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 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:

- 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.

- 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.

- 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.

- 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.

Alternative 2 - 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.

Alternative 3 - 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).

Alternative 4 - 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. Compliance with Applicable or Relevant and Appropriate New York State Standards, Criteria and Guidelines (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.

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

3. Short-term Impacts and Effectiveness--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. Long-term Effectiveness and Permanence--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. Reduction of Toxicity, Mobility, and Volume--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. Implementability--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. Cost--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.

SUMMARY OF THE GOVERNMENT'S DECISION

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.