Department of Environmental Conservation

Division of Hazardous Waste Remediation

Sterling Drug Inc. Site Number 3

I.D. Number 442011

Record of Decision

March 1992

New York State Department of Environmental Conservation
MARIO M. CUOMO, *Governor* THOMAS C. JORLING, *Commissioner*

SITE NAME AND LOCATION

Sterling Drug Inc., Site #3
Riverside Ave.
Town of East Greenbush
Rensselaer County, New York
Inactive Hazardous Waste Site Code : 442011

STATEMENT OF PURPOSE

This document describes the New York State Department of Environmental Conservation's (NYSDEC) selected alternative for remediating the source of contamination and for controlling the migration of the contaminants at the Sterling Drug Inc., Site #3 referred to as "the site." The selected alternative has been selected by the NYSDEC, as the State agency having primary responsibility for oversight of site activities. The preferred remedial alternative is based on the Phase I and Phase II Remedial Investigations (RI) Reports dated July 1984 and January 1987 respectively, and Feasibility Study (FS) Report dated, February 1992. These reports were prepared for the Responsible Party, Sterling Winthrop Inc., by their consultant, Dames and Moore.

This document provides background on the site, briefly describes the alternatives which were considered to remediate the site, presents the rationale for selecting the selected alternative, and outlines the public's role in helping the NYSDEC reach a final decision on the remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision, present a potential threat to public health, welfare and the environment.

STATEMENT OF BASIS

This decision is based upon the administrative record for Sterling Drug Inc., Site #3. A copy of the documents in the record is available for public review and copying at the following locations:

Rensselaer Public Library
810 Broadway
Rensselaer, New York 12144
(518) 462-1193
Call for hours

NYSDEC
Division of Hazardous Waste Remediation
50 Wolf Road, Room 222
Albany, NY 12233-7010
(518) 457-5637
Monday - Friday
8:30 - 4:45

The following documents are the primary components of the administrative record:

A. " Phase I - Final Report, Preliminary Investigation of Site 3 Sterling Organics, East Greenbush , New York, July 1984" Prepared by Dames and Moore

B. " Phase II - Report, Remedial Investigation of Site 3 Sterling Organics, East Greenbush, New York, Revised January 16, 1987 " Prepared by Dames and Moore

C. " Final Draft Feasibility Study Sterling - Site 3 Inactive Landfill, East Greenbush, New York, February 24, 1992" Prepared by Dames and Moore

DESCRIPTION OF THE SELECTED REMEDY

Based upon the Remedial Investigations and Feasibility Study and the criteria for selecting a remedy, the NYSDEC is proposing to implement Alternative 3 in combination with collection of the off-site portion of the plume. The estimated cost to implement this combination of alternatives (present worth) is $11,122,931. The cost of construction is estimated to be $3,444,785 and the annual operation and maintenance cost is estimated to be $1,002,800 for the first three years and $338,500 for the remainder of the estimated life of 30 years.

The Department's selected alternative includes the following elements: Installation of an Impermeable Cap, Grading and Surface Water Diversion, Groundwater Recovery and Treatment, Floodplain Management, Hot Spot Vacuum Extraction of Organics and Monitoring.

This action or operable unit is the first of two operable units that are planned for the site. This operable unit addresses the on-site soils and groundwater currently being managed by the groundwater treatment system. The second operable unit will address the off-site portion of the contaminant plume.

DECLARATION

The selected remedy is designed to be protective of human health and the environment, is designed to comply with New York State regulations and standards to the extent practicable and is cost effective. This remedy satisfies the Department's preference for actions that reduce the volume, toxicity and mobility of hazardous substances, pollutants or contaminants as the principal goal.

3/31/92
Date

Michael J. O'Toole for
Edward O. Sullivan
Deputy Commissioner
Office of Environmental Remediation

SITE DESCRIPTION AND HISTORY

The site is located in the Town of East Greenbush, Rensselaer County, on Riverside Avenue approximately two miles south of the City of Rensselaer(See Figure 1). The majority of the surrounding land is used for agricultural purposes; its immediate borders include Penn Central Railway on the east and Papscanee Creek on the west. The site sits in the Hudson River Floodplain approximately 2,000 ft. east of the river. The terrain between Site 3 and the Hudson River is nearly level and approximately 14 feet above sea level. The elevation rises rapidly east of Route 9J, which is approximately 900 feet east of the site, to a maximum elevation of slightly over 400 feet. The site is relatively flat and approximately seven acres in size and fenced. Niagara Mohawk transmission lines cut across the northern portion of the landfill; a set of power poles is located in the landfill.

Groundwater Hydrology

Three water bearing zones have been identified in the study area. They are designated the Bedrock Aquifer (with the top of bedrock ranging in depth from 45 to 120 feet), the Lower Unconsolidated Aquifer (at a depth ranging between 80 and 100 feet) and Upper Unconsolidated Aquifer (at a depth of 10 to 90 feet). The hydrologic characteristics of each of these water bearing units are described in more detail in the Phase II Remedial Investigation Report. The Upper Unconsolidated Aquifer has been impacted by the site. Groundwater flow in this unit is controlled by a geologic trough and flows towards the Hudson River in a northwest direction.

The nearest groundwater well is located at the Gold Bond Building Products Plant north of the site which is not being currently used for drinking water. The groundwater in this area contains high mineral concentrations (iron and manganese), and therefore it is not currently used for drinking water. Drinking water at the plant is provided by bottled water.

Site History

In 1956, Sterling leased Site 3 from S.A. Graziano for the landfilling of plant wastes. Disposal of pharmaceutical wastes began in 1956 and continued until the latter part of 1977. Disposed wastes included pharmaceutical intermediates, finished pharmaceutical products, Sterling Winthrop Research Institute waste, filter cakes, solvents, still bottoms, oils, and wood. The initial estimate was that 2,000 drums containing waste and waste solvents had been disposed of in the northern section of the landfill. In 1977, the landfill was covered with sandy clay and gravel, and closed. The site has remained inactive since the termination of landfill activities. Sterling erected an 8-foot-high chain-link security fence around the perimeter of the landfill in January 1984.

A chronological list of activities which have taken place at the site and reports on the findings investigations can be found on Table 1 located in the Appendix. The next section will briefly discuss the results of the remedial investigations and landfill characterization studies.

CURRENT SITE STATUS

Summary of Site Investigations and IRM's

Sterling's consultant, Dames and Moore, initiated investigation of the site environs in 1984 with the Phase I Remedial Investigation and these investigations concluded with the landfill characterization study and investigation of the Clay Breach Area in March 1991. The Remedial Investigations and IRM work were conducted in accordance with plans formally approved by the NYSDEC. For additional detailed information regarding the results of the investigations please refer to the above-referenced reports. The results of the investigations and Interim Remedial Measures(IRMs) are as follows:

- o Groundwater beneath the site and off-site in the northwest direction are contaminated with volatile organic chemicals. There is only one plume at the site, differentiated by on-site and off-site segments. For the purpose of discussion in this document the off-site portion of the plume will be considered downgradient outside the zone of influence of the groundwater treatment system(see Figure 5); the on-site portion will be considered the groudwater currently being captured by the groundwater treatment system. Off-site contaminants include diethyl ether; contaminants beneath the site which are at much higher concentrations include benzene, toluene, xylene, acetone, methyl thiophene, 1,2 dichlorethane, trichloroethylene and chloroform. Pockets of chemical product have been found under the site. Contaminants and the respective range of levels are located on Table 2. A groundwater treatment system was installed in 1989 and is currently working to control the migration of contaminants from the site.

- o Sediments and surface water in the Papscanee Creek do not appear to be severely impacted by the site. Contaminants found include semi-volatiles and some heavy metals, including, chromium, lead, and mercury. Most contaminants were found both upgradient and downgradient of the site at varying concentrations. Summary of data is located on Table 3.

- o Historical records indicated a significant number of drums were disposed of in the landfill; magnetometer surveys reinforced the belief that drums were present by indicating several subsurface anomalies present in the landfill. As a result of these findings Sterling's consultant, Dames and Moore, under the oversight of the State, completed a drum removal beginning in 1989 and concluding in 1990. Approximately 8,500 drums were removed and contents were properly disposed of off-site.

- o Approximately 185,000 cubic yards of material - contaminated soil, research wastes, consumer returns, and construction debris - remain at the site. A natural low permeability clay-like material is present under a majority of the landfill. This clay-layer acts as a barrier moderating the amount of contamination getting into the groundwater. During the drum removal program it was discovered that an area of the low permeability layer was penetrated during landfilling operations. This area is referred to as the Clay Breach Area (CBA).

Additionally, a high concentration of drums were found in this area. The soils and groundwater in this area are heavily contaminated with petroleum hydrocarbons and volatile and semi-volatile organic compounds. The contaminants in the soils are similar to the ones found in groundwater. Ranges of contaminant concentrations in soils can be found in Table 4 in the appendix. The ranges reflect two types of samples taken during the drum removal. The first type, post excavation samples, were taken from the base and walls(where appropriate) of the excavation after the drums were removed. The second, soil and debris samples, was a combination of test pit sampling, taken during the landfill characterization study, and samples taken from material commingled with the drums.

Summary of Current Site Conditions and Risk

As stated above, the major source of contamination was removed from the site during the IRM Drum Removal. The contamination that remains is residuals from the leaking drums or bulk disposal during landfilling operations. The most significant component of the remaining contamination consists of soils and groundwater contaminated with volatile and semi-volatile organic chemicals and petroleum hydrocarbons. Varying concentrations of the contaminants are present throughout the site, the areas detailed on Figure 4 indicate where higher levels contamination remain. Risks for soil would involve direct contact with soil either through dermal contact, soil ingestion, or inhalation of soil particles. At present, these risks are minimized because the heavily contaminated soils are only present at depth. Additionally, an indirect risk posed by the contaminated soils is to the groundwater. The contaminated soils are releasing chemicals into the groundwater in exceedance of groundwater standards.

The latest round of sampling indicates that off-site groundwater contains only diethyl-ether at detectable concentrations beyond the zone of influence of the ground water treatment system. Previous sampling had found benzene to be present off-site. The current risks associated with the groundwater are minimized because the highest contamination exists under the site and this groundwater is currently being collected and treated to meet State standards. Additionally, the water contains naturally high levels of inorganic chemicals, iron and manganese. Therefore, future risks associated with the groundwater are minimal because future use of the water by direct ingestion is unlikely.

Sediment sampling has taken place on three occasions. Results indicate no immediate threat to the environment and/or human health. Table 3 indicates the contaminants, their levels and date of sampling. Because of the nature of activities which have taken place at the site, further, more comprehensive sampling of the Papscanee Creek will be part of the remedy. At that time, if levels of contaminants are present at levels of concern, as defined by the Department, consideration will be given to the type of remediation necessary.

ENFORCEMENT STATUS

In 1984, Sterling Winthrop Inc. and the Department signed an Agreement/Determination (Index # 437T072382) to perform the initial site investigation. The Agreement required additional work if necessary based on the results of this investigation. In 1986, an amendment to the Agreement/Determination (Index No. T061485) was signed committing Sterling to a Remedial Investigation/Feasibility Study. This is the current legal document the State and Sterling are working under.

GOALS AND OBJECTIVES FOR THE REMEDIAL ACTION

The overall objective of the remediation is to reduce the concentrations of contaminants and control the routes of exposure to protect human health and the environment. The media-specific goals are outlined below.

Groundwater

The objective for groundwater remediation is to control the migration and reduce the concentrations of contaminants in the on-site portion of the plume by collection and treatment. The standards the State is applying to the groundwater are 6 NYCRR Parts 700-705, Water Quality Regulations for Surface Waters and Groundwaters and NYSDOH Part 5 Drinking Water Standards. These standards would be used as the treatment level for the groundwater treatment system and a goal for aquifer restoration.

Soils On-Site

The objective for remediating the soils will be to remove a majority of the volatile/semi-volatile contaminants present at discrete locations in the landfill, therefore reducing toxicity and volume of contaminated soils. The State does not currently have soil cleanup standards and relies on cleanup goals established by analyzing the impacts of the residual contaminations (after removal and/or treatment) effects on other environmental media (i.e., air, groundwater, and surface water) and human health. Without complete removal of the landfill, any remaining low level contamination left in place will need to be controlled through an engineered encapsulation mechanism.

Sediments

At this time, the State does not believe that the Papscanee Creek has been adversely impacted by the Site. However, as a part of the remedy, the sediments and surface water will be sampled and analyzed prior to and after the site activities are complete to verify the previous sampling results. The goal of any remediation of sediments present in the Papscanee Creek will be first to establish if there are impacts from the site and if necessary, evaluate what remedial alternatives are feasible.

SUMMARY AND EVALUATION OF THE REMEDIAL ALTERNATIVES

Summary of Alternatives

Alternative 1 - No Action with Monitoring

Present Worth: $3,012,531   Annual O and M:$184,000
Capital Cost: 0

No further activities will be undertaken at the site to manage the remaining contamination in the site soils or groundwater. All or some of the following institutional controls may be implemented at the site to limit future development:

- Potential deed restrictions on groundwater usage
- Access to the site will continue to be restricted with the existing fence and warning signs

Long-term monitoring of various media (i.e., surface water, sediments, and groundwater) will be performed to monitor migration of contaminants and evaluate the exposure routes.

<u>Alternative 2</u> - Impermeable Cap, Grading and Surface Water Diversion, Groundwater Recovery and Treatment, Floodplain Management Controls, Monitoring.

Present Worth: $9,250,112   Annual O & M: $335,800 - $393,300
Capital Cost: $3,231,785

An impermeable cap will be placed over the site, contours will be designed to minimize surface water run-on and enhance surface water run-off to the Papscanee Creek. Surface erosion and sediment control techniques will be implemented prior to site activities in order to minimize the potential for off-site transport of sediments from the site. The currently utilized groundwater collection and treatment system will remain as is for source control of the on-site groundwater contamination. The treatment system consists of an air stripper and granulated activated carbon(GAC) to remove the organic contaminants. Discharge of treated groundwater alternatives include to the aquifer via injection wells, recharge trenches or discharge to the Hudson River Floodplain management will include a flood retention berm around the perimeter of the site to divert flood waters away from the site. The berm will be installed to a height above the 100 year flood elevation (approximately 18 feet) as referenced to the National Geodetic Vertical Datum (NGVD). The existing elevation of the site is 14 feet NGVD. The top of the cap will be designed to allow surface water flow off the site during precipitation events.

Operation and maintenance (O and M) will include groundwater monitoring, periodic soil samples, maintenance of the cap and replacement of the GAC units. Selected on-site and off-site wells will be sampled semi-annually and all of the wells will be sampled annually with full Target Compound List analyses. Appropriate quality assurance/ quality control samples will be collected to ensure reproducibility of results. The variation in O and M costs is due to the replacement of the groundwater treatment system, which has an estimated life of 15 years.

<u>Alternative 3</u> - Impermeable Cap, Grading and Surface Water Diversion, Groundwater Recovery and Treatment, Floodplain Management, Hot Spot Vacuum Extraction of Organics and Monitoring.

Present Worth: $11,122,931 Annual O and M: $335,800 - 1,002,800
Capital Cost: $3,444,785

This alternative is similar to Alternative 2 except that it includes an in situ vacuum extraction system (VES) option to remove subsurface volatile and semi-volatile contaminants at the site. The areas where the VES will be implemented are shown in Figure 4.

The VES system will be implemented after preliminary grading activities and prior to installation of the impermeable cap. The recovery system will include an off-gas treatment system to control releases of contaminants to the air of contaminants. A temporary PVC cap will be placed over the site to assist in removal of contaminants and stabilize the exposed areas. Periodic sampling of the soils and off-gas will be used to determine the effectiveness of this and progress of the VES.

Once desired treatment goals are met or the system is no longer effective, the VES will be decommissioned. The impermeable cap and floodplain controls will be installed.

O and M activities will include all the activities under Alternative 2 as well as the O and M required for the VES. As a result the O and M costs for the estimated duration of the VES (1 to 3 years) are substantially higher($1,002,800).

<u>Alternative 4</u> - Impermeable Cap, Grading and Surface Water Diversion, Groundwater Recovery and Treatment, Floodplain Management, Hot Spot Bioreclamation, and Monitoring.

Present Worth: $13,368,112 Annual O and M: $335,800 - $393,300
Capital Cost: $7,349,785

This Alternative is essentially the same as Alternative 2 except that the hot spot areas of volatile and semi-volatile organic contamination will be treated with indigenous micro-organisms. This alternative was evaluated for remediating the soils both in-situ or ex-situ.

In-situ bioremediation will be implemented in the areas shown in Figure 4. The remediation will include installation of well points to recirculate nutrient- and oxygen-bearing solutions and control moisture content of soils to enhance the system's effectiveness. Periodic sampling of the subsurface soils will be done to determine the effectiveness and measure the progress of the remediation.

For ex-situ bioremediation the contaminated soils, located in areas identified in Figure 4, would need to be excavated. The soils would then be mixed intermittently with nutrients, to encourage biological activity to breakdown the contaminants. In order to implement this treatment, it will be necessary to construct lined treatment cells to mix the soils and necessary nutrient solutions. Periodic sampling of soils will be used to monitor effectiveness and progress of remediation.

O and M activities will be similar to those under Alternative 2.

Alternative 5 - Impermeable Cap, Grading and Surface Water Diversion, Groundwater Recovery and Treatment, Floodplain Management, Solidification/ Stabilization and Monitoring.

Present Worth: $11,983,612 Annual O and M: $335,800 - $393,300
Capital Cost: $5,965,285

This alternative incorporates the components detailed in Alternative 2 and adds in situ solidification/stabilization (S/S) of the top 2 feet of the site.

The S/S option will be implemented after the pre-design testing to determine its feasibility and optimize the stability and durability of the resulting product. Consideration will be given to effect organic chemicals found in the sites soils in determining specific additives necessary to ensure the weatherability of the stabilized soils. The S/S will be implemented on-site using specialized mixing equipment. Protective measures and quality assurance/quality control samples will be taken to ensure a consistent and effective stabilization.

The placement of the impermeable cap and floodplain management controls will take place after the stabilization/solidification activities.

O and M activities will be similar to those under Alternative 2.

Alternative 6 - Impermeable Cap, Grading and Surface Water Diversion, Groundwater Recovery and Treatment, Floodplain Management, Hot Spot Vacuum Extraction of Organics, Solidification/Stabilization and Monitoring.

Present Worth: $13,842,231 Annual O and M: $335,800 - $1,002,800
Capital Cost: $6,164,085

This alternative includes relevant components of Alternative 3 and adds the Stabilization/Solidification described in Alternative 5. The S/S will be implemented co-commitant with the VES activities.

O and M activities will be similar to those under Alternative 3.

Alternative 7 - Impermeable Cap, Grading Surface Water Diversion, Groundwater Recovery and Treatment, Floodplain Management, Hot Spot Bioreclamation, Solidification/Stabilization, and Monitoring.

Present Worth: $16,087,412 Annual O and M: $335,800 - $393,300
Capital Cost: $10,069,085

This alternative incorporates the components detailed under Alternative 2 and adds the bioremediation described under Alternative 4 and Solidification/Stabilization described under Alternative 5. The bioremedial actions will take place before or after the S/S option.

O and M activities will be similar to those under Alternative 2.

Alternative 8 - Excavation of Hot Spots, Off-site Disposal of Excavated Hot Spots, Installation of an Impermeable Cap, Surface Water Diversion and Grading, Groundwater Recovery and Treatment, Floodplain Management, and Monitoring.

Present Worth: $38,847,527 Annual O and M: $335,800 -$393,300
Capital Cost: $32,829,900

This alternative is essentially Alternative 2 supplemented by the excavation of the Hot Spot Areas identified in Figure 4. An estimated 75,000 cubic yards of contaminated soils will be shipped off-site for incineration and/or disposal. The waste will be properly manifested to a permitted Treatment Storage or Disposal Facility. Prior to backfilling, sampling of the excavated areas will be performed to ensure a majority of the Hot Spot is removed. The landfill will be capped and groundwater will be collected and treated as discussed in Alternative 2.

O and M activities will be similar to those under Alternative 2.

Alternative 9 - Excavation of Entire Site, Off-site Disposal and Incineration, Backfill to Grade Groundwater Recovery and Treatment, and Final Closure.

Present Worth: $70,385,554 Annual O and M: 0
Capital Cost: $72,102,275

This alternative consists of excavation and off-site disposal or incineration at an approved facility of approximately 185,000 cubic yards of contaminated material. The extent of the excavation will be decided upon by previous soil sampling and additional field studies performed during the design phase of the remedial action. The excavated area will be backfilled and revegetated. Groundwater recovery and treatment activities will continue through the excavation and afterwards until treatment objectives or groundwater standards are met.

Groundwater Alternatives

All of the Alternatives described above include groundwater treatment, which would maintain the current system. This system is comprised of an extraction well at the north end of the landfill, treatment with air-stripping and granulated activated carbon, and reinjection wells located upgradient of the landfill. Minor modifications to this system may be required if it is found that it is not functioning as planned.

As described previously there is a contaminant plume, containing diethyl-ether, migrating from the site in a northwest direction. The current system does not address the clean-up of the off-site portion of the plume.

The feasibility study also evaluated enhancing the current system to include a collection system to capture a significant part of the off-site portion of the plume and an additional treatment unit to effectively treat diethyl-ether. Basically, the additional collection system would include a series of wells down the spine of the plume. The additional treatment unit would be an UV oxidation unit to destroy the diethyl-ether. It is estimated that the enhancement of the treatment system in this manner would increase the capital cost of each alternative by $1,547,800 and the yearly O and M by $69,000. The present worth of this additional system would be $2,608,499. As stated earlier the Department is deferring the decision on the off-site portion of the to a separate decision.

CITIZEN PARTICIPATION

To inform the local community and provide a mechanism for citizens to make the Department aware of their concerns, a citizen participation program has been implemented. In accordance with a Citizen Participation (CP) plan developed for the project, the following goals have been accomplished:

- information repositories have been established;
- documents and reports associated with the project have been placed into the repositories;
- a contact list of interested parties (e.g. media, public, interest groups, government agencies, etc) has been created;
- public notice of the completion of the RI/FS and the proposed remedy was issued in local newspapers;
- a public comment period was established and a public meeting was held on March 9, 1992 in East Greenbush to describe the proposed remedy. The transcript of the meeting is part of the Administrative Record for the project and is in the document repositories for public inspection.

A summary of the comments received during the public meeting and the public comment period are included in Exhibit A along with the Department's response to them. No significant comments were received.

GOVERNMENT'S SELECTED ALTERNATIVE

Based upon the Remedial Investigations and Feasibility Study and the criteria for selecting a remedy, the NYSDEC is proposing to implement Alternative 3 in combination with collection of the off-site portion of the plume. The estimated cost to implement this combination of alternatives (present worth) is $11,122,931. The cost of construction is estimated to be $3,444,785 and the annual operation and maintenance cost is estimated to be $1,002,800 for the first three years and $335,800 for the remainder of the estimated life of 30 years.

The Department's selected alternative includes the following elements: Installation of an Impermeable Cap, Grading and Surface Water Diversion, Groundwater Recovery and Treatment, Floodplain Management, Hot Spot Vacuum Extraction of Organics and Monitoring.

This action or operable unit is the first of two operable units that are planned for the site. This operable unit addresses the on-site soils and groundwater currently being managed by the groundwater treatment system. The second operable unit will address the off-site portion of the contaminant plume.

EVALUATION OF ALTERNATIVES

Evaluation Criteria

The Remedial Alternatives presented in the Feasibility Study are evaluated against criteria defined in the National Contingency Plan (40 CFR 300.430). The evaluation criteria are listed below with a brief description, followed by a discussion of the expected performance of the selected alternative against the criteria and compares it to other available options when there are significant differences.

Threshold Criteria

The first two criteria must be satisfied in order for an alternative to be eligible for selection.

1. Protection of Human Health and the Environment--This criterion is an overall and final evaluation of the health and environmental impacts to assess whether each alternative is protective. This is based upon a composite of factors assessed under other criteria, especially short/long-term effectiveness and compliance with New York State's Standards, Criteria , and Guidance (SCGs).

The selected alternative will control risks to human health and the environment by reducing the amount of contamination present in the subsurface, controlling migration of contaminants through the groundwater and eliminating transport of particulates and volatile contaminants through the air pathway. The application of vacuum extraction on the subsurface soils will directly reduce the amount of volatile chemicals in the soil and groundwater and will indirectly reduce the amount of semi-volatile chemicals present by enhancing biodegradation. Groundwater will be collected and treated adjacent to the site, effectively reducing the contamination present in the on-site portion of the groundwater plume. The impermeable cap and surface water controls will reduce the amount of water infiltrating through the site which reduces the continued contamination of groundwater. Short term impacts would be minimal by treating the waste in-situ.

The other alternatives that utilize treatment methodologies (bioremediation) would be effective in treating a majority of the contaminants, but the control and duration of the remediation are not as well defined. The excavation alternatives would offer the highest overall protection of human health and environment, however, other factors would diminish the differences between the alternatives regarding this criterion. The process of excavation and handling of the contaminated soils could potentially release significant levels of volatile chemicals to the atmosphere. Although engineering controls could be utilized to control these emissions, the Department believes that the selected alternative utilizing in-situ treatment and emmissions controls will be as effective and easier to implement.

2. <u>Compliance with Applicable or Relevant and Appropriate New York State Standards, Criteria and Guidelines</u> (SCGs)-- SCGs are divided into the categories of chemical-specific (e.g., groundwater standards), action-specific (e.g., design of a landfill), and location-specific (e.g., protection of wetlands).

The implementation of the selected remedy will attempt to comply with all SCGs. The goal of the remediation of the groundwater is to restore the aquifer to its beneficial use and protect human health and the environment. Further migration of contaminants from the site will be controlled by the current groundwater collection system. The goal of this portion of the groundwater collection system is first to hydraulically contain the site and second to attempt to clean the groundwater to State standards. The emissions from the VES and groundwater treatment system will be controlled and monitored to meet the requirements of NYSDEC's Air Guide 1, Air Cleanup Criteria, and other applicable regulations.

Finally, the requirement for site closure will be met by the installation of an engineered final cover system that will meet applicable and/or appropriate State standards.

<u>Primary Balancing Criteria</u> - The next five "primary balancing criteria" are used to weigh major trade -offs among the different hazardous management strategies.

3. <u>Short-term Impacts and Effectiveness</u>--The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment is evaluated. The length of time needed to achieve the remedial objectives is estimated and compared with other alternatives.

The implementation of the selected alternative would create short-term impacts associated with regrading (dust and volatilization) of the site as well as emissions from operation of the Vacuum Extraction System. The impacts from site regrading can be controlled through various dust suppression methods. The volatilization of contaminants will be minimal because regrading will be on surficial soils where minimal contamination exists. Emissions from the VES will be controlled by various emission control equipment.

Implementation of all alternatives would create short-term impacts of varying levels associated with regrading and excavation. Alternatives 2 through 7 would be similar in types of impacts whereas alternatives 8 and 9 would create significantly higher levels due to the excavation of highly contaminated soils. The no-action alternative would create no short-term impacts.

4. <u>Long-term Effectiveness and Permanence</u>--If wastes or residuals will remain at the site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude and nature of the risk presented by the remaining wastes; 2) the adequacy of the controls intended to limit the risk to protective levels; and 3) the reliability of these controls.

The selected alternative will be treating and removing a significant portion of the mass of contamination present in the landfill and provide an adequate degree of long-term effectiveness and permanence. The magnitude and nature of the risks presented by the remaining residual contamination would be acceptable given the adequacy and reliability of the controls used to limit these risks. If the type and volume of contaminant released by the site were to significantly change over time, mitigative measures could be taken to address any new threats.

Alternatives 1, 2, and 5 would provide a lesser degree of long-term effectiveness and permanence because the areas of high contamination are not being treated. The excavation and off-site disposal of the contaminated soils, Alternatives 8 and 9, would provide for a higher degree of effectiveness and permanence but is in contradiction with Department preference for employing on-site treatment technologies.

5. <u>Reduction of Toxicity, Mobility, and Volume</u>--Department policy is to give preference to alternatives that permanently and significantly reduce the toxicity, mobility, and volume of the wastes at the site. This includes assessing the fate of the residues generated from treating the wastes at the site.

The selected alternative would reduce the toxicity mobility and volume of volatile organics contamination in the landfill. The application of vacuum extraction would be effective in removing volatile organic compounds, the most mobile and toxic chemicals present, from the subsurface soils thereby reducing the toxicity and volume of the wastes. The impermeable cap and surface water runoff controls would reduce infiltration into the landfill and in effect reduce the amount of contaminated leachate. The groundwater treatment system would reduce mobility and toxicity by controlling migration of and treating the residual contaminants in the groundwater.

The other alternatives involving treatment, Alternatives 4, 6, and 7 would also provide adequate reduction of mobility, toxicity and volume. Alternatives involving biodegradation (4 and 7) will be more effective than vacuum extraction in treating semi-volatile chemicals; but the semi-volatile compounds are not as mobile as the volatiles and pose less of a threat to human health and the environment.

The excavation alternatives (8 and 9) would remove the contaminants of concern, which would reduce the toxicity, volume and mobility of the wastes at the site.

6. <u>Implementability</u>--The technical and administrative feasibility of implementing the alternative is evaluated. Technically, this includes the difficulties associated with the construction and operation of the alternative, the reliability of the technology, and the ability to effectively monitor the effectiveness of the remedy. Administratively, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining special permits, rights-of-way for construction, etc.

Implementation of the selected alternative is technically feasible, it is a technology that has been applied successfully at other sites on similar contaminants and has been shown to be effective in removing contaminants during pilot studies at this site. The groundwater treatment system which is currently operating at the site has proven to be effective in removing the organic contaminants in the groundwater. Capping techniques are well established but require special techniques and personnel.

Administratively, all the alternatives except 8 and 9 would appear to be feasible. Off-site transport and disposal of material would be hindered by land ban restrictions, which depending upon the waste stream characterization would include pre-treatment requirements. More than likely, the wastes would be required to be incinerated of which there is limited capacity available.

7. <u>Cost</u>--Capital and operation and maintenance costs are estimated for the alternatives and compared on a present worth basis. Although cost is the last criterion evaluated, where two or more alternatives have met the requirements of the remaining criteria, lower cost can be used as the basis for final selection.

   The present worth cost of the selected alternative of $11,122,931 is the lowest cost of the alternatives that meet the remedial goals of the site. Permanently treating all of the wastes off-site would cost $70,385,554.

<u>SUMMARY OF THE GOVERNMENT'S DECISION</u>

Based upon the results of the Phase I and II Remedial Investigations, Feasibility Study, and the criteria for selecting a remedy, the NYSDEC is proposing to implement Alternative #3 (Impermeable cap, Grading and Surface water diversion, Groundwater Recovery and Treatment, Flood Plain Management, Hot Spot Vacuum Extraction and monitoring). The estimated present worth cost is $11,122,931. The cost to construct the remedy is estimated to be $3,444,785. The annual Operation and Maintenance cost is estimated to be $1,002,800 during VES operation (1 to 3 years) and $335,800 after completion of the VES. Listed below are some of the major components of the proposed remedial program:

1. A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation, maintenance, and monitoring of the remedial program. Currently a vacuum extraction pilot system is being evaluated to assist in the final design program.

2. A borehole and sampling program to assist in placement of extraction wells for the application of the vacuum extraction system.

3. Installation and operation of the vacuum extraction system at the areas defined in the borehole program. The treatment system will operate until the treatment objectives are attained or the Department determines that the system is no longer effective.

4. Installation of the impermeable cap and surface water controls to minimize surface infiltration from precipitation. The major components of the cap would include the following: clay, soil drainage layer and vegetation cover.

5. Installation of a flood plain management system to protect the landfill from potential disruption during a flood event. A flood retention berm will be installed around the perimeter of the site to divert flood waters away from the site and minimize disruption of the cap. The berm and cap will be designed to enhance surface water run-off.

6. Restrictions on the use of the site will be put in-place to ensure that the integrity of the remedy is not damaged or compromised. This would include restrictions on excavations into the cover or any other activities that would reduce the effectiveness of the remedy.

7. The current groundwater treatment system will remain in-place. Additionally, a monitoring program will be implemented to ensure the system is effectively capturing and treating the contaminated groundwater.

8. An environmental monitoring program to evaluate the performance of the remedial program. This would include monitoring the subsurface soils during the VES operation, monitoring of the groundwater to evaluate the effectiveness and performance of the groundwater treatment system and monitoring of the surface water and effects of the remedial program. Additional sediment sampling will be done to determine if the Papscanee Creek has been impacted by the site.

Remedial objectives of the remedy include the following:

1. The remedial goals for the subsurface soils are to attempt to clean the soils to the levels found on Table 5. These levels are established based on site specific and contaminant specific data. The clean-up levels are set so on the basis that leachate from residual contaminants would not contravene groundwater standards. The technology being applied to the soils is a proven technology for the types of contaminants present in the subsurface. The system will be run until the specified levels are achieved or until performance data indicate that the system is no longer effective. An evaluation of the residual concentrations of contaminants, if it is determined that significant concentrations remain the following additional measures may be instituted:

    * Modifications to the VES system or operation.

    * Additional technologies may be applied to the contaminated soils, such as, biological treatment.

   Once it is determined that a significant mass of contamination has been removed and application of additional technologies is not feasible, the containment portion of the selected alternative will be implemented.

2. The remedial goals for the groundwater are the standards contained within the NYSDEC 700-705 groundwater and surface water standards and NYSDOH Part 5 Drinking Water Standards.

During the operation of the groundwater treatment system its performance will be monitored on a regular basis and adjusted as warranted by the performance data collected. If after any modifications are instituted it is determined that certain portions of the aquifer cannot be restored to meet the applicable standards, all or a portion of the following contingency measures may occur :

* engineering controls such as long term gradient controls by low level pumping, will be implemented as containment measures;

* Applicable and /or appropriate chemical specific standards will be waived for those portions of the the aquifer based on the technical impracticability of achieving further contaminant reduction;

* Institutional control will be provided and maintained to restrict access to those portions of the aquifer that remain above remediation levels;

* Monitoring of specified wells;

* Remedial technologies for groundwater restoration will be reevaluated periodically.

The decision to invoke any or all of these measures may be made during a periodic review of the remedial action, which will occur at a maximum of 5 year intervals.

Due to the fact that contingency measures may be instituted it should be noted that both the primary remedy and contingency measures will provide overall protection of human health and the environment. This will be accomplished by either reducing contaminants to the respective standards or other remediation levels, or through a combination of mass reduction, institutional or engineering controls. Additionally, the chemical specific SCGs will either be attained or waived.

DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Remedial Action Plan for The Sterling Site was released on February 24, 1992. The PRAP identified the following preferred alternative:

* vacuum extraction of hot-spots identified in on-site soils;

* *groundwater recovery and treatment of on-site portion of* the contaminant plume;

* groundwater recovery and treatment of off-site portion of the contaminant plume to the maximum extent feasible as determined by a further evaluation; and

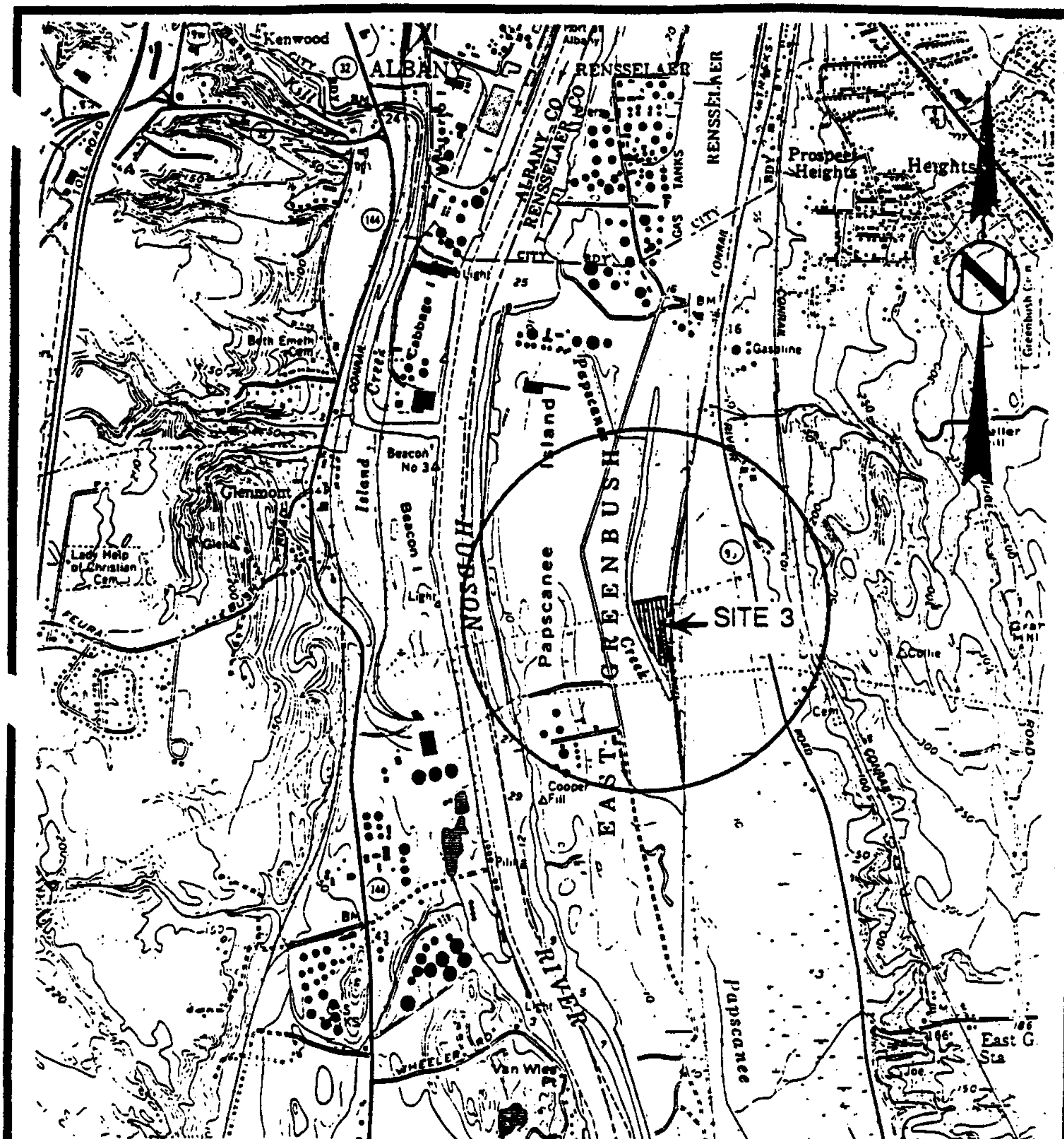
* installation of impermeable cap and floodplain management controls.

After reviewing all written and verbal comments received during the public comment period, the Department has made one significant change from this proposed alternative. This change was made based on the information received during the public comment period from NYSDOH, the public, Sterling Winthrop, and the Department.

Given that the applicability of NYSDOH Part 5 Drinking Water Standards relates to the use of the impacted groundwater as a drinking water source and given that the land over the contaminated groundwater could potentially be developed, the Department has determined there is a need to evaluate options for compliance with Part 5 to address this exposure. Though the FS did adequately address remedial options for the on-site contamination, it did not adequately evaluate options to address the off-site plume such as providing an alternate drinking water supply and treating water at point of use. Given this, the Department has decided to defer the selection of the remedy for the off-site portion of the plume to the second operable unit.

APPENDIX A

FIGURES AND TABLES



NEW YORK

QUADRANGLE LOCATION

0 1000 2000 FEET

GRAPHIC SCALE

REFERENCE:
BASE MAP PREPARED FROM PORTIONS OF USGS 7.5 MINUTE QUADRANGLES: E.GREENBUSH, N.Y.; DELMAR, N.Y.; ALBANY, N.Y.; TROY SOUTH, N.Y. 1953, PHOTOREVISED 1980

TITLE
SITE VICINITY MAP

PROJECT
STERLING ORGANICS – SITE 3
EAST GREENBUSH, NEW YORK

Dames & Moore
WILLOW GROVE, PENNSYLVANIA

SCALE AS SHOWN	DWN. BY EMM	JOB NO. 07425–038
DATE 10/5/89	APPR. BY FB	FIG. NO. 1-1

FIGURE 2

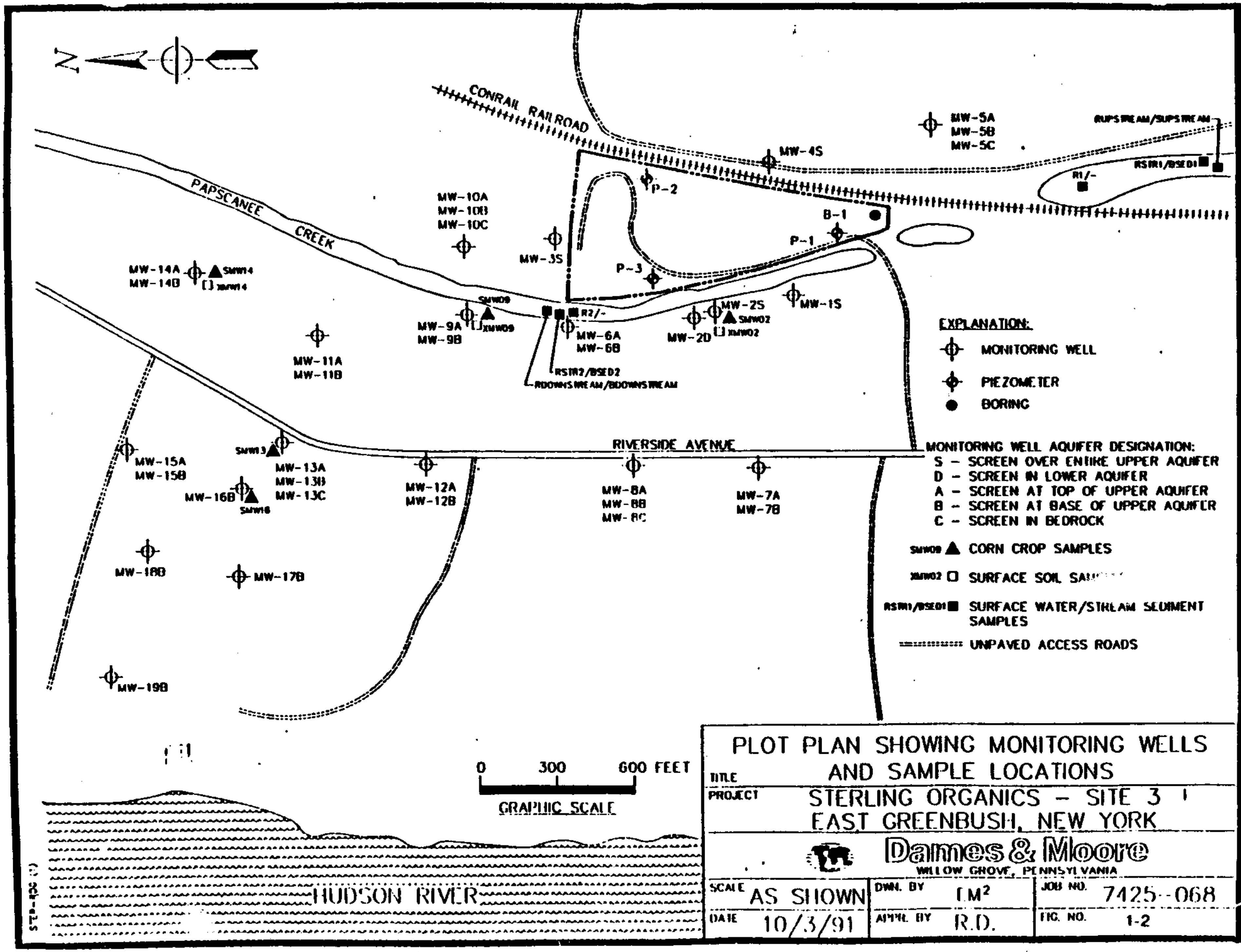
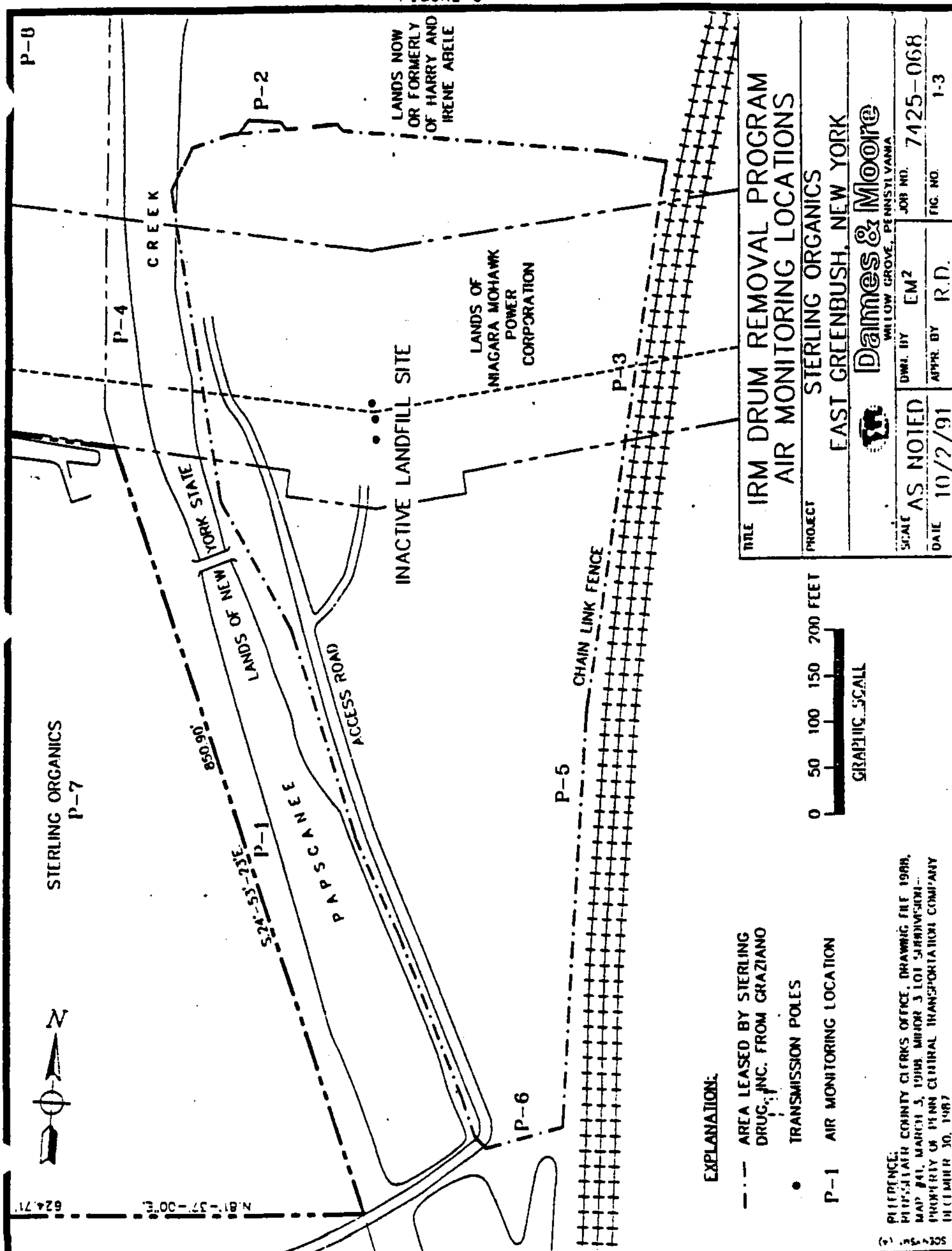
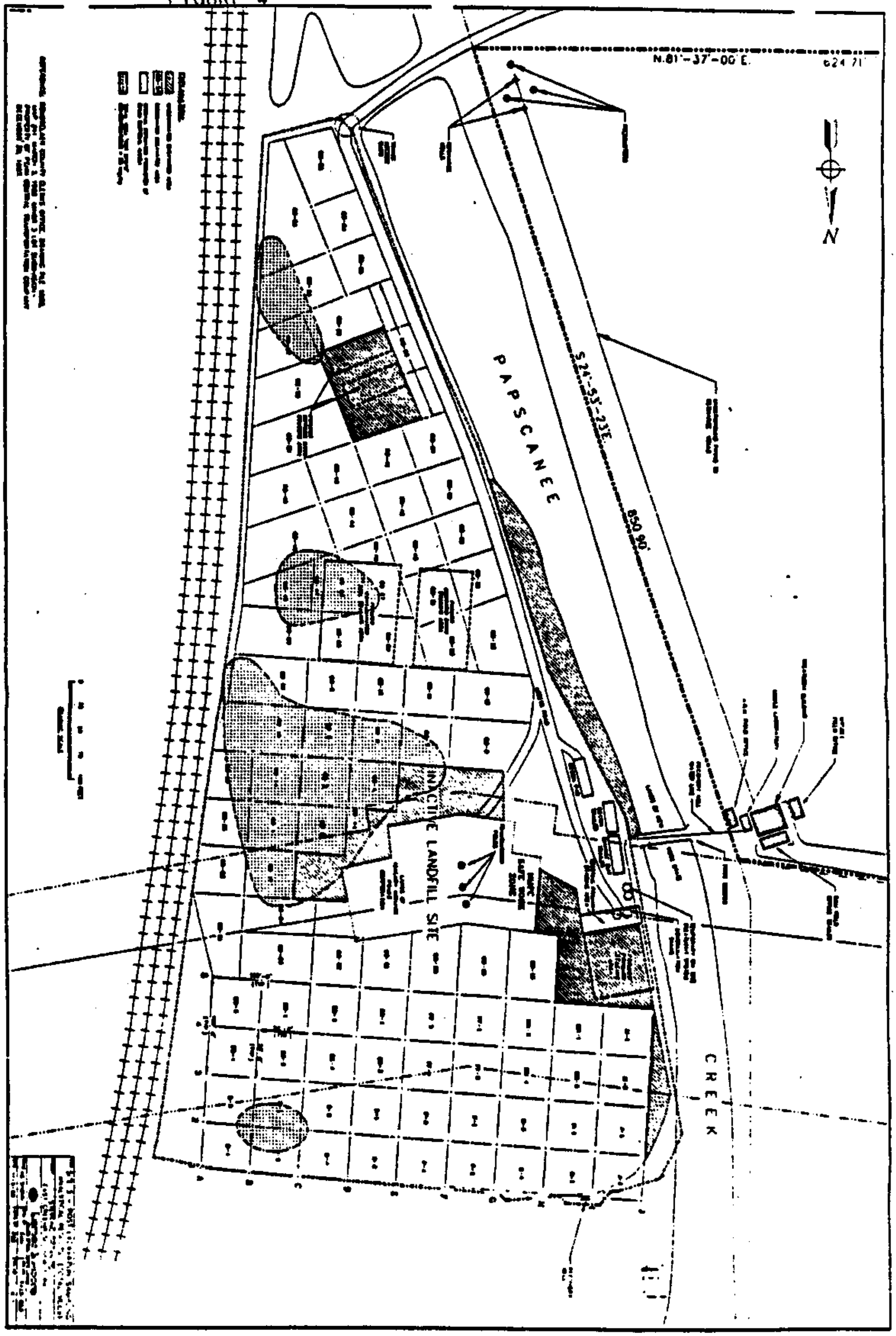

N
CONRAIL RAILROAD
PAPSCANEE CREEK
RIVERSIDE AVENUE
HUDSON RIVER
MW-1S
MW-2S
MW-2D
MW-3S
MW-4S
MW-5A
MW-5B
MW-5C
MW-6A
MW-6B
MW-7A
MW-7B
MW-8A
MW-8B
MW-8C
MW-9A
MW-9B
MW-10A
MW-10B
MW-10C
MW-11A
MW-11B
MW-12A
MW-12B
MW-13A
MW-13B
MW-13C
MW-14A
MW-14B
MW-15A
MW-15B
MW-16B
MW-17B
MW-18B
MW-19B
P-1
P-2
P-3
B-1
R1/-
R2/-
RSTR1/BSED1
RSTR2/BSED2
RUPSTREAM/SUPSTREAM
RDOWNSTREAM/BDOWNSTREAM
SMW02
XMW02
SMW09
XMW09
SMW13
SMW14
XMW14
SMW16
EXPLANATION:
MONITORING WELL
PIEZOMETER
BORING
MONITORING WELL AQUIFER DESIGNATION:
S - SCREEN OVER ENTIRE UPPER AQUIFER
D - SCREEN IN LOWER AQUIFER
A - SCREEN AT TOP OF UPPER AQUIFER
B - SCREEN AT BASE OF UPPER AQUIFER
C - SCREEN IN BEDROCK
SMW09 CORN CROP SAMPLES
XMW02 SURFACE SOIL SA
RSTR1/BSED1 SURFACE WATER/STREAM SEDIMENT SAMPLES
UNPAVED ACCESS ROADS
0 300 600 FEET
GRAPHIC SCALE
TITLE PLOT PLAN SHOWING MONITORING WELLS AND SAMPLE LOCATIONS
PROJECT STERLING ORGANICS - SITE 3 EAST GREENBUSH, NEW YORK
Dames & Moore
WILLOW GROVE, PENNSYLVANIA
SCALE AS SHOWN
DWN. BY LM²
JOB NO. 7425-068
DATE 10/3/91
APPR. BY R.D.
FIG. NO. 1-2

FIGURE 3



P-8
P-2
LANDS NOW OR FORMERLY OF HARRY AND IRENE ABELE
CREEK
P-4
LANDS OF NIAGARA MOHAWK POWER CORPORATION
INACTIVE LANDFILL SITE
P-3
YORK STATE
LANDS OF NEW
CHAIN LINK FENCE
ACCESS ROAD
850.90'
STERLING ORGANICS
P-7
P-1
P A P S C A N E E
P-5
S.24°-53'-23"E.
P-6
N
N.81°-37'-00"E.
624.71'
0 50 100 150 200 FEET
GRAPHIC SCALE
EXPLANATION:
AREA LEASED BY STERLING DRUG, INC. FROM GRAZIANO
TRANSMISSION POLES
P-1 AIR MONITORING LOCATION
REFERENCE:
RENSSELAER COUNTY CLERKS OFFICE, DRAWING FILE 1988, MAP #41, MARCH 3, 1988, MINOR 3 LOT SUBDIVISION - PROPERTY OF PENN CENTRAL TRANSPORTATION COMPANY DECEMBER 30, 1987
TITLE IRM DRUM REMOVAL PROGRAM AIR MONITORING LOCATIONS
PROJECT STERLING ORGANICS EAST GREENBUSH, NEW YORK
Dames & Moore
WILLOW GROVE, PENNSYLVANIA
SCALE AS NOTED
DWN. BY EM²
JOB NO. 7425-068
DATE 10/2/91
APPR. BY R.D.
FIG. NO. 1-3

FIGURE 4


N.81°-37'-00"E.
624.71'
N
PAPSCANEE
S24°-53'-23"E.
850.90'
INACTIVE LANDFILL SITE
CREEK

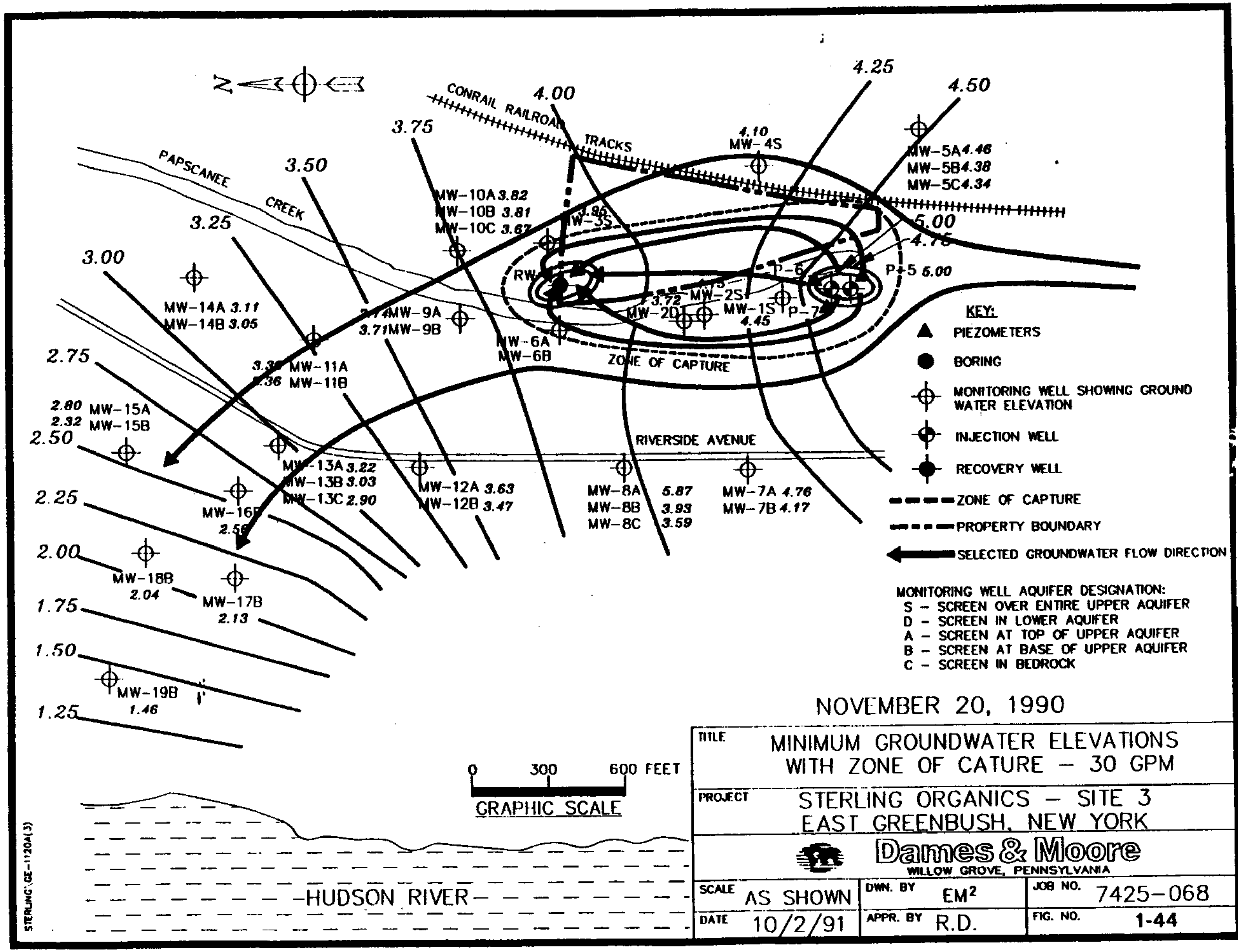

N
CONRAIL RAILROAD TRACKS
PAPSCANEE CREEK
4.00
4.25
4.50
3.75
3.50
3.25
3.00
2.75
2.50
2.25
2.00
1.75
1.50
1.25
5.00
4.75
4.10 MW-4S
MW-5A 4.46
MW-5B 4.38
MW-5C 4.34
MW-10A 3.82
MW-10B 3.81
MW-10C 3.67
3.86 MW-3S
RW
P-6
P-5 5.00
P-7
3.72 MW-2D
MW-2S
MW-1S 4.45
MW-14A 3.11
MW-14B 3.05
3.74 MW-9A
3.71 MW-9B
MW-6A
MW-6B
ZONE OF CAPTURE
3.39 MW-11A
3.36 MW-11B
2.80 MW-15A
2.32 MW-15B
RIVERSIDE AVENUE
MW-13A 3.22
MW-13B 3.03
MW-13C 2.90
MW-12A 3.63
MW-12B 3.47
MW-8A 5.87
MW-8B 3.93
MW-8C 3.59
MW-7A 4.76
MW-7B 4.17
MW-16B 2.59
MW-18B 2.04
MW-17B 2.13
MW-19B 1.46
KEY:
PIEZOMETERS
BORING
MONITORING WELL SHOWING GROUND WATER ELEVATION
INJECTION WELL
RECOVERY WELL
ZONE OF CAPTURE
PROPERTY BOUNDARY
SELECTED GROUNDWATER FLOW DIRECTION
MONITORING WELL AQUIFER DESIGNATION:
S - SCREEN OVER ENTIRE UPPER AQUIFER
D - SCREEN IN LOWER AQUIFER
A - SCREEN AT TOP OF UPPER AQUIFER
B - SCREEN AT BASE OF UPPER AQUIFER
C - SCREEN IN BEDROCK
NOVEMBER 20, 1990
0 300 600 FEET
GRAPHIC SCALE
HUDSON RIVER
TITLE MINIMUM GROUNDWATER ELEVATIONS WITH ZONE OF CATURE - 30 GPM
PROJECT STERLING ORGANICS - SITE 3 EAST GREENBUSH, NEW YORK
Dames & Moore
WILLOW GROVE, PENNSYLVANIA
SCALE AS SHOWN
DWN. BY EM2
JOB NO. 7425-068
DATE 10/2/91
APPR. BY R.D.
FIG. NO. 1-44
STERLING GE-1120A(3)

FIGURE 5

Table 1

Chronological List of Major Activities

1977	Landfill closed
April 1982	Phase I Remedial Investigation Activities Commented
July 1984	Phase I Remedial Investigation Final Report Issued
July 1985	Phase II Remedial Investigation Activities Commenced
January 1987	Phase II Remedial Investigation Final Report Issued
September 1987	Groundwater Remedial Design Report Issued
May 1988	Groundwater Pilot Treatment System Design Issued
November 1989-Aug 1990	IRM Drum Removal Program
March 1991	Investigation of Clay Breach Area
May 1991	Vacuum Extraction Pilot System
October 1991	FS submitted
January 1992	FS accepted by NYSDEC

Table 2

Groundwater Results On-site
Concentrations in Parts Per Million(ppm)

Constituent	Range of conc.
Benzene	89 - 290
Toluene	1.5 - 42
Acetone	2 - 410
Methyl Thiophene	2 - 30
Ethyl Ether	ND - 8
1,2-Dichloroethane	ND - 130
Trichloroethene	ND - .81
Chloroform	ND - 2.1

Groundwater Results Off-site
Concentrations in Parts Per Million(ppm)

Constituent	Range of conc.
Benzene	ND - .250
Diethyl-ether	ND - 1.5

ND - Below the quantitation limit of the laboratory

TABLE 3

SEDIMENTS

	Frequency Found	Upstream Conc. PPb	Downstream Conc. PPb
Base Neutral Organics			
Alkane	2	1970	
Anthracene	1	703	
Benzo(b)Fluoranthene	1	530	
Benzo(k)Fluorathene	1		616
Benzo(a)Pyrene	1	950	
Chrysene	1	288	
Fluoranthene	2	798	817
Naphthalene	1	166	
Phenanthrene	1	326	
Pyrene	2	666	717
Metals			
Arsenic	2	12000	12000
Cadmium	1	360	
Chromium	2	17000	31000
Lead	2	33000	67000
Mercury	2	200	600

Table 4

Soil Results On-site
Concentrations in Parts Per Million(ppm)
Levels are the Average Concentration

Constituent	Clay Breach Area Post-excavation	Clay Breach Area Soil/Debris	Hotspots Post-excavation	Hotspots Soil/Debris	Remaining Areas Post-excavation	Remaining Areas Soil/Debris
Benzene	556.0	259.0	79	50.7	0.454	2.94
Toluene	52.0	28.0	230.0	36.8	0.328	2.26
1,2-DCA	21.0	ND	ND	6.03	0.159	0.225
Xylenes	28.7	6.1	3.1	11.9	0.123	0.410
Chloroform	8.6	ND	ND	0.767	0.012	0.248
Phenol	2.1	10.5	8.75	1.92	0.090	0.571
4-Methylphenol	20.2	10.8	20.6	ND	0.141	ND

ND - Below laboratory quantitation limits

1,2-DCA - 1,2-Dichloroethane

TABLE 5

CONTAMINANT SPECIFIC CLEANUP GOALS

CONSTITUENT	CLEANUP GOALS LEVEL (PPM)
Benzene	0.756
Xylenes	2.16
Ethylbenzene	9.9
toluene	2.7
Tetrachloroethene	2.52
Trichloroethene	1.26
Acetone	0.198
2-Butanone	0.9
4-Methyl-2-Pentanone	1.8
1,1-Dichloroethane	0.36
1,2-Dichloroethane	0.18
1,1,2,2-Tetrachloroethane	1.08
1,2-Dichloroethene(trans)	0.54
Chlorobenzene	2.88
Chloroform	0.36
Phenanthrene	50.0
Fluoroanthene	50.0
Pyrnene	50.0
Benzo(a)pyrene	0.330 or MDL
4-Methylphenol	1.8
Naphthalene	23.40
2-Methylnaphthalene	50.0
Anthracene	50.0
bis(2-ethylhexyl)phthalate	50.0
Diethylphthalate	12.780
Chrysene	0.72
Benzo(a)anthracene	0.330 or MDL
Phenol	0.330 or MDL

MDL - Method Detection Limit

APPENDIX B

RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY FOR PROPOSED REMEDIAL ACTION PLAN
STERLING DRUG SITE #3
TOWN OF EAST GREENBUSH
RENSSELAER COUNTY, NEW YORK
ID # 442011

RESPONSE TO COMMENTS PROVIDED BY STERLING ORGANICS
MARCH 24, 1992

GENERAL COMMENTS

1. The delineation between the onsite and the offsite plume is not evident in the Proposed Remedial Action Plan (PRAP). Collection and containment of the onsite plume is currently being performed, and has been successful at reducing contaminant concentrations in the groundwater beneath the site and eliminating further contaminant migration. The diethyl ether in the offsite plume migrated from the site prior to the initiation of groundwater recovery activities, and is outside of the zone of influence of the existing recovery well. The text should be revised to further illustrate the differentiation between the two plumes.

   In order to clarify the actual situation at the site, the language will be modified. There is actually only one plume and the current groundwater treatment system is only collecting and treating a portion of it. As far as differentiation of the two sections of the plume the language will be modified and figures will be added to indicate the zone of influence of the treatment system.

2. The text regarding the impact of the site on groundwater appears to indicate that the constituents of interest are leaching from the entire site, rather than the Clay Breach Area (CBA), where free product is still present. The majority of the site is underlain by a confining layer which minimizes the impact of the residual contaminants present in site soils on the groundwater.

   The PRAP is not intended to be an all inclusive document. As suggested in the PRAP, additional details of the results of the investigations can be found in the Remedial Investigation Reports and Feasibility Study. Since the PRAP was written based on the data presented in those documents it can be deducted that the only area where there is a known impact on the groundwater is the area where the landfill monitoring wells are located.

3. Various sections of the text indicate that the soils at the site are "heavily" contaminated with a variety of constituents, including volatile organic compounds and petroleum hydrocarbons. "Heavily" implies that the soils throughout the site contain visible quantities of contaminants, when in fact this is not the case. We suggest that the text be revised to state that the

soils contain contaminants, or that the definition of such terms as "heavily" be provided in the text.

> The term heavily was used in reference to the area where the clay like material below the site had been penetrated, the CBA area; where the free product was found in soils and on the water table. It is the Department's belief that the term heavily does not imply that soils throughout the site contain visible quantities of contaminants.

4. Goals and objectives appear to be used interchangeably throughout the text. As detailed in Section 2.0 of the Final Draft Feasibility Study (Final Draft FS) for Sterling Site 3, remedial action goals are theoretical limitations for planning remedial activities, while remedial action objectives are the practicable, specific end point or cleanup goal to be achieved by remedial action. The objective may differ from the remedial action goal because technical, logistical and condition-specific considerations are taken into account when determining the remedial objective, whereas the remedial action goal is a theoretical limit. NYSDEC's Recommended Cleanup Goals, as presented in the Final Draft FS, and the Groundwater Standards and Guidelines presented in the Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1. AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES, dated November 15, 1991, will be used as the basis for evaluating the progress of remedial activities, but are not considered to be the remedial objectives for site activities.

> The text has been modified to clearly define the goals and objectives for the remediation. As stated in the PRAP the goals for the remediation of the groundwater also include New York State Department of Health's Part 5 Drinking Water Standards.

5. Recovery and treatment of the offsite plume was evaluated as part of the Final Draft FS. Dames & Moore performed mixing zone calculations to determine the potential impact of diethyl ether, the constituent of interest in the offsite plume, on the Hudson River water quality, should this plume contact the river. The results of these calculations indicates that even if the highest concentration of diethyl ether historically detected in the offsite plume (2,230 ppb in Monitoring Well 16-B, approximately 1,200 feet upgradient of the river, in June, 1986) were to be discharged into the Hudson River, the resulting concentration would only be approximately of 0.024 ppb above background within the river system.

   There are currently no promulgated standards, criteria or guidelines available for diethyl ether, either health-based ingestion criteria or for protection of aquatic life, so there is no basis for comparison. A risk assessment was performed on the potential impact of ingesting the groundwater at the site, and the detected diethyl ether concentration was found to be below the acceptable risk-based level of 14,000 ug/l. The exceedingly low concentrations which would be attributable to the plume discharging to the river, combined with available risk-based information previously supplied to NYSDEC, indicate that this concentration is not deemed to be at a level concern within the riverine system.

A cost analysis was also performed to evaluate the additional costs that would be incurred if offsite plume recovery activities were implemented. The approximate present worth capital and operation and maintenance cost associated with the installation of the recovery system, upgrading the existing groundwater treatment building, process units and discharge systems, calculated over 30 years, is approximately $2.6 million dollars, as detailed in Attachment J of the Final Draft FS.

The existing onsite groundwater treatment system has proven effective at controlling contaminant transport from the site into the offsite plume. The proposed landfill remediation activities will also reduce subsurface contaminant concentrations and provide additional source control, effectively minimizing the potential for further contaminant migration from the site into the offsite plume. Thus, the offsite plume will continue to naturally degrade and attenuate in the subsurface since the source is being treated and contained at the site. Therefore, based on the negligible impact of the offsite diethyl ether plume on the Hudson River, the potential costs associated with plume recovery, and the operations currently in place to control onsite additional plume migration, a No Action alternative is still proposed for the management of the offsite plume. Further investigation associated with the recovery of the offsite plume is considered unwarranted at this time.

The Department has reviewed your comment and the discussion on the off-site portion of the plume in the FS. As stated in the ROD the Department is deferring the decision on the off-site portion of the plume to a second operable unit. Given that the applicability of NYSDOH Part 5 Drinking water standards relates to the use of the impacted groundwater as a drinking water source and given that the land over the contaminated groundwater could potentially be developed , the department has determined there is a need to evaluate options to achieve compliance with this regulation to address this potential exposure.

SPECIFIC COMMENTS

1. Page 2. Groundwater Hydrology - **"The nearest groundwater well is located at the Gold Bond Building Products Plant north of the site and has not been impacted by the site."** NYSDOH/NYSDEC has informed Dames & Moore that Gold Bond wells are reportedly not used for drinking water, and that there are no records of sampling available. Dames & Moore cannot comment on the accuracy of this statement.

   The text has been modified to reflect that drinking water is supplied by bottled water and the well is no longer used.

2. Page 3, first bullet - **A floating layer of chemical product has been found under the site."** The term "floating product" is actually not indicative of existing site conditions. The residual contamination present in the subsurface in the CBA area does not exist as a continuous layer, but rather as discrete pockets of material at the saturated/unsaturated zone interface. The preferential flow zone created by the installation of the vacuum extraction recovery well facilitated accumulation of the contaminants into the area around the wellhead, but this is not indicative of current subsurface conditions. This statement indicates that free product is present under the entire site.

   The text has been modified as follows:

   "Pockets of chemical product have been found under the site."

3. Page 3, first bullet - **"A groundwater treatment system was installed in 1989 and is currently working to control the migration of contaminants from the site.** It is unclear as to what the term "working to control" means in this context. The effectiveness of the groundwater recovery and treatment system should be clarified in the RAP. It is our contention that the contaminants in the offsite plume migrated from the site prior to the installation of the groundwater treatment system (GWTS) in 1989. Based on actual operational data and groundwater monitoring results for the onsite and the offsite wells, the GWTS is controlling the migration of contaminants from the site. The reductions in contaminant concentrations in the offsite plume further indicate that the GWTS is preventing migration of site contaminants into the offsite plume.

   The text chosen accurately portrays the situation at the site. While the system is controlling the migration of the on-site portion of the plume and is not controlling the migration of the off-site portion of the plume.

4. Page 3, second bullet - **"Sediments and surface water in the Papscanee Creek do not appear to be severely impacted by the site."** The impact of the site on the sediments and surface water in Papscanee Creek has been minimal, based on the information obtained during previous site investigations. The majority of the polynuclear aromatic hydrocarbon (PAHs) listed in the Table 3 of the PRAP were detected in the upstrea (south of the site) sediments only. Only three (3), benzo(k) fluoranthene, fluoranthene and pyrene, were detected in downstream locations (north of the site). Of these, only benzo(k)fluoranthene was detected in the downstream location exclusively. These results cannot be considered indicative of a site impact on the creek. The general lack of surface water flow within the creek bed limits contaminant transport and distribution, and sediment and surface wate samples.

As the PRAP states, the sediments and surface water do not appear to be severely impacted by the site. The impacts from the site and or lack thereof due to the drum removal and final remedial activities will be determined during the proposed sediment and surface water sampling program. Table 3 accurately reflect the results from the Remedial Investigations.

5. Page 3, fourth bullet - **"Approximately 185,000 cubic yards of material contaminated soil, research wastes, consumer returns and construction debris remain at the site."** The 185,000 cubic yards of material presented in the PRAP as remaining at the site was based on excavation of the entire site to the water table and was used for FS cost estimation purposes only. It was not meant to be indicative of the total amount of contaminated soil, debris, etc., nor the total amount of material requiring treatment after the completion of the Drum Removal IRM.

This volume was used because it was the best estimate provided in the text of the FS.

6. Page 4, second paragraph - **"The most significant component of the remaining contamination consists of soils and groundwater contaminated with volatile and semivolatile organic chemicals and petroleum hydrocarbons."** Petroleum hydrocarbons are listed as one of the constituents of interest remaining in site soils. Petroleum hydrocarbons have been detected in site soils during previous investigations, but have never been referenced as a constituent of interest in either site soils or groundwater.

Based on the chemical analysis, it appears that the petroleum hydrocarbons are mixed with the semivolatile and volatile contaminants at the site. In order to remove the contaminants it will be necessary to remove the Total Petroleum Hydrocarbons(TPHs).

7. Page 4, second paragraph - **"At present, these risks are minimized because the heavily contaminated soils are only present at depth."** Please provide a definition of "heavily contaminated" in the RAP. (Refer to General Comment Number 3).

   At this location in the PRAP the terms "heavily contaminated" were referring to the area where the free product was found, the Clay Breach Area(CBA) as explained in general comment number 3. This paragraph also indicates where higher concentrations of contaminants were found by referencing Figure 4 of the PRAP.

8. Page 4, third paragraph, second sentence - **"The contaminated soils are releasing chemicals into the groundwater in exceedance of groundwater standards."** This statement indicates that the soils throughout the entire site are impacting groundwater. The confining clay layer present throughout the majority of the site effectively minimizes the potential for contaminant transport from the other areas of concern into the aquifer. The CBA area, where the confining clay layer is absent, is a potential conduit for subsurface transport, but the impact of this area on the environment is minimized through free product recovery and the effectiveness of the GWTS at controlling contaminant migration from the site.

   The PRAP is not an all inclusive document. The document is a summary of the results presented in the Phase I and II Remedial Investigations and Feasibility Study. Since groundwater data has not been gathered from other areas during any of the investigations, it can be inferred that the only confirmed area where contaminants are impacting the groundwater is in the vicinity of the CBA.

9. Page 4, third paragraph, second sentence - **"Previous sampling had found benzene to be present off-site."** This sentence should be clarified to underscore the fact that diethyl ether is the only constituent of interest present in the offsite plume. The November 1991 sampling round, which utilized the lower analytical detection limit of 0.5 ppb for benzene, also did not reveal the presence of benzene in the offsite plume.

   The previous sentence has been modified to state that the most recent round of sampling has found only diethyl ether at detectable concentrations.

10. Page 5, Sediments, last sentence - **The goal of any remediation of sediments present in the Papscanee Creek will be first to establish if there are impacts from the site and if necessary, evaluate what remedial alternatives are feasible."** Analytical results of sediment samples obtained during previous site investigations indicate that the site has had minimal impact on Papscanee Creek to date. The goal of the pre-remedial action (RA) sampling event will be to establish a baseline for comparing the surface water and sediment quality of Papscanee Creek prior to and subsequent to remedial actions at the site. The necessity

for sediment remedial activities will be assessed after the completion of the post-RA sampling event.

The intent of the sampling program of the sediments and surface water in the Papscanee Creek is to determine if activities during the drum removal have had any impacts and if so to determine if remedial action is warranted. The sampling to be performed after the final capping is to determine what impact if any the final remediation might have had on the Papscanee. Any subsequent sampling of the surface water and sediments will be performed to determine the effectiveness of the final remediation.

11. Page 7, Second Paragraph - **"A temporary PVC cap will be placed over the site to assist in removal of contaminants and stabilize the exposed areas."** A temporary PVC cap will be used to eliminate short-circuiting during the operation of the VES, if necessary.

The language in the PRAP was chosen to be similar to what was found in the FS in Section 5.3.3.1 on pages 5-21 and 5-22.

12. Page 9, Alternative 9, last sentence - **"Groundwater recovery and treatment activities will continue through the excavation and afterwards until treatment goals or groundwater standards are met."** The extent of groundwater recovery and treatment operations under this all alternative, as with the other alternatives retained for detailed evaluation, will be continuously evaluated during the RA. The effectiveness of aquifer restoration activities will be periodically assessed to determine if attainment of the groundwater remedial action goals is feasible. If aquifer restoration goals cannot be achieved, a justification package requesting cessation of recovery activities will be prepared for NYSDEC review and approval.

The text has been revised to state "treatment objectives" rather than treatment goals.

13. Page 9, last paragraph - **"The feasibility study also evaluated enhancing the system to include a collection system to capture all or a portions the off-site plume and an additional treatment unit to effectively treat diethyl-ether."** The FS evaluated the feasibility of enhancing the GWTS for collecting and treating the offsite plume, and found it to be unjustified based on the negligible risk associated with the offsite plume on potential receptors and the Hudson River and cost associated with the plume recovery. Refer to General Comment Number 5 for a more detailed discussion of the evaluation performed on the offsite plume.

The Department's policy for evaluating remedial alternatives contains two categories of criteria. The first category, the Threshhold Criteria, includes Overall Protection of Human Health and the Environment and Compliance with Standards, Criteria, and Guidance values. Remedial Alternatives should meet both of these criteria or provide justification for non-compliance. The FS evaluation for the off-site should include NYSDOH Part 5 Drinking Water Standards. Diethyl ether is an "unspecified organic contaminant" and the corresponding drinking water limit is 50 ppb. As stated in the ROD, the Department is deferring the decision on the off-site portion of the plume to a second operable unit so that a further evaluation can be performed.

14. Page 10. Department's Preferred Alternative - **"The preferred alternative will include collection and treatment of the off-site plume."** Alternative 3, as presented in the Final Draft FS, did not include the offsite plume recovery option. Various other potentially feasible options for groundwater recovery or treatment were never formally developed or evaluated specifically for the offsite plume in the FS. The costs provided for Alternative 3 also did not reflect inclusion of the offsite plume recovery option. Therefore, incorporation of the offsite plume recovery scenario into the selected alternative is not considered justified without further alternative development and evaluation.

    The Department has deferred the decision on the off-site portion of the plume to a second operable unit. This ROD will select remedy for the off-site portion of the plume.

15. Page 10, Department's Preferred Alternative - **"Therefore, additional information will be gathered during the design phase to determine the efficacy of treating the groundwater [in the offsite plume] to meet the standards."** The collection of additional information was never addressed during the preparation of the FS. Available information on the migration of the plume, potential impacts of the plume on the Hudson River, the lack of complete exposure pathway and the overall innocuous nature of diethyl ether indicate that the offsite plume will not have a significant impact on public health or the environment. The collection of additional information will not enhance the feasibility of collecting the plume, which has already been established, nor will it provide additional insight into the behavior or impact of the offsite plume. As stated in Section 2.0 of the FS, recovery and treatment of the offsite plume is not considered imperative or cost-effective at this point in time.

    The Department is deferring decision on the collection of the off-site portion of the plume to a second operable unit. Given that the applicability of NYSDOH Part 5 Drinking water standards relates to the use of the impacted groundwater as a drinking water source and given that the land over the contaminated groundwater could potentially be developed , the department has determined there is a need to evaluate options for compliance with this regulation to address this potential exposure.

16. Page 11, Compliance with Applicable or Relevant and Appropriate New York State Standards, Criteria and Guidelines (SCGs, third sentence - **"The preferred alternative will include collection and treatment of the off-site plume."** As defined in the FS, the preferred alternative does not include recovery and treatment of the offsite plume. This option was never subjected to the FS evaluation process, and is not considered an integral part of the selected remedial alternative.

The Department has deferred a decision on the off-site portion of the plume to a second operable unit; therefore, discussion of a remedy to address the corresponding groundwater contamination has been deleted.

17. Page 14, Summary of the Preferred Alternative - **"The estimated present worth cost is $14,109,640."** The present worth cost for the preferred alternative as presented in the FS is $11,411,141. The costs presented in this section incorporate the recovery of the offsite plume, which is not considered an integral part of the selected alternative.

The Department has deferred decision on the off-site portion of the plume; therefore, the related costs will be deleted from the discussion.

18. Page 14, Summary of the Preferred Alternative, Item 1 - **Currently a vacuum extraction pilot system is being evaluated to assist in the final design program."** The vacuum extraction pilot test has been completed. VES has been found to be effective at reducing VOC contamination in the areas that were studied, and will be applicable in the hot spot areas remaining at the site.

The ROD will be modified to include this information.

19. Page 14, Summary of the Preferred Alternative, Item 2, - **A borehole and sampling program to clearly define the areas to be addressed by the application of the vacuum extraction system."** The areas of concern at the site have been defined during previous site activities. Additional sampling activities will be performed during the RA to evaluate the progress of the remediation, not to define the areas requiring remediation.

The statement in the ROD has been modified

20. Page 14, Summary of the Preferred Alternative, Item 3 - **"The [VES] treatment system will operate until the treatment**

objectives are attained or the Department determines that the system is no longer effective." The treatment objective defined in the Final Draft FS was the 90 percent overall reduction in average organic contaminant concentrations in the soils. The treatment goals are the Recommended Soil Cleanup Objectives provided by NYSDEC, which will be used to monitor the progress of remedial activities. These "objectives" will be used as the theoretical endpoint for remedial activities (i.e., goals), but the actual degree of cleanup attainable at the site will be determined during the RA. This section should be clarified.

> The term objectives has been changed to goals. The Department has not agreed to the 90 % overall reduction in average organic contaminant concentrations as a cleanup objective. The vacuum extraction system appears to perform well on most of the soils at lesser depths, however, there is some question as to the effectiveness on soils near the water table. Therefore the vacuum extraction system will be continually evaluated to determine when it is no longer being effective at which time the Department will decide as to whether any additional treatment by alternative means will be required.

21. <u>Page 14, Summary of the Preferred Alternative, Item 7</u> - **During the design an evaluation of the feasibility for collecting and treating the downgradient plume will be performed."** Mixing zone calculations on the potential impact of the diethyl ether plume on the Hudson River were provided in Appendix J of the Final Draft FS. The results of these calculations showed that even in the most conservative situation, the increase in diethyl ether concentration in the Hudson River would be approximately 0.024 parts per billion (ppb), assuming that the plume would even migrate to that point. Diethyl ether does not have promulgated water quality criteria available; however, an LD_{50} value of 2,138 parts per million (ppm) for guppies (Poecilia reticula) is available (Handbook of Environmental Data on Organic Chemicals, Verschueren). Based on this criteria, it is our opinion that the impact of the offsite plume on the Hudson River would be negligible, if the plume should advance to that point.

The risk assessment performed as part of the FS indicated that the acceptable groundwater ingestion concentration under a light industrial land use scenario would be 14,000 ppb. The most downgradient concentration of diethyl ether detected in the offsite plume during them most recent round of sampling (November 1991) was 255 ppb, which is significantly lower than the health-based concentration. The potential risks associated with the ingestion of the offsite groundwater plume would be minimal.

Therefore, based on the results of the mixing zone calculations and the risk assessment, the risk associated with the diethyl ether in the offsite plume is considered minimal. The feasibility of recovering the offsite plume may be performed using information obtained during previous site activities, but it is our opinion that this work is not warranted.

Please refer to response to general comment 5.

22. Page 15, Item 8.1 - **The remedial goals for the subsurface soils are to attempt to clean the soils to the levels found on Table 5.** Table 5 is entitled "Contaminant Specific Cleanup Objectives." As stated in the Final Draft FS, the remedial objectives for the soil RA are a 90 percent reduction in overall average organic contaminant concentrations across the site; the remedial goals for site oils are specified in Table 5 of the PRAP. Please revise the table accordingly.

The term objectives has been changed to goals.

23. Page 15, Item 8.2 - **The remedial objectives for the groundwater are the standards contained within the NYSDEC 700-705 groundwater and surface waster standards and NYSDOH Drinking Water Standards."** The remedial objectives for the groundwater RA have not been formally defined and will be evaluated during the course of GWTS operation; the remedial goals are the standards and guidelines contained within NYCRR 700-705 groundwater and surface water standards and NYSDOH drinking water standards.

The text of the ROD has been modified.

24. Page 15, Item 8.2, first star - **"engineering controls such as long term gradient controls by low level pumping, will be implemented as containment measures;"** We are unsure of the exact meaning of "low level pumping" and request further clarification of what would be required if this contingency was implemented.

    At some point during the operation of the groundwater treatment system, the Department may decide that it is no longer effective. At such time, alternate means for adequate groundwater treatment may need to be implemented. Low level pumping is one of the potential alternatives the Department may consider. Low-level pumping would likely involve a modification to the current system by changing location of extraction and/or reinjection wells to minimize the amount of water to be pumped in order to control off-site migration of contaminants.

25. Page 16, Last paragraph - **"The decision to invoke any or all of these measures may be made during a periodic review of the remedial action, which will occur at 5 year intervals."** It is our understanding that a periodic review of the effectiveness of the RA may occur prior to the expiration of the 5-year interval, depending on the progress of remedial activities at the site. This should be specified in the RAP.

The sentence has been modified to say "at a maximum" of 5-year intervals.

26. Table 2 - **"Groundwater Results On-Site and Off-Site"** The contaminant concentration range presented in this table appears to indicate that significant concentrations of the constituents of interest were detected in all wells installed at the site, and that elevated concentrations of contaminants are still being detected to date. This table should be revised to indicate that contaminant concentrations in the offsite wells have been steadily decreasing since the implementation of the groundwater recovery and treatment operations, and that a number of the wells have not exhibited detectable concentrations of the constituents of interest listed in this table.

    Again, the PRAP is a document that summarizes the data collected from the Remedial Investigations and Feasibility Study. The PRAP refers to these documents for more detailed information.

27. Table 5 - **Contaminant Specific Cleanup Objectives"** The word "objective" in this table should be replaced with "goal."

    The term objectives has been replaced with goals.

RESPONSIVENESS SUMMARY CONTINUED
FOR STERLING DRUG SITE #3 ID 442011

RESPONSE TO COMMENTS FROM JEANNE CASATELLI AND ROBERT FAKUNDINY

Q1. Can the State provide plume maps showing the distribution of pollution in the groundwater and the concentration values at all sample points?

R1. Plume maps are included in the feasibility Study which is available for public review at the Rensselaer Public Library.

Q2. How much land and water(surface and groundwater) are truly impacted both on and off the site?

R2. The land impacted is limited to the area of the site itself, approximately 10 acres. The area under which the groundwater plume exists is approximately 23 acres. The volume of contaminated groundwater is approximately 30 million gallons. No surface water has been significantly impacted.

Q3,6 and 7. These questions concerned the future use of the site.

R3,6 and 7 It is estimated that for thirty years the site will remain fenced and capped with no building, farming or other such use made of the site. Beyond this time frame, the answer depends upon site conditions which would have to be evaluated at the time.

Q4. The PRAP mentions that no wells in the contaminated area are considered "safe" but wells outside the contaminated area are considered "fairly safe". What does "fairly safe" mean?

R4. It is not apparent where the PRAP mentions that wells outside of the contaminated area are "fairly safe". A review of the document did not reveal the source of this comment.

Q5. What degree of certainty is there that the technology used to remediate the site will be effective? Has it been used elsewhere?

R5. Both the groundwater treatment system and the vacuum extraction system have been successfully tested at this site and are commonly used at other hazardous waste sites with similar types of contaminants.

STATE OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

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In the Matter

- of -

a proposed Remedial Action Plan for Sterling Drug
Site #3 - ID # 442011

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TRANSCRIPT OF PROCEEDINGS at a public hearing in the above-captioned matter held by the New York State Department of Environmental Conservation at the East Greenbush Town Hall, 224 Columbia Turnpike, East Greenbush, New York, on the 9th day of March, 1992, commencing at 7:00 p.m.

PRESIDING:

ERIC R. OBRECHT, P.E.,
Hearing Officer

P R O C E E D I N G S

MR. OBRECHT: All right. We would like to get started. I would like to thank everybody for coming here tonight and welcome you to the public meeting on the proposed remedial action plan for Sterling Site #3. Tonight we have this public meeting and participation activities. It offers you the opportunity to comment on the proposed remedy for the aforementioned site.

Some of the people that are present tonight representing the state, John Sheehan, from the New York State Health Department, Bob Filkins, is a geologist for the New York State DEC, and myself. My name is Eric Obrecht and I'm the project manager for the Sterling Site #3.

What I would like to do is you see the agenda, I will be opening up going over the normal review of the RI/FS process and discussion where the project is now. Representatives from Dames and Moore, Frank Vernese, will be going over the results of the remedial investigation results as well as some of the IRM's that have taken place and treatability studies we have done to gather information to develop the feasibility study, and finally, the remed... the cleanup that we've chosen for this site.

I would just like to briefly go over the RI/FS process and give you some background on what is involved in the development of remedial alternatives for hazardous waste sites, inactive hazardous waste sites in New York.

The first step would involve listing the site. This is -- the listing is done at a time when we think there is a potential of hazardous waste to be disposed of in a particular area. The first phase would involve initial studies, preliminary site assements, Phase I, Phase II studies which determine whether or not in actuality, hazardous waste has been disposed of. If it is determined that hazardous waste has been disposed of, the next step we follow into is the remedial investigation feasibility studies phase. What this does is it's an in-depth investigation into the different environmental media, groundwater, surface water, soils, sediments, as well as the air, in determining what impacts there are, nature and the extent of the contamination out there. This information is then used to develop remedial alternatives which are evaluated in the feasibility study. Once the feasibility study organizes all of this information and based on an evaluation process, a preferred alternative is selected. The Department develops a record of decision. The document scopes out the process we actually go through to this point in time and it justifies, I guess, the decision that was made for the cleanup that was selected.

After the record of decision is developed, a -- the project then goes into a design construction phase and that's kind of self-explanatory. The remedy that was selected, designs and specifications that are developed for that, depends on a lot of things. It would depend on the site-specific characteristics, as well as the contaminants and then the actual construction would take place once the designs are approved. Most -- a lot of the sites that we deal with require a long-term monitoring and maintenance program. Some sites will have groundwater treatment which would involve a groundwater treatment system that would run over a period of years. This would require a constant yearly water monitoring program, as well as replacement of equipment that's either been utilized to its fullest extent or needs to be replaced because of -- for whatever reason.

The projects that we have gone through have various types of funding. There are state-financed projects. There are federal-financed projects that we're involved with. There are government-financed projects that are for landfills under Title 3 program and then there are the responsible party projects. The responsible party projects are projects that are paid for and funded by the companies that dispose of waste and -- well, that's what this site is, this is a responsible party project. Sterling has funded all of the investigations, the inner remedial measures, as well as the feasibility study. Under the Department's -- then all of this under the Department's approval and auspices. And finally, the activities that are involved in fronting the participation activities. We have public meetings -- we previously had a public meeting regarding the drum removal that took place out there. Tonight is another public meeting where you're able to comment on the selected remedy or the preferred remedy that we've chosen out there. A couple of dates I want you to be aware of. The public record runs for 30 days. It ran from February -- it runs from February 24th to March 24th. Tonight's public meeting, again, I would like to encourage you not only to comment on the selective alternatives, but the other alternatives that are outlined in the proposed remedial action plan. Copies are available back there.

One other reminder. If you haven't signed up on the sign-in sheet, I would appreciate that you did. O.K.

John Sheehan wants to just briefly discuss the Health Department's role in the remedial investigation.

MR. SHEEHAN: Thank you. The bureau of the Health Department I work for is the Bureau of Environmental Exposure Investigations and our role in the -- in hazardous waste sites is evaluating exposure of humans to chemicals. In order for there to be any kind of risk to people because of chemicals or hazardous waste in the environment, there has to be a route of exposure. In this particular case, because the site is so remote, it's kind of a unique combination of an industrial-agricultural area. It's certainly not in a residential area at the present time. We haven't identified any direct routes of exposure, possibly some exposure from the distant past before the site was controlled. We would consider that very minor and very incidental, so we really haven't identified anything of any significance right at the present time. The -- there's no homes there where people are drinking the groundwater and the site is, as I said, fenced in and controlled. The type of thing we do is to evaluate those situations and the reason that we are involved is to answer any questions that come up, and we try to eliminate exposure, if that is the case, so in this particular case, it is pretty much potential, so if there is any questions along those lines, after the presentation, I would be happy to answer them. Also we have tonight here, Sue Collamer, who is the citizen participation specialist with our department, and I'm not sure that we've done it in this case, but many times we would draw up a fact sheet, if there is a lot of public interest and any questions can also be referred to Sue. Thank you.

MR. OBRECHT: Now, Frank Vernese from Dames and Moore will be going over the results of the remedial investigation as well as some of the IRM's that have taken place outside of the site, and the treatability studies.

MR. VERNESE: Thank you. O.K. What I'm going to try to do is give you some background on the site and, as Eric mentioned before, the results of our remedial investigation and some of the IRM's, interim remedial measures, that have taken place at the site.

I guess the best place to start, where is the site? The site is located approximately two miles south of Sterling Drug's plant site right over here, and here is the Hudson River over here. What we first did is to install wells in order to characterize the site, take borings, take cells, basically what we did is take the Hudson River, this triangular cell of the site, it's seven and a half acres.

It's adjacent to the Conrail tracks. Again, this is north and this side, this is south. What we did is we started back in '83-84, with just a few wells to see what was happening at the site. Essentially, what we have are these circles here, are the wells, and we installed them in various phases. We had one phase, installed the wells, took samples of the soil and the groundwater. We found out that there was some contamination. We wanted to delineate that so we put in an additional phase so eventually we ended up the groundwater is going in this direction towards the Hudson River, so we had wells that are within the groundwater to delineate the extent of the contamination, also to characterize the geological conditions at this site.

In addition to wells, we also took samples of sediments in the river -- I mean in the creek, Papscanee Creek. It's not ground moving. We also took surface water samples in the creek, both upgrading and downgrading in the landfill. In addition, we took soil samples in the general vicinity of the landfill outside of the landfill itself. In addition to that, there used to be corn and we took samples of corn to see if there was any impact there. Additionally, we did a terrestrial study around the entire site in the landfill, outside of the landfill and around the area, and in addition to that, we also looked at air and tested the air at the landfill itself to see if there was any contaminants that might be volatilizing into the air.

To summarize this, in essence what we found -- we didn't find anything in the creek except some basically based nutrients in the sediment. We didn't find anything in the corn. We didn't find anything off site in the soil, and we didn't find anything that was emanating or volatilizing off the landfill property itself. What we did find, however, is that there was some groundwater -- contaminants entering the groundwater and following the path along here. I'll get into that in a second. So in order to determine the extent of the contaminants entering the groundwater and where they are headed, we had to first understand the geology. I will try to make this as simple as possible. Here is the landfill. Those who are familiar, River Road is here and the Hudson River is over here. What we found is that there are -- the landfill -- basically, this up here is clay. The landfill is underlined by a layer of clay and there is two aquifers. An aquifer is a water-bearing zone, an upper aquifer here and a lower aquifer here. Those two aquifers are separated by clay and, in fact, underneath the landfill the clay is about 40 feet thick and what's the most interesting feature about this geology and the controlling feature of groundwater flow at this site, is a geological trough, this dip here is an old channel, a geological channel, so any of the migration of concentration of contaminants, anything migrating is migrating along that channel.

Back in '86 we found that the contaminants of concern were benzene and diethyl ether. This in general shows you the concentration of benzene in '86 and it shows that geological trough moves along right here, so anything entering the groundwater goes moving along this, and the concentrations back in '86 were 20,000 parts per billion, and down that River Road, the furthest extent that we detected it back in '86 was about 700 parts per billion. That's benzene back in '86. We decided that one of the largest concerns or the biggest concern in the landfill were drums that were in the landfill, so we agreed with the state that we should eliminate that source of potential contamination. What we did is an interim remedial measure to remove the drums. We removed about 8500 drums from the landfill, but before we started that, what we wanted to do is put in an interim groundwater treatment system and we did it right about here, put a recovery well here. The purpose of the groundwater treatment system was really twofold. One is we didn't want to remove drums that were full of contaminants and if they broke or leaked, they get into the the groundwater. We want to have a fail-safe system, so we had something that would capture any contaminants that would enter the groundwater. That was one reason. The other reason was that we wanted to cut off the source of anything migrating from that landfill by collecting ground-water and treating it. So this shows you in September of '90, approximately one year later after the ground water treatment system was in, we had concentrations, as I recall there were 20,000, there are now 500 of benzene, and then by the river there's 70. The following year, the same benzene concentrations were a little less at that recovery well, an era of triage, 1300, so back down from 20,000, we didn't find anything down here.

I have mentioned that the other contaminant of concern was diethyl ether. That followed the same kind of -- in the general direction, and this is the concentration of diethyl ether, essentially in that geological trough, concentrations 230, up by the landfill, and 800 here, and down here, about a hundred. A summary of concentrations in the groundwater are shown in that table here. What it shows is the various wells that we had and we had 34 wells and it showed two contaminants of concern, benzene, diethyl ether in the various years '83 to '91. In fact, we just took another round of samples in November of '91. This was, I believe, in May '91. I outlined here, you can see it, the well triage, that that's right up by the landfill, the recovery well, and you can see benzene going from 25,000 back in '86 over to 1300 in 1991. This is the 13-B, which is right at River Road, and you can see that the benzene went from 745 down to benzene, 90, they were concentrations. However, down the road, diethyl ether, those are the two main contaminants, and that's the general history of the concentrations over time.

This schematic here shows you the groundwater treatment system. Basically what we used to treat the groundwater is -- the major component was benzene again and diethyl ether. However, what we installed to treat it, we would treat other volatiles in addition to that. In general, the system is -- was installed just outside of the landfill. You have a recovery well to the north of the landfill which recovers water, treats it and then we re-inject the water over here into wells. The treatment system that we used is shown in this next schematic. Basically, water comes in, it's filtered. It goes into an exterior -- an air stripper removes about 90 mic... about 90 percent or higher from the air stripper. Well, before the air stripper, we have some pH adjustment, both before and after, then we have polishing units. These are granule carpeting units that fill the air stripper so that it does not take out the volatiles, the granule activator carpet will -- and this here is just simply the regeneration of the carbon. When the carbon is spent or exhausted to remove everything it can from the water, it's replaced. It's disposed of off site in the proper manner. As I mentioned before, the water is filitered again and it's re-injected into the ground, clean water. To give you an idea of the zone of capture, that means basically how much water is -- the treatment system capturing and treating it -- we have been running the system now since '89, and so we have some fairly good data since that time. It's been run at 30 gpm, 40, 50, just to find the different zones of capture. What that shows you here, these dotted lines, these lines show you the zone of influence, what the recovery well is pumping, so in other words, at 30 gallons per minute, this dotted line here represents the zone of influence of the recovery well in the treatment system. At 40, this line here represents that.

At 50, this line represents that, and what it has been designed for and recommended, is at 55 gallons per minute, so somewhere out here, so that's the general zone of influence of the treatment.

Now, I had mentioned that we removed drums. What we did is sample the entire landfill. We characterized the entire landfill. This grid system shows you basically the areas that we tried -- we sampled them. We have taken over 130 samples in the landfill, including trenched various areas and while we were removing the drums, we excavated each of these areas here in the grids, so we have a good handle of what's in the landfill and what is, as I mentioned, all of these grids here, we removed 8500 drums. What was left, we characterized and sampled after we removed the drums again, so we sampled before the drum removal and after the drum removal. What we were left with, these shaded areas here, we identified as being areas that had higher concentrations than -- and we didn't feel -- and we felt that these needed to be treated, so these areas of high concentrations that needed to be treated, what we recommended to treat these areas -- and let me just put this up for just one second. I mentioned before, there is clay throughout the entire landfill. However, there is one area here, and that's good. The reason that's good is because -- that's why we can't see very much migration from this landfill of anything of significance, other than the benzene in that one geological trough, but that's good because clay is impermeable, so it's very difficult for anything to get into the clay, into the groundwater. However, in this one area here we're calling the CBA -- that means the clay beach areas -- the clay was missing in one spot, so what we have recommended in the -- our feasibility study, we want to address these areas and basically the best way to address them, these volatile organics, was through vacuum extraction, bioremediation, and these are two pilot studies and treatability studies that we have implemented to get the information of the recommendations we have made in the feasibility study. The vacuum extraction is a process by which you put a well in the ground above the groundwater table, you put a vacuum to it, and essentially what you're doing is pulling air over the contaminants and that's a form of in situ treatment and volatilization of the contaminants. What we did is we ran the vacuum extraction test, any contaminants that we pulled out, we ran through carbon, so they wouldn't get into the atmosphere and we ran that test for approximately 700 hours, and this here shows you the cumulative volatile organics what were removed over time, so in the matter of about 700 hours, we removed approximately 1800 pounds of contaminants, and what that tells us is that this does work.

If you compare that to ground water treatment, once the contaminants have gotten into the groundwater, the analogy is if you look at our groundwater treatment systems, it's been running for two years, 15 million gallons have been treated and it's removed approximately 300 pounds of volatiles, so 15 million gallons it took for 300 pounds of volatiles whereas -- in the groundwater, whereas this is 1800 pounds in only 700 hours, so that's -- so what we want to do is make sure that we take the volatiles that are in the soil out before they reach the groundwater, and that again is the reason that we want to use vacuum extraction and whatever else we can in these areas where you have high volatile contamination, and that's what we proposed in our feasibility study.

The -- so I think you're getting an idea of some IRMs and what we're proposing here. In addition to treating those areas of higher concentration, once they're treated, we recommended putting a cap over the site, a cap, and the cap basically would look something similar to this, and that is the stone with about three feet of clay, followed by filter fabric, some common fill and topsoil, and the purpose of the cap is really twofold. One is that we do have debris in the landfill, but it's non-hazardous debris. We also have -- we'll be treating those hot -- those areas of higher contamination. We don't want any of the soil from the landfill washing off site, number one, and we don't want animals burrowing into it, and we want to limit the amount of infiltration of rain, so that's the reason.

In addition -- just to recap, the recommended final remedial measure here was -- and included already the drum removal. We want to continue the groundwater treatment system at 55 gpm or gallons per minute. That means that we have to modify the system that's out there. We don't want to shut it off, though. We want to modify it, upgrade it. In addition to that, we want to utilize vacuum extraction in those areas where they had high concentrations that I showed you. We're also looking right now at the bioremediation to enhance the vacuum extraction and quicken the process there. In addition to that, we would like to put the cap on the site, and in addition to that, we would like to control surface water runoff, so that is basically what is being proposed and how that process works, the feasibility, I'll later explain, but that's basically the background, what we did, what the results of the remedial measures were and which we proposed, and that's all in this two-volume booklet. O.K.

MR. OBRECHT: As Frank said, what I would like to do is briefly discuss the process that was -- we went through, actually Dames and Moore went through, to develop the remedial alternatives from which we finally -- we selected the preferred alternatives.

Basically what we do is we utilize information from the remedial investigation treatability studies to develop remedial objectives and goals. The goals and objectives are set from New York State standards, criteria and guidance values. If we don't have a standard, we have some guidance that gives you a way to determine what kind of cleanup levels we would be trying to attain at this site. From these remedial action -- remedial goals and objectives, we developed a general response action. The response addresses types of -- basic broad types of treatment/containment options that can address various media. You would have treated options for the groundwater. You would have contaminant and treated options for the site. At this site, we only found contamination present in the soils and in the groundwater, so those are the kind of general response actions we're looking at as treatment and containment options. What those general response actions are, there are a laundry list of technologies that could be supplied to treat the soil, to treat the groundwater. Those are looked at to see if they're actually implementable at the site and whether or not they're feasible, dependent on the site characteristics and the geological characteristics. From those technologies, we develop alternatives. Alternatives are a combination of the technologies that can be applied to groundwater and soil and combine those into alternatives that would address all the contamination at the site. Then the final analysis on those alternatives, the alternatives are evaluated against several criteria. The criteria includes two threshold areas, the first one being overall protection in the environment, the second being compliance with New York State -- the applicable appropriate and relevant New York State standards, criteria and guidelines. From there, the alternatives are -- are -- is necessary for any alternative that goes beyond this point for further evaluation, must meet those two criteria. If they don't, especially in the area of compliance with the standards, there should be further justification for waiving the standards or the criteria that the state has established in their promulgated regulations. Then there are five primary balancing criteria. These are used to evaluate each of the alternatives relative to the -- to themselves, in comparison of how easy it is to implement or compare to one of the other alternatives. These include short-term impact and the effectiveness, long-term permanency and effectiveness, reduction in toxicity, mobility and volume of waste at this site, the implementability included the administrative implementability feasibility, as well as technical feasibility, and finally, the cost would be the last primary criteria.

As Frank said, the preferred alternative involves first the impermeable cap, actually that's part of the last part of the remediation. The first part would be continue the current groundwater treatment system. At this point in time, we plan to evaluate further capturing of off-site plume. What we know, it's technically feasible, but at what point do we -- is it not a -- where we spend an inordinate amount of funds to catch a minimum amount of contamination, so we plan to evaluate that further.

Next would be a vacuum extraction. A vacuum extraction would be done on the areas where Frank had pointed out where he found the highest degree of contamination. Those areas we were told to be GMA organics, so in addition things that would be done out there would be grading the surface water diversion to minimize infiltration to this site once the cap is in place, as well as controlling erosion of the cap so that the maintenance -- it doesn't require a lot of maintenance. The other, which actually is kind of a site-specific part of the remedy,would be a flood plain management system in the Hudson River, would be measures taken to protect the cap, the integrity of the cap from any potential flood that would take place. In -- we also would be doing some mointoring out there to evalute the performance of the vacuum extraction, as well as the groundwater recovery treatment system.

The final remediation would include the permeable cap. This would be done after the vacuum extraction system has been in decommission and we determine that no longer to be effective in the remedial contamination, and at that point in time, it would be determined that a significant amount of contamination has been removed from the site and any additional attempt at removal would be infeasible. The cost for remediation in the present worth terms is around $14 million and that includes the cost for collection of the treatment of the off-site plume. We are going to evaluate that further. I have included the cost because of the potential that it could cost that much.

What I would like to do now is open up to any questions and comments that you may have on the preferred alternative. And if you would, would you please state your name and any pertinent affiliation that you might have. Anybody who would like to make a comment, have any questions?

MS. WEBB: My name is Sue Webb. I'm wondering what the feasibility of building anything in that area is in the near future?

MR. OBRECHT: In the area, I don't think there's a problem of building in that area.

MS. WEBB: What about wells?

MR. OBRECHT: Well, the putting in of wells out there? We would have -- we would -- in order -- well, that comes along with evaluating the -- the potential or collecting any off-site -- collecting the off-site plume. If we were to determine in the future that we weren't going to cut that plume, there would be restrictions that would have to be placed on that particular area where the plume has been identified.

MS. WEBB: How much more time into the future do you see as -- or is there only one answer to that?

MR. OBRECHT: For --

MS. WEBB: For cleanup.

MR. OBRECHT: Well, the majority of the cleanup involves a vacuum extraction on site, would take from one to three years, we estimate.

MS. WEBB: From now?

MR. OBRECHT: The groundwater -- at this point in time, it's difficult to say. Groundwater remediation, we find that they aren't as easy to predict, the duration of any groundwater cleanup, because you'll find that a lot of chemicals that we deal with a lot of times would be -- would tend to be caught up on the sands, the formation of the aquifer, the sands or the clays, and so it's difficult to predict with any real accuracy, the duration of a groundwater cleanup, and that would be done over a period of years from pumping and treating the water and see what kind of response you get for the -- decreasing the concentration of it.

MS. WEBB: Hypothetically, if someone was to build a building, say for its own light industrial, would there be any consequences to the employees in the buildings or, you know, if it was over an area that you considered you were still trying to clean up?

MR. OBRECHT: Where the groundwater was contaminated?

MS. WEBB: Yes.

MR. OBRECHT: No, it's actually a health question, but I'll just say unless you build a cellar, I don't see a potential, but John --

MR. SHEEHAN: As far as if a well has to be put in, we would certainly at this point with all the investigation, we know where the contamination is and you should certainly be careful about putting a well into the contaminated area. If you're outside that contamination, chances are you're going to be fairly safe, as far as contamination from the site. If there's any contamination of the soil, which there is because the vacuum extraction seemed to be working there, has the potential of coming up into a building, again, you want to be outside that immediate area of the contamination area, but that's outside of the landfill itself.

MS. WEBB: Right, but I --

MR. SHEEHAN: You're a property owner down in that area?

MS. WEBB: The point I'm trying to reach, is it a good idea to build anywhere in the area.

MR. SHEEHAN: Each case would have to be looked at as an individual case. It would depend on where you wanted to put a facility, what type of facility it would be. You would have to come to, you know, submit the proper permit applications and have everything evaluated depending on what you wanted to do with the land.

MS. WEBB: Thank you very much.

MR. OBRECHT: Any other questions or comments? O.K. I have some business cards here, if you want to get in contact with me, if you have any questions, the cards are back on the back table and we have an address to send written comments to and my phone number, if you need to contact me, if you have any questions. I appreciate everybody coming here tonight and -- Darwin will get everyone's complete name and address for mailing.

MR. ROOSA: Will you produce a response summary?

MR. OBRECHT: Yes, I'm sorry. There really weren't a lot of comments, but there will be -- as you can see, we have a stenographer here who has recorded the whole meeting. Any questions that we have had will be addressed in the response to the summary which will be attached to a record of decision which will be available for public review at the depository which we named in the PRAP. Thank you very much.

(Whereupon, at 7:45 p.m., the hearing in the above-entitled matter was concluded.)

STATE OF NEW YORK)

COUNTY OF ALBANY)

MELISSA A. MATTHEWS, being duly sworn, deposes and says: That she acted as the Official Reporter at the hearing herein on the 9th day of March, 1992; that the transcript to which this affidavit is annexed is an accurate transcript of said proceedings to the best of deponent's knowledge and belief.

Melissa A. Matthews

Melissa A. Matthews

Sworn to before me this

27 day of March, 1992.

Irma H. Davis

My Commission expires 3/30/93