carbon would be handled in a manner similar to that described for GW-1.

This technology, although considered to be comparable to GW-1 in cost and effectiveness, could be more difficult to implement due to the additional step required. In addition, the cost estimate for GW-1 is considered to be the most accurate; see the discussion in Appendix F on this issue.

Estimated Time for Construction and Operation: 10 years
Estimated Capital Cost: $503,000
Estimated Present Worth of Operation and Maintenance Costs: $615,000
Estimated Total Cost: $1,118,000

GW-2

Ultraviolet Light - Ozonation with Hydrogen Peroxide Pretreatment

This alternative would consist of the same pretreatment process described in alternative GW-1a. Following both H_2O_2 pretreatment and filtering through sand beds, the groundwater would be treated with ozone in the presence of ultraviolet (UV) light to destroy PCBs and any remaining VOCs. Because ozone is a highly reactive gas and toxic in high concentrations, any off-gases from the process would be passed through an ozone decomposer to change the ozone into oxygen prior to release.
UV-Ozonation is a relatively new technology, but has been proven effective in treating hazardous wastes containing VOCs and PCBs. This technology is currently a demonstration project under the EPA SITE program. This technology would comply with ARARs, and it would have long term effectiveness and provide a permanent reduction in site contamination. Short term effects could be minimized through engineering controls. This technology would potentially be more difficult to implement than GW-1 due to its stage of development.

Estimated Time for Construction and Operation: 10 years
Estimated Capital Cost: $585,000
Estimated Present Worth of Operation and Maintenance Costs: $560,000
Estimated Total Cost: $1,145,000

GW-3

Carbon Treatment with Hydrogen Peroxide Pretreatment

This alternative also would utilize the same hydrogen peroxide pretreatment as in alternatives GW-1A and GW-2. H_2O_2 pretreatment would be utilized to remove 80% to 90% of the VOCs. Carbon filtering would then be utilized to remove the PCBs and the remaining VOCs. Spent carbon would be handled in a manner similar to that as described in alternative GW-1 in Section X.

Additional testing would be required to prove the effectiveness of hydrogen peroxide in removing high levels of VOCs, and its ability to meet ARARs, prior to construction of the treatment facility. This alternative would reduce the volume, toxicity, and mobility of the contaminants permanently and would utilize engineering controls to minimize short term impacts.

Estimated Time for Construction and Operation: 10 years
Estimated Capital Cost: $370,000
Estimated Present Worth of Operation and Maintenance Costs: $880,000
Estimate Total Cost: $1,250,000

X. THE SELECTED REMEDY

The selected remedy is comprehensive since it includes both a source management and a management of migration component.

A. Description of the Selected Remedy

After evaluating all of the feasible alternatives, EPA is selecting a two-part cleanup plan to address soil and groundwater contamination at the Rose site.

1. Air stripping and carbon treatment is selected to prevent the spread of contamination through the groundwater and to restore contaminated groundwater. The Rose Pond would be drained and the water treated in the same manner if the levels continue to exceed the groundwater cleanup goals.

2. On-site incineration is the selected alternative for addressing soil and sediment contamination.

In an effort to encourage development of alternative technologies for treatment of hazardous waste, however, EPA is considering allowing GE to conduct a demonstration project for application at the site during the design of the on-site incinerator. This alternative is chemical extraction with incineration of extracted liquids (SM-9). This alternative would be considered for use if it is demonstrated to meet the criteria for evaluation for remedy selection. If the alternative is not proven to be effective by the end of the incinerator design phase, construction and operation of the incinerator would begin immediately upon completion of design. This demonstration project would be conducted in parallel with the remedial design for the on-site incinerator.

To minimize further spread of contaminants from the disposal area, EPA is requiring that groundwater treatment begin immediately and continue until the groundwater cleanup goals are achieved. Recovery of the subsurface free product will continue. This oil/water/solvent mixture will continue to be shipped off-site for thermal destruction at an approved TSCA incineration facility.

B. Rationale for Selection/Points of Compliance

The rationale for choosing the selected alternative is based on the assessment of each criteria listed in the evaluation of alternatives section of this document. In accordance with Section 121 of CERCLA, to be considered as a candidate for selection in the ROD, the alternative must have been found to be protective of human health and the environment and able to attain ARARs unless a waiver is granted. In assessing the alternatives that met these statutory requirements, EPA focused on the other evaluation criteria, including short term effectiveness, long term effectiveness, implementability, use of treatment to permanently reduce the mobility, toxicity and volume, and cost.

EPA has determined that incineration is the only available technology which satisfies all of these criteria, particularly permanence, and that on-site incineration is more cost effective than off-site incineration for the Rose site. Additionally, the short term impacts associated with off-site incineration of increased truck traffic and the transportation of contaminated materials untreated over long distances are considered to be less acceptable than the construction impacts associated with on-site incineration. Further, many of the potential source remedies were not considered by EPA to be implementable because the technology has not yet been developed. In addition, the groundwater treatment is deemed necessary to comply with EPA's Groundwater Protection Strategy and the RCRA Subpart F and G requirements.

EPA also considered nontechnical factors that affect the implementability of a remedy, such as state and community acceptance. Based upon this assessment, taking into account the statutory preferences of CERCLA, EPA selected the remedial approach for the Site.

<u>1. Source Management</u>

The source management portion of the remedial action is designed to permanently destroy the source area soil and sediment contamination.

Under this alternative, contaminated soil and sediments will be excavated and then burned in a transportable thermal destruction facility that will be set up at the site. Three different types of incinerators were evaluated: rotary kiln, circulating fluidized bed, and infrared processing. The extremely high temperatures in any of these thermal destruction facilities would destroy virtually all of the organic contaminants. The TSCA regulations require that the destruction and removal efficiency of PCBs by incineration be 99.9999% and the ash (decontaminated soil) must contain less than 2 ppm PCBs. Exhaust gases will be passed through air pollution control devices before being released into the atmosphere. All soil will be tested to ensure that the PCB cleanup goals have been met and that acceptable levels of metals are present. Decontaminated soil will be replaced on site.

On-site incineration will provide long term protection of human health and the environment. Organic contamination is destroyed; no mobility, toxicity, or volume concerns remain, so that the remedy will comply with ARARs. This alternative is a proven technology and it will require engineering controls to prevent the emission of contaminants during excavation of contaminated soil and sediments and during actual thermal treatment, to minimize short term impacts and to meet site specific air quality ambient action and emissions limits. These controls will be developed during the design process.

On-site incineration will utilize a transportable (mobile) unit. Such systems are commercially available at the present time. It should be noted, however, that full scale operation of these transportable units has been limited, and periods of downtime have been experienced.

The extent of excavation will be to the seasonal low water table for the majority of the disposal area. EPA has determined that extensive dewatering would not be practicable at this site for the reasons explained in Section VII of this ROD and is not necessary to be protective since PCBs will be effectively immobilized by groundwater treatment. Of equal importance, the potential impacts on the nearby wetland from a large dewatering effort which could lower the water table significantly are unacceptable.

Deeper excavation will be required only in the free product area that is believed to be localized. Since the time for groundwater treatment is directly dependent upon the volume of the source area, this source area will be removed and treated.

The deep saturated soils which will remain on site contain PCBs up to a maximum of approximately 5000 ppm. Leaving these soils in place will require imposition of institutional controls for the disposal area to prevent groundwater use and excavation in the saturated zone. In addition, capping the site will prevent any direct contact with the remaining PCBs in the saturated zone.

Potential waste streams that will be generated by the incineration process requiring disposal include material collected by the air pollution control device(s). This material will need to be disposed of in accordance with the land disposal ban and all other applicable requirements.

Estimated Time for Construction and Operation: 2 years
Estimated Capital Cost: $208,400
Estimated Present Worth of Operation and Maintenance Cost: $5,000,000
Estimated Total Cost: $5,200,000

2. Management of Migration

The management of migration portion of the remedial action is designed primarily to treat contaminated groundwater that is migrating from the site.

EPA will address groundwater contamination at the Rose site by utilizing a combination of air stripping and carbon treatment. The treatment system will entail construction of trenches or wells to collect shallow groundwater from the 2 plumes of contamination. In addition, a well will be installed in bedrock in the vicinity of the free product area to prohibit migration into fractured rock. Collected groundwater will be pumped to an air stripping tower. As air is forced up through the tower, VOCs are removed from the groundwater into the air stream. This air stream containing VOCs is passed through an activated carbon filter to remove contaminants before being released into the atmosphere.

Following air stripping, the groundwater will be passed through activated carbon filter beds to remove PCBs and any residual contaminants. Treated water will then be discharged into an area where it will be returned to the aquifer. Water from the Rose's pond will be treated in the same manner, if necessary, after being pumped from the pond.

Air stripping is a proven technology for removing volatile organic compounds of the type that have been found at the site. EPA has used air stripping and carbon treatment successfully at numerous hazardous waste sites. This technology will provide overall protection of human health and the environment and compliance with ARARs. It will provide permanent reduction in the site contamination and will provide long term effectiveness. Short term effects can be minimized through engineering controls, such as the use of carbon filters. EPA believes that air stripping followed by carbon treatment is the easiest management of migration alternative to implement.

The draft FS did not include the costs of a carbon filter on the air stripper. Because Massachusetts DEQE requires Best Available Control Technology (BACT) for all new sources, EPA has estimated the additional costs of a carbon filter and has added them here. See Appendix F for these cost calculations.

Spent carbon will be generated from the (used) carbon filters. These spent filters will be disposed of either by manufacturer regeneration, incineration, or an alternative disposal method which will comply with the land disposal ban and the RCRA regulations.

Estimated Time for Construction and Operation: 10 years
Estimated Capital Cost: $466,000
Estimated Present Worth of Operation and Maintenance Costs: $790,000
Estimated Total Cost: $1,256,000

XI. STATUTORY DETERMINATIONS

The remedial action selected for implementation at the Rose site is consistent with CERCLA and, to the extent practicable, the NCP. The selected remedy is protective of human health and the environment, attains ARARs and is cost effective. The selected remedy also satisfies the statutory preference for a permanent solution and for treatment which reduces the mobility, toxicity or volume as a principal element. Additionally, the selected remedy utilizes alternate treatment technologies to the maximum extent practicable.

A. The Selected Remedy is Protective of Human Health and the Environment

The remedy at this site will permanently reduce the risks presently posed to human health and the environment by:

- preventing exposure to contaminated soils by excavation and incineration of the contaminated soils above the water table;
- protecting uncontaminated groundwater and surface water for current and future use by intercepting and treating contaminated groundwater and by removing the free product layer below the water table, thereby eliminating the source for potential future contamination; and
- restoring contaminated groundwater for potential future use and elimination of this source of contamination of

Rose's pond and surrounding wetland areas, thereby removing the threat to wildlife.

B. The Selected Remedy Attains ARARs

This remedy will meet or attain all applicable or relevant and appropriate federal and state requirements that apply to the site. Federal environmental laws which are applicable or relevant and appropriate to the selected remedial action at the Rose site are:

Resource Conservation and Recovery Act (RCRA)
Clean Water Act (CWA)
Safe Drinking Water Act (SDWA)
Executive Order 11990 (Protection of Wetlands)
Toxic Substances Control Act (TSCA)
Clean Air Act (CAA)
Occupational Safety and Health Act (OSHA)

Table 8 lists potential action-specific State ARARs and presents a brief synopsis of the requirements. Note that via the state programs authorization process, Massachusetts' hazardous waste regulations under Chapter 21C are essentially equivalent to the federal counterpart found at 40 CFR Subpart F (releases from solid waste management units, including groundwater monitoring requirements) and Subpart G (closure and post-closure).

Table 5 lists the chemical-specific ARARs for groundwater. Table 7 lists potential action-specific Federal ARARs. A brief narrative summary of the ARARs follows.

The Resource Conservation and Recovery Act (RCRA) closure regulations require closure by removal of waste, waste residues and contaminated subsoils which is equivalent to closure as a surface impoundment or waste pile (40 CFR 264 Subpart K and L); or closure as a landfill by capping and appropriate post-closure care (40 CFR 264 Subpart N). The selected remedy for the Rose site attains the general RCRA closure performance standards as specified in 40 CFR § 264.111:

The owner or operator must close the facility in a manner that:

(a) Minimizes the need for further maintenance;

(b) Controls, minimizes or eliminates, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere; and

(c) Complies with the closure requirements of Subpart G including, but not limited to, the requirements of §§ 264.178, 264.197, 264.228, 264.258, 264.280, 264.310 and 264.351.

Excavation and treatment of PCB-contaminated soils above 13 ppm above the water table will result in the removal of a large portion of wastes and waste residues and it will eliminate the direct contact threat from those contaminants, as well as their contribution to groundwater contamination. The management of migration groundwater treatment option will minimize and eliminate to the extent necessary the migration of contaminants from the site. The restriction of on-site groundwater use, in conjunction with the RCRA closure and post-closure requirements in §§ 264.115, 264.116, 264.117, 264.119 and 264.120, will provide the necessary long term protection for public health and the environment.

Regarding management of migration measures, the specific relevant Federal regulations are the RCRA Releases from Solid Waste Management Units, including the groundwater monitoring requirements (40 CFR 264 Subpart F), the Clean Water Act (40 CFR Part 122) and the Safe Drinking Water Act (40 CFR 141 Subpart B). The groundwater protection regulations require the setting of groundwater protection standards which must be protective of public health and the environment. The groundwater cleanup goals were set at MCLs, proposed MCLGs, LHAs, or site-specific levels that EPA has determined will adequately protect public health at a lifetime cancer risk of 10^{-6} (see Section VI).

A groundwater monitoring system will be implemented consistent with 40 CFR § 264.100(d) to determine the effectiveness of the groundwater remediation system.

The remediation of groundwater is consistent with the U.S. EPA Groundwater Protection Strategy (August 1984) which classifies the aquifer at the Rose site as Class IIA (current usage) and requires the restoration of these aquifers.

The Safe Drinking Water Act (SDWA) is only applicable to public drinking water supplies (i.e. a water supply serving 25 or more people). However, EPA considers the MCLs established under the SDWA to be relevant and appropriate. Table 5 lists the relevant MCLs for the Rose site. EPA finds that it is technically infeasible to reduce PCB levels in groundwater within the 1.5-acre disposal area to the 0.005 ppb health-based level and institutional controls will be required for the disposal area. This is discussed in Section VI and VII of this ROD.

The remedy will comply with Executive Order 11990 - Protection of Wetlands, the Clean Water Act § 404(b)(1) guidelines and the State Wetland Protection Act (310 CMR 10.00). Rose's pond is an artificial pond that was excavated by a previous landowner to drain the surrounding wetland area. The pond has been affected by the site and it will be affected by the remedy. Because the pond water exceeds the groundwater cleanup goals, it will be necessary to drain and treat this water. Because the pond bottom sediments exhibit PCB levels in excess of the PCB cleanup goal, these sediments will be excavated for thermal treatment. EPA finds that there is no practicable alternative to these actions since it is the pond itself that is contaminated. Implementation of the remedy will utilize measures to restore the pond to its original wetlands character after remediation and to minimize any harm to the surrounding wetlands. In addition, the operation of the groundwater treatment system is intended to prevent contamination from the shallow aquifer from impacting the wetlands, and this system will operated to minimize any impacts on the surrounding areas.

Under TSCA, soils contaminated with PCBs at concentrations greater than 50 ppm that are disposed of after February 17, 1978 must be disposed of in accordance with 40 CFR 761 Subpart D. Since incineration is selected as the source treatment technology, treatment and disposal of the 15,000 cubic yards of the PCB-contaminated waste will be in accordance with the criteria of 40 CFR 761.70.

The 50 ppm TSCA regulatory threshold referred to in GE's draft Feasibility Study is not a cleanup standard. The establishment of this regulatory limit was based on economic and administrative considerations as well as human health and the environment. As such, on a site-specific basis, it does not necessarily achieve the objective of Section 121 of CERCLA. In this case, EPA developed a site-specific health-based cleanup standard for PCBs based upon a risk assessment that considered future use of the Rose site.

The TSCA PCB Spill Cleanup Policy (TSCA Section 761.120 Subpart G; April 2, 1987) provides cleanup guidelines based on access to the site that were considered in determining the site-specific cleanup level. The PCB cleanup level of 13 ppm for the Rose site is considered to be consistent with the cleanup guideline of 10 ppm suggested in this policy.

During the excavation and treatment of PCB and VOC-contaminated soils, and during the groundwater treatment, air emissions will be monitored and all relevant Federal and State standards will be attained. Specifically, the National Ambient Air Quality Standards (NAAQS) will be met through specified techniques for excavation activities, as well as required air monitoring for the incinerator and during excavation, to ensure that site-specific ambient action levels are not exceeded.

During the excavation and treatment of contaminated soils and during groundwater treatment, OSHA regulations will be followed. In particular, 29 CFR 1910.120 specifies standards for handling hazardous wastes and 29 CFR 1910.1000 sets allowable ambient air concentrations for activities which involve release of VOCs in the workplace. Techniques such as limiting the extent of excavation, use of suppressant foams, and use of air purifying and filtering devices will be utilized to provide compliance not only with OSHA regulations but also any federal and state air quality standards.

C. The Selected Remedial Action is Cost Effective

Once EPA has identified alternatives that are protective and attain ARARs, EPA analyzes those alternatives to determine a cost-efficient means of achieving the cleanup.

The estimated cost of on-site incineration may be somewhat higher than several of the other source management alternatives. However, EPA believes that the remedy is cost effective due to the fact that only incineration will permanently destroy the organic contamination at the site. Future remedial action with associated costs may be needed if wastes are left on site. When comparing equivalently protective alternatives that provide permanent remedies, KOHPEG and on-site incineration were considered to have approximately the same cost. However, because of the lack of full-scale implementability of the KOHPEG process, EPA considers incineration to be preferable for the Rose site.

The actual costs for on-site incineration are difficult to estimate precisely. However, the $380 per cubic yard estimate for on-site incineration is well within the range provided by guidance and vendor quotes. EPA believes that the remedial on-site treatment market is becoming more competitive. The cost of remedial services may decline due to factors such as increased market competition, more efficient design and operation of treatment equipment, improved materials handling capability, and increased availability of equipment and treatment capacity.

The costs for GW-1 and GW-1A are considered to be approximately the same due to the level of detail in the estimates (+50/-30%) for feasibility studies. Further, the cost estimate for alternative GW-1 is considered to be the most accurate. GW-1 technology has been implemented full-scale at several Superfund sites, while the other GW alternatives have not been used as extensively. See Appendix F for further discussion of the accuracy of the GW cost estimates.

The addition of the GAC filter on the air stripper increased both the capital and O&M costs for the GW-1 and GW-1A alternatives. The design of the actual groundwater treatment system will determine if a pretreatment phase is desirable to reduce the O&M costs. See Appendix F for calculation of the adjusted cost estimates.

D. The Selected Remedy Utilizes Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

Incineration is an alternative treatment technology that will provide a permanent solution to the PCB problem at the site. Excavation of the PCB-contaminated soils in the unsaturated zone to 13 ppm and treatment by incineration will reduce the risks posed to human health from direct contact with on-site soils by virtual complete destruction of the organic contaminants, as well as elimination of the potential risk of release of PCBs from this zone into groundwater. This soil treatment process will also provide the added benefit of treating a large quantity of VOCs in the unsaturated zone, thus assisting in the cleanup of groundwater. In addition, eliminating a significant source of contamination to the groundwater by removal of the free product below the water table will substantially reduce the time required to meet the groundwater treatment goals.

Treatment of the groundwater will permanently and significantly reduce the volume, toxicity and mobility of the volatile organics as well as reduce the mobility of the PCBs present in the saturated zone soil matrix. Restoration of the aquifer will permit the groundwater beyond the disposal area to be used for drinking water purposes in the future. However, EPA will require that institutional controls restricting groundwater use be implemented for the disposal area.

Further, restoration of the groundwater will eliminate the threat posed to public health and the environment from the current and future extent of contaminant migration in groundwater and surface water.

E. The Selected Remedy Satisfies the Preference for Treatment as a Principal Element

The principal element of the selected remedy is the excavation and on-site incineration of contaminated soil and sediments. This element addresses the threat at the site of contamination of soil and sediments with PCBs and VOCs. The selected remedy also satisfies the statutory preference for treatment as a principle element by requiring groundwater treatment.

However, some PCB contamination will remain in the saturated zone. Only the VOC contamination in this zone will be treated to immobilize the PCBs. The basis for this is discussed previously in Section X.

XII. STATE ROLE

In accordance with CERCLA Section 121(f)(1)(E) and (G), EPA has provided the Commonwealth of Massachusetts' Department of Environmental Quality Engineering a reasonable opportunity to review and comment on the Remedial Investigation, the Endangerment Assessment, and the Feasibility Study. EPA has also provided notice to the State and an opportunity to comment on the Proposed Plan for remedial action at the Site. A copy of the State's correspondence is attached as Appendix C.

FIGURE 1

SITE LOCATION MAP

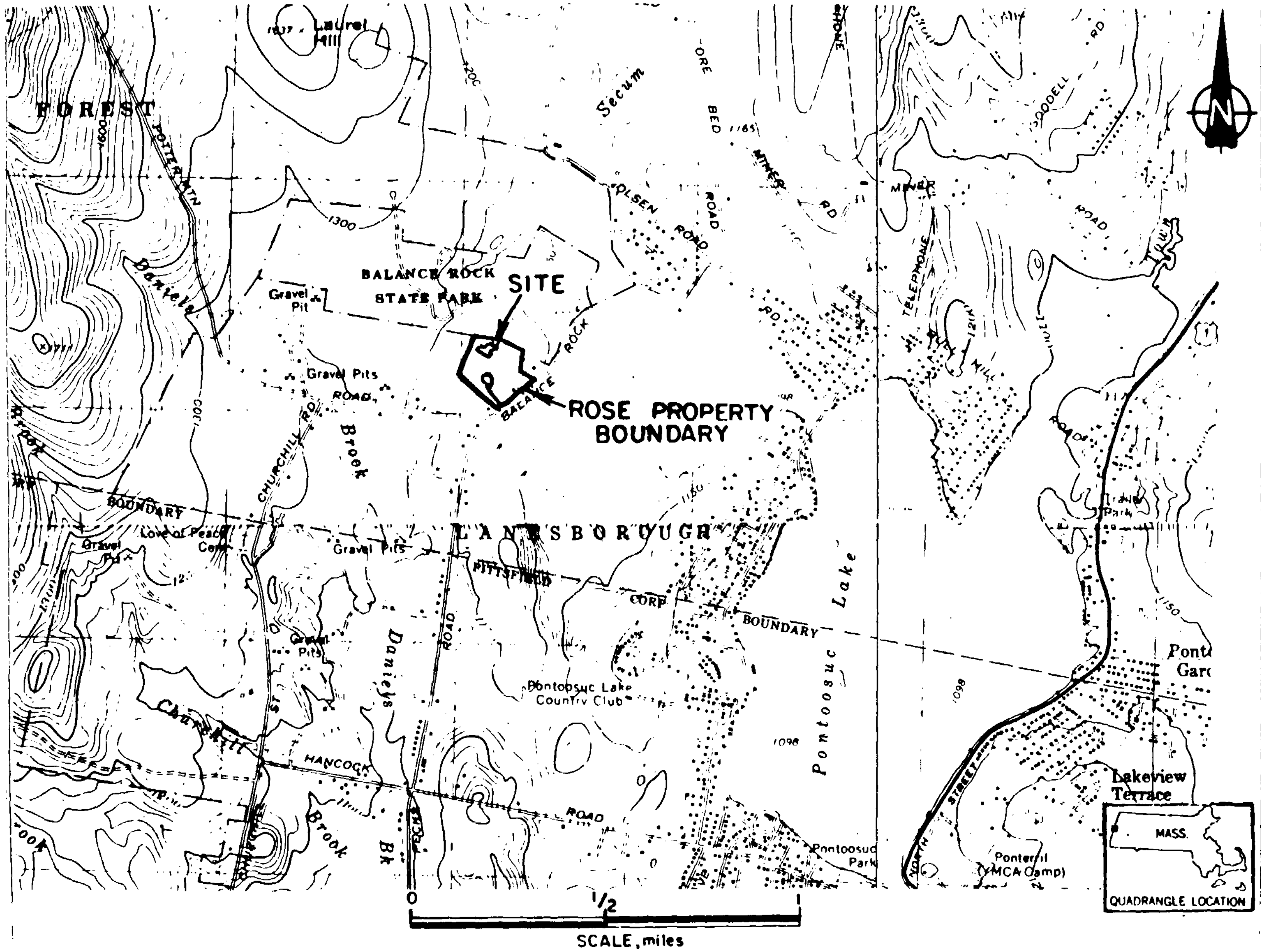
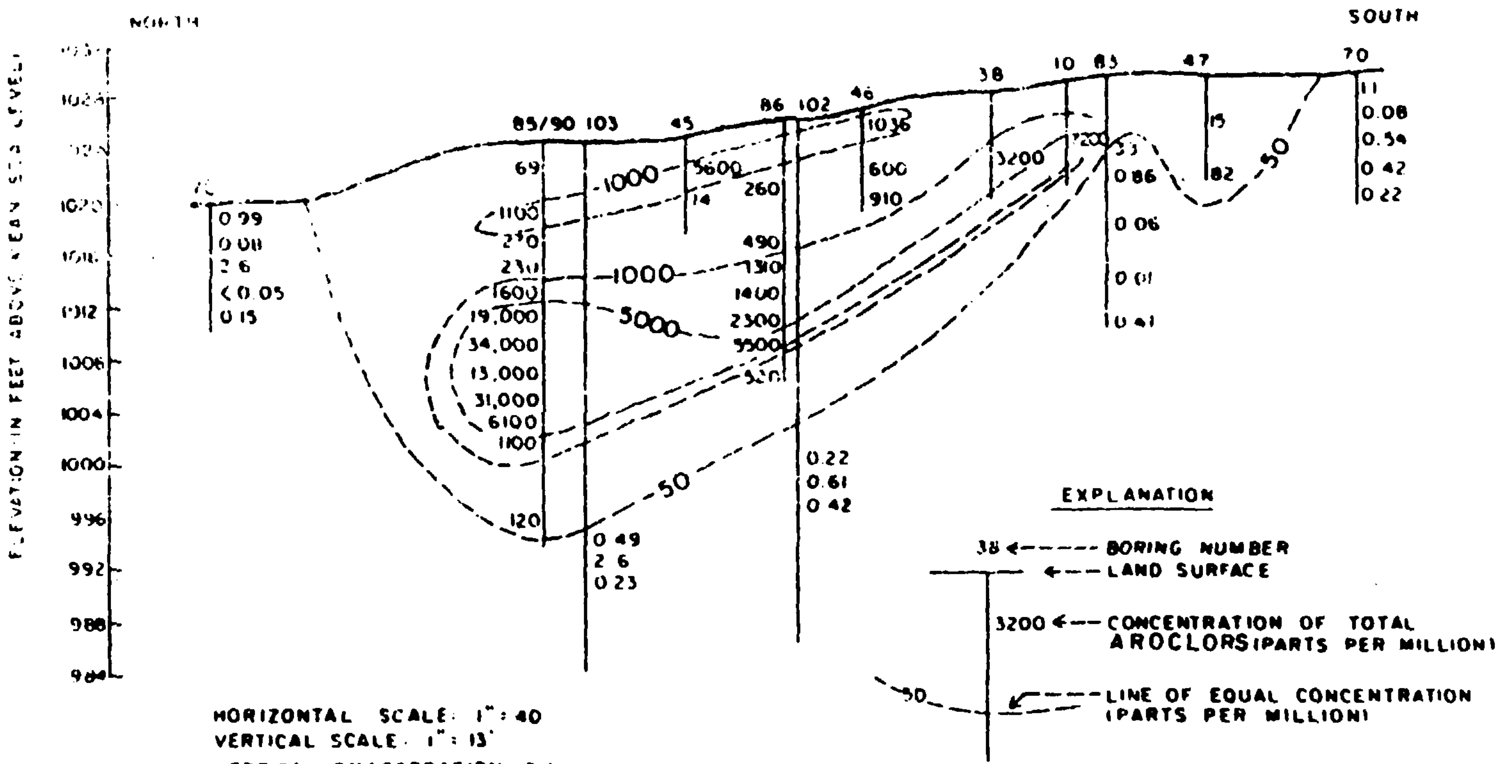
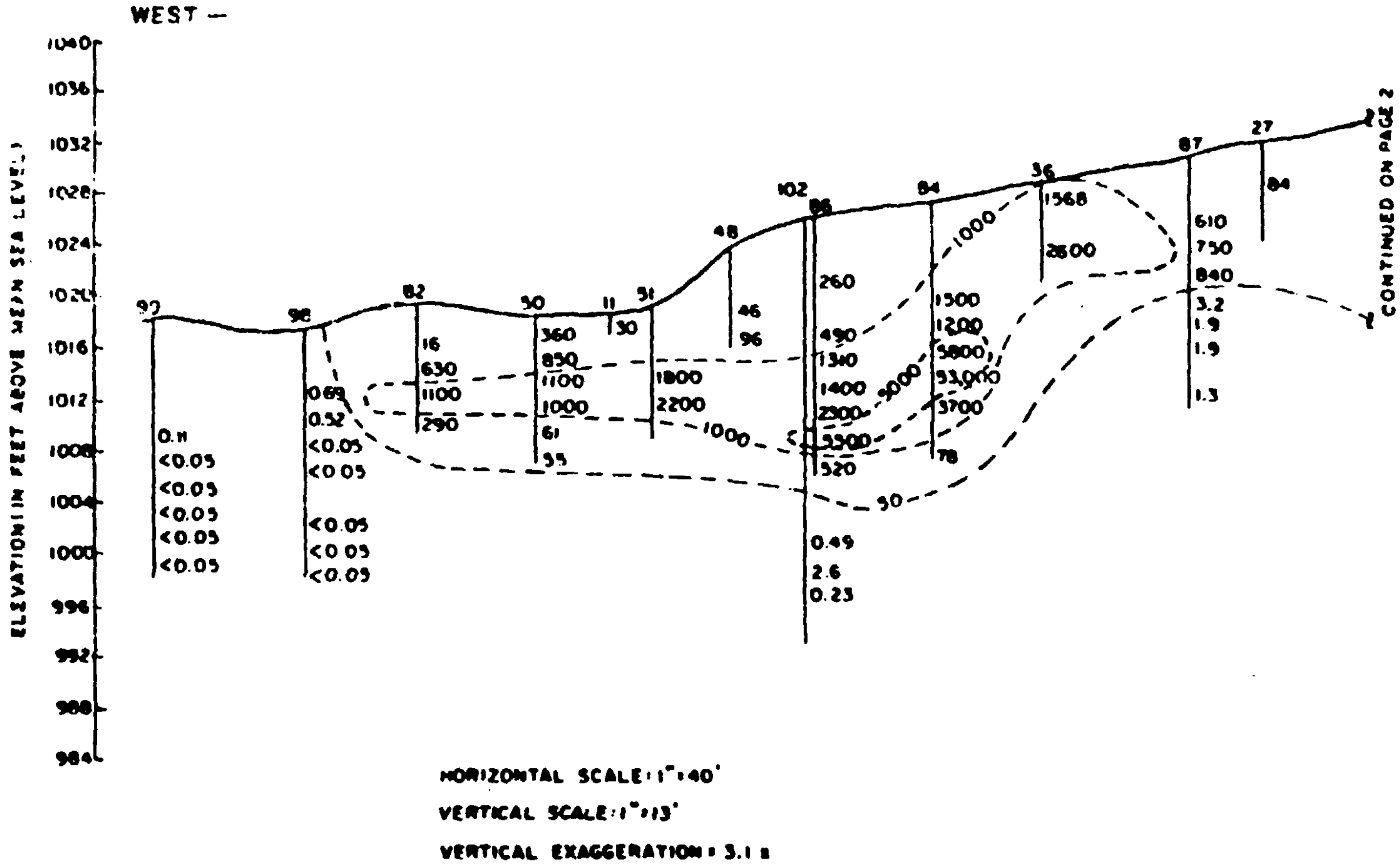

SITE
ROSE PROPERTY
BOUNDARY
BALANCE ROCK
STATE PARK
Laurel Hill
FOREST
Secum
Gravel Pit
Gravel Pits
CHURCHILL RD
Brook
BOUNDARY
Love of Peace Cem
LANESBOROUGH
PITTSFIELD
CORP
BOUNDARY
Pontoosuc Lake
Pontoosuc Lake Country Club
HANCOCK
ROAD
Daniels
Pontoosuc Park
Lakeview Terrace
Ponterril (YMCA Camp)
MASS.
QUADRANGLE LOCATION
0
1/2
1
SCALE, miles

FIGURE 2

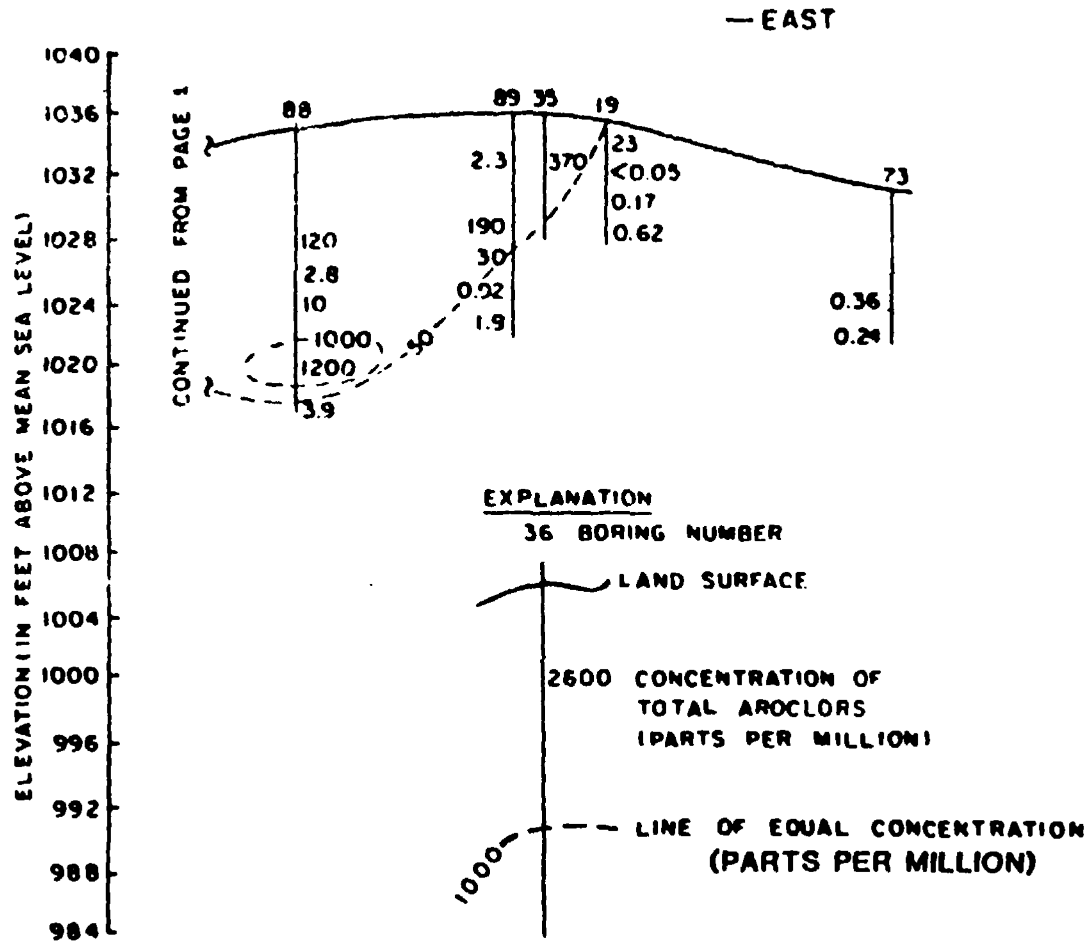
PCB SOIL CONTAMINATION PROFILES IN THE DISPOSAL AREA



North-south cross-section through the disposal pit.



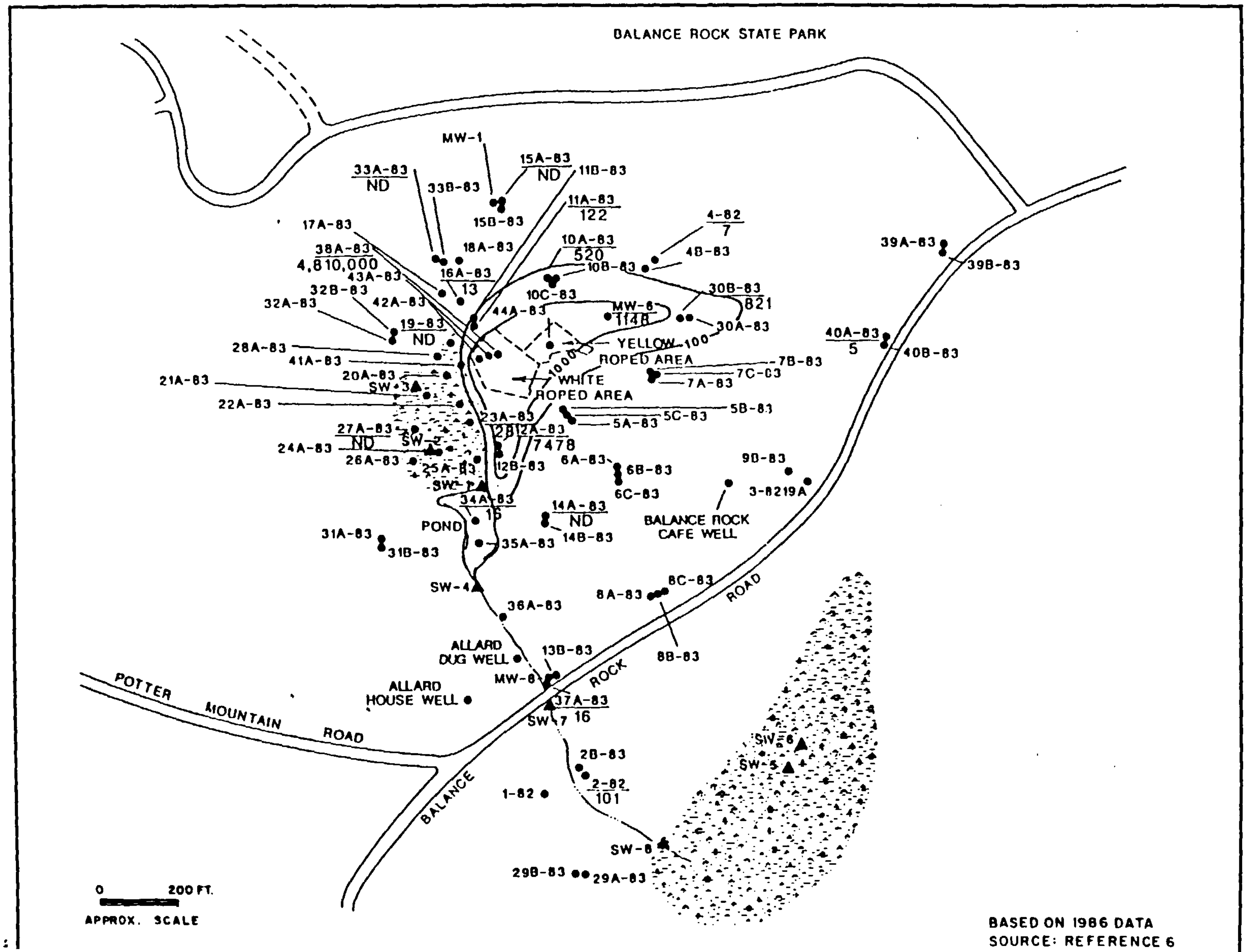
East-west cross-section through the disposal pit (page 1).



East-west cross-section through the disposal pit (page 2).

FIGURE 3

WELL LOCATIONS AND TOTAL VOCs
IN SHALLOW GROUNDWATER



BASED ON 1986 DATA
SOURCE: REFERENCE 6

LEGEND:

- MARSH
- ● LOCATION OF MONITOR WELL
- ▲ LOCATION OF SURFACE WATER STATION
- 5 CONCENTRATION OF TOTAL VOCs IN MICROGRAMS PER LITER
- 100 LINE OF EQUAL CONCENTRATION IN MICROGRAMS PER LITER

GENERAL ELECTRIC COMPANY
ROSE SITE

TOTAL VOCs IN SHALLOW GROUNDWATER (A WELLS)

BLASLAND & BOUCK ENGINEERS, P.C.

TABLE 1

SUMMARY OF FIELD INVESTIGATIONS

	EPA/DEQE/E&E	GE/G&M	TOTAL
Assessment of Soils			
1. Soil Borings			
a. Number of Borings	See Monitoring Wells	110	110
b. Linear footage of borings	See Monitoring Wells	1132 ft.	1132 ft.
c. Number of analyses	102 (from monitoring well boreholes)	341	443
2. Misc. Soil Samples			
a. Pond Sediment (Adjacent Site)	0	7	7
b. Garden Soils (Adjacent Site)	0	5	5
c. Surface Soils (At Site)	3	0	3
d. Swamp/brook soils (Adjacent Site)	6	2	8
3. Geophysical Surveys	Ground Probing Radar	Magnetometer	
4. Dates of Investigations	8/80-9/82	1/82-7/83	
. Assessment of Ground Water			
1. Monitoring Wells			
a. Number of Wells	8 wells	67 wells	75 wells
b. Linear footage of wells	362 feet	1835 ft.	2197 ft.
2. Ground-Water Level Monitoring	3 Rounds (8 Wells)	3 Rounds (67 Wells)	
. Ground-Water Level Monitoring			
a. Number of Analyses	23	160	183
4. Drinking Water Monitoring			
a. Number of Analysis	12	3	15
5. Dates of Investigations	11/81-4/82	3/83-8/83 11/86-12/86	
. Assessment of Surface Water			
1. Number of Analyses	7	12	19
2. Dates of Investigations	3/81	11/86	

TABLE 2

SITE CONTAMINANTS AND CONTAMINANTS OF CONCERN

Site Contaminants and Contaminants of Concern

Site Contaminants

A. Volatile Organics

1. vinyl chloride
2. methylene chloride
3. 1,1-dichloroethylene
4. t-1,2-dichloroethylene
5. trichloroethylene
6. benzene
7. 1,1,2-trichloroethane
8. tetrachloroethylene
9. toluene
10. chlorbenzene
11. ethylbenzene
12. xylenes
13. dichlorobenzenes

B. Semi-Volatile Organics

1. 1,2-dichlorobenzene
2. 1,3-dichlorobenzene
3. 1,4-dichlorobenzene
4. 2,4-dimethylphenol
5. 1,2,4-trichlorobenzene

C. PCBs

Contaminants of Concern; Indicator Compounds

1. vinyl chloride
2. t-1,2-dichloroethylene
3. trichloroethylene
4. tetrachloroethylene
5. toluene
6. ethylbenzene
7. PCBs

TABLE 3

SUMMARY OF POTENTIAL EXPOSURE ROUTES

Route of Exposure	Physical and Chemical Features	Environmental	Receptor Population	Current Probability of Exposure	Future Probability of Exposure Without Remedial Action
Dermal contact with soil within the disposal area.	PCBs are adsorbed strongly to soil particles. VOCs exhibit limited capacity to adsorb to soil.	Area within the disposal site is covered with plastic, and the perimeter has warning signs and fencing.	The disposal area is near approximately 30 homes although no evidence of trespass is evident.	Absent	Low to moderate
Dermal contact with soil outside the disposal area.	PCBs strongly adsorb to soil particles. VOCs adsorb less strongly and were not reported in soil samples.	Dermal contact outside the disposal area is limited by the vegetative cover. Surrounding area is not secured to prevent human and animal traffic.	Residents near the disposal area, visitors to the state park, and gardeners on the Rose property represent potential receptors.	Moderate	Moderate
Dermal contact with Rose Pond sediments.	PCBs strongly adsorb to Rose Pond sediments. VOCs will generally remain mobile in an aqueous system.	Wading in the Rose Pond could result in exposure to the stream sediments.	Local residents who use the Rose Pond for recreation.	Low	Moderate
Dermal contact with surface water in the Rose Pond.	PCBs have limited solubility in water. VOCs were detected in surface-water samples.	The pond is accessible to local residents.	Exposure to local residents could occur for brief intervals (total body immersion) and longer periods for hand and/or foot contact.	Low	Moderate
Dermal contact with stream surface waters.	VOCs were detected at low concentrations.	The stream is accessible to local residents.	Exposure to local residents could occur for brief periods of time over small portions of the body.	Low	Moderate
Dermal contact with ground water.	PCBs are not easily mobilized in ground water. VOCs may be transported via ground water to shallow water-supply wells.	Ground water is used in eight households within a 1/4-mile radius of the site. Residential supply wells are located in the unaffected deeper aquifer. All other wells are on municipal supply.	Local residents or private ground-water supply wells for bathing facilities.	Absent	Low
Inhalation of fugitive dust.	The protective plastic cover at the disposal site and the surrounding trees and vegetation do not promote the generation of fugitive dust.	The site is accessible to pedestrian traffic from the nearby residential area.	The receptor population is anticipated to be small-to-absent as evidenced by its obscure location.	Absent	Low

Geraghty & Miller, Inc.

Route of Exposure	Physical and Chemical Features	Environmental	Receptor Population	Current Probability of Exposure	Future Probability of Exposure Without Remedial Action
Inhalation of organic chemicals.	Periodic olfactory detection of organic vapors has been recorded.	Air monitoring results suggest the presence of organic vapors.	Local residents that live near the site.	Low	Moderate
Ingestion of soil within the disposal area.	PCBs are strongly adsorbed to soil particles.	The disposal area is fenced, and circumstances at the disposal area do not encourage picnics or opportunities for hand-to-mouth transfer events.	Nearby receptor populations would not use this area for food consumption or recreational purposes.	Low	Low
Ingestion of soil outside the disposal area.	PCBs are strongly adsorbed to soil particles.	Gardening could result in the accidental ingestion of raw, partially cleaned vegetables (e.g., carrots).	The receptor population most likely to consume vegetables grown in contaminated soils at the site is the Rose family. PCB soil contamination beyond property boundary has not been demonstrated.	Low	Moderate
Ingestion of ground water.	PCBs in ground water have not been detected 1,000 ft beyond the disposal area. VOC contamination is limited to the surficial aquifer.	The surficial aquifer is not used for residential water supplies. Extension of the municipal water supply to area homes has limited private well use.	Ground-water supply wells used by local residents located outside the disposal area and within the Rose property.	Absent	Low
Ingestion of fish.	PCBs are accumulated in stream sediment. Bioconcentration and biomagnification is possible. Fish greater than six inches in length have not been seen in the pond.	Analytical results show that PCB transport via sediments does not extend beyond the Balance Rock Road culvert. Extensive distribution of PCBs beyond this point is unlikely.	The Rose Pond is not fished by local residents.	Absent	Absent.

Route of Exposure	Physical and Chemical Features	Environmental	Receptor Population	Current Probability of Exposure	Future Probability of Exposure Without Remedial Action
Ingestion of agricultural products.	PCBs strongly adsorb to soil particles and express limited mobility in ground water.	The probability that PCBs will be introduced to the agricultural field is low since ground water is not used to irrigate and PCB-contaminated soils are almost completely bound to the disposal site.	Corn, the predominant crop in the agricultural field, has an adventitious root system not suited to inter-cepting the ground-water table.	Absent	Absent
Ingestion of game and domestic food animals.	PCBs are strongly bio-accumulated from sediments.	The covered disposal site offers little benefit for grazing, browsing, or protective cover for wildlife.	The game, birds, and deer hunted at the site are not expected to have accumulated significant quantities of PCB or VOC contaminants.	Low	Low

TABLE 4

POTENTIAL EXPOSURE ROUTES WITH
POTENTIAL HUMAN HEALTH RISKS

Route of Exposure	Cancer Risk Adult	Cancer Risk Child	Hazard Index Adult	Hazard Index Child
Disposal Area				
Dermal Contact/ Ingestion: Soil	6.9×10^{-2} (M) 2.6×10^{-3} (A)	1.6×10^{-2} (M) 6.1×10^{-4} (A)	4.7×10^{3} (M) 1.7×10^{2} (A)	3.7×10^{3} (M) 1.4×10^{2} (A)
Inhalation: Air	5.1×10^{-11}	2.9×10^{-11}	8.8×10^{-3}	1.7×10^{-2}
Total	6.9×10^{-2} (M) 2.6×10^{-3} (A)	1.6×10^{-2} (M) 6.1×10^{-4} (A)	4.7×10^{3} (M) 1.7×10^{2} (A)	3.7×10^{3} (M) 1.4×10^{2} (A)
Rose Garden				
Dermal Contact/ Ingestion: Soil	6.9×10^{-7}	9.5×10^{-7}	7.2×10^{-2}	1.6×10^{-1}
Total	6.9×10^{-7}	9.5×10^{-7}	7.2×10^{-2}	1.6×10^{-1}
Rose Pond				
(Pond Sediments) Dermal	3.1×10^{-7} (M) 7.8×10^{-8} (A)	4.3×10^{-7} (M) 1.1×10^{-7} (A)	5.0×10^{-1} (M) 1.3×10^{-1} (A)	4.6×10^{-1} (M) 1.2×10^{-1} (A)
Pond Surface Water				
Dermal Contact/ Ingestion: Water	2.3×10^{-10}	2.3×10^{-6}	4.0×10^{-5}	4.3×10^{-1}
Inhalation: Air	2.9×10^{-8}	9.4×10^{-9}	3.4×10^{-3}	3.7×10^{-3}
Total	3.4×10^{-7} (M) 1.1×10^{-7} (A)	2.7×10^{-6} (M) 2.4×10^{-6} (A)	5.0×10^{-1} (M) 1.3×10^{-1} (A)	9.0×10^{-1} (M) 6.0×10^{-1} (A)
Stream				
Dermal Contact: Water	3.1×10^{-7} (M) 7.8×10^{-8} (A)	4.2×10^{-7} (M) 1.1×10^{-7} (A)	5.0×10^{-1} (M) 1.3×10^{-1} (A)	4.7×10^{-1} (M) 1.2×10^{-1} (A)
Inhalation: Air (pond)	2.9×10^{-8}	9.4×10^{-9}	3.4×10^{-3}	3.7×10^{-3}
Total	3.3×10^{-7} (M) 1.7×10^{-7} (A)	4.2×10^{-7} (M) 1.1×10^{-7} (A)	5.0×10^{-1} (M) 1.3×10^{-1} (A)	4.7×10^{-1} (M) 1.2×10^{-1} (A)

(continued)

Route of Exposure	Cancer Risk Adult	Hazard Index Adult
Ground Water		
Ingestion		
Area 1	2.3	8.7×10^{3}
Area 2	7.0×10^{-5}	1.1×10^{-1}
Area 3	1.4×10^{-2}	1.2
Area 4	6.6×10^{-6}	3.2×10^{-1}
Area 5	3.7×10^{-6}	1.2×10^{-1}
Range	2.3 to 3.7×10^{-6}	8.7×10^{3} to 1.1×10^{-1}

(M) Maximum Reported Concentration
(A) Average Reported Concentration

Geraghty & Miller, Inc.

Animal Health Risk Summary

Route of Exposure	Cancer Risk	Hazard Index
Rose Pond		
Ingestion: Water	7.3×10^{-4}	1.8
Stream		
Ingestion: Water	1.4×10^{-4}	3.8×10^{-1}

TABLE 5

POTENTIAL CHEMICAL-SPECIFIC ARARs, GUIDELINES AND CLEANUP GOALS FOR GROUNDWATER

TABLE 5

SUMMARY OF POTENTIAL GROUNDWATER ARAR'S, GUIDELINES, AND CLEANUP GOALS
(in parts ber billion)

Compound	ARARs			Other Guidelines/Criteria				
	MCL	AWQC		Proposed MCLG	LHA(1)	RSD	Carcinogen Class(2)	Proposed Cleanup Goal
		Acute	Chronic					
A. Volatile Organics								
1. vinyl choride	2	-	-	-	-	-	A	2
2. methylene chloride	-	-	-	-	-	4.6	B2	5
3. 1,1-dichloroethylene	7	11,600	-	-	-	0.06	C	7
4. t-1,2-dichloroethylene	-	11,600	-	70	70	-	-	70
5. trichloroethylene	5	45,000	21,900	-	-	3.1	B2	5
6. benzene	5	5,300	-	-	-	1.2	A	5
7. 1,1,2-trichloroethane	-	-	9,400	-	-	0.63	C	0.63
8. tetrachloroethylene	-	5,280	840	0	-	0.67	C	0.67
9. toluene	-	17,500	-	2000	2420	-	-	2000
10. chlorobenzene	-	-	-	60	300	-	-	300
11. ethylbenzene	-	32,000	-	680	680	-	-	680
12. xylenes	-	-	-	440	440	-	-	440
13. dichlorobenzenes:								
o-DCB	-	-	-	620	620	-	-	620
p-DCB	75	1,120	760	-	75	-	-	75
m-DCB	-	-	-	-	620	-	-	620
B. PCBs	-	2.0	0.014	0	-	0.005	B2	0.005

Abbreviations:

ARAR = Applicable or Relevant and Appropriate Requirement
MCL = Maximum Contaminant Level
AWQC = Ambient Water Quality Criteria (for Aquatic Species)
MCLG = Maximum Contaminant Level Goal
LHA = Lifetime Health Advisory
RSD = Risk-Specific Dose; based on 10-6 risk for all carcinogens

Notes:

(1) Lifetime Health Advisories are values established by the U.S. EPA office of Drinking Water in Health Advisories issued March 31, 1987.

(2) Carcinogen classes established by EPA: A = human carcinogen; B2 = probable human carcinogen; C = possible human carcinogen.

TABLE 6

SUMMARY OF REMEDIAL ALTERNATIVES

SOURCE MANAGEMENT REMEDIAL ALTERNATIVES:
SUMMARY OF FEASIBILITY STUDY RANKING

	Remedial Alternative (in conjunction with ground-water treatment)	Technical Feasibility Ranking	Institutional Ranking	Public Health and Environmental Ranking	Estimated Costs[1] (Present Worth) ✱	Constructic or O&M Duration
-	No Action	high	low	low/moderate	$210,000	30 years
SM-1	Containment (cap & cutoff wall)	high	low	moderate	$910,000	30 years
SM-2	In-situ Soil Flushing with Leachate Treatment[2]	requires Field Study	high	high	to be defined by Field Study	to be defi by Field S
SM-3	KOHPEG Dechlorination	moderate	high	moderate-high	$16-30 million	5-9 years
SM-4	On-Site Incineration	moderate	moderate	moderate	$ 19.2 Million	5+ years
SM-5	Off-Site Incineration	low	moderate	moderate	$ 148 Million	6 years
SM-6	On-Site Landfill	high	low - moderate	moderate	$ 14.1 Million	30 years
SM-7	Off-Site Landfill	high	low	moderate	$ 25.6 Million	4 years
SM-8	Chemical Fixation/Immobilization	moderate	high	high	$ 11.2 Million	4 years
SM-9	Chemical Extraction with Incin-eration of Recovered Liquids[2]	requires Field Study	high	high	to be defined by Field Study	to be defi by Field S
SM-10	On-Site Biodegradation (landfarming)[2]	requires Field Study	high	high	to be defined by Field Study	to be defi by Field S

Notes:

(1) Present worth costs are for duration indicated. Interest Rate of 10% assumed.

(2) Requires implementation of interim remedial measures.

✱ The estimated costs and duration are based on the original estimate of 60,000 cubic yards of soil; see Appendix F for adjusted cost estimates.

GROUND WATER REMEDIAL ALTERNATIVES: SUMMARY OF FEASIBILITY STUDY RANKING

	Remedial Alternative (in conjunction with source management)	Technical Feasibility Ranking	Institutional Ranking	Public Health and Environmental Ranking	Present Worth Costs(1)
GW-1	Air stripping followed by carbon absorption	high	high	high	$ 770,000 *
GW-1A	Hydrogen peroxide pretreatment, filtration air stripping, and carbon absorption	high	high	high	$ 875,000 *
GW-2	Hydrogen peroxide pretreatment, filtration and UV-Ozonation	moderate-high	high	high	$1,145,000
GW-3	Hydrogen peroxide pretreatment, filtration, and carbon absorption	moderate-high	high	high	$1,250,000

Notes:

(1) Based on 10 years of operation and maintenance, 10% discount factor.

* The costs for GW-1 and GW-1A do not include emission control costs; see Appendix F for adjusted cost estimates.

TABLE 7

POTENTIAL ACTION-SPECIFIC ARARs; FEDERAL

FEDERAL
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
(ARARS)

	REGULATIONS		AUTHORITY & PURPOSE	ACTIVITY COVERED	APPLI-CABLE?	RELEVANT & APPRO-PRIATE ?
1.	Water Quality Regulations					
(a)	40 CFR 104, Regulations on Public Hearings on Effluent Standards for Toxic Pollutants	1(a)	Establishes requirements for conducting public hearings of effluent standards for discharges of toxic pollutants under the NPDES program.	Public Meetings on NPDES Discharges	Yes*	No
(b)	40 CFR 116, Regulations on Designation of Hazardous Substances	1(b)	Designates compounds identified as Hazardous Substances under the Federal Water Pollution Control Act (Clean Water Act).	Identification of Hazardous Compounds	Yes	No
(c)	40 CFR 122, National Pollutant Discharge Elimination System Permit Regulations	1(c)	Identifies permitting requirements for discharges of any "pollutants" from any "point sources" into "waters of the United States".	Water Discharge Permitting Requirements	Yes*	No
(d)	40 CFR 125, Regulations on Criteria and Standards for the National Pollutant Discharge Elimination System	1(d)	Establishes criteria and standards for identifying and applying water treatment requirements for discharge permits issued under the Clean Water Act.	Identification of Wastewater Treatment Requirements	Yes*	No
(e)	40 CFR 129, Toxic Pollutant Effluent Standards	1(e)	Establishes effluent standards for toxic compounds including Aldrin, DDT, DDD, DDE, Endrin, Toxaphene, Benzidine and PCBs.	Pesticide & PCB Discharges	No	Yes
(f)	40 CFR 141 and 142, National Primary Drinking Water Standards	1(f)	Specify maximum contaminant levels (MCLs) for Trichloroethylene, carbon tetrachloride, 1,2-dichloroethane, benzene, 1,1-dichloroethylene, para-dichlorobenzene, 1,1,1-trichloroethane and vinyl chloride in drinking water. The regulation also specifies best available technology (BAT) upon which the MCLs are based.	Drinking Water Standards	No	Yes
(g)	Ambient Water Quality Criteria	1(g)	Criteria published by EPA pursuant to Section 304 (a)(1) of the Clean Water Act establish levels which reflect current scientific knowledge regarding the effect of pollutants on aquatic life.	Surface Water Discharge	Yes*	Yes
2.	Solid and Hazardous Waste Regulations					
(a)	40 CFR 260-270, Regulations on the Management of Hazardous Wastes	2(a)	Provide for the management of hazardous wastes under the Resource Conservation and Control Act	Management of Hazardous Wastes	Yes	No
(b)	40 CFR 761, Regulations for Manufacturing, Processing and Use of Polychlorinated Biphenyls	2(b)	Specifies controls over handling of PCBs and PCB-contaminated materials under the Toxic Substances Control Act	Identification of PCB Contaminated Material	Yes*	Yes

*Applies to specific actions only

FEDERAL
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
(ARARS)

	REGULATIONS	AUTHORITY & PURPOSE	ACTIVITY COVERED	APPLI-CABLE?	RELEVANT & APPRO-PRIATE ?
(c)	40 CFR 761, Subpart G: 2(c) "Polychlorinated Biphenyls Spill Cleanup Policy"	Identifies standards for removal of PCBs from soils and equipment surfaces.	PCB Clean Up Actions due to spills	No	Yes
3.	Air Quality Regulations				
(a)	40 CFR 50, National Primary and Secondary Ambient Air Quality Standards	3(a) Sets ambient air standards for sulfur dioxide ozone, particulates, carbon monoxide, nitrogen dioxide and lead.	Inorganic Air Emissions	No	Yes*
(b)	40 CFR 60, Regulations on Standards of Performance for New Stationary Sources	3(b) Establishes air emission standards for specific point sources which are primarily industrial facilities.	Industrial Air Emissions	No	Yes*
(c)	40 CFR61, National Emission Standards for Hazardous Substances	3(c) Sets emission standards for hazardous pollutants from specific sources	Benzene and Vinyl Chloride Emissions from Production Facilities	No	Yes*
4.	Occupational Safety and Health Administration Regulations				
(a)	29 CFR 1910.120, Hazardous Waste Operations and Emergency Response	4(a) Specifies standards for hazardous waste operations.	Hazardous Waste Handling	Yes	No
(b)	29 CFR 1910.1000, Toxic and Hazardous Substances	4(b) Sets allowable ambient air concentrations for specific compounds.	Any activity involving release of VOCs in the workplace	Yes	No
5.	Other Regulations				
(a)	40 CFR 6, Regulations on Implementation of NEPA	5(a) Specifies procedures for complying with the National Environmental Policy Act.	Wetlands impacts	No	Yes

*Applies to specific actions only

TABLE 8

POTENTIAL ACTION-SPECIFIC ARARs; STATE

MASSACHUSETTS
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
(ARARS)

REGULATIONS	AUTHORITY & PURPOSE	ACTIVITY COVERED	APPLI-CABLE?	RELEVANT & APPRO-PRIATE ?
1. 105 CMR Department Public Health				
(a) 105 CMR 670.000. "Right to Know"	1(a) 105 CMR 670.000 regulations are adopted by the Department of Public Health pursuant to the authority granted it by M.G.L. c. 111F, Section 2. The regulations establishes the Massachusetts Substance List and amendments of regulated substances, trade secrets and research lab exemptions. The goal of the regulations is to protect public health by providing and encouraging the greatest possible transmission of health and safety information concerning toxic and hazardous substances.	Availability of information to public regarding toxic and hazardous substances.	Yes	No
2. 301 CMR Executive Office of Environmental Affairs				
(a) 301 CMR 11.00, Massachusetts Environmental Policy Act Regulations	2(a) 301 CMR 11.00 regulations govern the implementation of the Massachusetts Environmental Policy Act, M.G.L. c. 30, Sections 62-62H. These regulations provide a substantive basis to use all feasible means or measures to avoid or minimize adverse environmental impact in compliance with M.G.L. c. 30, Section 61.	Implementation of, and standards for compliance with Applicable Environmental Regulations.	Yes	No
3. 310 CMR Department of Environmental Quality Engineering Regulations				
(a) 310 CMR 6.00, Ambient Air Quality Standards for the Commonwealth of Massachusetts	3(a) 310 CMR 6.00 regulations are adopted by the Department pursuant to the authority granted it by M.G.L. c. 111, Section 142(d). The regulations set primary and secondary air quality standards for certain pollutants.	Air Emissions of SO_2, Particulates, CO, O_3 and lead.	No	Yes*
(b) 310 CMR 7.00, Air Pollution Control	3(b) 310 CMR 7.00 regulations adopted by the Department pursuant to the authority granted it by M.G.L. c. 111 Sections 142(a)-142(j) and M.G.L. c. 21C, Sections 4 and 6. The purpose of the regulations are to prevent the occurrence of conditions of air pollution where such do not exist and to facilitate the abatement of conditions of air pollution where and when such occur.	Air Emissions of Toluene, Trichloroethylene, Vinyl Chloride and other VOCs from stationary sources.	Yes*	No
(c) 310 CMR 9.00, Administration of Waterways Licenses	3(c) 310 CMR 9.00 regulations are adopted by the Department pursuant to the authority granted it under M.G.L. c. 21A, Section 2 to implement M.G.L. c. 91, Sections 1-63 and M.G.l. c. 21A, Sections 2, 4, 8, and 14. The regulations establish procedures, criteria and stan- for the uniform and coordinated administration of the provision of M.G.L. c. 91, work (dredging etc.) that takes place in a waterway (stream, river).	Dredging of Streams	No	No

*Applies to specific actions only

MASSACHUSETTS
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
(ARARS)

	REGULATIONS		AUTHORITY & PURPOSE	ACTIVITY COVERED	APPLI-CABLE?	RELEVANT & APPRO-PRIATE ?
(d)	310 CMR 10.00, Wetlands Protection	3(d)	310 CMR 10.00 regulations are adopted by the Department pursuant to the authority granted it under M.G.L. c. 131, Section 40. The regulations establish procedures, criteria, and standards for work in a wetland (dredging, altering, etc.) subject to the protection under M.G.L. c. 131, Section 40.	Work in Wetlands	No	Yes
(e)	310 CMR 19.00, Disposal of Solid Waste by Sanitary Landfill	3(e)	310 CMR 19.00 regulations are adopted by the Department pursuant to the authority granted it under M.G.L. c. 111, Section 150A. The regulations establish rules and requirements for solid waste disposal facilities.	Disposal of Wastes in Sanitary Landfills	No	Yes*
(f)	310 CMR 22.00, Drinking Water Regulations	3(f)	310 CMR 22.00 regulations are adopted by the Department pursuant to the authority granted it under M.G.L. c. 111, Section 160. The regulations establish standards and requirements deemed necessary to prevent pollution and to assure the sanitary protection of water used as sources of public water supply and to ensure the delivery of fit and pure water to all consumers.	Protection of Public Water Supply	No	Yes
(g)	310 CMR 27.00, Underground Water Source Protection	3(g)	310 CMR 27.00 regulations are adopted by the Department pursuant to the authority granted it under M.G.L. c. 111, Section 160; c. 21, Section 17. The regulations govern any underground injection of hazardous wastes, of fluids used for extraction of minerals, oil, and energy and certain other fluids with potential to contaminate ground water in order to protect underground sources of drinking water.	Underground Injection of Fluids	No	No
(h)	310 CMR 30.00, Hazardous Waste Regulations	3(h)	310 CMR 30.00 regulations are adopted by the Department pursuant to the authority granted it under M.G.L. c. 21C, Sections 4 and 6 and M.G.L. c. 21E, Section 6. The regulations establish rules and requirements for the generation, storage, collection, transportation, treatment, disposal, use, reuse, and recycling of hazardous materials, in Massachusetts under M.G.L. c. 21C, and M.G.L. c. 21E.	Hazardous Waste Treatment and Disposal	Yes	No
(i)	310 CMR 33.00, Implementation of M.G.L. C. 111F, Employee and Community "Right to Know"	3(i)	310 CMR 33.00 regulations are adopted by the Department pursuant to the authority granted it under M.G.L. c. 111F. The regulations establish rules and requirements for the dissemination of information related to toxic and hazardous substances to the public.	Availability of Information to Put in Regarding Toxic and Hazardous Substances	Yes	No
(j)	310 CMR 40.00, Contingency Plan Regulations (DRAFT)	3(j)	310 CMR 40.00 regulations are adapted by the Department pursuant to M.G.L. c. 21E.	Releases of Hazardous Materials	Yes	No

*Applies to <u>specific actions</u> only

MASSACHUSETTS
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
(ARARS)

REGULATIONS	AUTHORITY & PURPOSE	ACTIVITY COVERED	APPLI-CABLE?	RELEVANT & APPRO-PRIATE ?
4. 314 CMR Massachusetts Water Pollution Control Regulations				
(a) 314 CMR 3.00, Surface Water Discharge Permit Program	4(a) 314 CMR 3.00 regulations care adopted by the Department pursuant to the authority granted it under M.G.L. c. 21, Sections 27 and 43. The regulations establish requirements for discharges of pollutants to surface waters of the Commonwealth. In addition to regulating these discharges, M.G.L. c. 21, Section 43 also requires the Department to regulate the outlets of such discharges and any treatment works associated with these discharges.	Surface Water Discharges	Yes*	No
(b) 314 CMR 4.00, Surface Water Quality Standards	4(b) 314 CMR 4.00 regulations are adopted by the Department pursuant to the authority granted it under M.G.L. c. 21, Sections 27(5), 27(6), and 27(12). The regulations establish Surface Water Quality Standards to meet the goal of entrancing the quality and value of the resources of the Commonwealth.	Surface Water Quality Maintenance	Yes*	No
(c) 314 CMR 5.00, Ground-Water Discharge Permit Program	4(c) 314 CMR 5.00 regulations are adopted by the Department pursuant to the authority granted it under M.G.L. c. 21, Sections 27 and 43. The regulations establish requirements for discharges of pollutants to the ground waters of the Commonwealth. In addition to regulating these discharges, M.G.L. c. 21, Section 43 requires the Department to regulate the outlet for such discharges and any treatment works associated with these discharges to assure that these waters are protected for their highest potential use.	Ground Water Discharges	No	Yes*
(d) 314 CMR 6.00, Ground-Water Quality Standards	4(d) 314 CMR 6.00 regulations are adopted by the Department pursuant to the authority granted it under M.G.L. c. 21, Sections 27(5), 27(6), 27(12). The regulations establish Ground-Water Quality Standards. These standards consist of ground-water classifications, which designate and assign the uses for which the various ground waters of the Commonwealth shall be maintained and protected; water quality criteria necessary to sustain the designated uses; and regulations necessary to achieve the designated uses or maintain the existing ground-water quality.	Ground Water Quality Maintenance	Yes	No

*Applies to specific actions only

MASSACHUSETTS
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
(ARARS)

REGULATIONS	AUTHORITY & PURPOSE	ACTIVITY COVERED	APPLI-CABLE?	RELEVANT & APPRO-PRIATE ?
(e) 314 CMR 7.00, Sewer System Extension and Connection Permit Program	4(e) 314 CMR 7.00 regulations are adopted by the Department pursuant to the authority granted it under M.G.L. c. 21, Sections 27 and 43. The regulations established a program whereby sewer systems, extensions and connections are regulated and permitted.	Extension & Connection of Sewer Systems	No	No
(f) 314 CMR 9.00, Certification for Dredging Material Disposal, and Filling in Waters	4(f) 314 CMR 9.00 regulations are adopted by the Department pursuant to the authority granted it under M.G.L. c. 21, Section 27(12). The regulations establish procedures, criteria, and standards for the uniform and coordinated administration of water quality certification of dredging and dredged material disposal and filling projects in the waters of the Commonwealth.	Administration and Certification of Dredging Projects	No	No
(g) 314 CMR 12.00, Operation and Maintenance and Pretreatment Standards for Wastewater, Treatment Works, and Indirect Discharges	4(g) 314 CMR 12.00 regulations as adopted by the Department pursuant to the authority granted it under M.G.L. c. 21, Sections 27(9), 27(12) and 34. The regulations establish requirements that ensure the proper operation and maintenance of wastewater facilities and sewer systems within the Commonwealth.	Maintenance and Operation of Wastewater Treatment Facility	No	Yes*
5. 441 CMR Department of Labor and Industries				No
(a) 441 CMR 21.00, Worker "Right to Know"	5(a) 441 CMR 21.00 regulations are adopted by the Department pursuant to the authority granted it under M.G.L. c. 111F. The regulations establish requirements for worker "Right to Know."	Availability of Information to Workers Regarding Toxic and Hazardous Substances	Yes	
6. Allowable Ambient Levels (AALs)	6. The AALs are generated from a comprehensive assessment procedure contained in a document entitled: The Chemical Health Effects Assessment Methodology and the Method to Derive Allowable Ambient Levels (CHEM and AAL).	Allowable 24-hour time-weighted average air toxics	No (see text)	No (see text)
7. M.G.L. Chapter 21D Massachusetts Hazardous Waste Facility Siting Act	7. Establishes procedures for siting of facilities which treat, store or otherwise manage hazardous waste.	Siting of new hazardous waste facilities.	No	Yes*

*Applies to specific actions only

APPENDIX A

RESPONSIVENESS SUMMARY

Responsiveness Summary

Rose Disposal Pit Superfund Site

Lanesborough, Massachusetts

September 23, 1988

U.S. Environmental Protection Agency

Region I

ROSE DISPOSAL PIT
RESPONSIVENESS SUMMARY
TABLE OF CONTENTS

PREFACE

The U.S. Environmental Protection Agency (EPA) held a public comment period from July 21, 1988 to August 19, 1988 to provide an opportunity for interested parties to comment on the draft Feasibility Study (FS) and the July 1988 Proposed Plan prepared for the Rose Disposal Pit Superfund site (Rose site) in Lanesborough, Massachusetts. The draft FS examines and evaluates various options, called remedial alternatives, for addressing contamination of groundwater, surface water, soil and sediment at the site. EPA identified its preferred alternative for the cleanup of the site in the Proposed Plan before the start of the public comment period.

The purpose of this responsiveness summary is to identify major comments raised during the public comment period and to provide EPA response to the comments. EPA has considered all of the comments summarized in this document before selecting a final remedial alternative for the contamination at the Rose site in Lanesborough, Massachusetts.

This responsiveness summary is divided into the following sections:

I. Overview of Remedial Alternatives Considered in the Draft Feasibility Study, Including the Preferred Alternative - This section briefly outlines the remedial alternatives evaluated in the draft FS and the Proposed Plan, including EPA's preferred alternative.

II. Background on Community Involvement and Concerns - This section provides a brief history of community interest and concerns regarding the Rose site.

III. Summary of Comments Received During the Public Comment Period and EPA Responses - This section summarizes and provides EPA responses to the oral and written comments received from the public during the public comment period. In Part I, the comments received from citizens are organized by subject. In Part II, the extensive comments received from the PRP and EPA's responses follow the order of presentation by the PRP. A brief summary of PRP comments precedes EPA's detailed response.

IV. Remaining Concerns - This section describes issues that may continue to be of concern to the community during the design and implementation of EPA's selected remedy for the Rose site. EPA will address these concerns during the Remedial Design and Remedial Action (RD/RA) phase of the cleanup process.

Exhibit A - This exhibit is a list of the community relations activities that EPA has conducted to date at the Rose site.

Exhibit B - This exhibit is a copy of the transcript from the informal public hearing that was held on August 3, 1988.

I. OVERVIEW OF REMEDIAL ALTERNATIVES CONSIDERED IN THE DRAFT FEASIBILITY STUDY, INCLUDING THE PREFERRED ALTERNATIVE

Using the information gathered during the Remedial Investigation (RI) and the Endangerment Assessment (EA), EPA identified several objectives for the cleanup of the Rose site. The response objectives are:

1) prevent exposure to contaminated soils and groundwater;

2) protect uncontaminated groundwater and surface water for current and future use; and

3) restore contaminated soils and groundwater for future use.

GE, with EPA oversight, screened and evaluated potential cleanup alternatives for the Rose site. This evaluation, or feasibility study (FS) report, specifically describes alternatives for addressing contamination of groundwater and contaminated soil and sediment, as well as the criteria used to narrow the list to four potential remedial alternatives for groundwater contamination and eleven potential remedial alternatives for soil and sediment contamination. Each of these alternatives is briefly described below.

Groundwater Alternative #1: Air Stripping/Carbon Treatment. For this alternative, contaminated groundwater is pumped to the surface or collected in trenches, and is then pumped to the top of an air stripping tower. Air is forced up through the tower and volatile organic compounds (VOCs) are removed from the groundwater into the air stream. This air stream is passed through an activated carbon filter to remove contaminants before being released into the atmosphere. Following air stripping, the groundwater is passed through a carbon filter to capture PCBs and any residual contaminants.

In the Proposed Plan issued prior to the public comment period, EPA recommended this alternative as the Agency's preferred alternative for addressing groundwater contamination at Rose site.

Groundwater Alternatives #1A: Air Stripping/Carbon Treatment with Hydrogen Peroxide Pretreatment. In this alternative, air stripping/carbon treatment would be proceeded by a hydrogen peroxide pretreatment step. This would involve mixing the groundwater with hydrogen peroxide and passing the mixture through a sand filter to remove approximately 75 percent of the VOCs before the water enters the air stripping tower.

Groundwater Alternative #2: Ultraviolet Light-Ozonation with Hydrogen Peroxide Pretreatment. This alternative would consist of the same pretreatment process described in Alternative #1A, followed by treatment with ozone and ultraviolet light to destroy PCBs and any remaining contaminants.

Groundwater Alternative #3: Carbon Treatment with Hydrogen Peroxide Pretreatment. This alternative would utilize hydrogen peroxide pretreatment to remove 80 to 90 percent of the VOCs. Carbon filtering then would be used to remove the PCBs and any remaining contaminants.

Source Management: No Action Alternative. The no action alternative would entail leaving contaminants untreated on site, maintaining the existing synthetic cover and fence, continuing the on-going program to recover the pocket of oil located beneath the disposal site, and monitoring surface water and groundwater for 30 years.

Source Management Alternative #1: In-Situ Containment with Impermeable Cap and Barriers. This alternative would involve covering the disposal site with a waterproof cap to limit the amount of rain and snow that could filter through the wastes and carry contaminants away from the site. A groundwater cutoff wall also would be constructed around the disposal area to limit groundwater contact with contaminated soils.

Source Management Alternative #2: In-Situ Soil Flushing with (a) Incineration or (b) Biodegradation of Recovered Liquids. This alternative would involve pumping a solvent or other solution through the contaminated soils to release PCBs and VOCs. The solution and contaminants then would be carried with the groundwater and captured by a groundwater collection system. After being separated from the groundwater, the contaminants would be either incinerated or treated by biodegradation.

Source Management Alternative #3: KOHPEG Dechlorination. In this alternative, contaminated soils and sediments would be excavated and mixed in a chamber with a heated mixture of chemicals capable of destroying PCBs. VOCs released by this process would be captured with carbon filters prior to the treated air being released to the atmosphere. Decontaminated soils would be replaced on site.

Source Management Alternative #4: On-Site Incineration. Under this alternative, contaminated sediments and soils would be excavated and then incinerated in a mobile incinerator located at the site. Decontaminated materials would be replaced on site. All exhaust gases from the incinerator would be passed though air pollution control devices prior to release into the atmosphere. As outlined in the Proposed Plan, EPA chose this alternative as its preferred alternative for treatment of contaminated soil and sediment.

Source Management Alternative #5: Off-Site Incineration. Under this alternative, contaminated soil and sediment would be excavated and transported to an off-site hazardous waste incinerator.

Source Management Alternative #6: On-Site Disposal in an Approved Hazardous Waste Landfill. This alternative would require construction of a federally-approved TSCA hazardous waste landfill on the Rose property. The landfill would include a waterproof synthetic liner as well as a leachate collection system to prevent potentially contaminated liquids from migrating from the area. Groundwater monitoring also would be conducted to ensure that the landfill and leachate collection system is functioning properly. Contaminated soil and sediment would be excavated and placed within the landfill.

Source Management Alternative #7: Off-Site Landfilling. This alternative would involve excavating contaminated soil and sediment and transporting this material to a federally-approved off-site TSCA hazardous waste landfill.

Source Management Alternative #8: Chemical Fixation-Stabilization of Excavated Wastes. In this alternative, contaminated soil and sediment would be excavated and mixed with a material such as cement or flyash to bind or stabilize ("fix") the contaminants into a solid material. Stabilized materials would be replaced on site.

Source Management Alternative #9: Chemical Extraction with Incineration of Recovered Liquids. In this alternative, contaminated soil and sediment would be excavated and mixed with a combination of chemicals to extract the contaminants. The concentrated contaminants then would be transported off-site for incineration. Decontaminated soil and sediment would be replaced on site.

Source Management Alternative #10: On-Site Biodegradation. In this process, naturally-occurring or laboratory-tailored bacteria would be utilized to degrade, or break down, site contaminants into harmless materials such as carbon dioxide, water, and humus.

II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

The Rose site, which consists of a disposal area approximately 1.5 acres in size within a fourteen acre residential lot, is located in Lanesborough, Massachusetts. Beginning in 1951 and continuing through 1959 and possibly later, waste oils and solvents from the

General Electric Plant in Pittsfield, Massachusetts were disposed at the site in an open trench.

The neighborhood surrounding the site is a mix of protected natural areas, farms, and low density residential development. Reports on the possible presence of hazardous wastes at the site were first brought to the attention of town and state officials by a neighborhood resident in 1974.

Community attention briefly focused on the site during the winter of 1980 when the Massachusetts Department of Environmental Quality Engineering (DEQE) conducted a site inspection. Following the investigation, at the request of DEQE, General Electric (GE) removed empty barrels from the site. Newspaper coverage of site activities continued during EPA's initial site investigation and the site's placement on the National Priorities List. Additional coverage occurred when GE provided municipal water to residences abutting the site and when EPA subsequently ordered GE to conduct a Remedial Investigation/Feasibility Study of the site.

According to residents, there has been very little sustained community interest in the site. Until EPA held a public informational meeting in July 1988, concerns focused on the lack of information available on the site, potential health effects resulting from the site contamination, and confusion about the respective roles of EPA and GE, the Potentially Responsible Party. At the July 1988 public meeting, community concerns focused on the extent of the site contamination, EPA's preferred alternative, and other hazardous waste sites in Lanesborough. Specific concerns voiced by residents are outlined below.

<u>Roles of EPA, the State, and the PRP</u>

Citizens expressed confusion about who is ultimately responsible for cleaning up the Rose site. Citizens expressed their desire that EPA make the final decisions about the cleanup. Citizens also asked for regular information updates from EPA.

<u>Extent of Site Contamination</u>

Citizens expressed concern about what steps EPA was taking to prevent the spread of contamination from the site. In addition, citizens asked about potential contamination of private wells and about ways to have their wells tested for contamination.

<u>EPA's Preferred Alternative</u>

Citizens expressed concern about the potential impact that operation of a hazardous waste incinerator might have on the community. Specific concerns focused on the noise associated with excavation and incineration, possible air pollution resulting from excavation and incineration, and the potential for wastes from other communities being shipped to the site for treatment.

Other Hazardous Waste Sites in Lanesborough

A number of citizens stated their concern that the owner of the Rose site at the time wastes were deposited at the site also owned other suspected or confirmed hazardous waste sites in the town. Citizens asked EPA to investigate the potential impacts of these sites on the community and on the municipal water supply.

Future Use of the Site and Surrounding Areas

Residents expressed concern that future development of the site could pose a health risk to the future residents. One citizen asked EPA about possible restrictions on development of land adjacent to the site.

III. SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA RESPONSES

This responsiveness summary addresses the comments received by EPA concerning the draft FS and Proposed Plan for the Rose Superfund site in Lanesborough, Massachusetts. Three formal sets of written comments were received during the public comment period (July 21 - August 19, 1988): one from a nearby resident in Lanesborough, one from an individual who operates a business adjacent to the site, and one set from General Electric. One oral comment was presented at the August 3, 1988 informal public hearing (which was reiterated in writing during the public comment period). A copy of the transcript is included as Exhibit B. Copies of the transcript are also available at the Lanesborough Public Library and the EPA Records Center at 90 Canal Street, Boston, Massachusetts, 02114 as a part of the Administrative Record.

The comments from citizens, along with EPA responses, are summarized and organized into the following categories:

A. Comments Regarding the Remedial Alternatives
B. Comments Regarding Water Quality

Part I - Citizen Comments

A. Comments Regarding the Remedial Alternatives

1. One commenter stated that their business, which operates adjacent to the Rose site, relies on telephone activities for their mail order operations. The commenter stated that they would like assurances from EPA that the impact of remedial

actions upon their business will be minimal. The commenter also asked to be notified whether personnel and equipment associated with the cleanup would be utilizing the commenter's property for access to the site.

EPA Response: EPA is aware of the desirability to minimize impacts from the remedial activities. However, any construction activities will inherently be disruptive to some degree. The design and subsequent construction will attempt to minimize the short term impacts to reach the long term goal of overall protection of human health and the environment. Although the implementation of a permanent remedy will have greater short term impacts than a "no action" or minimal action alternative, the fact that contaminants will no longer be able to migrate from the site and that long term operation and maintenance will be greatly reduced and ultimately eliminated must be considered. During remedial design, local input will be solicited to ensure that specific concerns are addressed.

Any remedial activity will generate some degree of noise. However, variables such as hours of operation for particularly noisy activities may be limited to certain times of the day. Techniques to minimize noise and other specific concerns will be examined during the remedial design process.

All access needs will be primarily kept to the Rose property. In addition, EPA believes that the vast majority of the remedial activities can be conducted on the Rose property. As part of design, EPA will require site maps which will indicate all land and access needs and will include an overlay map with property boundaries. Should any land or access needs extend beyond the Rose property, appropriate agreements with those landowners will need to be negotiated.

2. One commenter stated that they would like assurances from EPA that their property would be cleaned up should it become contaminated as a result of remediation activities at the Rose site.

EPA Response: Remediation will be conducted to minimize impacts to surrounding areas. Should any releases occur during construction activities, however, the construction contractor would need to immediately address any such release. One of the items that will be required as a part of the design will be a "contingency plan" which will set forth the activities to be undertaken in the event of a release or other unplanned event. This contingency plan will be circulated for comment to ensure that local concerns are addressed. In addition to addressing noise and access (as noted in the preceding comment), EPA will utilize the following activities, as necessary, in conjunction with the contingency plan:

Releases to air - Air monitoring will be required to ensure that allowable levels of contaminants are not exceeded. Potential techniques to minimize air releases include the use of carbon filters on the air stripper, utilization of sophisticated air pollution control devices on the incinerator (stack), limiting the extent of soil excavation at any one time, and the use of suppressant foams that control the release of contaminants during excavation.

Releases to water or surrounding soil - The groundwater interception and treatment system will be in place prior to initiation of soil excavation activities. Although no significant additional release of contaminants to the groundwater is expected during soil excavation, the interceptor trenches/wells will be in place so that any releases would be captured to prevent any offsite migration.

Soil excavation activities will be controlled so that releases or unplanned movement of soils will not occur outside of designated areas. Work areas will be designated as either contaminated ("hot zone"), a decontamination zone, or as clean unrestricted areas. Site activities will be conducted such that these designations are maintained.

3. One commenter urged EPA to utilize permanent, proven technologies to address the site contamination. The commenter further urged EPA to consider the welfare of the community and the environment in making decisions related to the cleanup before considering economic impacts upon GE.

EPA Response: In evaluating the potential remedies for the Rose site, the statutory preference for a permanent remedy was a major factor in remedy selection. Air stripping and carbon treatment are proven techniques to permanently address groundwater contamination. Incineration is a proven technique to permanently destroy organic contamination in the soil and sediment.

In addition, the nine criteria used to evaluate remedial alternatives include such items as overall protection and short and long term effects, as well as community concerns. Cost effectiveness is considered among alternatives that are considered to be equally protective. See Section VIII of the Record of Decision (ROD) for a discussion of these criteria.

B. Comments Regarding Groundwater Quality

4. One commenter expressed concern that their private well currently could be contaminated by the wastes at the Rose site. An additional commenter asked EPA to test their well for contaminants at no expense to the property owner.

   EPA Response: Review of the groundwater monitoring results indicate the extent of groundwater contamination based on a network of approximately 70 wells of varying depths in and around the site. The RI reports provide the actual data from the various sampling rounds that have been conducted.

   The most recent groundwater data (November 1986) indicates the extent of the two contaminated shallow groundwater plumes and is shown in the ROD on Figure 3. Because the deep wells between the disposal area and the closest residential wells do not show any contamination, EPA has not required GE to conduct a residential well sampling program. Further, the groundwater contamination is generally restricted to the shallow overburden aquifer (to an approximate 25 foot depth), and it is believed that residential wells tap the deeper bedrock aquifer.

   As a part of the selected remedy, GE will be required to install a bedrock well in the vicinity of the disposal area (where the highest levels of contamination are found) to prevent the migration of contamination into the fractured bedrock. Should EPA obtain data that indicates that groundwater contamination may extend beyond the current areas of delineation, EPA would then conduct, or require GE to conduct, a residential well sampling program and appropriate monitoring.

Part II. Summary of Potentially Responsible Party Comments

EPA received and responded to extensive comments from the PRP, General Electric (GE). In brief, GE's main comments are: (1) GE contends that EPA is relying on a document (the draft Feasibility Study prepared by GE) that was never intended to, and does not, provide the technical information necessary to determine which source remedies meet the basic statutory criteria for treatment of wastes at Superfund sites; (2) GE contends that mobile incineration will not satisfy the statutory requirements of CERCLA and that it is not appropriate for the Rose site; (3) GE contends that mobile incineration will not be protective of human health and the environment, nor attain Applicable or Relevant and Appropriate Requirements (ARARs), nor be a cost-effective remedy, nor be a permanent solution for metals contamination; (4) GE supports EPA's choice of a groundwater treatment alternative and recommends implementation of the groundwater treatment program; (5) GE suggests that a five-year testing period be conducted to develop and further evaluate alternative treatment technologies for soil contamination; and (6) GE suggests that if EPA requires immediate implementation of a soil and sediment treatment program, that chemical fixation/stabilization is an appropriate permanent solution for the Rose site. EPA's responses to GE's comments are provided in the following section.

Part II - Potentially Responsible Party Comments

Comment 1

GE is committed to a permanent remedy for the F.T. Rose Superfund Site that is protective of public health and the environment. Based on the data gathered to date, the Rose Site, located in Lanesboro, Massachusetts, may be contaminated with volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), and inorganic compounds. Additional site characterization work, however, is not yet complete. In fact, soil data as to VOCs is uncertain at best. Additional site characterization is necessary for all substances, but particularly soil data for VOCs and metals.

Since beginning work on the Remedial Investigation/Feasibility Study (RI/FS), GE has worked closely with EPA to identify the nature of contamination at the Rose Site and to devise a remedial plan that would address the contamination in each environmental medium. In the course of winnowing a list of over 100 remedial alternatives originally identified, EPA and GE recognized early that mobile (on-site) incineration was not well-suited to the conditions of the Rose Site. Because of this, the data necessary to evaluate thoroughly an incineration remedy was never gathered. Up until June 1988, all indications were that EPA agreed with GE that further development of emerging innovative technologies would provide an effective remedy for the contaminated soil. (See discussion of EPA correspondence summarized infra.) Suddenly, however, EPA reversed its course and insisted on immediately selecting a permanent source remedy. Compounding the problems with its sudden reversal, EPA selected mobile incineration as its "preferred" remedial alternative, despite the fact that mobile incineration was not even among the top five remedies identified in the draft FS for the Rose Site.

Response 1

EPA is committed to a timely permanent remedy for the Rose Superfund Site that is protective of public health and the environment. Section 116(e) of CERCLA states the statutory mandate that substantial and continuous physical on-site remedial action commence at NPL sites in a timely manner. This section specifies that 175 remedial actions commence by October 16, 1989 and an additional 200 commence by October 16, 1991.

Based on the data gathered to date and available site history, the Rose site is contaminated with volatile organic compounds (VOCs), semi-volatile organic compounds (semi-VOCs), and polychlorinated biphenyls (PCBs). EPA believes that the site characterization work is adequate for remedy selection. Data necessary for remedy selection is distinct from that required for remedial design. EPA believes that the limited soil data on VOCs is adequate to select a remedy from the technologies under consideration. The soil VOC data that is currently available is included in the October 1982 Field Investigation Report prepared by EPA (see Tables 4 through 7, in particular). Additional site characterization is necessary for remedial design, particularly soil data for VOCs, semi-VOCs, and metals.

Since beginning work on the RI/FS, EPA and GE have worked together to identify the nature of contamination at the Rose site and to devise a remedial plan that would address the contamination in each environmental medium. After brief examination of over 100 technologies originally identified in the March 1985 report entitled "Initial Screening Feasibility Study Report" prepared by Blasland & Bouck for GE, EPA and GE recognized that mobile (on-site) incineration was potentially suited to the conditions of the Rose site and it was retained as a potential alternative for remediation. GE's reference to a different decision appears to be based on an inaccurate perception of EPA's statements; there is no record of any other decision. In fact, this alternative was retained for consideration from the initial screening through the June 1988 draft FS.

The data necessary to design an incinerator was never gathered, nor was design data/treatability studies performed for other proposed source management alternatives (such as dechlorination or chemical fixation/stabilization). Treatability studies that were conducted by GE were focused on the groundwater alternatives. Up until June 1988, when EPA received the complete draft FS from GE, all indications were that further development of emerging innovative technologies could potentially provide feasible alternatives for the remediation of contaminated soil. Three such technologies were discussed for potential demonstration projects in the Proposed Plan issued by EPA in July 1988. In the absence of fully developed and implementable alternatives, EPA proposed mobile (on-site) incineration as a timely, permanent source remedy for the Rose site. EPA believes that incineration is the only currently implementable technology to permanently remediate the high levels of PCB contamination found at the Rose site.

GE's reference to the "top five remedies identified in the draft FS" is misleading. GE's draft FS "recommended" five potential source management alternatives for use at the Rose site, three of which are still in the developmental phase. However, this did not lead to a decision by EPA to exclude incineration from consideration. EPA selects a remedial alternative on the basis of the Administrative Record and the statutory requirements and the response objectives. This selection process is explained in further detail in Section VIII of the ROD.

Comment 2

B&B, the author of the draft FS, points out that the feasibility study has not been completed; the draft FS simply does not provide the technical basis for selecting any source remedy. With regard to mobile incineration, there are numerous, significant, unresolved issues that make its selection, at best, uninformed, and, at worst, arbitrary and capricious. These significant issues include, but are not limited to, the lack of soil contamination data (which affects a wide variety of implementability, safety, regulatory standard compliance and cost issues), potential emissions during excavation, the potential for generation of ash containing leachable metals and the limited availability of, and experience with, mobile PCB incinerators.

Response 2

EPA believes that the RI and draft FS provides an adequate basis for selecting a source remedy. The existing data indicates that high levels of soil PCB contamination exist throughout the disposal area. Figure 2 of the ROD (PCB soil contamination profiles in the disposal area) and the soil boring data presented in the RI show that contamination in most areas is above 50 ppm PCBs. Under the PCB disposal requirements of TSCA, 761.60(a)(4) states that any non-liquid PCBs at concentrations of 50 ppm or greater in the form of contaminated soil.....shall be disposed of in either an incinerator (761.70) or a chemical waste landfill (760.75). EPA believes that incineration is an appropriate and feasible remedy for PCB contamination of soil.

The Superfund Remedial Design and Remedial Action Guidance Manual (OSWER Directive No. 9355.0-4A) indicates in Section 2.3.2 that remedial actions involving on-site treatment or disposal of contaminated wastes may require additional studies to supplement the technical data available from the RI/FS so that the optimum treatment or disposal methods may be determined. Additional studies could include field work and/or bench and pilot scale studies. Since treatability studies during the RI/FS focused on groundwater only, these additional studies will need to be conducted as a part of remedial design/remedial action (RD/RA) for the source portion of the remedy. Obtaining such design data for all potential remedial alternatives would be extremely time-consuming and expensive. EPA regards the existing data as sufficient for comparison of the potential remedies.

EPA acknowledges that there is additional work needed for the design of an incineration remedy at this site. This work includes:

1. Soil VOC and semi-VOC data: This data is required for evaluating emissions during excavation, for design of air emissions control equipment for the incinerator, and for design of

precautions for overall safety. However, any soil VOC or semi-VOC contamination that exists in the PCB-contaminated soils that are to be excavated would be destroyed during the incineration process. Materials handling precautions will need to be tailored during design based upon the soil VOC levels.
The soil VOC screening and analysis that was conducted in 1981 generally indicates low levels of VOCs in the soil above the water table.

EPA believes that there is adequate characterization of PCB soil contamination. PCBs are the major contaminant at the site. Over 100 soils borings were taken in and around the disposal area with over 400 analyses conducted for PCB contamination.

2. Soils metal data: This data is required to evaluate the potential need for treatment of leachable metals which would be concentrated in incinerator ash and for design of appropriate air pollution control devices. EPA does not have any record of disposal of metal-bearing wastes at the Rose site. In addition, GE continues to recover contaminated liquids from the free product area and send this material to their Pittsfield incinerator for thermal destruction. Although EPA has requested data from GE on the analysis of this material in accordance with their Toxic Substances and Control Act (TSCA) permit, the only data received to date is on PCB and VOC content.

Because there is no evidence that leads EPA to expect unusually high levels of metals in the soil to be incinerated at the site, EPA believes that the metals content of the soil will not be an obstacle to incineration. Metals analysis conducted on water samples represent naturally occurring levels of metals. EPA believes the metals that may be present can be managed with appropriate controls, including, if necessary, fixation-solidification of the ash.

3. Limited availability of, and experience with, mobile PCB incinerators: Both pilot and full-scale mobile PCB incinerators are available and have been used successfully at other hazardous waste sites. Experience with this technology is more extensive than that of the proposed demonstration technology(s). (The draft FS states that three of the promising technologies [in-situ soil flushing, chemical extraction, and biodegradation] all require field study to determine their effectiveness, particularly in light of the high levels of contamination found at the Rose site.)

EPA owns a mobile rotary kiln incinerator which consists of specialized equipment mounted on 4 trailers. System performance is monitored through instruments and automatic safety shutdown controls. This mobile unit has demonstrated a greater than 99.9999% destruction and removal efficiency at a trial burn on liquids and solids contaminated with dioxins. It has been operated over the past 2 years for cleanup of dioxin-contaminated liquids and soils from numerous dioxin sites in Missouri. To date, over 2 million pounds of solids and 18,000 gallons of liquids have been processed.

Ogden Environmental Services, Inc. owns and operates a mobile circulating bed combustor incinerator for the treatment of hazardous wastes. Test results from the company's pilot plant indicate that the TSCA requirement for 99.9999% destruction and removal efficiency was achieved for soil contaminated with 10,000 ppm of PCBs.

Under EPA's Superfund Innovative Technology Evaluation (SITE) program, a full-scale and a pilot-scale infrared system have been demonstrated. The full-scale system demonstration was conducted at the Peake Oil Superfund site in Florida. A total of 7,000 cubic yards of waste material contaminated with PCBs and lead was processed. During the trial burn that was conducted, extensive sampling was included for the solid waste feed, stack gas, ash, scrubber liquid and water influent, scrubber effluent solids, and ambient air. The final technical report on the demonstration will document the entire mechanical operating history of the system and the problems that were encountered in operating this type of full-scale system. The pilot-scale system demonstration was conducted at the Rose Township - Demode Road Superfund site in Michigan. Approximately 10 cubic yards of contaminated soils were treated utilizing a blend of the most highly PCB- and lead-contaminated soils at the site. The final technical report will document information similar to the full-scale demonstration.

Comment 3

As a consequence of the deficiencies in the database underlying EPA's proposed remedy selection, and in view of the known and potential concerns regarding the mobile incineration of the contaminated soil at the Rose Site, EPA has clearly failed to establish that this remedy would satisfy the four fundamental criteria that Section 121 of the Comprehensive Environmental Response, Compensation, Liability Act (CERCLA) requires of a selected remedy, namely, that it:

- is protective of human health and the environment;
- attains all federal, state and local applicable or relevant and appropriate requirements (ARARs);
- is cost effective; and
- utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

As detailed in the comments that follow, EPA's proposed selection of mobile incineration cannot be demonstrated to satisfy these statutory requirements. Indeed, presently available information indicates that the remedy may fail all four requirements. It is these fundamental issues and concerns raised by EPA's remedy selection as it relates to remediation of soil contamination which are the focus of these comments.

Response 3

EPA believes that the existing database is adequate to support EPA's proposed remedy selection. Identified concerns regarding mobile incineration of contaminated soil at the Rose site are concerns that may be addressed during the remedial design process, and are not essential to remedy selection of mobile (on-site) incineration. See discussion under Response 2 above. Incineration is a proven technology which will meet ARARs and will be protective of human health and the environment. Incineration is considered to be the only technology currently available to meet the remedy selection criteria and the statutory requirements. Since on-site incineration is less expensive than off-site incineration, it is considered the most cost-effective alternative. Although design work is needed, there is no basis for any expectation that new information will change EPA's conclusion.

EPA believes that the record establishes that this remedy does satisfy the four fundamental criteria of Section 121 of CERCLA, namely, that it:

- is protective of human health and the environment;
- attains all federal, state and local applicable or relevant and appropriate requirements (ARARs);
- is cost effective; and
- utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

See Section XI of the ROD for a discussion of each of these issues.

Comment 4

GE does not reject every aspect of EPA's Proposed Plan. To the contrary, GE supports EPA's proposed groundwater remediation plan (air stripping and carbon treatment). Because this aspect of the cleanup can proceed independent of soil remediation, GE proposed that EPA divide groundwater remediation and soil remediation into separate operable units. EPA could then issue a Record of Decision (ROD) on the groundwater operable unit embodying the groundwater cleanup strategy described in EPA's Proposed Plan and implement that plan. An interim remedial measure -- supplemental capping of the site -- should also be implemented to minimize maintenance of the existing temporary cap while GE completes development of innovative technology to remediate the contaminated soils. With the completion of additional site characterization work, and following a period of time necessary to significantly advance the promising emerging innovative technologies, EPA could issue a ROD on the second operable unit and a permanent solution to the soil contamination could be implemented.

Response 4

EPA does not believe that the groundwater aspect of the cleanup can successfully proceed independent of soil remediation. EPA has selected a permanent source remedy in conjunction with a groundwater remedy for this reason. EPA also does not believe that operable units are appropriate for this site; operable units are intended to address technically distinct portions of a site. At the Rose site, the groundwater contamination is directly related to the (source) disposal area. For example, the free product portion of the disposal area contains up to 57,000 ppm trichloroethylene (TCE) in the oil fraction, a component of the groundwater contamination. The groundwater cleanup goal for TCE is 5 ppb. Clearly, with extremely high levels of TCE approximately 150 feet from the potential location of the interceptor trenches/wells for the groundwater treatment system, the cleanup goals for groundwater may never be attained if a permanent remedy for the source area is not implemented concurrently. Although it is possible to prevent the plume from advancing with a groundwater treatment system in the interim, it is not possible to actually impact groundwater contaminant levels within the existing plume and effectively it would be a groundwater containment system. In keeping with EPA's and GE's commitment to a permanent remedy for the Rose site that is protective of public health and the environment, and consistent with the response objective of restoration of contaminated groundwater for future use and elimination of the source of contamination to Rose's Pond, EPA has selected a remedial approach which allows for timely remediation of the groundwater.

Comment 5

Splitting groundwater and soil remediation into separate operable units and delaying selection of the final source remediation is far better than blindly selecting mobile incineration now without the benefit of a better understanding of the Rose Site characteristics or the innovative technologies better suited to those characteristics. But if EPA feels compelled to select a final source remedy now, chemical fixation/stabilization is clearly more appropriate for the Rose Site conditions than mobile incineration. More importantly, unlike mobile incineration, chemical fixation/stabilization would satisfy the four fundamental criteria under CERCLA § 121.

Response 5

As previously stated, EPA believes that the Rose site is sufficiently characterized to select mobile incineration. No innovative technologies can be judged to be better suited to the Rose site based on the information submitted to EPA by GE. These referenced technologies are assumed to be those discussed in the draft FS and the Proposed Plan for potential site demonstrations. These technologies have not been proven in the field, nor on a pilot scale, nor at bench scale for the contaminant concentrations found at the Rose site. Mobile incineration is a proven technology on all levels.

GE estimates that the timeframe necessary to sufficiently develop the innovative technologies is four to six years, excluding comparison of technologies and subsequent remedial design. This timeframe is unacceptable for remediation of the Rose site in light of the extremely high concentrations of contaminants. In addition, this 4 to 6 year timeframe inherently conflicts with the Congressional mandate to begin remediation at NPL sites, as stated in Section 116(e) of CERCLA (see Response 1 above).

For discussion on this point concerning GE's proposal in Attachment 3 to GE's comments entitled "Research and Development Program for the Analysis and Destruction of F.T. Rose Site PCBs", see EPA's response to Comment 7 below.

EPA does not believe that chemical fixation/stabilization is appropriate for the Rose site. GE has not provided any proof that existing fixation or stabilization processes are capable of immobilizing PCBs at the levels that exist at the Rose site. See Response 24 for detailed discussion of this issue.

Comment 6

Mobile Incineration Is Not Appropriate For The Rose Site

Incineration is a viable and appropriate treatment technology under the right circumstances. In fact, GE operates a fixed-based liquid PCB incinerator at its facility in Pittsfield, Massachusetts, and a fixed-based rotary kiln hazardous waste incinerator at its facility in Waterford, New York. GE thus recognizes that incineration is an important treatment technology. GE's operational experience also allows it to perceive the limitations of incineration when not used in appropriate circumstances.

Incineration is not appropriate at every site, or under any and all circumstances. An enormous number of factors -- e.g., variability of waste feed composition, nature of contamination, depth of contamination, even climate -- must be considered and analyzed before one can determine if incineration can achieve the desired result at a particular site, much less how much it would cost. It is this very type of information which EPA lacked when it decided that mobile incineration was the preferred remedial alternative.

Response 6

EPA agrees that incineration is not appropriate at every site. EPA considered a variety of factors in determining that incineration could achieve the desired clean-up goals at the Rose site. These factors include:

1. Variability of waste feed composition: Variability in particulate size will be addressed by design of appropriate pretreatment and materials handling processes. Variability in feed contaminant concentrations will be addressed by soil blending, particularly in cases where extremely high PCB concentrations are found. (It is possible that a successful demonstration of the soil washing alternative could address this factor.)

2. Nature of contamination: There is no historical evidence of disposal of metal-bearing wastes. Contaminants identified at the Rose site are predominantly organic and are suited to destruction by thermal treatment. As discussed in Response 2 above, EPA does not believe there are high levels of metals at the site. Appropriate design of air emissions controls and ash disposal practices can be imposed to address metals levels.

3. Depth of contamination: Soil excavation below the water table becomes complex and expensive and generally complicates material handling procedures. Soil moisture content affects the fuel consumption rate of the incinerator. EPA believes that limiting excavation to the water table for the majority of the site addresses a number of GE's technical implementation concerns.

Because the PCB level in groundwater needed to satisfy the drinking water risk level is so low (0.005 ppb), virtual complete site excavation would be required. This is considered to be technically impracticable; see the ROD for a more detailed discussion of this issue.

4. Climate: A mobile incinerator may be more susceptible to climate considerations than GE's stationary incinerators located in close proximity to the site. However, appropriate weatherproofing (e.g. temporary structures to protect the incinerator, area of excavation, and/or materials handling and preparation area) would mitigate climactic impacts. EPA does not consider the weather to be an insurmountable obstacle to the implementation of on-site incineration.

Other factors which will need to be considered during remedial design include, but are not limited to: non-combustible fraction of solids, fraction of ash as particulate; combustible solids heating value; incinerator and afterburner operating temperatures; and residence time. Treatability testing will be required to determine appropriate operating parameters for the incinerator as well as ash/decontaminated soil handling procedures.

Comment 7

The Draft Feasibility Study Has Not Been Finalized

GE and EPA had long contemplated that the most appropriate approach to remediating the PCBs in the soil at the Rose Site would most likely emerge from the innovative technologies which are being developed under GE's Corporate Research and Development (CRD) program. EPA Region I is quite familiar with this program, as GE has included regular written updates which have been submitted to EPA, which in turn have formed the basis for periodic technical review sessions between EPA and GE. A description of the CRD program, as it relates to the Rose Site, is attached (Enclosure 3).

Response 7

EPA made no remedial decision as to which proposed technology might be the most appropriate for remediating PCBs in the soil at the Rose site prior to the Record of Decision to which this responsiveness summary is an attachment. Technical alternatives retained for consideration in the FS were retained based on a screening process dictated by EPA RI/FS guidance; consideration of GE's CRD Program was incidental.

EPA Region I is familiar with GE's CRD Program. GE has submitted regular written updates to EPA which have formed the basis for periodic discussions between EPA and GE. Submittals related to CRD prior to GE's submission of these comments have not been specific as to the Rose site. Previous submissions have focused on bioremediation and only recently have included surfactant extraction.

Attachment 3 is the first site-specific submission purportedly describing research for the Rose site to EPA, particularly for the surfactant extraction process. EPA had received the identical (verbatim) submission which differed from Attachment 3 only in references to site name. The report transmitted to EPA by cover letter dated June 15, 1988 from GE entitled "Research and Development Program for the Destruction of PCBs" otherwise included identical text, soil sample levels, degree of extraction, and percentage of native soil lost as fines in the precipitate for the surfactant extraction process, but was written for GE's Oakland site in California. Laboratory documentation subsequently submitted by GE upon request by EPA states that GE has not conducted any extractions on Rose site soils.

GE has represented that the timeframe for development of innovative technologies would be an estimated 4 to 6 years. EPA, DEQE, and GE have now been investigating the Rose site for approximately 7 years. On-site incineration is a presently available permanent remedy for organic contamination. EPA sees no basis in CERCLA on which an available permanent remedy could be rejected in favor of speculative, long term research, particularly when there is no firm basis for finding that the research is likely to yield an effective alternative within the time frame in which the available alternative could be implemented.

Comment 8

Several of the most promising of these innovative technologies were directly incorporated in the draft FS. As B&B states:

> It is this research which has formed the basis for the recommendations, in the draft Feasibility Study, for on-site pilot study of several of the promising innovative technologies at the Rose Site.

B&B Comments, p. 15. It has been GE's opinion, from the outset, that emerging innovative technologies offered a better solution for the Rose Site than any of the "proven" technologies, particularly mobile incineration. This approach has been discussed by EPA and GE in their many meetings and communications addressing Rose Site source remediation, and it has been manifest in the draft FS submitted by GE in the past year.

Response 8

EPA acknowledges GE's opinion as having been expressed in meetings and in the draft FS. However, as indicated in Response 7, no remedial decision as to which proposed technology might be the most appropriate for the Rose site was made prior to the Record of Decision. In addition, EPA's commitment to a timely remedy for the site in accordance with the selection criteria conflicts with GE's development timeframes of 4 to 6 years for "emerging innovative technologies" that have not demonstrated the potential for effective implementation for the Rose site. See Response 7 for further discussion.

Comment 9

For its part, EPA has recognized and understood that this (see Comment 8) was GE's preferred approach. See, e.g., EPA's letter of April 6, 1987 to Mr. Ron Desgroseilliers of GE (Enclosure 4), in which EPA discusses GE's proposal to separately address groundwater issued (through "short time frame" activities) and source remediation (through "longer time frame" activities). More recently, EPA has not only acknowledged GE's approach, it has given every indication that the Agency concurred in it. No disagreement with GE's approach is expressed in EPA's undated draft comments on the draft FS (submitted to EPA on April 1, 1988) (Enclosure 5). Nor was there any mention of any disagreement with GE's approach in the Agency's formalized comments dated May 12, 1988 (Enclosure 6). And finally, in the Agency's undated comments on the next draft FS (submitted to EPA on June 3, 1988) (Enclosure 7), EPA never discussed mobile incineration nor disagreed with GE's approach.

Response 9

EPA's letter of April 6, 1987 to Mr. Ron Desgroseilliers of GE stated that ..."G.E. proposed a two-phased approach to continue conducting activities at the site....

a) 'Short time frame' activities - G.E. indicated a desire to address the VOC contamination problem at the site on a separate and expedited schedule. G.E. believes that the VOC contamination of the (shallow) groundwater lends itself to treatment with proven technologies that are currently available, as well as accommodating SARA's preference for permanent treatment technologies.

The following is the tentative implementation schedule that was presented at the meeting:

March - April '87	--	Review and update the initial screening of alternatives for the groundwater contamination problem.
March - May '87	--	Screen the alternatives in light of the SARA requirements.
June - '87	--	EPA issues an Administrative Order to G.E. to conduct the selected groundwater treatment alternative.
July '87 - ?	--	G.E. implements the remedial alternative.

b) 'Longer Time Frame' Activities - G.E. indicated a desire to keep on the longer time frame for the ROD process that is required for the site as a whole. G.E. believes that the PCB portion of the contamination at the site does not lend itself as readily to a proven and available technology for remediation, as well as considering the preference for permanent remedies under SARA.

As such, the following tentative implementation schedule was proposed:

March - June '87	--	Review the initial screening of alternatives, and screen the alternatives in light of the SARA requirements.
July - December '87	--	Conduct the detailed FS.
January - March '88	--	EPA issues its Record of Decision.
April '88 - ?	--	G.E. implements the remedial alternative...."

EPA did not formally agree nor disagree with GE on any preferred remedial approach prior to the proposed plan issuance. In fact, a review of the schedule outlined in the EPA letter (excerpt above) shows a schedule for the detailed FS approximately six (6) months ahead of the current schedule.

EPA acknowledges that the design of the groundwater treatment portion of the remedy may be accomplished sooner that the design of the incinerator. It is EPA's intention that the design and implementation of the groundwater treatment system be carried out expeditiously. The design of the incinerator portion of the remedy will require a longer time period than that for the groundwater treatment system.

Comment 10

The first signal from EPA of the need for a major shift in direction came at a June 14, 1988 meeting with GE, when EPA announced that its Region I "Management Committee" had decided that the Agency would select a remedy based on the limited data in hand, and that selection would be mobile incineration.

Response 10

In the June 14, 1988 meeting with GE, EPA and GE discussed the upcoming EPA issuance of the Proposed Plan for the Rose site. EPA developed the Proposed Plan based on the RI, the draft EA, and the draft FS which addressed remedial alternatives for both the source area and groundwater. The draft FS includes information pertinent to the selection of an overall site remedy which meets the intent of CERCLA. One of the alternatives retained in the draft FS was mobile incineration. Further, EPA proposed mobile incineration at this time; final remedy selection is made in the ROD to which this responsiveness summary is an attachment.

Comment 11

As the preparers of the draft FS documents, B&B is uniquely qualified to comment on the approach and intended scope of the documents prepared to date, and/or the technical problems associated with EPA's sudden insistence on selecting a final source remedy from the data in the latest draft FS. Their overview of this issue is compelling:

> It is our belief that the Feasibility Study process should continue with the collection of additional site characterization data and finalization of the Feasibility Study Report. Only at that time can a defensible remedy be selected by the EPA and subsequently be implemented without significant delay.

B&B Comments, p. 5.

Response 11

EPA cannot allow FSs to continue indefinitely, particularly when sufficient information exists to show that a feasible permanent alternative is currently available. B&B's belief that the FS process should continue with the collection of additional data seems to address the purposes of remedial design rather than remedy selection.

Comment 12

As a consequence of all of the above, EPA has failed to follow the statutory procedures for selecting a remedy. EPA is relying on a document that never intended to, and does not, provide the technical information necessary to determine which source remedies meet the basic statutory criteria -- much less which one is the best choice from among those that do.

Response 12

The ROD explains how the remedy selection of mobile incineration meets the statutory criteria of Section 121 of CERCLA. In addition, in the Administrative Order on Consent signed by EPA and GE dated March 22, 1988 (U.S. EPA Docket No. CERCLA-I-88-1010; paragraph 4), the stated purpose of the Consent Order is "In entering into this Consent Order, the mutual objectives of EPA and the Respondent [GE] are the following... To provide EPA with a Feasibility Study so that EPA can evaluate alternatives and determine the appropriate extent of the remedial action needed to prevent or mitigate the release or threatened release of hazardous substances, pollutants, or contaminants at or from the F.T. Rose site..." This Feasibility Study was to be completed by GE by June 30, 1988. The draft FS and the administrative record provide EPA with sufficient information to support a remedy selection. See previous responses, including Responses 2 and 3, for further discussion.

Comment 13

Mobile Incineration Will Not Satisfy The Statutory Requirements Of CERCLA

On technical, policy and legal grounds, any final selection of remedy would be premature and would not meet CERCLA's requirements. Congress has mandated that EPA select a remedy that is protective of human health and the environment, attains ARARs, is cost-effective, and utilizes permanent solutions and alternative technologies or resource recovery technologies to the maximum extent practicable. CERCLA § 121(b). EPA cannot, on the basis of the information before it, determine whether mobile incineration satisfies any of these requirements.

Response 13

The ROD discusses how the mobile incineration and groundwater treatment remedy does, in fact, meet the statutory requirements of CERCLA. Refer to Section XI of the ROD for a discussion of these issues.

Comment 14

Mobile Incineration At The Rose Site Will Not Protect Human Health And The Environment

The Endangerment Assessment Report identified the following long-term risks:

(1) human ingestion of or dermal contact with contaminated groundwater,

(2) human ingestion of or dermal contact with contaminated site soils, and

(3) animal ingestion of surface water.

Endangerment Assessment, pp. 95, 100-01. For a remedy to be protective of human health and the environment, it must limit or eliminate each of the risks identified in the Endangerment Assessment Report. [GE believes that the risks identified above will have been successfully mitigated by the measures taken to date (e.g., fencing and capping) and by the installation and operation of the groundwater treatment system. Notwithstanding this, GE remains committed to a permanent source remedy at the Rose Site.]

Response 14

GE's EA never identified metals contamination (in either soil or water) nor soil VOC contamination as a potential risk factor to be considered.

As noted by GE in the previous comment, CERCLA Section 121(b) states that EPA will select a remedy that is protective of human health and the environment, attains ARARs, is cost-effective, and utilizes permanent solutions and alternative technologies or resource recovery technologies to the maximum extent practicable. Mobile incineration and groundwater treatment will protect human health and the environment by permanently eliminating each of the risks identified in the EA report.

Measures taken to date at the site do not constitute permanent mitigation of site risks to the maximum extent practicable. The site cap consists of multiple pieces of 5 mil plastic sheeting held in place with wooden pallets and tree branches and the fence is a 4-foot high wooden snow fence. The property is zoned residential and there are no current restrictions on use of the property.

It is assumed that the groundwater treatment system referred to is actually the oil recovery system that is currently in operation at the site. The oil recovery system extracts liquids from the free product portion of the site below the water table. This recovered product is sent off site for incineration at GE's Pittsfield TSCA incinerator. The primary intent of this recovery system is not groundwater treatment but rather reduction of the source volume. This system does not collect nor treat contaminated groundwater that has migrated east and south of the disposal area.

Comment 15

In addition, however, a remedy must not create new risks. As ERM notes in its comments, "it is essential to understand the risks of implementing the technology, given the possibility that the cure may be worse then the disease." ERM Comments, p. 3. EPA's proposed selection of mobile incineration poses just such a scenario. For example, mobile incineration potentially poses several health risks which EPA has not adequately considered, specifically, the impact that vapors, particulates, and/or dusts from excavating contaminated soils would have on workers, nearby residents, and the environment. Control of the emissions would be particularly critical since VOCs are believed to have contaminated the soil. While both B&B and ERM believe the emission controls can be engineered to minimize the impacts of these emissions, such control mechanisms have significant inherent risk of failure, as well as significant costs that have not been evaluated in the draft FS. B&B Comments, p. 7.

There is also the potential for the generation of ash containing leachable metals. As discussed infra, incineration does not destroy metals. Thus, following incineration of soils, metals will be concentrated in the ash. In this form, the metals may be more leachable than metals in soil and thereby present a greater risk to human health and the environment. EPA has not considered this issue. See B&B Comments, pp. 8-9, and ERM Comments, pp. 6-7. One final example (although by no means exhausting all of the potential risk issues) is the negative affect that mobile incineration could have on the surrounding environment. At EPA's August 3, 1988 public meeting, a local resident expressed her concern about the environmental impacts associated with operating a mobile incinerator 24-hours a day for a period of four or more years.[2] EPA has not considered the increased vehicular traffic and noise that will result or the impact on local wildlife (particularly in the wetlands area).

2/ Comments of Dianne Nichols, an owner of property adjacent to the Rose Site.

Response 15

EPA has considered the "several health risks" which GE has identified. A detailed approach on how to address these risks will be developed during remedial design:

1. Impact of excavation: Excavation would be necessary for more than one of the alternatives proposed in the draft FS, including one or more of the demonstration projects. Any remedy involving excavation to permanently remediate contaminated soils would need to address excavation concerns, and the costs and risks of excavation would be the same for all such remedies. As a part of safety precautions, an air monitoring program will be developed to permit rapid detection and early response to potential releases of air contaminants during excavation. (See Response 24 for a more complete discussion of this issue.)

Emissions controls can be implemented and have been at other hazardous waste sites. The risk of failure and the cost are both minimized by the fact that the total areal extent of the site is relatively limited and that excavation would be phased to minimize the extent of open cuts at any given time. B&B failed to indicate that "significant cost" or "significant inherent risk of failure" were factors to consider in the evaluation of alternatives involving excavation discussed in the draft FS. Experience in the Superfund program to date does not indicate that emission controls for excavation for a site of this size for on-site treatment of contaminants found at the Rose site are subject to "significant inherent risk of failure". EPA believes that proper engineering design and implementation of appropriate safety precautions can greatly reduce the risk of failure.

Moreover, the cost information of concern is not included in any information submitted by GE to EPA. The reference to cost and to potential failure of excavation emission controls is vague and ambiguous.

2. Generation of ash containing leachable metals: As discussed in Response 2, EPA has no record of disposal of metal-bearing wastes at the Rose site. Metals as a potential site contaminant has never been studied by GE since GE's inception of work at the site in 1983, nor were they identified as a potential concern in the EA. Metals characterization sufficient to complete remedial design will need to be undertaken in conjunction with remedial design (see Response 6). Potential metals contamination of incinerator ash will need to be evaluated at that time. Without any site-specific treatability studies on incineration, it is uncertain whether or not any metals would concentrate in the decontaminated soil fraction at unacceptable levels. In any case, EPA believes that measures to prevent the potential release of metals, particularly from the ash, are available and feasible if needed. Air pollution control devices will capture metals that are attached to dust or soil particles carried with the gas stream.

The November 1986 sampling results show low levels of metals in groundwater, including a sample from well 12A, one of the most contaminated wells at the site. All metals levels were below drinking water standards.

At no time since 1984 when GE initiated incineration of the free product portion of the site (see previous Response 14 on oil recovery system) has GE provided information to EPA on metals analysis data nor suggested that metals are present at the site.

3. Vehicular traffic and noise: EPA has considered the impact of traffic associated with the site on the surrounding areas. Concern about increased vehicular traffic was a factor in selecting an on-site remedy. (Off-site incineration would result in the transportation of untreated highly contaminated soils over long distances.) B&B did not consider these controls to be of such concern previously as to include pertinent discussion in the draft FS. Further, the incremental costs and risks which are of such concern to B&B and GE are not presented in sufficient detail here to evaluate.

EPA weighs the short and long term impacts of various remedial alternatives as a part of the overall remedial selection process. EPA acknowledges that increased traffic will necessarily result with any type of remedial construction activity. An on-site versus an off-site remedy will help to minimize these potential impacts. In addition, EPA believes that the benefits of the long term goals of overall protection through the implementation of a permanent remedy, thereby not allowing contaminants to migrate from the site and the reduction and ultimate elimination of long term operation and maintenance, outweigh the short term impacts of remedy implementation.

Comment 16

Mobile Incineration Will Not Attain ARARs

Protection of human health and the environment is achieved, at least in part, by identifying and complying with the "applicable or relevant and appropriate standard, requirement, criteria, or limitation" (commonly referred to as "ARARs") for the hazardous substances, pollutants, or contaminants that will remain at the site. CERCLA § 121(d)(2)(A). As EPA noted in its "Interim Guidelines on Superfund Selection of Remedy":

> Remedies must be protective of human health and the environment. This means that the remedy meets or exceeds ARARs or health-based levels established through a risk assessment when ARARs do not exist.

Memorandum dated December 24, 1986 from J. Winston Porter, Assistant Administrator, U.S. EPA Headquarters, to Regional Administrators, EPA Regions I-X, p. 7 (emphasis in original). EPA has not shown, and cannot show on the available data, that mobile incineration of contaminated soils satisfies ARARs or health-based standards for those soils.

In its "Interim Guidance on Compliance With Order Applicable or Relevant and Appropriate Requirements," 52 Fed. Reg. 32,496, 32,497 (1987), EPA identifies three different types of ARARs:

(1) ambient or chemical-specific requirements,

(2) performance, design, or other action-specific requirements, and

(3) locational requirements.

All three types of ARARs potentially apply to the selection of mobile incineration to remediate contaminated soil at the Rose Site. EPA states in the Proposed Plan that "PCBs, thirteen different VOCs, and six semi-VOCs have been detected in the soil and groundwater at the F.T. Rose site." Proposed Plan, p. 4. Yet, in the same section, EPA admits that it has not established cleanup goals for the soil contaminants:

> EPA is also developing soil cleanup goals for the site based on EPA's PCB policies and other guidelines . . . . The groundwater and soil and sediment cleanup method selected by EPA must reduce the concentration of the contaminants at the F.T. Rose site to the designated cleanup goals.

As EPA has not yet established chemical-specific soil cleanup goals, it cannot state that mobile incineration satisfies those cleanup goals. EPA has thus concluded that mobile incineration is the "preferred" remedial alternative having never established the chemical-specific soil cleanup goals, the site conditions have not been adequately analyzed to determine whether mobile incineration at the Rose Site could achieve those cleanup goals.

Because EPA has not fully characterized site conditions, EPA similarly could not determine whether mobile incineration would satisfy action-specific ARARs. For example, the draft FS contains no data on the metals content of the soil. Incineration of soil does not destroy metals. As a result, toxic metals may end up being concentrated in the burned soils, which could lead to one or both of the following results. First, concentrated metals can increase the leaching potential of those metals in the ash. If the metals were rendered more leachable by mobile incineration, it is difficult to characterize that remedy as being protective of human health and the environment or permanent. Second, if the incinerator ash concentrates the metals, the ash may fail the Extraction Procedure Toxicity Criteria, and be considered a hazardous waste. The standards established under the Resource Conservation and Recovery Act (RCRA) for handling hazardous wastes would then apply to the disposal of the hazardous ash from operations at the Rose Site, requiring either on-site construction of a RCRA landfill or disposal of the ash in an off-site licensed facility. See B&B Comments, p. 8, and ERM Comments, p. 7. EPA has ignored the potential applicability of such RCRA standards, and their potentially significant compliance costs, in its Proposed Plan.

Although some of these risks may be mitigated through the design and engineering of additional controls,[3/] EPA has not assessed the existence of such potential risks, the question of whether, and if so, how the risks may be mitigated, and the incremental costs and time that the mitigation measures will add to the project.

Finally, EPA not has considered whether mobile incineration would comply with locational ARARs. Specifically, the draft FS identifies the Massachusetts Hazardous Waste Siting Act, M.G.L., c.21(d), as an ARAR in Table 3-1. Further, mobile incineration was not among the top five source remediation alternatives in the draft FS because it is "potentially unacceptable due to the proximity of residential areas, Balance Rock State Park and Pittsfield State Forest." Draft FS, p. 7-3. Yet, in meetings prior to the issuance of its Proposed Plan, EPA informed GE that, in the Agency's opinion, the Massachusetts Siting Act is not an ARAR. Instead, EPA views the siting laws as analogous to a state permitting requirement, and, as such, not applicable to the F.T. Rose cleanup pursuant to SARA § 121(e), which states:

> No Federal, State, or local permit shall be required for the portion of any removal or remedial action conducted entirely on-site, where such remedial action is selected and carried out in compliance with this section.

This interpretation would suggest that because this section relieves the person remediating a Superfund site from obtaining permits required under federal, state, or local law relating to hazardous waste handling, it logically follows that such federal, state, or local laws need not be considered in the remedy selection process. Such an interpretation, however, conflicts with CERCLA § 121(d) which expressly characterizes facility siting laws as ARARs that must be satisfied at the completion of a remedial action. See CERCLA § 121(d)(2)(A). Senator Robert Stafford (R-Vt.), one of the architects of SARA, made this exact point in the floor debate which followed passage of SARA: "This section requires the Administrator to meet the requirements of State facility siting laws . . . ." 132 Cong. Rec. S14,910 (daily ed. Oct. 3, 1986). EPA, in its own guidance on compliance with ARARs, recognizes as much. In providing examples of locational ARARs, which "set restrictions on activities depending on the characteristics of a site or its immediate environs," EPA included "[f]ederal and State siting laws for hazardous waste facilities." 52 Fed. Reg. 32,497. Thus, it is clear from EPA's own guidance that facility siting laws are ARARs which must be substantively met in the remedy selection process.

Given that EPA's Proposed Plan would place a mobile incinerator in the midst of a state park, a state forest, and residential communities, and given that this mobile incinerator would operate 24 hours a day for a period of years, it is imperative that EPA consider the acceptability of such a plan under the Massachusetts siting law. The fact that EPA has not determined whether the location of a mobile incinerator next to irreplaceable state resources would be consistent with the standards of the Massachusetts Hazardous Waste Siting Act is just another indication that EPA has not demonstrated that mobile incineration would be protective of human health and the environment or would achieve all federal, state and local ARARs.

3/ See B&B Comments, pp. 6-10, and ERM Comments, p. 3, for a more detailed discussion of potential risks not identified by EPA.

Response 16

The ROD documents that mobile incineration of contaminated soils satisfies ARARs. The soil cleanup goal has been established by EPA and is set forth in the ROD. B&B did not present costs for incinerator ash treatment for application should levels of metals (not an identified site contaminant) warrant treatment.

CERCLA §121(d)(2)(A) applies "With respect to any hazardous substance, pollutant or contaminant that will remain on-site..." and it requires compliance with ARARs, including those promulgated under a state facility siting law "...at the completion of the remedial action." The mobile incinerator called for by EPA's selected remedy will thus not be subject to facility siting requirements as ARARs. The Massachusetts statute cited in the comment, M.G.L. c. 21(d) is applicable only to new facilities. In the regulations which implement the Siting Act, the State has specifically exempted on-site remedial actions (900 CMR §1.02(2)). Chapter 21(d) is thus neither applicable nor relevant and appropriate.

EPA is unaware of any impacts on "irreplaceable state resources" that would occur during implementation of the remedy, and no such impacts were identified in the draft FS. Although the site is adjacent to a state park, the park is not heavily utilized and access to the site from the park is through heavily wooded areas. Measures to minimize any impacts will be factored in to the design process. EPA regards any potential for short term impacts as outweighed by the long term permanence of the remedy.

Comment 17

Mobile Incineration Will Not Be A Cost-Effective Remedy At The Rose Site

A determination that a selected remedy is cost-effective can only be determined after (1) cleanup goals are established, (2) remedies are identified which can attain those cleanup goals and (3) the cost of each such remedy is determined. As noted above, EPA did not establish critical cleanup goals (or adopt those listed in the draft FS) prior to selecting mobile incineration as the preferred remedy. But had EPA done so, it still would not be in a position to determine whether other remedial alternatives achieve those health goals at a lower cost since data to determine the cost of all of the source remedies, particularly mobile incineration, are substantially lacking.

Although EPA includes the draft FS estimate of $19.2 million for mobile incineration in its Proposed Plan, the accuracy of that estimate is highly dependent on the level of cleanup that ultimately is selected. The draft FS estimate is based on the assumption that "VOCs would be reduced to insignificant levels" and PCBs would be reduced to 50 ppm. Draft FS, p. 6-59. As indicated earlier, however, EPA is currently contemplating different -- and presumably more stringent -- level of cleanup for PCBs. The quantity of soil at the Rose Site in which PCB levels exceed a 50 ppm cleanup goal could be much smaller than the quantity of soil exceeding a lower cleanup level. Accordingly, by lowering the cleanup goal, EPA could significantly increase the quantity of soil required to be excavated and, in turn, the cost of mobile incineration.

The failure to recognize that the cost of mobile incineration varies greatly with the desired level of cleanup is just one of many variables which EPA has failed to consider in its cost estimate for mobile incineration. The B&B comments touch on a number of these variables which, in addition to not being considered or analyzed in terms of technical implementability, also were not factored into the $19.2 million estimate. Each of these variables could significantly increase the cost of mobile incineration.

B&B notes that the cost of mobile incineration can vary greatly depending on the composition of the soil matrix. For example, soils with high moisture content consume larger quantities of fuel and require longer periods to incinerate --as much as 1.5 to 2 times. In addition, high moisture content soils require special and costly handling procedures to avoid exposing personnel and the local community to hazardous emissions from the excavated soil. Finally, the presence of cobbles, boulders, and other nonuniform constituents of the soil matrix can increase the cost of mobile incineration significantly. <u>See</u> B&B Comments, pp. 12-14.

Another potentially costly variable relates to the depth of contamination. If soils below the water table must be excavated, groundwater infiltration and corresponding problems of subsidence will greatly increase the time needed to excavate and incinerate contaminated soil. B&B notes, for example, that at the Peake Oil Site in Brandon, Florida, incineration of only 7,000 cubic yards of soil took over a year to complete due to excavation problems (below the water table), as well as problems with "debugging" the incinerator. B&B Comments, p.13. If the Rose Site water table creates the same level of difficulty encountered in excavating the Peake Oil Site soils, then the estimated four to five years required for incinerating soil at the Rose Site would be far short of the actual incineration time.

<u>Response 17</u>

GE is attempting to argue both that there is insufficient data on incineration to evaluate cost-effectiveness, and (see Comment 24) that there is sufficient data on solidification to evaluate its cost effectiveness and select it. GE fails to specify which cost data is "substantially lacking" or to provide missing cost data. EPA believes that there is sufficient data on both alternatives to evaluate cost effectiveness. It is also important to consider the accuracy of costs developed for a feasibility study. Typically, these cost estimates provide an accuracy of +50 to -30 percent.

EPA believes that the only currently available feasible alternative - and therefore the most cost-effective - is incineration. Since GE estimated the costs of off-site incineration to be greater than those for on-site, EPA concludes that for the Rose site mobile incineration is a cost effective remedy. The cost estimate used in the draft FS of approximately $380 per cubic yard is considered to be within the range used for estimating the costs of incineration.

In addition, the ROD sets forth the limits of excavation to 13 ppm PCBs to the water table and the free product area, resulting in excavation of approximately 15,000 cubic yards of soil, a large portion of which is above the water table. Accordingly, EPA believes that a 2 year estimate for implementation is reasonable. Even if incineration should prove to develop "delays" as the Peake Oil site has experienced, EPA believes that the 2 year estimate is still conservative.

Appropriate pretreatment and materials handling, such as feed size preparation and the reduction of potential emissions, will be an integral part of remedial design for any alternative involving soil excavation prior to treatment.

Comment 18

Beyond increasing the cost of mobile incineration, certain variables could render mobile incineration impracticable. B&B points out that there are presently a total of twelve mobile incinerator units in the United States. Of these twelve, there are no circulating bed variety (the type specified in EPA's preferred remedy) available for use at the Rose Site. The available units are either rotary kiln or infrared units and cost two to three times more than circulating bed units. Moreover, most of the vendors contacted by B&B stated that they could not guarantee the availability of even a rotary kiln or infrared unit for this project, and would likely have to construct a unit for the Rose Site. B&B Comments, p.8.

Response 18

EPA's Proposed Plan did not specify circulating bed incineration. Rather, the preferred alternative stated "...on-site incineration is the preferred alternative for addressing soil and sediment contamination.....Three different types of incinerators were evaluated: rotary kiln, circulating fluidized bed, and infrared processing. The extremely high temperatures in any of these thermal destruction facilities would destroy 99.9999% of all of the organic contaminants." The ROD states that design will determine the most appropriate type of incinerator for use at the Rose site.

The design phase will include examination of the availability of existing units appropriate for the site. This information will be factored into the overall design and the potential need for construction of a unit. Time frames for design will be sensitive to vendor response. Further, Ogden Environmental Services, Inc. owns and operates a transportable circulating bed combustor.

Comment 19

B&B also noted that EPA failed to consider the fact that the utilities required by incinerators -- 7 million gallons of diesel oil or 22 million kwh of electricity, and 250 million gallons of water -- are not currently available at this site or in the immediate area. B&B Comments, pp. 10-11. But perhaps the most glaring deficiency in EPA's analysis of the cost-effectiveness of mobile incineration at the Rose Site is the failure to consider the effect of the northern climate on that operation. The northern climate will significantly limit, or preclude, operations during winter months due to the inability to dewater and otherwise prepare materials for incineration. B&B Comments, p.12.

Response 19

Detailed information regarding utility needs was not provided in the draft FS. The assumptions used to generate these figures are not presented by GE. EPA assumes that the numbers presented in this comment have been calculated to reflect extensive excavation below the water table. Design work will need to estimate the actual utility needs and to make provisions for providing them to the site. Certain design items, such as sizing of the incinerator and examining the potential for recycling of quench and scrubber water, could potentially reduce the utility needs.

Climatic considerations will also need to be factored into the design. As previously stated, limiting a large portion of the excavation to above the water table will minimize problems affiliated with deep saturated soil excavation. (Climatic concerns could also be applicable to certain fixation-solidification techniques.) For remedial work conducted at other sites in northern climates, various techniques have been employed to minimize weather-related impacts. Such techniques include temporary structures to house equipment and to protect open excavation areas.

The Administrative Order on Consent (previously referenced) in Appendix B stated that the FS shall include "... a description of all special engineering considerations required to implement the alternative...". As such, EPA assumed that the cost estimates in the draft FS addressed these concerns.

Because EPA has found no other alternative to currently be feasible, increases in costs resulting from utility or weather considerations will not alter the basis for EPA's selection of incineration. These potential cost increases may increase the cost of on-site incineration, but are assumed to still be lower than the costs associated with off-site incineration.

Comment 20

The availability of mobile incinerators and utilities to run them, and the operability of such units under climatic extremes common in the Northeast are central to any determination of whether mobile incineration is implementable at the Rose Site, much less how much it would cost.

In terms of cost, B&B believes that these variables, together with others that it identified -- e.g., revision of soil cleanup goals, engineering controls for emissions, material handling issues -- could double or triple the $19.2 million cost estimate for mobile incineration in EPA's Proposed Plan. B&B Comments, p. 15. EPA's failure to consider these issues belies EPA's claim that it has determined mobile incineration to be cost-effective.[4/]

4/ For a more detailed discussion of these and other variables which potentially would have a significant impact on the cost estimate, see B&B Comments, pp. 7-15, and ERM Comments, pp. 3-5.

Response 20

Please see previous responses to address the issues that are reiterated in the above comment, including Responses 6, 17, 18, and 19.

Comment 21

But even assuming, for the sake of argument, that the proffered cost estimate of mobile incineration is as accurate as the cost estimates of other remedial alternatives listed in the Proposed Plan, this information demonstrates conclusively that, contrary to EPA's assertion (Proposed Plan, p.13), mobile incineration is not cost-effective. Comparison of mobile incineration with the other remedial alternatives included in the Proposed Plan is instructive. Of the alternatives for which cost has been estimated, two are containment alternatives which EPA says do not satisfy the statutory preference for permanent solutions. One (dechlorination) is reported to range anywhere from $16 to $30 million. Chemical fixation is a permanent treatment technology which protects human health and the environment, [5/] and, at $11.2 million, nearly halves the $19.2 million cost of mobile incineration and clearly is cost-effective. Only the remaining two remedial alternatives -- off-site landfilling, at $25 million, and off-site incineration at $149 million -- cost more than mobile incineration.

Landfilling is not a permanent solution and off-site incineration runs counter to the disfavor under § 121 of off-site transport of hazardous substances. Thus, EPA's claim that mobile incineration is "cost-effective" simply does not comport with the facts as stated in the draft FS.

5/ The permanence of chemical fixation/stabilization is discussed <u>infra.</u>

<u>Response 21</u>

EPA considers cost-effectiveness only among feasible alternatives that achieve equivalent levels of cleanup and degree of protectiveness. With the information that EPA has received from GE to date, EPA does not consider fixation/stabilization to be feasible nor equivalent to incineration in protectiveness nor permanence. It is for this reason that EPA did not directly compare the costs of incineration to fixation/stabilization and compared only the costs of on- and off-site incineration. Cost effectiveness also takes into account the total short and long term costs of alternatives, including the costs of operation and maintenance. See Section XI of the ROD discussion regarding cost effectiveness for further detail.

Section 121 of CERCLA does not disfavor off-site <u>transport</u> of hazardous substances. Rather, Section 121 disfavors off-site <u>disposal</u>, particularly when the remedial action does not involve treatment.

<u>Comment 22</u>

Mobile Incineration Will Not Be A Permanent Solution For Metals Contamination

The cleanup standards under § 121 (b)(1) mandate in pertinent part:

> Remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principal element, are to be preferred over remedial actions not involving such treatment.

Even the permanence of mobile incineration is questionable. GE would agree that mobile incineration would permanently reduce the "toxicity, mobility [or] volume" of the organic contamination in the soil. Proposed Plan, p.7. However, as noted above, mobile incineration does not destroy metals. The potential presence of high concentrations of several heavy metals is an unresolved issue, as ERM notes in its comments. ERM Comments, p.6. If metals have contaminated the site, mobile incineration would not reduce the toxicity of the metals contamination. Mobile incineration also does not significantly reduce the volume of the contaminated soil. Finally, as noted earlier, mobile incineration may render metals more leachable and thus mobile incineration would not reduce the mobility of the metals. Whether metal-contaminated ash is placed in an off-site or on-site secure landfill, the statutory preference for permanent solutions would not be satisfied.

In sum, EPA has no basis for "preferring" mobile incineration over other remedial alternatives. It has not gathered the data which would permit it to undertake the detailed comparative assessment of remedial alternatives contemplated under CERCLA § 121. As a consequence, and notwithstanding EPA's statements to the contrary in the Proposed Plan, EPA has not demonstrated, and cannot demonstrate, that mobile incineration of the Rose site would satisfy CERCLA's remedy selection criteria, i.e., that the remedy protects human health and the environment, attains ARARs, is cost-effective, and utilizes permanent solutions to the maximum extent practicable.

Response 22

See previous responses to address similar comments made previously, including Responses 1, 3, 12, 13, and 15.

Comment 23

GE's Proposed Remedy

Congress "encourage[d] the development and implementation of innovative permanent treatment *technologies* . . . whether or not they have been achieved in practice at other similar sites or facilities." 132 Cong. Rec. §14,926 (daily ed. Oct. 3, 1986) (statement of Sen. Chafee). GE believes that innovative technology is the key to remediating the soil contamination at the Rose Site and is committed to developing, through its Corporate Research and Development Program, the appropriate permanent treatment technology.

The three technologies that EPA indicated in the Proposed Plan it is considering as demonstration projects -- in-situ soil flushing with leachate treatment, chemical extraction with incineration of extracted liquids, and on-site biodegradation-- were among the five alternatives which the draft FS identified as "show[ing] the greatest promise for remediating the disposal area in accordance with guidance set forth in SARA." Draft FS, p. 7-3. Mobile incineration was not among these alternatives for reasons already explained. GE believes EPA should be willing to return to the original approach for this site, i.e., providing GE with the time and incentive to further develop these innovative PCB treatment technologies, and to demonstrate -- through pilot studies, field studies and, if warranted, full scale demonstration -- the feasibility of such alternatives at a Superfund Site.

The development of innovative PCB treatment technology as an alternative to mobile incineration would be of national significance. PCB contamination is widespread in this country. The cost to society of incinerating every PCB-contaminated site would be staggering. Clearly, the significance of innovative PCB technology would extend far beyond Lanesborough, Massachusetts.

GE proposes that EPA divide groundwater remediation and soil remediation into separate operable units, an option expressly endorsed in the National Contingency Plan, 40 C.F.R. § 300.68(c)(1) (19871) ("Response actions may be separated into operable units consistent with achieving a permanent remedy"). EPA could immediately issue a ROD on the groundwater operable unit and that remedial plan could then be implemented. Air stripping and carbon treatment would prevent the spread of contamination through the groundwater. GE would, within five years, develop the alternative treatment technology for the soil remediation operable unit. During this five-year period, interim source remedial measures will be implemented to manage site soils while these studies are underway. GE would propose to:

(1) remove the existing synthetic membrane cover from the disposal area;

(2) cover the disposal area with a new synthetic cap (such as 40-mil Hypalon or HDPE);

(3) upgrade the existing fence around the disposal area; and
(4) continue oil removal operations from Well 42-A.

The groundwater collection and treatment system described above would be designed and constructed concurrently with the interim source control remedy. Thus, during the five-year period all of the risks identified in the Endangerment Assessment will have been mitigated.

By the end of five years, GE would finalize a new FS for the second operable unit, incorporating the results of the CRD program. Based on that FS, EPA would select a permanent remedy for immediate implementation.

GE cannot overemphasize the benefits of further developing innovative PCB treatment technology. Allowing additional time for such development makes particular sense at the Rose Site. Implementation of the first operable unit will eliminate all of the identified risks to human health and the environment. This is particularly true given that the primary contaminants of concern -- PCBs -- are immobile. B&B Comments, p.14. In combination with the fact that the data is simply insufficient to select final source remediation as part of any current ROD, it makes a compelling case for not artificially forcing a remedy selection now.

Response 23

There are several reasons EPA does not agree with GE's proposed approach. Although the issues have been previously addressed they are briefly be reiterated here:

1. Research and development. EPA believes that the development and implementation of innovative technologies was not intended to be an open-ended process. While EPA appreciates GE's commitment to the development of alternative treatment technologies independent of EPA's Superfund Innovative Technology Evaluation (SITE) program, the CRD work to date that has been presented to EPA is focused on bioremediation which has long (4 to 6 years) development time frames. Even longer time frames would be required to implement these potential technologies, if they are even applicable to the Rose site, considering the site conditions and the levels of contamination present. It is extremely difficult to predict when technologies under development might be ready for scale-up and actual implementation that could achieve clean-up goals.

EPA acknowledges the desirability of alternative technologies in the ROD. The selected remedy specifically states "In an effort to encourage development of alternative technologies for treatment of hazardous waste....EPA is considering allowing GE to conduct a demonstration project .... this alternative would be considered for use if it is demonstrated to meet the criteria for remedy selection." Clearly, EPA is receptive to the concept of alternative technologies that could be developed, designed, and implemented in a time frame equivalent to that needed to design and implement on-site incineration. However, EPA will not delay implementation of an available remedy for speculative, long term research. Studies have been ongoing at the Rose site for approximately 7 years. EPA finds the proposal that GE be allowed another 5 years to conduct a FS for the site to be unacceptable.

2. Operable units. EPA does not believe that operable units are appropriate because of the direct connection between the source disposal area, especially the free product area, and the groundwater contamination. Operable units are intended for technically distinct portions of a site, which is not the case for the Rose site.

3. Site risks. Although immediate implementation of the groundwater treatment system would address the risk posed by contaminated groundwater migration, merely "containing" the source disposal area would put the groundwater treatment system in a

"containment" mode as well rather than beginning active remediation of the groundwater. Extremely high free product levels of contamination would exist in close proximity to the groundwater capture area.

Regarding disposal area soils, the temporary cap is merely a temporary measure to limit contact; it is not a permanent remedy that is preferred by the statute.

Comment 24

Alternative Proposal

If EPA feels compelled to select a final source remedy now, mobile incineration is not the appropriate choice, as demonstrated previously, because it does not meet the statutory requirements. Based upon current data, the only remedy that meets the statutory criteria is chemical fixation/stabilization. Chemical fixation is a proven technology which would immobilize PCBs and any inorganic contamination in the soil and thus eliminate the identified health risks associated with those contaminants. Chemical fixation, under this scenario, would be the remedy designated to be implemented at the end of the 5-year period for development of innovative technologies.

To complement the selection of chemical fixation/stabilization, GE would immediately undertake additional assessment and remedial activities. First, GE would undertake an extensive soil characterization program, focusing on both VOCs and metals. Second, if VOC contamination is confirmed in the soil characterization study, GE would implement a VOC extraction procedure. VOCs would be extracted and destroyed prior to excavating and immobilizing the contaminated soil. This would address the concerns, discussed earlier and in the enclosed B&B and ERM Comments, that VOC emissions during excavation activities would pose a potential health risk. Further, the remedy would be protective of human health and the environment with regard to any remedy that involves soil excavation.

Chemical fixation/stabilization would also satisfy the requirement under § 121 that the EPA select a permanent remedy. VOCs will be destroyed and PCBs and inorganic contaminants will be permanently immobilized. In its analysis of chemical fixation/stabilization, EPA agrees that it "would greatly reduce the mobility of the contaminants, minimizing long-term environmental effects." Proposed Plan, p. 12. However, the agency asserts that the technique would not reduce the volume and toxicity of the contaminants and the "stabilized material would still be considered hazardous." Id. Curiously, this statement is inconsistent with EPA's analysis of chemical fixation/stabilization contained in its May 12, 1988 comments on the draft FS (Enclosure 6).

> It is not clear why alternative SM-8 (chemical fixation/stabilization) was given a low institutional ranking. This alternative would be completed on-site and could significantly reduce the mobility <u>and toxicity</u> of contaminants (with resultant increase in volume, however).

Attachments to EPA Comments, p.7 (emphasis added).

Regardless of whether one accepts the May or July version of EPA's position, chemical fixation/stabilization would satisfy the requirement to "utilize permanent solutions" under § 121. A permanent solution is one which employs treatment which "permanently and significantly reduces the volume, toxicity or mobility" of hazardous substances at the site. CERCLA § 121(b)(1). It was no accident that Congress used the disjunctive "or" rather than the conjunctive "and" in the phrase "volume, toxicity or mobility." Based on the plain meaning of the statutory phrase, treatment which significantly reduces <u>either</u> volume <u>or</u> toxicity <u>or</u> mobility of hazardous substances at a Superfund site would satisfy the statutory preference for permanence. Representative Dennis Eckart D-Ohio) made this exact point during the floor debate which followed passage of SARA:

> [T]he statute refers to the significant reduction of volume, toxicity or mobility -- using the disjunctive "or" rather than the conjunctive "and."

132 Cong. Rec. H9589 (daily ed. Oct. 8, 1986). Since chemical fixation/stabilization would "permanently and significantly reduce" the mobility (and, GE believes, the toxicity) of hazardous substances at the F.T. Rose Superfund site, it satisfies the statutory preference for permanence.

In this regard, it is important to note that Congress did not intend EPA to select the

> "most permanent" remedy available; it is not intended that EPA spend millions of dollars incinerating vast amounts of slightly contaminated materials where other cost-effective alternatives would provide a high degree of permanence and protection of public health and the environment.

132 Cong. Rec. H9567 (daily ed. Oct. 8, 1986) (statement of Rep. Lent). Thus, the fact that mobile incineration destroys PCBs whereas chemical fixation/stabilization only immobilizes them would not, by itself, justify or require the selection of incineration. Both remedies achieve a "high degree of permanence and protection of public health and the environment:"

Section 121 also requires that EPA select a cost-effective remedy. Assuming, for the sake of argument, that both mobile incineration and chemical fixation/stabilization would constitute permanent solutions, be protective of human health and the environment, and achieve ARARs, the fact that mobile incineration is far more expensive than chemical fixation/stabilization would require the selection of chemical fixation/stabilization, since it is the more cost-effective remedy.

EPA reached a similar conclusion in the ROD for the Liquid Disposal, Inc. (LDI) Site, Utica, Wisconsin (EPA Reg. V) (Sept. 30, 1987). Chemical fixation was selected to remediate soils contaminated with volatile organic compounds (including PCBs) and various inorganic metals. Regarding the preference under § 121 for remedies involving permanent treatment, EPA notes that the selected remedy "uses treatment as a principal element." LDI ROD, p. 18. The Agency further notes:

> The remedy will reduce the mobility and toxicity of the waste by greatly reducing or eliminating the ability for hazardous chemicals to leach out of the solidified mass. However, hazardous chemicals still remain in that mass.

Id.

Incineration was rejected by the Agency because

> [I]t is not cost-effective for the LDI site contaminants. The RI concluded that there was no clearly identifiable pattern or "hot spots" of contamination at the site. Due to the non-uniform and unpredictable waste distribution, the cost-effectiveness of selectively incinerating certain types of waste types or site areas could not be determined. Therefore . . . the entire soil/waste volume [125,000 cubic yds.] on-site would require incineration.

Id., p. 16.

Similar facts at the Sand Springs Petrochemical Complex Superfund Site, Tulsa, Oklahoma (EPA Region VI) (September 29, 1987) convinced EPA to scrap a plan to incinerate soils heavily contaminated with VOCs and inorganic metals and select "on-site solidification" instead. Mobile incineration would have cost nearly $67 million, while solidification will cost approximately $38 million. In comparing incineration and solidification (using the same nine criteria listed in EPA's Proposed Plan for the Rose site), EPA concluded that solidification represented the best balance among these criteria. In selecting solidification, EPA stated that it constitutes a "promising innovative technology," it is significantly less costly, and human health and the environment would be protected. See "Declaration For the Record of Decision" (which precedes the full text of the Sand Springs site ROD). These same three factors would justify use of chemical fixation/stabilization as the chosen remedy to be implemented at the Rose Site at the end of the 5-year period for the development of innovative technology, should such technologies not prove effective.

Response 24

Effectiveness of Fixation/Stabilization

GE has not provided any proof that existing fixation or stabilization processes are capable of immobilizing PCBs at the levels found at the Rose site. EPA is unaware of the use of this technology for containing levels of organic contamination as high as are documented at this site. Further, GE's EA did not identify any health risks associated with any VOC or inorganic contamination in the soil.

Contrary to GE's claims, EPA has never concluded that fixation-stabilization would permanently immobilize the contaminants since EPA has no data on which to base such a conclusion. Fixation-stabilization has not been proven effective in containing PCBs or other organic chemicals. Although fixation/stabilization has been used for over 20 years (primarily for inorganic contamination), there is little information on the physical durability and chemical stability of the stabilized mass when placed in the ground. Little research has been conducted on the long term effects of organic contaminants on performance.

Several types of fixation/stabilization technologies are currently being tested under EPA's SITE program. Because this program has been operating for less than 2 years, little specific information is available of the effectiveness of these technologies in immobilizing PCBs or other organics. The HAZCON process was evaluated at the Douglassville, PA Site in 1987. The process was not effective in immobilizing organic chemicals. Similar amounts of these chemicals leached from treated and untreated soils during short term leachate tests. Further, microscopic analyses of treated soils revealed globules of untreated organics, indicating that the mixing and treatment process was not completely effective. It should be noted that none of the technology demonstrations that have been carried out or planned in the near future have involved soils with PCB concentrations as high as those found at the Rose site. Thus, even if the tests conducted under the SITE program show promising results for PCBs, questions will remain concerning the applicability of those results to the Rose site.

Effectiveness of Vapor Extraction

GE's reference to implementation of a VOC extraction procedure to accompany fixation is speculative since it was never discussed in the draft FS prepared by GE's consultants. Further, GE's statement that VOCs would be destroyed is unclear. VOC extraction does not destroy VOCs but merely separates them from the soil.

EPA believes that the effectiveness of this technology may be limited by the Rose site soil characteristics. The Rose site soils are predominantly glacial till deposits. The till is composed of a poorly sorted and nonstratified mixture of gravel, sand, clay and silt. The till deposits are overlain by sand, silt, top soil or fill. The wide variety of soil types make the technical feasibility of vapor extraction questionable. Pilot scale study would be required to determine the feasibility of this technology for the Rose site.

Because of the variability in the soil, the implementation of vapor extraction could be hindered or delayed, particularly due to the presence of clay and silt at the site. Depending on the soil porosity and moisture content, the amount of vapor present in the pore space of the unsaturated zone, and vapor phase contaminant concentrations, it could take a significant period of time to remove soil vapors. Also, the limited soil VOC data indicates that much of the VOC contamination is likely to be found below the water table, inaccessible to (in situ) vapor extraction. This could result in delay of excavation of soils for subsequent treatment (*e.g.* chemical fixation/stabilization).
In addition, the vapor extraction would have no effect on the free product portion of the site.

If vapor extraction was determined to be feasible for the site, the costs would need to be added to those for fixation-stabilization. Assuming that a vapor phase carbon adsorption system would be required to treat the extracted vapors, these costs could be quite significant, particularly if vinyl chloride is found. This contaminant has been detected at high levels in groundwater at the site. These high vinyl chloride concentrations resulted in a significant increase in costs for the groundwater treatment alternatives that involved air stripping due to the need for air emissions control.

Finally, GE's claim that removal of VOCs from soil prior to excavation will eliminate health risks due to VOC emissions during implementation of fixation/stabilization is unsubstantiated. EPA believes this is unlikely for 2 reasons:

1. Inability to remove all VOCs from soil before beginning the fixation/stabilization process. EPA does not believe that vapor extraction will be completely effective at the Rose site. Based on the limited soil VOC data, much of the VOC contamination is likely to be found below the water table, inaccessible to (in situ) vapor extraction.

2. Release of VOCs during and after the fixation/stabilization process. Since vapor extraction may not be completely effective above the water table and will not be effective below the water table, soils to be treated by fixation/stabilization may contain VOCs. These VOCs are likely to be released during excavation of

contaminated soils (particularly those below the water table), during mixing of soil with stabilization agents in the treatment process, and during curing of the solidified material. Technical evaluations of fixation processes have shown that VOCs are released during the mixing stage of the fixation process. Short term (up to 28 days) tests indicate that VOCs continue to be released at a steady rate as the stabilized waste cures. Differences in VOC concentrations between untreated and treated soils have been attributed to these volatilization mechanisms rather than to binding of the VOCs by the fixation/stabilization process.

References to Other Decisions and Intent

GE's reference to Congress' statement that "...it is not intended EPA spend millions of dollars incinerating vast amounts of slightly contaminated materials..." is curious. Clearly, EPA would not characterize the PCB soil contamination at the Rose site as "slightly contaminated". To the contrary, EPA Region I is unaware of any other NPL site nationwide with PCB levels that exceed those documented at the Rose site (up to 440,000 ppm PCBs). In addition, the estimated 15,000 cubic yards designated for excavation and treatment is not considered to be a "vast amount", and the majority of the contaminated material lies within a 1.5 acre area.

GE's reference to 2 other sites that selected fixation implies that the factors that lead to the choice of fixation should lead to a similar selection at the Rose site. While there may be some common factors, each site is unique and must be evaluated accordingly.

In reference to the Liquid Disposal site in Michigan, GE notes that "incineration was rejected by the Agency" at this site because there was no clearly identifiable pattern or "hot spots" of contamination at the site. Clearly, this is not the case at the Rose site. The extent of PCB contamination is well defined and is localized in a relatively small area approximately 1.5 acres in size. Further, the location of the free product area (or "hot spot") is defined in the western portion of the disposal area. As such, incineration should be technically and economically feasible due to the uniformly high levels of PCB contamination throughout much of the disposal area and the well-characterized distribution of this contamination.

Further, although the Liquid Disposal Site ROD selected stabilization for soil contaminated with organic chemicals, it notes that the hazardous substances will not be permanently destroyed. The ROD also states that "...data does not exist...to accurately judge the long term reliability of the process. Long term leaching and volatilization can be expected for soluble and volatile organic wastes..." As a result, the ROD also calls for a slurry wall around and an impermeable cap over the solidified material, measures not included in GE's proposal.

Regarding the Sand Springs Petrochemical Complex in Oklahoma, EPA's original reasons for rejecting solidification are of particular interest:

a) lack of demonstrated permanence;
b) inability of solidification technologies to permanently bind wastes with organic contents up to 50 percent;
c) doubts about whether the stabilized material would meet RCRA requirements in the long term;
d) potential air emissions; and
e) the high potential for failure, compared to other remedies.

It should be further noted that this site is also contaminated with sludges containing heavy metals, a condition which is not believed to exist at the Rose site.

Comment 25

Conclusion

GE is committed to implementing a permanent solution at the Rose site. However, it was, and is, premature for EPA to select mobile incineration -- or any other technology -- as the preferred remedial solution to soil contamination. EPA does not have at its disposal the information that is necessary to select a remedy in accordance with the requirements of CERCLA § 121. GE urges EPA to proceed with the issuance of a ROD on the groundwater operable unit, but to withhold a decision on remediation of the source until the soil and site conditions have been more fully characterized. GE will proceed with the development of innovative technologies which hold promise for this, as well as other, PCB-contaminated sites. While GE develops these technologies, interim remedial measures will be implemented to fully protect human health and the environment.

Response 25

GE's commitment to implementing a permanent solution at the Rose site is speculative until GE signs a legally binding Consent Decree to implement a Record of Decision signed by EPA that calls for a permanent remedy for the Site.

Since this final comment is a reiteration of previous comments, see previous responses (including Responses 1 through 5, 11 through 13, and 23) and the ROD for further discussion.

IV. REMAINING CONCERNS

At the public informational meeting held in Lanesborough on July 20, 1988, and at the informal public hearing held on August 3, 1988, local residents and officials discussed issues of concern as the site moves into the design and implementation phase of EPA's selected remedy for the Rose site. These issues and concerns are described briefly below along with statements about how EPA intends to address these concerns as they arise in the future.

(A) Noise

Citizens expressed a strong concern that the incineration and excavation process be carried out in a manner that would minimize adverse impacts upon the community.

At the July 20, 1988 public informational meeting, EPA stated the Agency's willingness to work with local officials to minimize the adverse impacts of site remediation activities and stated that local input will be solicited during the remedial design process to address local concerns.

(B) Other Hazardous Waste Sites in Lanesborough

Citizens asked EPA to investigate other hazardous waste sites owned by the contractor who disposed wastes at the Rose site.

EPA stated that the Agency is aware of the location of these sites, but since these sites are not on the Federal Superfund list (National Priorities List), EPA does not have any direct involvement with these sites. Only the Rose site in Lanesborough is on the National Priorities List and therefore qualifies for federal funding. However, these other sites that are of concern are on the Massachusetts DEQE "List of Confirmed Disposal Sites and Locations to be Investigated" and are being investigated by the State. EPA has relayed citizens' concerns about these sites to the State.

(C) Groundwater Contamination

Citizens urged EPA to act quickly to prevent groundwater contaminants from continuing to migrate from the Rose site.

EPA stated that the site cleanup will be carried out by GE and that the EPA will pursue immediate implementation of the groundwater cleanup portion of the overall site remedy with GE. EPA further stated that the EPA will oversee all cleanup activities conducted by GE, including remedial design and actual construction activities.

EXHIBIT A

COMMUNITY RELATIONS ACTIVITIES CONDUCTED AT THE ROSE SITE

EXHIBIT A

COMMUNITY RELATION ACTIVITIES CONDUCTED AT THE ROSE SITE IN LANESBOROUGH, MASSACHUSETTS

Community relations activities conducted to date at the Rose Superfund site include:

- February 1988 - EPA conducted community interviews to assess community concerns related to the site and to develop specific plans to address those concerns.
- June 1988 - EPA released a fact sheet to inform the public about the results of the Remedial Investigation (RI) conducted by GE at the site.
- June 1988 - EPA issued a public notice announcing the availability of the Administrative Record and the results of the RI.
- July 1988 - EPA released a community relations plan describing citizen concerns about the site and outlining a program to address these concerns and how EPA intends to keep citizens informed about and involved in site activities.
- July 1988 - EPA issued a public notice to announce the time and place of the public informational meeting for the site and to invite public comment on the Feasibility Study (FS) and the Proposed Plan.
- July 1988 - EPA mailed the Proposed Plan announcing EPA's preferred alternative for addressing contamination at the site to all those on the site mailing list.
- July 20, 1988 - EPA conducted a site visit to familiarize interested citizens and local officials with the site and to discuss current and future EPA activities at the site.
- July 20, 1988 - EPA held a public informational meeting to discuss the results of the RI/FS and EPA's Proposed Plan.
- July 21 - August 19, 1988 - EPA held a public comment period on the Proposed Plan.
- August 3, 1988 - EPA held an informal public hearing to accept comments on the remedial alternatives evaluated in the FS and on the Proposed Plan.

EXHIBIT B

TRANSCRIPT FROM THE INFORMAL PUBLIC HEARING

UNITED STATES OF AMERICA

ENVIRONMENTAL PROTECTION AGENCY

RE: F.T. ROSE SITE SUPERFUND PROGRAM,

A PUBLIC MEETING, held at the Lanesborough High School Auditorium, on Wednesday, August 3, 1988, commencing at 7:13 p.m.

BEFORE: Sam Silverman, EPA, Chairman
Mary Sanderson, Remedial Project Manager

I N D E X

P R O C E E D I N G S

(7:13 p.m.)

MR. SILVERMAN: We'll begin the meeting now. Good evening and welcome. My name is Sam Silverman. I'm Acting Deputy Director of the Environmental Protection Agency -- Deputy Director of the Waste Management Division of the Environmental Protection Agency, Region One, in Boston.

My responsibilities include managing the Superfund Program in the State of Massachusetts. I will serve as Chairman of this meeting and want to welcome you all here this evening.

The purpose of this hearing is to formally accept comments on the remedial investigation endangerment assessment feasibility sutdy and proposed plan for remediation of the F.T. Rose Superfund site located here in Lanesborough.

Also present today is Mary Sanderson, who is EPA's Site Manager for the F.T. Rose site.

What I would like to do now is to describe for you the format for this hearing. First, Mary will give you a brief overview of the proposed plan.

As many of you know, EPA representatives made a detailed presentation of the proposed plan at an informational meeting which we held here on July 20th.

Following Mary's overview, we will accept any oral comments you may wish to make for the record. Those of you wishing to comment should have already indicated your desire to do so by filling out the form we made available to you.

Also available, if you don't already have a copy, is the proposed plan on the table in the middle of the auditorium. If you have not yet completed a form, but do wish to make a comment, please do so now or any other time during the course of the hearing.

I will call on the people wishing to make statements in the order in which they filled out the form. I will reserve the right to limit comments to ten minutes. However, given the low turnout, I doubt I'll have to do that.

Following the comments, Mary or I may ask clarifying questions regarding the comments just to make sure that we're able to fully understand what the issues are that you are raising.

After all the comments have been heard, I will close the formal hearing. The purpose of tonight's hearing is for EPA to receive your comments. As part of the formal hearing, Mary and I will not be able to respond to your comments or questions tonight.

However, after I close the formal part of the hearing, Mary and I will remain available to answer any questions informally which you may have on issues which have been raised this evening or in any other aspects of the feasibility study and proposed plan.

As you may know, the public comment on the proposed plan opened on July 21st and runs through August 19th. If you wish to submit written comments, and I encourage you to do so, they must be postmarked no later than August 19th and mailed to our office in Boston.

The appropriate address can be found on Page 2 of the proposed plan. At the conclusion of the meeting, please see Mary or me if you have any questions on the process for making written comments.

All oral comments we receive tonight and those we receive in writing during the comment period will be responded to in a document we call the Responsiveness Summary.

This summary will be included with the decision document or record of decision that EPA prepares at the conclusion of the comment period. In the record of decision, EPA will explain which clean-up alternatives have been selected for the F.T. Rose site.

Are there any questions at this time on the format for this evening?

(No response.)

Seeing that there are none, I just wanted to encourage you all wishing to comment to do so now orally or in writing before August 19th.

If anyone else has decided to make an oral comment tonight, please fill out one of those forms on the table at this time.

Mary Sanderson will now open with a brief overview of the proposed plan for the F.T. Rose site.

MS. SANDERSON: As Sam said, we were here two weeks ago, at which time we did a longer presentation reviewing the results of the remedial investigation, the endangerment assessment, the feasibility study and EPA's proposed plan.

I won't be doing slides or any other presentation, so to speak, tonight. I have brought a map later on for questions and answers, if you wish.

What I will just briefly review is the site history, the disposal area, approximately one and a half acres in the back portion of the Rose property.

The contamination is predominantly PCB's in a source disposal area with volatile organic contamination migrating from the site into plumes.

The endangerment assessment form, the risks posed by the site to be contact with the PCB's in the disposal area as well as groundwater consumption in the area where the groundwater has become contaminated from the site.

We talked about some of the options that were presented in the feasibility study, and EPA has proposed a two-part clean-up plan.

We have proposed that for the groundwater treatment portion of the contamination at the site, an air stripping and carbon treatment system. There would be two interceptor wells or trenches installed at the site where the two plumes are emanating from the site, and those would be treated by an air stripping and carbon treatment system.

For the source area, the one and a half acre area, we are proposing excavation and on-site incineration of those contaminated soils.

That, in a nutshell, is what several years of study has done, and I will leave it at that, unless people have questions on the proposed plan being excavation and on-site incineration for the source area soils and the groundwater treatment air stripping with carbon treatment for the groundwater contamination.

That, in a nutshell, I'll turn it back to Sam for comments.

MR. SILVERMAN: Thank you, Mary. At this time, I'll start taking the comments from the audience. At present, the only person who indicated an interest in making an oral comment is Diane Nichols. Ms. Nichols, would you please go to the microphone and make your comments?

MS. NICHOLS: As an abutter to the Rose site and as the owner of the business that functions at that site primarily on the telephone, I am opposed to any method which would bring excessive noise or excessive construction disruption.

My husband and I bought the property in 1987 specifically for my telephone telemarketing business, and if I can't do busy, then a noisy clean-up is unacceptable to me.

I would also insist that the Environmental Protection Agency do everything possible to contain the contamination during the clean-up process, and if that contamination is found to extend to my property, then that contamination be cleaned as well.

My property was found to contain a very small insignificant amount of PCB-1260. That's what I understand is out in back of the Rose property. Right now, it's -- we call it an unknown source.

As an employer, I have had to try to keep my current employees informed and happy. In this type job market situation, I have had to try not to stir prospective employees, and I've gone through one headache after another with testing in my basement, testing on the property.

I would support any method that the EPA would want to do that would be, first of all, complete and, second of all, permanent.

If we have to go with an incinerator and such which is going to generate so much noise at a high cost, fine. We'll have to live with it. I would hope that, you know, it could be done so that everybody is happy without either noise or disruption.

Whatever you can do that would be the most effective, the most permanent is fine. I do not support most of the unproven experimental methods, except probably for SM-10, which is the biodegradation.

I do not support any of the methods which would not reduce the toxicity of the material. I do not support more solvents and more chemicals being pumped into the land which has already been unacceptably defiled.

I particularly do not support the proposal at the M-6 which proposes to turn the Rose site into a hazardous waste site because that opens up a whole can of worms for other hazardous waste to be dumped there, for town garbage to be dumped there, et cetera.

As property owner that abutts this, we've had enough headaches. I, personally, don't want it. I think that public health is at stake in this particular instance so whatever will contain this mess from being -- from more public exposure is fine by me.

I think you should do whatever is necessary to clean it up for the public's good.

In response to the Berkshire Eagle accounts that I've been reading of General Electric's position regarding this whole thing, I think that the GE is ultimately responsible for this mess that we have on Balance Rock Road. I'm very tired of hearing about Berkshire County high cancer rate, Berkshire County's toxic waste dumps here and there that somehow are always traced back to a major industry, usually General Electric.

I feel that it is General Electric's responsibility to do whatever is necessary to restore the land that they defiled, not what they find the easiest on their pocketbooks, but it's time that GE took full responsibility for their actions in regard to this environmental problem.

Lastly, I would hope that the comments that we, as abutters, are making and the Rose family's comments weigh heaviest on whatever the EPA plans to do. I think that our feelings are more important than somebody that, say, lives up on North Main Street or Summer Street because we're the ones that are ultimately at stake here. It's our property and our health.

Since the Rose family lives on the land and pays the taxes on that land and has had their privacy invaded because of all this and since they live with the albatross around their neck daily, I think that their opinions should weigh the heaviest on EPA's final recommendations.

I think the Rose family has been put through all this and after all this deserves a break so I say let's give them a break, listen to them, listen to me and do whatever is necessary. Thank you.

MR. SILVERMAN: Thank you.

(Whereupon, on August 3, 1988, the above matter was concluded.)

CERTIFICATE OF REPORTER AND TRANSCRIBER

This is to certify that the attached proceedings before: THE ENVIRONMENTAL PROTECTION AGENCY in the Matter of:

FT ROSE SUPERFUND SITE

Place: Lanesborough High School

Date: 8/3/88

were held as herein appears, and that this is the true, accurate and complete transcript prepared from the notes and/or recordings taken of the above titled proceeding.

V. McCann — 8/3/88

Reporter — Date

S. Hayes — 8/16/88

Transcriber — Date

APPENDIX B

ADMINISTRATIVE RECORD INDEX

Rose Disposal Pit

NPL Site Administrative Record

Index

As of September 23, 1988

Prepared for

Region I
Waste Management Division
U.S. Environmental Protection Agency

With Assistance from

AMERICAN MANAGEMENT SYSTEMS, INC.
One Kendall Square, Suite 2200 • Cambridge, Massachusetts 02139 • (617) 577-9915

Introduction

This document is the Index to the Administrative Record for the Rose Disposal Pit National Priorities List (NPL) site. Section I of the Index cites site-specific documents, and Section II cites guidance documents used by EPA staff in selecting a response action at the site.

The Administrative Record is available for public review at EPA Region I's Office in Boston, Massachusetts, and at the Lanesborough Town Library, 83 North Main Street, Lanesborough, Massachusetts 02137. Questions concerning the Administrative Record should be addressed to the EPA Region I site manager.

The Administrative Record is required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA).

Section I

Site-Specific Documents

ADMINISTRATIVE RECORD INDEX

for the

Rose Disposal Pit NPL Site

1.0 Pre-Remedial

1.2 Preliminary Assessment

1. "Preliminary Site Assessment - Rose Site," Ecology and Environment, Inc. (April 13, 1981).

1.3 Site Inspection

1. "Site Inspection Report - Rose Site - Final Report," Ecology and Environment, Inc. (March 22, 1982).

1.18 FIT Technical Direction Documents (TDDs) and Associated Records

1. "Field Investigation of the Rose Site - Balance Rock Road - Final Report," Ecology and Environment, Inc. (October 15, 1982).

2.0 Removal Response

2.1 Correspondence

1. Cross-Reference: Determinations and Administrative Order, *In the Matter of General Electric Company for the Rose Site*, Docket No. 84-1025 (May 16, 1984) [Filed and cited as entry number 1 in 10.7 Administrative Orders].
2. Memorandum from EPA Region I to File (September 28, 1984).

3.0 Remedial Investigation (RI)

3.2 Sampling and Analysis Data

Sampling and Analysis and Contract Laboratory Program (CLP) Data for the Remedial Investigation (RI) maybe reviewed, by appointment only, at EPA Region I, Boston, Massachusetts.

1. Letter from Dorothy A. McGlincy and Ellis Koch, Geraghty & Miller, Inc. to Grant Bowman, General Electric Company Regarding Oil Recovery Chronology and Analytical Results (February 8, 1988).

3.4 Interim Deliverables

1. "Personnel and Field Tasks - Rose Site Sampling Project," Geraghty & Miller, Inc. for General Electric Company (November 19, 1986).
2. "Remedial Investigation Oversight at the F.T. Rose Site - Project Operations Plan," Planning Research Corporation for Camp Dresser & McKee Inc. (December 11, 1986).

3.6 Remedial Investigation (RI) Reports

1. "Effect of Waste Oil and Solvent Disposal on Ground-Water Quality at the Rose Site - General Electric Company," Geraghty & Miller, Inc. for General Electric Company (February 1984).
2. "Volume I - 1986 Supplementary Investigation at the Rose Site, Lanesborough, Massachusetts - General Electric Company," Geraghty & Miller, Inc. (February 1987).

3.10 Endangerment Assessments

Endangerment Assessments

1. "Endangerment Assessment Report for the Frank T. Rose Site," Geraghty & Miller, Inc. for General Electric Company (June 1988).

Endangerment Assessments Comments

2. Comments Dated February 17, 1988 from Mary C. Sanderson, EPA Region I on the June 1988 "Endangerment Assessment Report for the Frank T. Rose Site," Geraghty & Miller, Inc. for General Electric Company.
3. Comments from EPA on the June 1988 "Endangerment Assessment Report for the Frank T. Rose Site," Geraghty & Miller, Inc. for General Electric Company.

4.0 Feasibility Study (FS)

4.1 Correspondence

1. Letter from Mary C. Sanderson for Richard Cavagnero, EPA Region I to Robert Bois, Commonwealth of Massachusetts Department of Environmental Quality Engineering Regarding Proposed Plan, Site Schedule and ARARs (June 23, 1988).

4.2 Sampling and Analysis Data

Sampling and Analysis Data

1. "Rose Site Ground-Water Treatability Report," Blasland & Bouck Engineers, P.C. for General Electric Company (January 1988).
2. Cross Reference: Letter from Dorothy A. McGlincy, Geraghty & Miller, Inc. to Grant Bowman, General Electric Company Regarding Oil Recovery Chronology and Analytical Results (February 8, 1988) [Filed and cited as entry number 1 in 3.2 Sampling and Analysis Data].

Sampling and Analysis Data Comments

3. Comments Dated February 17, 1988 from Mary C. Sanderson, EPA Region I on the January 1988 "Rose Site Ground-Water Treatability Report," Blasland & Bouck Engineers, P.C. for General Electric Company.

4.4 Interim Deliverables

Interim Deliverables

1. "Ground-Water Treatability Plan," Blasland & Bouck Engineers, P.C. for General Electric Company (November 1987).
2. "Feasibility Study Detailed Analysis of Alternatives (Sections 1, 2 & 3 only)," Blasland & Bouck Engineers, P.C. for General Electric Company (November 1987).

Interim Deliverables Comments

3. Comments Dated December 11, 1987 from Mary C. Sanderson, EPA Region I on the November 1987 "Ground-Water Treatability Plan," Blasland & Bouck Engineers, P.C. for General Electric Company.
4. Comments Dated December 11, 1987 from Mary C. Sanderson, EPA Region I on the November 1987 "Feasibility Study Detailed Analysis of Alternatives (Sections 1, 2 & 3 only)," Blasland & Bouck Engineers, P.C. for General Electric Company.
5. Comments Dated December 30, 1987 from Stephen F. Joyce, Commonwealth of Massachusetts Department of Environmental Quality Engineering on the November 1987 "Feasibility Study Detailed Analysis of Alternatives (Sections 1, 2 & 3 only)," Blasland & Bouck Engineers, P.C. for General Electric Company.

4.5 Applicable or Relevant and Appropriate Requirements (ARARs)

1. Letter from Robert K. Goldman, Blasland & Bouck Engineers, P.C. for General Electric Company to Mary C. Sanderson, EPA Region I (March 17, 1988).
2. Letter from William Walsh-Rogalski, EPA Region I to Ann Bingham, Commonwealth of Massachusetts Department of Environmental Quality Engineering (August 18, 1988).

4.6 Feasibility Study (FS) Reports

Feasibility Study (FS) Reports

1. "Feasibility Study - Initial Screening of Alternatives (Revision No. 1) - Rose Site," Blasland & Bouck Engineers, P.C. for General Electric Company (March 1986).
2. "Feasibility Study - Initial Screening of Alternatives (Revision No. 2) - Rose Site," Blasland & Bouck Engineers, P.C. for General Electric Company (June 1987).
3. Draft - "Feasibility Study," Blasland & Bouck Engineers, P.C. for General Electric Company (March 1988).
4. "Feasibility Study," Blasland & Bouck Engineers, P.C. for General Electric Company (June 1988).

Feasibility Study (FS) Reports Comments

5. Cross Reference: Letter from Robert K. Goldman, Blasland & Bouck Engineers, P.C. for General Electric Company to Mary C. Sanderson, EPA Region I (March 17, 1988) [Filed and cited as entry number 1 in 4.5 Applicable or Relevant and Appropriate Requirements (ARARs)].

4.6 Feasibility Study (FS) Reports Comments (cont'd.)

6. Comments Dated May 12, 1988 from Mary C. Sanderson, EPA Region I on the March 1988 Draft "Feasibility Study," Blasland & Bouck Engineers, P.C. for General Electric Company.
7. Comments from EPA Region I on the June 1988 "Feasibility Study," Blasland & Bouck Engineers, P.C. for General Electric Company.

4.9 Proposed Plans for Selected Remedial Action

Proposed Plans for Selected Remedial Action

1. "EPA Proposes Cleanup Plan for the F.T. Rose Superfund Site," EPA Region I (July 1988).

Proposed Plans for Selected Remedial Action Comments

Comments on the Proposed Plan received by EPA Region I during the formal public comment period are filed and cited in 5.3 Responsiveness Summaries.

5.0 Record of Decision (ROD)

5.1 Correspondence

1. Memorandum from Mary C. Sanderson, EPA Region I to John Zipeto, EPA Region I (July 1, 1988).

5.2 Applicable or Relevant and Appropriate Requirements (ARARs)

1. Cross Reference: All Applicable or Relevant and Appropriate Requirements (ARARs) for the Record of Decision are in Section XI of the Record of Decision [Filed and cited as entry number 1 in 5.4 Record of Decision (ROD)].

5.3 Responsiveness Summaries

1. Cross Reference: Responsiveness Summary is Appendix A of the Record of Decision [Filed and cited as entry number 1 in 5.4 Record of Decision (ROD)].

The following citations indicate documents received by EPA Region I during the formal public comment period.

2. Comments Dated August 9, 1988 from Diane and William Nichols, Allegro Tech, Inc. on the July 1988 "EPA Proposes Cleanup Plan for the F.T. Rose Superfund Site," EPA Region I.
3. Comments Dated August 16, 1988 from Darlene A. White on the July 1988 "EPA Proposes Cleanup Plan for the F.T. Rose Superfund Site," EPA Region I.
4. Comments Dated August 18, 1988 from Robert A. Matthews and Peter L. Gray, McKenna, Conner & Cuneo for General Electric Company on the July 1988 "EPA Proposes Cleanup Plan for the F.T. Rose Superfund Site," EPA Region I.
5. Errata Sheet to Comments Dated August 18, 1988 from Peter L. Gray, McKenna, Conner & Cuneo for General Electric Company on the July 1988 "EPA Proposes Cleanup Plan for the F.T. Rose Superfund Site," EPA Region I (September 6, 1988).
6. Transcript, Public Meeting for the F.T. Rose Site (August 3, 1988).

5.4 Record of Decision (ROD)

1. Record of Decision, EPA Region I (September 23, 1988).

10.0 Enforcement

10.3 State and Local Enforcement Records

1. Letter from Stephen F. Joyce, Commonwealth of Massachusetts Department of Environmental Quality Engineering to Ronald Desgroseilliers, General Electric Company (April 2, 1984).

10.7 EPA Administrative Orders

1. Determinations and Administrative Order, *In the Matter of General Electric Company for the Rose Site*, Docket No. 84-1025 (May 16, 1984).
2. Determinations and Administrative Order, *In the Matter of General Electric Company for the Rose Site*, Docket No. 84-1059 (November 21, 1984).
3. Administrative Order by Consent, *In the Matter of General Electric Company for the F.T. Rose Site*, Docket No. 88-1010 (March 22, 1988).

11.0 Potentially Responsible Party (PRP)

11.9 PRP-Specific Correspondence

1. Letter from Leslie Carothers, EPA Region I to Peter Traversa (May 14, 1982).
2. Letter from Peter Traversa to RCRA Compliance Clerk, EPA Region I (May 24, 1982).

13.0 Community Relations

13.2 Community Relations Plans

1. "Final Community Relations Plan," ICF Technology Incorporated for Ebasco Services, Inc. (July 1988).

13.3 News Clippings/Press Releases

1. "Environmental News - EPA Issues Consent Order For F.T. Rose Site," EPA Region I (March 23, 1988).
2. News Clipping Announcing the Availability of the Administrative Record for Public Review, Berkshire Eagle - Pittsfield, MA (June 14, 1988).
3. "Environmental News - Public Meeting To Explain Proposed Cleanup Plan For The F.T. Rose Superfund Site," EPA Region I (July 12, 1988).
4. News Clipping Inviting Public Comment on the Feasibility Study and the Proposed Plan for the F.T. Rose Site, Berkshire Eagle - Pittsfield, MA (July 18, 1988).

13.4 Public Meetings

1. "Summary of the Public Informational Meeting on the Remedial Investigation, Feasibility Study, and Proposed Plan for the F.T. Rose Superfund Site," ICF Technology Incorporated (July 20, 1988).
2. Cross Reference: Transcript, Public Meeting for the F.T. Rose Site (August 3, 1988) [Filed and cited as entry number 6 in 5.3 Responsiveness Summaries].

13.5 Fact Sheets

1. "EPA and General Electric Announce Investigation Results for the F.T. Rose Site," EPA Region I (June 1988).
2. Cross Reference: "EPA Proposes Cleanup Plan for the F.T. Rose Superfund Site," EPA Region I (July 1988) [Filed and cited as entry number 1 in 4.9 Proposed Plans for Selected Remedial Action].

17.0 Site Management Records

17.4 Site Photographs/Maps

The record cited in entry number 1 may be reviewed, by appointment only, at EPA Region I, Boston, Massachusetts.

1. "Site Analysis - Lanesborough Sites," U.S. EPA Environmental Monitoring Systems Laboratory (April 1985).

17.7 Reference Documents

1. "Transportable Circulating Bed Hazardous Waste Incinerator for Thermal Treatment of Soils, Sludges and Oils," Ogden Environmental Services, Inc. for Camp Dresser & McKee Inc. (June 5, 1987).
2. Letter from Ronald F. Desgroseilliers, General Electric Company to Mary C. Sanderson, EPA Region I (June 15, 1988) with Attachment Dated June 1, 1988 entitled "Research and Development Program for the Destruction of PCBs."
3. Letter from Mark R. Harkness, General Electric Company to Ronald F. Desgroseilliers, General Electric Company (September 6, 1988).
4. "Site Demonstration of Hazcon Solidification/Stabilization Process," Paul R. de Percin, EPA Hazardous Waste Engineering Research Laboratory and Stephen Sawyer, Enviresponse Inc.
5. "U.S. EPA Research in Solidification/Stabilization of Waste Material," Carlton C. Wiles and Hinton K. Howard, EPA Hazardous Waste Engineering Research Laboratory.
6. "Evaluation of Solidification/Stabilization as a Best Demonstrated Available Technology," Leo Weitzman and Lawrence E. Hamel, Acurex Corporation and Edwin Barth, EPA Hazardous Waste Engineering Research Laboratory.
7. "TCLP as a Measure of Treatment Effectiveness: Results of TCLP Work Completed on Different Treatment Technologies for CERCLA Soils," Robert C. Thurnau, EPA Hazardous Waste Engineering Research Laboratory and M. Pat Esposito, PEI Associates, Inc.

Section II

Guidance Documents

GUIDANCE DOCUMENTS

EPA guidance documents may be reviewed at EPA Region I, Boston, Massachusetts.

General EPA Guidance Documents

1. Comprehensive Environmental Response, Compensation, and Liability Act of 1980, amended October 17, 1986.

2. Letter from Lee M. Thomas to James J. Florio, Chairman, Subcommittee on Consumer Protection and Competitiveness, Committee on Energy and Commerce, U.S. House of Representatives, May 21, 1987 (discussing EPA's implementation of the Superfund Amendments and Reauthorization Act of 1986).

3. Memorandum from Gene Lucero to the U.S. Environmental Protection Agency, August 28, 1985 (discussing community relations at Superfund Enforcement sites).

4. Memorandum from J. Winston Porter to Addressees ("Regional Administrators, Regions I-X; Regional Counsel, Regions I-X; Director, Waste Management Division, Regions I, IV, V, VII,and VIII; Director, Emergency and Remedial Response Division, Region II; Director, Hazardous Waste Management Division, Regions III and VI; Director, Toxics and Waste Management Division, Region IX; Director, Hazardous Waste Division, Region X; Environmental Services Division Directors, Region I, VI, and VII"), July 9, 1987 (discussing interim guidance on compliance with applicable or relevant and appropriate requirements).

5. "National Oil and Hazardous Substances Pollution Contingency Plan," Code of Federal Regulations (Title 40, Part 300), 1985.

6. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Community Relations in Superfund: A Handbook (Interim Version) (EPA/HW-6), September 1983.

7. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Draft Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites (OSWER Directive 9283.1-2), October 1986.

8. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Draft Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites (OSWER Directive 9283.1-2), April 1988.

9. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Superfund Public Health Evaluation Manual (OSWER Directive 9285.4-1), October 1986.

10. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Superfund Remedial Design and Remedial Action Guidance (OSWER Directive 9355.0-4A), June 1986.

11. U.S. Environmental Protection Agency. Office of Ground-Water Protection. Ground-Water Protection Strategy, August 1984.

12. U.S. Environmental Protection Agency. Office of Health and Environmental Assessment. A Compendium of Technologies Used in the Treatment of Hazardous Waste (EPA/625/8-87/014), September 1987.

13. U.S. Environmental Protection Agency. Office of Research and Development. Environmental Research Laboratory. EPA Guide for Minimizing the Adverse Environmental Effects of Cleanup of Uncontrolled Hazardous Waste Sites, (EPA-600/8-85/008) June 1985.

General EPA Guidance Documents (cont'd.)

14. U.S. Environmental Protection Agency. Office of Research and Development. Hazardous Waste Engineering Research Laboratory. Handbook for Stabilization/Solidification of Hazardous Wastes (EPA/540/2-86/001), June 1986.

15. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Data Quality Objectives for Remedial Response Activities: Development Process (EPA/540/G-87/003), March 1987.

16. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Guidance on Feasibility Studies under CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) (EPA/540/G-85/003), June 1985.

17. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Guidance on Remedial Investigations under CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) (EPA/540/G-85/002), June 1985.

18. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Interim Guidance on Superfund Selection of Remedy (OSWER Directive 9355.0-19), December 24, 1986.

Rose Disposal Pit NPL Site Specific Guidance Documents

1. "PCB Spill Cleanup Policy," (40 CFR Part 761), Federal Register, April 2, 1987.

2. U.S. Environmental Protection Agency. Office of Health and Environmental Assessment. Development of Advisory Levels for Polychlorinated Biphenyls (PCBs) Cleanup (OHEA-E-187), May 1986.

3. U.S. Environmental Protection Agency. Office of Health and Environmental Assessment. Development of Statistical Distribution or Ranges Standard Factors Used in Exposure Assessments (OHEA -E-161), March 1985.

4. U.S. Environmental Protection Agency. Office of Health and Environmental Assessment. Drinking Water Criteria Document For Polychlorinated Biphenyls (PCBs) (ECAO-CIN-414), May 1987.

5. U.S. Environmental Protection Agency. Office of Health and Environmental Assessment. Risk Analysis of TCDD Contaminated Soil (EPA-600/8-84-031), 1984.

6. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. The Superfund Innovative Technology Evaluation Program: Progress and Accomplishments (EPA/540/5-88/001), February 1988.

7. Lagoy, P.K., "Estimated Soil Ingestion Rates for Use in Risk Assessment," Risk Analysis (7: 355-360), 1987.

APPENDIX C

STATE CORRESPONDENCE

APPENDIX D

CALCULATION OF SOIL VOLUMES TO BE EXCAVATED

ESTIMATED EXCAVATION VOLUME

EPA estimated the volume of soil that would have to be excavated from the Rose site disposal area to remove (1) all soil above the water table contaminated at PCB levels higher than 13 ppm and (2) highly contaminated soil that lies below the water table in the western half of the disposal area. The highly contaminated soil is located near wells 38A, 42A, and 43A; one well is currently being pumped to recover and oil and water mixture from below the water table. Removal of PCB-contaminated soil to the water table will eliminate risks due to ingestion of and dermal contact with PCB-contaminated soil. Removal of the source material below the water table will reduce the duration of groundwater treatment.

Volume of PCB-Contaminated Soil Above Water Table

EPA used the following methods and assumptions to estimate the amount of soil above the water table with PCB concentrations higher than 13 ppm. First, EPA assumed that the areal extent of 13 ppm PCB contamination was approximately equal to the covered disposal area. The basis for this assumption is as follows:

- Review of Figures 9 through 13 of the Rose site EA (Geraghty & Miller, 1988) indicates that, to a depth of 10 feet, the areal extent of 50 ppm PCB contamination is approximately the same as or slightly smaller than the disposal area.

- Examination of PCB concentrations for data points between the 1 ppm and 50 ppm isopleths on Figures 9 through 13 of the Rose EA indicates that the areal extent of 13 ppm contamination is not much larger that the extent of 50 ppm contamination.

EPA divided each half of the disposal area (eastern and western) into three subareas to estimate the areal extent of 13 ppm contamination. These subareas are shown on Figure 5-1. Next, EPA used a planimeter to measure the square footage of each subarea. Finally, EPA estimated the depth to the water table for each subarea by overlaying topographic and water table maps for the site (Geraghty & Miller, 1987, Figures 2 and 5). The depth to the water table was estimated as the difference between the topographic surface and the shallow groundwater surface. For each subarea, EPA multiplied the surface area by the depth to water table to estimate the volume of soil to be excavated. This approximation assumes that excavation will proceed directly down from the surface to the water table; that is, the estimated volume does not consider any side slope contingencies. The estimated excavation volumes for the eastern and western halves of the disposal area are 3,278 cubic yards and 4,554 cubic yards, respectively. Calculations for these volumes are included in Table 5-3.

Volume of PCB-Contaminated Soil Below Water Table

EPA used the following methods and assumptions to estimate the amount of highly contaminated soil to be excavated below the water table. First, EPA reviewed the cross-section of the disposal area shown on Figure 19 of the EA (Geraghty & Miller, 1988). This cross-section passes through the most highly contaminated part of the western half of the disposal area, near wells 38A, 42A, and 43A. The cross-section is reproduced here as Figure 5-2.

Next, EPA outlined the most highly contaminated portion of the cross-section. The highly contaminated portion extends vertically from the surface to the bottom of the 5,000 ppm isopleth and horizontally from the northern edge of the 5,000 ppm isopleth to the location of boring 45. EPA measured the area of this cross-section by planimeter as 1,320 square feet.

Finally, EPA calculated an excavation volume by projecting this area over the average linear distance across the western half of the disposal area, going from southwest to northeast. EPA estimated the average linear distance as 110 feet. The surface area of this projection is shown on Figure 5-3. This excavation volume is based on the conservative assumption that all soil across the disposal area will have PCB concentrations equal to those in the cross-section. It is more likely that concentrations will decrease near the edges of the disposal area. The excavation volume can be calculated as

$$(1{,}320\ ft^2) \times (110\ ft) \times (1\ yd^3 / 27\ ft^3) = 5{,}378\ yd^3$$

This volume must be corrected to avoid double counting soil above the water table that has already been included in the excavation volume estimated in Table 5-3. The correction equals the projected surface area of the deep excavation from Figure 5-3 times the depth to the water table. EPA estimated the projected surface area as 6,600 square feet and the depth to the water table as 7 feet (a weighted average for the western half of the disposal area, based on the data presented in Table 5-3). The volume to be subtracted is

$$(6{,}600\ ft^2) \times (7\ ft) \times (1\ yd^3 / 27\ ft^3) = 1{,}711\ yd^3$$

Thus, the total excavation volume for the western half of the disposal area, above and below the water table, is

$$(4{,}554\ yd^3) + (5{,}378\ yd^3) - (1{,}711\ yd^3) = 8{,}221\ yd^3$$

With the addition of the excavation volume for the eastern half of the disposal area (3,278 cubic yards), the total excavation volume for the site is 11,499 cubic yards.

EPA repeated this process assuming that excavation below the water table will be carried out with 3-to-1 side slopes to comply with Occupational Safety and Health Administration (OSHA) requirements. That is, the excavation must extend three feet horizontally for every one foot of depth. Figure 5-2 shows the cross-section through the highly contaminated portion of the disposal area, accounting for 3-to-1 side slopes. EPA measured the area of this cross-section by planimeter as 2,409 square feet.

EPA then projected this area across the western half of the disposal area, going from southwest to northeast. EPA estimated the average linear distance of the projection as 143 feet. This distance should be sufficient to allow side slopes on all four sides of the excavation. The surface area of this projection is shown on Figure 5-3. The excavation volume can be calculated as

$$(2{,}409\ ft^2) \times (143\ ft) \times (1\ yd^3 / 27\ ft^3) = 12{,}579\ yd^3$$

Again, this volume must be corrected to avoid double counting soil above the water table that has already been included in the excavation volume estimated in Table 5-3. The correction equals the projected surface area of the deep excavation <u>within</u> the boundary of the disposal area (Figure 5-3) times the depth to the water table. EPA estimated the projected surface area as 11,580 square feet and the depth to the water table as 7 feet (a weighted average for the western half of the disposal area, based on the data presented in Table 5-3). The volume to be subtracted is

$$(11{,}580\ ft^2) \times (7\ ft) \times (1\ yd^3 / 27\ ft^3) = 3{,}002\ yd^3$$

Thus, the total excavation volume for the western half of the disposal area, above and below the water table with 3-to-1 side slopes, is

$$(4{,}554\ yd^3) + (12{,}579\ yd^3) - (3{,}002\ yd^3) = 14{,}131\ yd^3$$

With the addition of the excavation volume for the eastern half of the disposal area (3,278 cubic yards), the total excavation volume for the site is 17,409 cubic yards.

It should be noted that EPA has used an approximate soil volume of 15,000 cubic yards as an estimate for the ROD and for cost estimating purposes. This amount is between the minimum 11,500 cubic yard volume and the 17,500 cubic yard volume which includes additional soil for 3-to-1 side slopes during excavation. EPA believes that the 15,000 cubic yard volume is a reasonable estimate of the soil volume that may actually need to be excavated to meet the cleanup goals, including the volume of pond sediments that will need to excavated in addition to the disposal area soil.

TABLE 5-3

VOLUME OF PCB-CONTAMINATED SOIL TO BE EXCAVATED ABOVE WATER TABLE

Subarea	Surface Area (ft^2)	Depth to Water Table (ft)	Excavation Volume (yd^3) [1]
East -- A	700	5	130
East -- B	6,967	10	2,580
East -- C	1,533	10	568
East -- Total			3,278
West -- A	1,867	10	691
West -- B	11,400	7	2,956
West -- C	4,900	5	907
West -- Total			4,554
Total -- East + West			7,832

Note: [1] Excavation volume = (Surface area, ft^2) x (Depth to water table, ft) x (1 yd^3 / 27 ft^3)

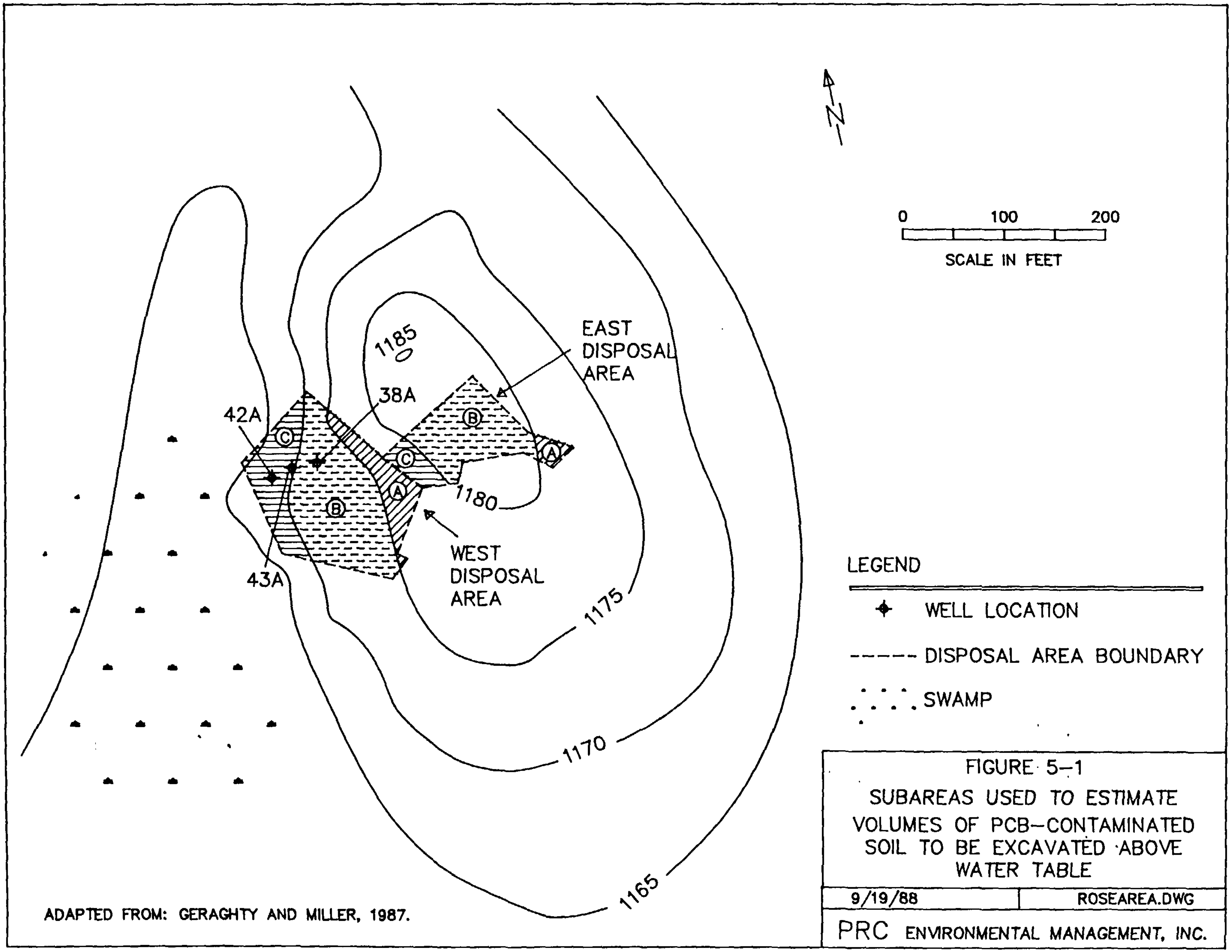
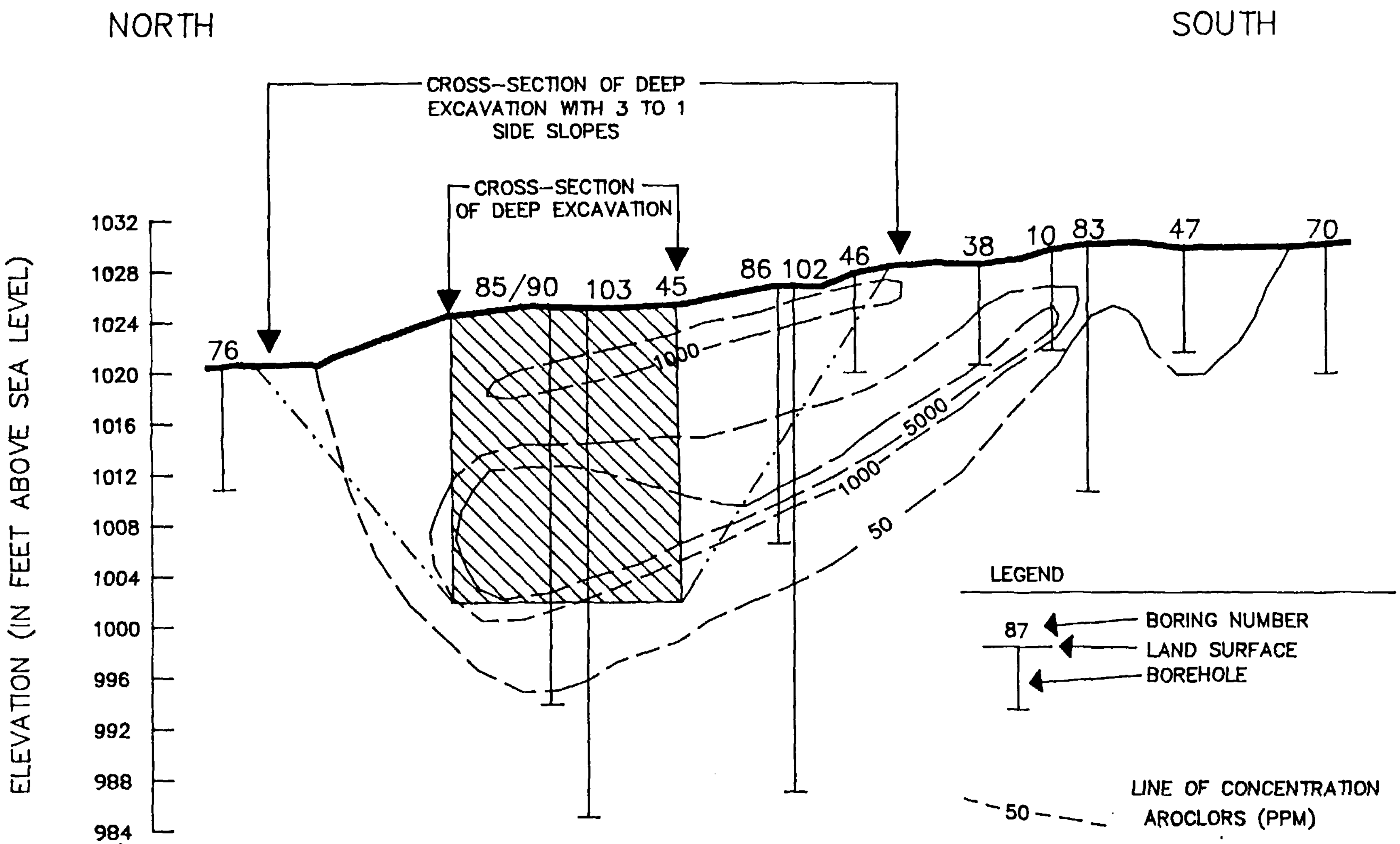


FIGURE 5-1
SUBAREAS USED TO ESTIMATE VOLUMES OF PCB-CONTAMINATED SOIL TO BE EXCAVATED ABOVE WATER TABLE

9/19/88	ROSEAREA.DWG

PRC ENVIRONMENTAL MANAGEMENT, INC.

ADAPTED FROM: GERAGHTY AND MILLER, 1987.

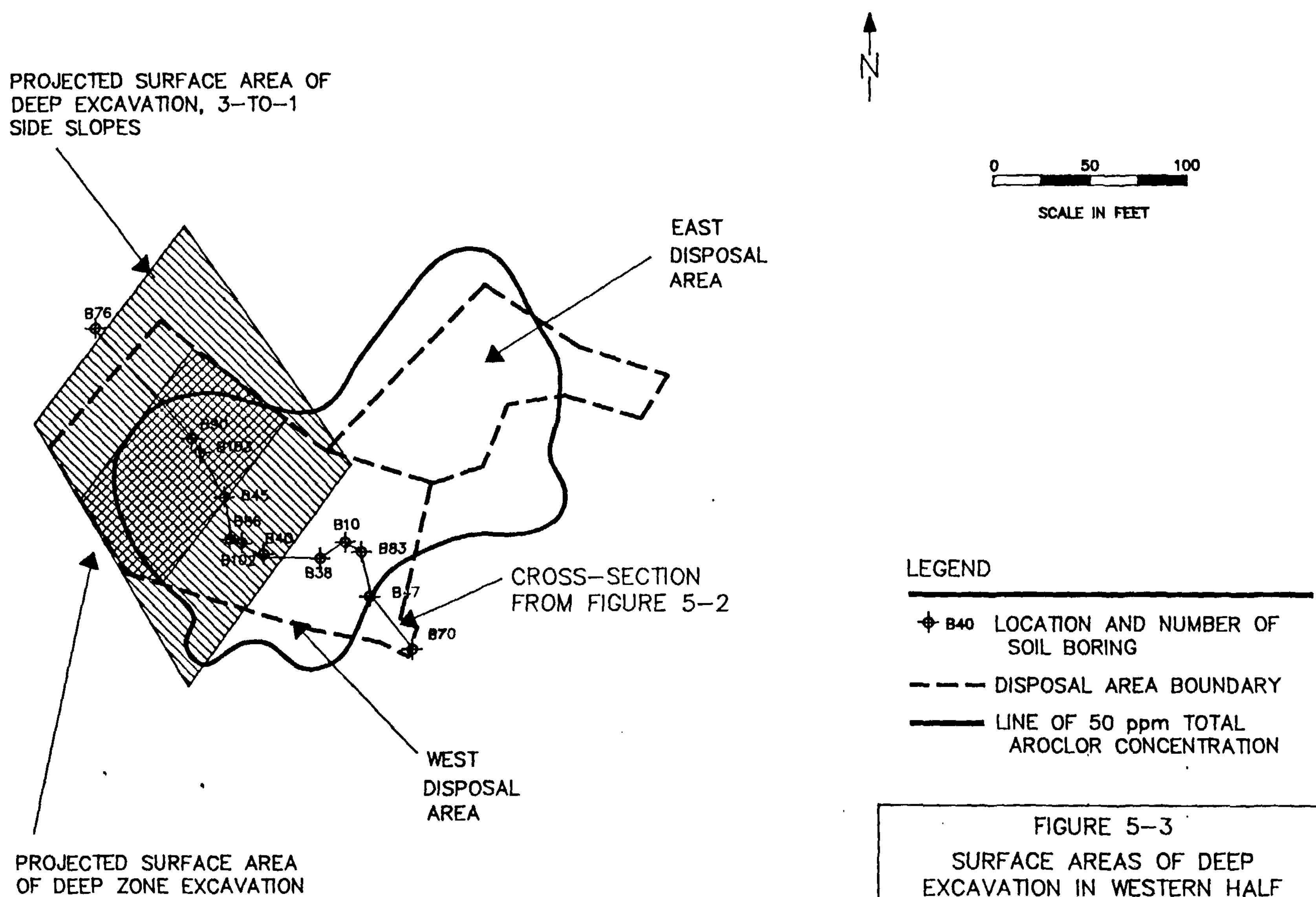


ADAPTED FROM: GERAGHTY AND MILLER, 1988

FIGURE 5-2
CROSS-SECTION OF DEEP EXCAVATION IN WESTERN HALF OF DISPOSAL AREA

9/15/88 | ROSECROS.DWG

PRC ENVIRONMENTAL MANAGEMENT, INC.



ADAPTED FROM: GERAGHTY AND MILLER, 1988.

FIGURE 5-3

SURFACE AREAS OF DEEP EXCAVATION IN WESTERN HALF OF DISPOSAL AREA

9/19/88 | ROSESUR.DWG

PRC ENVIRONMENTAL MANAGEMENT, INC.

APPENDIX E

CALCULATION OF PCB SOIL CLEANUP LEVEL

APPENDIX E

PCB Soil Cleanup Level for Rose Site

The PCB soil cleanup level for the Rose Site is recommended to be 13 ppm. The calculation is based on the following assumptions which are considered to be reasonable by the U.S. Environmental Protection Agency (EPA) for the potential land use of the site as a residential area.

Based on information in the references listed at the end of this Appendix, EPA makes the following assumptions; these assumptions represent the average over a lifetime:

	EPA	GE
Body Weight of exposed person(kg):	70	70
Dermal contact rate (mg/day):	500	43.5
Dermal absorption factor:	0.02	0.02
Soil dermal dose (mg/kg/day):	0.143	0.012
Soil ingestion rate (mg/day):	54	43.5
Ingestion absorption factor:	0.30	1.00
Soil ingestion dose (mg/kg/day):	0.231	0.621
Total soil dose (mg/kg/day):	0.374	0.633
Days of exposure per year:	100	36
Years of exposure per 70 year lifetime:	70	52
Cancer potency factor (CPF) $(mg/kg/day)^{-1}$:	7.7	4.34
Risk-based soil cleanup level for PCBs (ppm)	13	64

The body weight of 70 kg is EPA's standard assumption for the adults for a lifetime of 70 years. Individuals can be exposed for 100 days in a year to the contaminated soil in residential areas. Based on the conditions of this site, EPA is using 100 days per year as an assumed annual average exposure over a lifetime. (See EPA, 1984 for a discussion of exposure duration.) Dermal contact rate is a function of the skin surface area available for exposure to soil and the soil deposition rate per unit of the surface area. EPA assumes that half of a person's upper and lower extremities will be exposed to the contaminated soil (EPA, 1985) with a soil deposition rate of 0.5 mg/cm^2 (EPA, 1984). The dermal absorption factor for PCBs in soil is assumed to be 0.02 (2%) as described in the Endangerment Assessment Report for the Rose Site.

Dermal contact rate = Skin surface area x dermal contact rate (mg/day)

Soil dermal dose (mg/kg/day) = (Dermal contact rate x dermal absorption factor)/body weight

Soil ingestion rates vary with the age groups with the average ranging from 50 mg/day to 100 mg/day (LaGoy, 1987). It is assumed an ingestion rate of 100 mg/day for 5 years and 50 mg/day for the remaining of the lifetime (65 years). For the purpose of this calculation, EPA is using a calculated average value of 54 mg/day for the lifetime exposure. The ingestion absorption factor of 0.3 (30%) for PCBs in soil is used (EPA, 1986).

Soil ingestion dose (mg/day) = (Soil ingestion rate x ingestion absorption factor)/body weight

The exposure dose from inhalation is considered insignificant.

Total soil dose = soil dermal dose + soil ingestion dose

A CPF of 7.7 $(mg/kg/day)^{-1}$ currently recommended by the U.S. EPA (EPA, 1987) is used.

PCB Cleanup Level base on the lifetime cancer risk of 10^{-5}

$$= 10^{-5} / [(\text{total soil dose}) \times (1 \text{ kg soil}/10^{6} \text{ mg soil}) \times (\text{days of exposure}/365 \text{ days}) \times (\text{years of exposure}/70 \text{ years}) \times \text{CPF})]$$

$$= 10^{-5} / [0.374 \times (1 \text{ kg soil}/10^{6} \text{ mg soil}) \times (100/365) \times (70/70) \times 7.7]$$

= 13 ppm

REFERENCES:

LaGoy, P. K. (1987) Estimated Soil Ingestion Rates for Use in Risk Assessment, Risk Analysis, 7: 355-360.

U.S. EPA (1984) Risk Analysis of TCDD Contaminated Soil, Exposure Assessment Group, Office of Health and Environmental Assessment, Washington, D.C., EPA-600/8-84-031

U.S. EPA (1985) Development of Statistical Distribution or Ranges Standard Factors Used in Exposure Assessments, Office of Health and Environmental Assessment, Washington, D.C., March 1985, OHEA-E-161.

U.S. EPA (1986) Development of Advisory Levels for Polychlorinated Biphenyls (PCBs) Cleanup, Exposure Assessment Group, Office of Health and Environmental Assessment, Washington, D.C., May 1986, OHEA-E-187.

U.S. EPA (1987) Drinking Water Criteria Document for Polychlorinated Biphenyls (PCBs), Office of Health and Environmental Assessment, ECAO-CIN-414.

APPENDIX F

CALCULATION OF ADJUSTED COST ESTIMATES

Alternatives GW-1 and GW-1A (Air-Stripping/Activated Carbon): Capital Costs

	Item	Estimated Cost GW-1	Estimated Cost GW-1A
1.	Groundwater Collecion System	$ 145,000	$ 145,000
2.	Air Stipper, 30" diameter	45,000	40,000
3.	Liquid Phase Activated Carbon Units (2)	24,000	24,000
4.	Backwash Pump and Controls	5,000	5,000
5.	Prefabricated Building	18,000	18,000
6.	Site Preparation	5,000	5,000
7.	Electrical Supply	15,000	15,000
8.	Pumps, Piping and Instrumentation	9,000	13,000
9.	Receiving Tanks (2)	3,000	3,000
10.	H_2O_2 Metering Pumps (2) and Controls	-	6,000
11.	Baffled Tank (Pretreatment)	-	8,000
12.	Green Sand Filter	-	13,000
13.	Oil/Water Separator (10 gpm)	5,000	5,000
14.	Vapor Phase Activated Carbon Unit (1)	50,000	50,000
	Subtotal	$ 324,000	$ 350,000
	Administrative & Engineering (15%)	48,600	52,500
	Subtotal	372,600	402,500
	Contingency (25%)	93,150	100,625
	Total	$ 465,750	$ 503,000
	Rounded to	$ 466,000	$ 503,000

Alternatives GW-1 and GW-1A (Air Stripping/Activated Carbon):

O&M Costs

	Item	Estimated Annual Cost GW-1	Estimated Annual Cost GW-1A
1.	Energy		
	GW-1 (19,300 kwh/yr at 7.5c/kwh)	$ 1,500	
	GW-1a (22,800 kwh/yr at 7.5c/kwh)		$ 1,800
2.	Liquid Phase Activated Carbon Replacement (200 lb/year)	1,000	1,000
3.	Vapor Phase Activated Carbon System*	67,400	28,100
4.	Hydrogen Peroxide (40 lb/day @ 65c/lb)	-	9,500
5.	Labor		
	a) Treatment System (8 hrs/week)	19,000	19,000
	b) Collection System (1.1 hr/week)	2,500	2,500
6.	Maintenance Supplies (3% of capital)	11,700	12,900
7.	Monitoring		
	a) Groundwater/Surface Water	17,400	17,400
	b) Treatment System (24 samples)	8,000	8,000
	Total Annual Cost	$ 128,500	$ 100,200
	Present Worth Factor (10 years @ 10% interest)	x 6.145	x 6.145
	Total Present Worth of O&M	$ 789,633	$ 615,729
	Rounded to	$ 790,000	$ 615,000

* Please see the end of this Appendix for an explanation of these costs.

Alternative GW-2 (UV-Ozonation):

Capital Costs

	Item	Estimated Cost
1.	Groundwater Collection System	$ 145,000
2.	H_2O_2 Metering Pumps (2) and Controls	6,000
3.	Baffled Tank (pretreatment)	8,000
4.	Green Sand Filter	13,000
5.	UV-Ozone Reactor (750 gal) with 19 lb/day ozone generator	170,000
6.	Prefabricated Building (16' x 24')	25,000
7.	Electrical Supply	17,000
8.	Site Preparation	5,000
9.	Instrumentation	6,000
10.	Receiving Tanks	3,000
11.	Backwash Pump & Controls	5,000
12.	Oil/Water Separator (10 gpm)	5,000
	Subtotal	$ 408,000
	Administrative & Engineering (15%)	61,200
	Subtotal	$ 469,200
	Contingency (25%)	117,300
	Total	$ 586,500
	Rounded to	$ 585,000

Alternative GW-2 (UV-Ozonation):

O&M Costs

	Item		Estimated Annual Cost
1.	Energy		
	a) Pumps (5300 kwh/yr at 7.5c/kwh)	$	400
	b) UV (53,400 kwh/yr at 7.5c/kwh)		4,000
	c) Ozone Generator (61,300 kwh/yr at 7.5c/kwh)		4,600
2.	Hydrogen Peroxide (110 lb/day @ 65c/lb)		26,100
3.	UV Replacement Bulbs		4,400
4.	Other Maintenance Supplies (2% of capital)		11,600
5.	Labor		
	a) Treatment System (5hr/week)		12,000
	b) Collection System (1.1 hr/week)		2,500
6.	Monitoring		
	a) Ground Water/Surface Water		17,400
	b) Treatment System (24 samples)		8,000
	Total Annual Cost	$	91,000
	Present Worth Factor (10 years @ 10% interest)		x 6.145
	Total Present Worth	$	559,195
	Rounded to	$	560,000

Alternative GW-3 (Hydrogen Peroxide/Activated Carbon):

Capital Costs

	Item	Estimated Cost
1.	Ground Water Collection System	$ 145,000
2.	H_2O_2 Metering Pumps (2) and Controls	6,000
3.	Baffled Tank (pretreatment)	8,000
4.	Activated Carbon Units	32,000
5.	Green Sand Filter	13,000
6.	Backwash Pump and Controls	5,000
7.	Piping	3,000
8.	Storage Structure	10,000
9.	Site Preparation	5,000
10.	Electrical Supply	15,000
11.	Receiving Tanks	3,000
12.	Instrumentation	6,000
13.	Oil/Water Separator	5,000
	Subtotal	$ 256,000
	Administration & Engineering (15%)	38,400
	Subtotal	294,400
	Contingency (25%)	73,600
	Total	$ 368,000
	Rounded to	$ 370,000

Alternative GW-3 (Hydrogen Peroxide/Activated Carbon):

O&M Costs

	Item	Estimated Annual Cost
1.	Energy (10,500 kwh/year at 7.5c/kwh)	$ 800
2.	Hydrogen Peroxide (110 lb/day at 65c/lb)	26,100
3.	Activated Carbon (200 lb/day at 90c/lb)	65,700
4.	Labor	
	a) Treatment System (5 hr/week)	12,000
	b) Collection System (1.1 hr/week)	2,500
5.	Other Maintenance Supplies (3% of capital costs)	10,800
6.	Monitoring	
	a) Groundwater/Surface Water	17,400
	b) Treatment system (24 samples)	8,000
	Total Annual Cost	$ 143,300
	Present Worth Factor (10 years at 10% interest)	x 6.145
	Total Present Worth of O&M	880,578
	Rounded to	880,000

Alternative SM-0 (No Action Alternative)

O&M Costs

	Item			Estimated Annual Cost
1.	Maintenance of cap and fence			$ 500
2.	Operation of Oil Recovery System			2,500
3.	Incineration of Collection Oils (600 gal @ $2.50/gal)			1,500
4.	Ground Water and Surface Water Monitoring			
	a)	Sample collection (25 samples)	$ 2,500	
	b)	Analysis (PCB, VOC)	9,600	
	c)	Data review	400	
	d)	QA/QC	900	
	e)	Maintenance of Wells	4,000	
		Subtotal	$ 17,400	
				$ 17,400
			Total Annual Cost	$ 21,900
			Present Work Factor (30 years @ 10% interest)	x 9.427
			Total	$ 207,100
			Rounded to	$ 210,000

Alternative SM-1 (Containment):

Estimated Costs

	Capital Costs	Total Costs
1.	Synthetic membrane cap (52,000 ft^2)	$ 210,000
2.	Vegetative cover	25,000
3.	Fencing (1,200')	18,000
4.	Slurry wall (1,000' x 30' x 30")	210,000
5.	Recovery wells (3)	30,000
	Subtotal	$ 493,000
	Administration & Engineering (15%)	73,950
	Subtotal	556,950
	Contingency (25%)	141,737
	Total Capital Costs	$ 708,687
	Rounded to	710,000

	O&M Costs	Annual Costs
1.	Maintenance of cap	$ 15,000
	Present Worth Factor (30 years, 10%)	x 9.427
	Present Worth of Cap Maintenance	$ 141,405
2.	Additional ground water/surface water monitoring beyond 10-year duration assumed for ground-water treatment system (Annual Cost = $ 17,400)	
	Present Worth (30 years, 10%)	$ 164,030
	Present Worth (10 years, 10%)	106,923
	Net Difference	$ 57,107
	Total Present Worth of O&M	$ 198,512
	Rounded to	$ 200,000

Alternative SM-3 (KOHPEG Dechlorination):

Preliminary Cost Range

	Item	Estimated Cost — Minimum	Estimated Cost — Maximum
1.	Estimated Treatment Cost	$ 135/cy	$ 270/cy
2.	Excavation and Handling Ependitures	30/cy	30/cy
3.	Miscellaneous Expenditures	10/cy	10/cy
		$ 175/cy	$ 310/cy
		x 15,000cy	x 15,000cy
	Subtotal	$ 2,625,000	$ 4,650,000
	Administration & Engineering (15%)	393,750	697,500
	Subtotal	3,018,750	5,347,500
	Contingency (35%)	1,056,550	1,871,625
	Total	4,075,300	7,219,125
	Rounded to	$ 4 million	$ 7.2 million

Alternate SM-4 (On-Site Incineration): Estimated Costs

	Capital	Cost
1.	Utility Connection	$ 25,000
2.	Temporary Building	40,000
3.	Preliminary test burns/approval	80,000
	Subtotal	$ 145,000
	Administration & Engineering (15%)	21,800
	Subtotal	$ 160,000
	Contingency (25%)	41,600
	Total	& 208,400
	Operation & Maintenance	
1.	Excavation/soil preparation	& 40/cy
2.	Incineration	
	a. Fuel	45/cy
	b. Equipment rental	100/cy
	c. Analytical services	20/cy
	d. Other	60/cy
	Subtotal	$ 265/cy
	Administration & Engineering (15%)	$ 40/cy
	Subtotal	$ 305/cy
	Contingency (25%)	$ 76/cy
	Total	$ 381/cy
	Assuming 7,500 c.y. per year incinerated	= 7,500 x 381
	Total Annual Cost	2,857,500
	Present Worth Factor (2 years at 10% interest)	x 1.736
	Total Present Worth of O+M	$ 4,960,620
	Grand Total	5,169,020
	Rounded to	$ 5.2 million

Alternate SM-5 (Off-Site Incineration):

Estimated Costs

	Item	Cost ($/cy)
1.	Excavation	25
2.	Replacement with Clean Fill	5
3.	Transportation	550
4.	Incineration Fees (including sampling and analysis), based on $0.67 per lb and 1.5 ton/cy	2,000
	Subtotal	2,580
	Administration (5%)	129
	Subtotal	2,709
	Contingency (25%)	677
	Total	3,386

Assume 7,500 cy incinerated per year:

Total Annual Cost = $3,386 x 7,500 =	$ 25,395,000
Present Worth Factor	
(2 yrs. @ 10%)	x 1.736
TOTAL	44,085,720
Rounded to	$ 44 million

Alternative SM-6 (On-Site Landfill):

Estimated Costs

Capital		Total Cost
1.	Construction of Landfill include liners, leachate collection, etc. ($125/c.y.)	$ 1,875,000
3.	Excavation and Placement of soils into landfill ($35/c.y.)	525,000
	Subtotal	2,400,000
	Administration & Engineering (15%)	360,000
	Subtotal	2,760,000
	Contingency (25%)	690,000
	Total	3,450,000

O&M		Estimated Annual Cost
1.	Maintenance of Cap	$ 15,000
2.	Leachate Treatment	6,000
	Total (Items 1 & 2)	$ 21,000
	Present Worth Factor (30 years, 10% interest)	x 9.427
	Present Worth (Items 1 & 2)	$ 197,967
3.	Additional ground water monitoring (beyond that required for ground water treatment system)	$ 57,107
	Total O&M Present Worth	$ 255,074
	GRAND TOTAL (Present Worth)	3,705,074
	Rounded to	3.7 million

Alternative SM-7 (Off-Site Landfill):

Estimated Costs

	Item	Cost,$/c.y.
1.	Excavation (and dewatering, if necessary)	25
2.	Transport to Niagara Falls	150
3.	Landfilling Fee	200
4.	Replacement with Clean Fill	5
	Subtotal	380
	Administration (5%)	19
	Subtotal	399
	Contingency (35%)	140
	Total	$ 539/c.y.

Assume 7,500 c.y. removed per year

Annual Cost = $539 x 7,500 =	4,042,500
Present Worth Factor (2 years @ 10%)	x 1.736
Total Landfilling Present Worth	7,017,780
Rounded to	$ 7 million

Alternate SM-8 (Chemical Fixation/Stabilization):

Preliminary Cost Estimate*

	Item	Cost
1.	Excavation ($30/cy)	$ 450,000
2.	Soil Preparation ($5/cy)	75,000
3.	Treatment ($100/cy)	1,500,000
4.	Pilot Testing	50,000
	Subtotal	$ 2,075,000
	Administration & Engineering (15%)	311,250
	Subtotal	2,386,250
	Contingency (25%)	596,550
	Total Present Worth	2,982,800
	Rounded to	$ 3 million

* Note that this estimate does not include any costs for VOC extraction.

COSTS FOR AIR STRIPPER AIR EMISSIONS CONTROL

Three control technologies are commonly used to reduce VOC emissions from air strippers. These technologies include vapor phase granular activated carbon (GAC) treatment, thermal incineration, and catalytic incineration. Among these three technologies, both capital and operation and maintenance (O&M) costs for either type of incineration are generally higher than for vapor phase GAC. U.S. EPA (1987b) compared capital and O&M costs for vapor phase GAC and thermal and catalytic incineration for removing VOCs from air stripping off-gases at four hazardous waste sites. This comparison indicates that (1) capital costs for thermal and catalytic incineration are significantly higher than for vapor phase GAC and (2) differences in O&M costs are even more pronounced. From this limited review, it appears that vapor phase GAC would be the most cost-effective VOC emission control alternative for the proposed air stripper at the Rose site.

GE's FS report recommended groundwater treatment by air stripping, followed by liquid phase GAC, as the preferred remedial alternative (alternative GW-1). However, the FS report also evaluated an air stripping-GAC system that included pretreatment of groundwater by hydrogen peroxide (H_2O_2) (alternative GW-1A). Data collected during the November 1987 groundwater treatability study at the Rose site indicate that H_2O_2 pretreatment (at a dose of 62 mg/L H_2O_2) can remove approximately 75 percent of the VOCs in groundwater <u>before</u> treatment by air stripping (Blasland & Bouck, 1988b, Table 10). It is possible that the added costs of H_2O_2 pretreatment will be offset by the reduction in VOC concentrations reaching the air stripper and the vapor phase GAC system. Thus, this section presents vapor phase GAC cost estimates for both alternatives GW-1 and GW-1A.

COST ESTIMATE FOR VAPOR PHASE GAC

A variety of VOCs are present in contaminated groundwater at the Rose site; however, the design of a vapor phase GAC system will be controlled by the presence of high concentrations of vinyl chloride, a poorly adsorbed compound. Based on information obtained from vendors of carbon systems, the capacity of vapor phase GAC to remove vinyl chloride (VC) is not likely to exceed 1 percent by weight (0.01 pounds VC per pound of GAC) (Stratico, 1988; Peschman, 1988).

Table 3-4 of the FS report estimates average and maximum VC concentrations in ground water as 1,040 and 2,000 ppb, respectively (Blasland & Bouck, 1988a). EPA used these concentrations, along with the following assumptions, to estimate vapor phase GAC requirements and GAC replacement costs for groundwater treatment alternatives GW-1 and GW-1A:

- Air stripper design parameters -- EPA used the values presented in the FS report for both groundwater treatment rate (50 gpm) and gas-to-liquid ratio (80). and assumed that the air stripper would operate continuously.

- Treatment efficiency -- EPA assumed that H_2O_2 pretreatment efficiency for VC will be 75 percent and that all remaining VC will be removed by the air stripper; that is, all VC in ground water entering the air stripper is stripped to the air.

- Capacity of vapor phase GAC -- EPA used a value of 0.01 pounds of VC per pound of GAC (or 1 percent by weight) to estimate the capacity of vapor phase GAC (Stratico, 1988; Peschman, 1988).

- GAC replacement costs -- EPA used a typical value of $1.75 per pound for the cost of fresh GAC (Stratico, 1988; Peschman, 1988).

Table 3-1 shows vapor phase GAC requirements and GAC replacement costs for alternatives GW-1 and GW-1A. Based on these calculations, annual GAC replacement costs for alternative GW-1 would be approximately $44,700 to $86,200. In a vessel containing 10,000 pounds of GAC, the GAC would need to be replaced every 2.5 to 5 months. Annual GAC replacement costs for alternative GW-1A, with H_2O_2 pretreatment, would be reduced to approximately $11,200 to $21,600. GAC replacement would be required every 10 to 19 months.

Several additional factors would contribute to operating costs of the vapor phase GAC system. Additional power would be needed to overcome pressure drop across the GAC bed and to heat the air stripper off-gas to reduce relative humidity. Adsorption capacity of air stripped VOCs can be increased if relative humidity is reduced below 40 percent; this is usually accomplished by increasing the temperature of the air stream with an in-line heater (Stenzel and Gupta, 1985). EPA estimates that added power costs would increase annual O&M costs by $15,000 to $20,000 for alternatives GW-1 and GW-1A.

EPA assumed that spent GAC would not be regenerated but would be collected and replaced by the carbon vendor. Based on conversations with vendors, EPA estimated transportation costs to be approximately $3,000 per replacement. Annual transportation costs for alternative GW-1 could range from $7,700 to $14,800, assuming 2.55 to 4.93 bed replacements per year. Annual transportation costs for alternative GW-1A could range from $1,900 to $3,700, assuming 0.64 to 1.23 bed replacements per year.

From the factors considered above (carbon replacement, power requirements, and transportation costs), annual O&M costs for vapor phase GAC control of air stripper emissions could range from

$67,400 to $121,000 for alternative GW-1. For alternative GW-1A, with hydrogen peroxide pretreatment before air stripping, annual O&M costs for vapor phase GAC could range from $28,100 to $45,300.

Capital costs for the vapor phase GAC system are expected to be approximately $50,000. This estimate includes costs for (1) a 10,000-pound vapor phase GAC vessel 8 feet in diameter with a carbon bed depth of approximately 7 feet; (2) an in-line air heater; and (3) associated ductwork. To be consistent with the cost estimates presented in the FS report, EPA increased the $50,000 capital cost estimate by 15 percent to allow for administrative and engineering expenses and by another 25 percent to account for contingencies. Thus, the total estimated capital cost for the vapor phase GAC system is approximately $72,000.

Table 3-2 summarizes total costs for VOC air emissions control systems for both alternatives GW-1 and GW-1A.

POTENTIAL COST REDUCTIONS

It may be possible to reduce O&M costs of a vapor phase GAC system by reducing the concentration of VC in the ground water to be treated. VC is often formed as a degradation product when chlorine atoms are removed from more highly chlorinated compounds, such as di-, tri-, and tetra-chlorinated ethanes and ethenes. By collecting ground water for treatment at a location closer to the disposal area, it may be possible to intercept the contaminated plume before significant amounts of VC have formed.

A comparison of limited data from wells in the disposal area and wells south of the disposal area supports the idea that VC concentrations increase with distance from the disposal area. (VC has not been detected in ground water from the eastern plume). VC has been detected in only two of four samples collected from wells in the disposal area. The average VC concentration for these four samples is 215 ppb, and the maximum concentration is 500 ppb (Blasland & Bouck, 1988a, Table 3-4; Geraghty & Miller, 1988, Appendix A; McGlincy and Koch, 1988). One sample has been analyzed from well 47A, approximately 120 feet south of the disposal area perimeter. The VC concentration in this sample was 1,000 ppb (Blasland & Bouck, 1988b, Table 1). Eight samples (including three duplicates) from well 12A, approximately 150 feet south of the disposal area perimeter, have been analyzed. The average VC concentration for these samples is 3,375 ppb, with a maximum concentration of 6,000 ppb (Blasland & Bouck, 1988b, Table 1; Geraghty & Miller, 1988).

These data suggest that collection of groundwater at a location between wells 12A and 47A and the disposal area may result in lower VC concentrations. In the long term, O&M costs for the vapor phase GAC system on the air stripper could be reduced by collecting and treating groundwater with lower VC concentrations. However, in the short term, treatment of groundwater near wells 12A and 47A will be required since VC concentrations in these wells greatly exceed the proposed VC cleanup goal of 2 ppb.

TABLE 3-1

VAPOR PHASE GAC REQUIREMENTS AND GAC REPLACEMENT COSTS FOR ALTERNATIVES GW-1 AND GW-1A

Parameter	Alternative GW-1 Average	Alternative GW-1 Maximum	Alternative GW-1A Average	Alternative GW-1A Maximum
VC concentration in ground water	1040 ppb	2000 ppb	1040 ppb	2000 ppb
Pretreatment efficiency	NA[1]	NA	75 %	75 %
VC concentration in water entering air stripper	1040 ppb	2000 ppb	260 ppb	500 ppb
VC concentration in air leaving air stripper	13.0 mg/m^3	25.0 mg/m^3	3.25 mg/m^3	6.25 mg/m^3
VC loading rate to vapor phase GAC	0.70 lb/day	1.35 lb/day	0.175 lb/day	0.338 lb/day
Vapor phase GAC use rate	70 lb/day	135 lb/day	17.5 lb/day	33.8 lb/day
Annual GAC replacement costs (rounded)	$44,700	$86,200	$11,200	$21,600
Lifetime of GAC in 10,000-pound bed	143 days	74 days	571 days	296 days
Number of bed replacements per year	2.55	4.93	0.64	1.23

Note: 1 Not applicable, since alternative GW-1 does not include ground-water pretreatment prior to air stripping.

TABLE 3-2

COSTS FOR VAPOR PHASE GRANULAR ACTIVATED CARBON SYSTEM

Alternative GW-1

Capital Cost[1]

Includes 8-foot-diameter x 7-foot-depth carbon adsorber, including carbon, heater, and ductwork			$ 72,000

Annual O&M Cost[2]

Carbon replacement	$ 44,700	to	$ 86,200
Additional power requirements	15,000	to	20,000
Transportation costs	7,700	to	14,800
Total	$ 67,400	to	$ 121,000

Alternative GW-1A

Capital Cost[1]

Includes 8-foot-diameter x 7-foot-depth carbon adsorber, including carbon, heater, and ductwork			$ 72,000

Annual O&M Cost[2]

Carbon replacement	$ 11,200	to	$ 21,600
Additional power requirements	15,000	to	20,000
Transportation costs	1,900	to	3,700
Total	$ 28,100	to	$ 45,300

Notes:

1 For consistency with FS report, cost estimate includes additional 15 percent for administrative and engineering expenses and additional 25 percent for contingencies.

2 Cost estimates are presented as ranges based on average and maximum VC concentrations in ground water.

COST SENSITIVITY ANALYSIS

EPA evaluated the sensitivity of groundwater treatment costs to interest (or discount) rate and duration of groundwater treatment. GE's FS report assumed that groundwater treatment would occur for a period of 6 to 12 years, but calculated total costs only for a 10-year operating period. EPA calculated costs for 7-, 10-, and 30-year operating periods to produce data for the sensitivity analysis. The 7-year period was chosen as a minimum possible duration of groundwater treatment. The 30-year operating period is based on the assumption of typical duration for post-closure care following closure of a hazardous waste site. The FS report discounted future O&M costs using an interest rate of 10 percent. In addition to this rate, EPA used interest rates of 5 and 15 percent for the sensitivity analysis.

Capital and annual O&M costs for the four groundwater treatment alternatives were presented in Tables 6-3 through 6-8 of the FS report (Blasland & Bouck, 1988a) and are summarized here in Table 4-1. EPA also looked at the costs for both air stripping and carbon adsorption alternatives (GW-1 and GW-1A) after the addition of vapor phase GAC for air emissions control. Capital and O&M costs for vapor phase GAC were added to the groundwater treatment costs for alternatives GW-1 and GW-1A. Costs for GW-1 and GW-1A with air emissions control are also included in Table 4-1.

EPA calculated the present worth of total costs (capital plus O&M) for each alternative for interest rates of 5, 10, and 15 percent over operating periods of 7, 10, and 30 years. Thus, nine separate calculations were made for each alternative. The results of these calculations are shown in Table 4-2.

Relative costs for the four alternatives evaluated in the FS report do not appear to be sensitive to either interest rate or duration of groundwater treatment. The FS report found that at a 10 percent interest rate over 10 years, the alternatives were ranked GW-1, GW-1A, GW-2, and GW-3, going from lowest to highest total present worth costs. This ranking holds for all combinations of interest rates and operating periods evaluated in Table 4-2.

When the costs of air emissions control are considered for alternatives GW-1 and GW-1A, the total present worth costs are greatly increased compared to the costs of these alternatives without control. In evaluating the effects of air emissions control costs in Tables 4-1 and 4-2, EPA considered both the average and the maximum annual O&M cost estimates ($67,400 versus $121,000 for alternative GW-1(GAC) and $28,100 versus $45,300 for alternative GW-1A(GAC)). These average and maximum O&M cost estimates are based on average and maximum vinyl chloride concentrations in groundwater, respectively.

During the actual treatment of groundwater at the Rose site, it is more likely that vinyl chloride concentrations will be closer to the average value. This average is based on a composite concentration for vinyl chloride in the eastern and southern groundwater plumes. Current plans are to combine groundwater from both plumes and to treat this combined stream. Thus, for groundwater treatment alternatives GW-1(GAC) and GW-1A(GAC), total present worth costs are likely to be closer to the lower values presented in Table 4-2.

With the addition of air emissions control, costs for alternatives GW-1(GAC) and GW-1A(GAC) (Table 4-2) are similar to or slightly higher than costs for alternatives GW-2 (hydrogen peroxide pretreatment with UV-ozonation) and GW-3 (hydrogen peroxide pretreatment with carbon adsorption). For example, at a 10 percent interest rate and a 10-year treatment duration, there is only a 12 percent difference between the highest and lowest costs. Furthermore, cost estimates developed for feasibility studies conducted under CERCLA are typically accurate only to within -30 to +50 percent of actual remediation costs (U.S. EPA, 1988). Of the cost estimates for the four alternatives, the estimate for alternative GW-1(GAC) is likely to be most accurate. The technology used in alternative GW-1(GAC) has been tested and implemented in full-scale at several Superfund sites and is considered a demonstrated and proven method of groundwater treatment. Alternative GW-2 employs a technology that has not been used extensively at Superfund sites. This technology is currently being evaluated on a pilot-scale under U.S. EPA's Superfund Innovative Technology Evaluation (SITE) program. Alternatives GW-1A(GAC) and GW-3 both require hydrogen peroxide pretreatment, which also has not been widely used to treat contaminated groundwater. Thus, cost estimates for alternatives GW-1A(GAC), GW-2, and GW-3 are subject to greater uncertainty than the estimate for GW-1(GAC). Given these uncertainties and the relatively small range of costs shown in Table 4-2, no groundwater treatment alternative stands out as the most cost-effective.

EPA was not able to conduct a similar sensitivity analysis for source management remedial alternatives. Cost estimates were not presented for the three potential alternatives recommended by GE for futher study in the FS report -- in-situ soil flushing, chemical extraction, and biodegradation -- due to the developmental nature of these technologies.

Costs for most of the source management alternatives are presented in the FS report as lump sums and are not broken into capital and annual O&M costs. Furthermore, the assumptions behind the cost estimates are not presented. Thus, EPA is not able to evaluate the sensitivity of the costs to factors such as interest rate or operating period or to comment on the costs in detail. However, EPA has identified several factors that may impact costs for the incineration and fixation-stabilization source management alternatives.

The cost estimate for on-site incineration (Blasland & Bouck, 1988a, Table 6-11) is based on a nominal incineration cost of $225 per cubic yard (cy) of contaminated soil. The FS report does not discuss the BTU value of the soil that will be treated. This factor will have a significant impact on fuel costs and may vary considerably for soils from different parts of the disposal area. Fuel costs are estimated to be 45 percent of the equipment rental costs and represent a significant portion of the incinerator O&M costs (Blasland & Bouck, 1988a). Overall costs of incineration may be particularly sensitive to soil BTU content.

The proposed soil preparation method for chemical fixation-stabilization (screen out large objects such as rocks before treatment) is similar to the method described for on-site incineration. However, the soil preparation costs for the two alternatives are different. The unit cost for soil preparation prior to chemical stabilization/fixation is $5/cy, whereas the unit soil preparation cost prior to incineration appears to be $10/cy ($40/cy for excavation/soil preparation minus $30/cy for excavation). This difference of $5/cy, if incorporated into the costs for chemical stabilization/fixation, would add approximately $500,000 to total costs as presented in the FS.

TABLE 4-1

CAPITAL AND ANNUAL O&M COSTS
FOR GROUNDWATER TREATMENT ALTERNATIVES

Costs[1]	Alternative	Capital Costs[1] ($ x 1000)	O&M ($x1000)
GW-1	Air stripping followed by carbon adsorption	395.0	61.1
GW-1A	Hydrogen peroxide pretreatment, filtration, air stripping, and carbon adsorption	430.0	2.1
GW-1(GAC)[2]	GW-1 with vapor phase GAC added for air emissions control	467.0	128.5 to 182.1
GW-1A(GAC)[2]	GW-1A with vapor phase GAC added for air emissions control	502.0	100.2 to 117.4
GW-2	Hydrogen peroxide pretreatment, filtration, and UV-ozonation	585.0	91.0
GW-3	Hydrogen peroxide pretreatment, filtration, and carbon adsorption	370.0	143.3

Notes:

1 Costs obtained from Tables 6-3 through 6-8 of FS report (Blasland & Bouck, 1988a).

2 Costs obtained by adding vapor phase GAC capital and O&M costs to costs presented in Tables 6-3 and 6-4 of FS report (Blasland & Bouck, 1988a). The lower and higher O&M costs are based on average and maximum vinyl chloride concentrations in groundwater, respectively.

TABLE 4-2

SENSITIVITY ANALYSIS FOR GROUND-WATER REMEDIAL ALTERNATIVE COSTS

Interest Rate (percent)	Duration of Ground-Water Treatment (years)	Present Worth Factor	Present Worth of Total Costs (in $1000)[1,2] GW-1	GW-1A	GW-1 (GAC)[3]	GW-1A (GAC)[3]	GW-2	GW-3
5	7	5.79	749	847	1211 to 1521	1082 to 1182	1112	1199
	10	7.72	867	987	1459 to 1873	1276 to 1408	1288	1477
	30	15.37	1334	1538	2442 to 3266	2042 to 2306	1984	2573
10	7	4.87	693	781	1093 to 1354	990 to 1074	1028	1068
	10	6.14	770	873	1256 to 1585	1117 to 1223	1144	1251
	30	9.43	971	1110	1679 to 2184	1447 to 1609	1443	1721
15	7	4.16	649	730	1002 to 1225	919 to 990	964	966
	10	5.02	702	792	1112 to 1381	1005 to 1091	1042	1089
	30	6.57	796	903	1311 to 1663	1160 to 1273	1183	1311

Notes:

1 Costs calculated from values in Table 4-2 using the following formula:

Present worth of total costs = (Capital costs) + (Present worth factor x Annual O&M costs)

2 All costs are rounded to the nearest $1,000.

3 Range of costs is based on the range of O&M costs in Table 4-1.

U.S. Environmental Protection Agency, 1970. Workbook of Atmospheric Dispersion Estimates, Office of Air Programs, Research Triangle Park, N.C. (AP-26).

U.S. Environmental Protection Agency, 1986. Superfund Public Health Evaluation Manual, Office of Emergency and Remedial Response (OSWER Directive 9285.4-1), Washington, DC, October.

U.S. Environmental Protection Agency, 1987a. Final Draft Superfund Exposure Assessment Manual, Office of Solid Waste and Emergency Response (OSWER Directive 9285.5-1), Washington, DC, September 22.

U.S. Environmental Protection Agency, 1987b. Air Stripping of Contaminated Water Sources -- Air Emissions and Controls, Air Toxics Control Technology Center, Research Triangle Park, NC (EPA-450/3-87-017), August.