2021 Hazardous Waste Scanning Project

File Form Naming Convention.

(*File_Type*).(*Program*).(*Site_Number*).(*YYYY-MM-DD*).(*File_Name*).pdf

Note 1: Each category is separated by a period "."
Note 2: Each word within category is separated by an underscore "_"

Specific File Naming Convention Label:

report . HW . 932099 . 1990 - 08 - 01 . Feasibility _ Study.pdf

eder associates
consulting engineers, p.c.

SCHRECK'S SCRAPYARD
NORTH TONAWANDA, NEW YORK

SCHRECK'S SCRAPYARD
FEASIBILITY STUDY

RECEIVED
AUG 30 1990
BUREAU OF WESTERN REMEDIAL ACTION
DIVISION OF HAZARDOUS
WASTE REMEDIATION

PROJECT #611-1
AUGUST, 1990

EDER ASSOCIATES CONSULTING ENGINEERS, P.C.
Ann Arbor, Michigan
Locust Valley, New York
Madison, Wisconsin

611-1.FS

082890

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

EXECUTIVE SUMMARY

This report has been prepared to serve as the Final Draft Feasibility Study for the Schreck Scrapyard Site, located in North Tonawanda, New York. The FS report documents the basis and procedures that were used in identifying, developing, screening, and evaluating remedial alternatives that are capable of addressing the contamination issues at the Schreck Scrapyard Site. The Feasibility Study was conducted in accordance with USEPA guidance.

During the technology screening and alternative development phases of the FS, a total of seven (7) alternatives were formulated. The remaining seven (7) alternatives were evaluated in detail in terms of the following criteria:

- Overall Protection of Human Health and the Environment
- Compliance with ARAR's
- Long-term Effectiveness
- Reduction of Mobility, Toxicity, Volume
- Short-term Effectiveness
- Implementability
- Cost

After completion of the detailed evaluation for each alternative, a comparative summary of the alternatives was developed. The comparative summary is presented in narrative and tabular form in the body of this report.

The alternatives that were developed and that have been determined to be feasible for the Schreck Scrapyard Site are as follows:

Alternative S-1 - No Action

Alternative S-2 - Access Restrictions, Drum Removal, Building Decontamination, Multi-layer Capping of site

Alternative S-3 - Access Restrictions, Drum Removal, Building Decontamination, Soil Solidification/Stabilization, Multi-layer capping of site

Alternative S-4 - Access Restrictions, Drum Removal, Building Decontamination, Construction of On-site RCRA Landfill

Alternative S-5 - Access Restrictions, Drum Removal, Building Decontamination, Soil Solidification/Stabilization, Construction of on-site RCRA Landfill

Alternative S-6 - Access Restrictions, Drum Removal, Building Decontamination, In-situ Vitrification

Alternative S-7 - Access Restrictions, Drum Removal, Building Decontamination, Off-site RCRA Landfill Disposal

The wide range of advantages and disadvantages between these alternatives are covered in detail in this FS report. Excluding the "no action" alternative, capital cost for the alternatives range from $930,000 to $5,755,000. Present worth values of the alternatives range from $1,448,500 to $5,993,000.

I. INTRODUCTION

1.1 Purpose and Organization of Report

The purpose of this Feasibility Study (FS) report is to identify and evaluate remedial alternatives applicable to the Schreck's Scrapyard Site located in North Tonawanda, New York and select the most cost effective remedial alternative. This FS report is a supplement to the Remedial Investigation (RI) Reports prepared by Eder Associates (August, 1989). This FS responds directly to USEPA policy and regulations contained in the November 20, 1985 NPL Revision (40 CFR 47912 et seq.) by identifying those feasible and cost effective responses to the hazardous materials at the site in a manner which adequately protects human health and the environment and which are consistent with Federal and State regulations.

The FS is comprised of five sections. Section I, the Introduction, presents site background information; summarizes the nature and extent of contamination, contaminant fate and transport, and the baseline risk assessment; and lists the remedial action objectives.

Section II, the Identification and Screening of Remedial Technologies, identifies and presents a brief description of potentially applicable remedial technologies and evaluates each remedial technology with regard to effectiveness, implementability, and cost. Remedial technologies which pass the initial screening are grouped into alternatives which address each of the specific areas of concern.

Section III, the Detailed Evaluation of Alternatives, evaluates the remedial alternatives which pass the Section II screening. This evaluation of alternatives is comprehensive and medium-specific with regard to the following criteria: short-term effectiveness; long-term effectiveness and permanence; reduction of toxicity, mobility, and volume; implementability; cost; compliance with ARARs; overall protection of human health and the environment.

Section IV, the Comparison of Remedial Alternatives, compares the alternative-specific criteria described in Section III.

Section V, the Recommended Remedial Alternative, provides a recommended alternative based on the detailed evaluation and comparison of alternatives presented in Sections III and IV.

The FS will be limited to those alternatives which are potentially relevant and appropriate to the Schreck's Scrapyard site and which can adequately protect health and the environment in a cost effective manner. Excluded remedial alternatives include unproven technologies, alternatives that are obviously not relevant to the site, alternatives that cannot be applied at the site because of physical constraints, and alternatives that can accomplish similar remedial objectives but at a higher order of magnitude cost.

The development of alternatives in this feasibility study has been guided by the site conditions identified in the RI report. The extent of current and possible future human health and environmental risks at the Schreck's Scrapyard site, presented in the RI report, constitute an objective constraint on the need for and development of appropriate remedial actions.

1.2 Background

1.2.1 Site History

Schreck's Iron and Metal Company operated a scrap iron business at this site from 1951 to 1953, site operations prior to 1951 are unknown. In 1953, the business was sold to Bengart and Menel, Inc., who reportedly operated a scrap metal business until 1977. In addition to the metal salvage operation, drums of phenolic waste from Occidental-Durez were reportedly brought to the site and subsequently hauled by the facility's trucks to local waste disposal facilities from 1951 to 1975. If the drums were picked up late in the day, the truck loaded with the drums would be kept at the site overnight. In 1965, reportedly 50-60 drums of phenolic wastes were landfilled in an abandoned press pit located at the south end of the property. Reportedly, the drums were placed into the 18-20 feet deep concrete pit on top of building debris which partially filled the pit. The drums and building debris were then covered with approximately 2 feet of soil.

From 1960 to 1975, transformers from Niagara Mohawk Power Corporation were routinely brought to the site for salvage. The metal carcasses were sheared and the oil was then allowed to spill onto the ground. Reportedly, the oil soaked soils were periodically excavated by a dozer and pushed towards the eastern property boundary.

In 1983 the Lawless Container Corporation retained RECRA Research, Inc. (RECRA) to conduct a prepurchase environmental audit of the property. Analysis of two composite soil samples revealed the presence of PCBs (18 and 66 mg/kg), elevated levels of metals, and the presence of cyanide, phenolics and volatile organic compounds.

Subsequently, NYDEC retained RECRA to conduct a Phase I environmental assessment in 1986 to score the site for possible inclusion on the state and federal priority lists of uncontrolled hazardous waste sites. The site scored high enough for inclusion on both the state and national priority lists.

Eder Associates Consulting Engineers, P.C., was retained by NYDEC to conduct a Remedial Investigation/Feasibility Study of the Schreck's Scrapyard site to evaluate the potential impact of prior waste disposal activities on public health, welfare, and the environment. The RI was initiated in October, 1988, and the Phase 1 field investigation conducted in December 1988. A Phase II field investigation was conducted in November of 1989 to supplement the Phase I RI data.

1.2.2 Site Description

The Schreck Scrapyard site, located at 55 Schenck Street in North Tonawanda, New York is presently operated as an automotive scrapyard by VTJ Salvage Inc. Figure 1.1 shows the scrapyard's location with respect to the regional area.

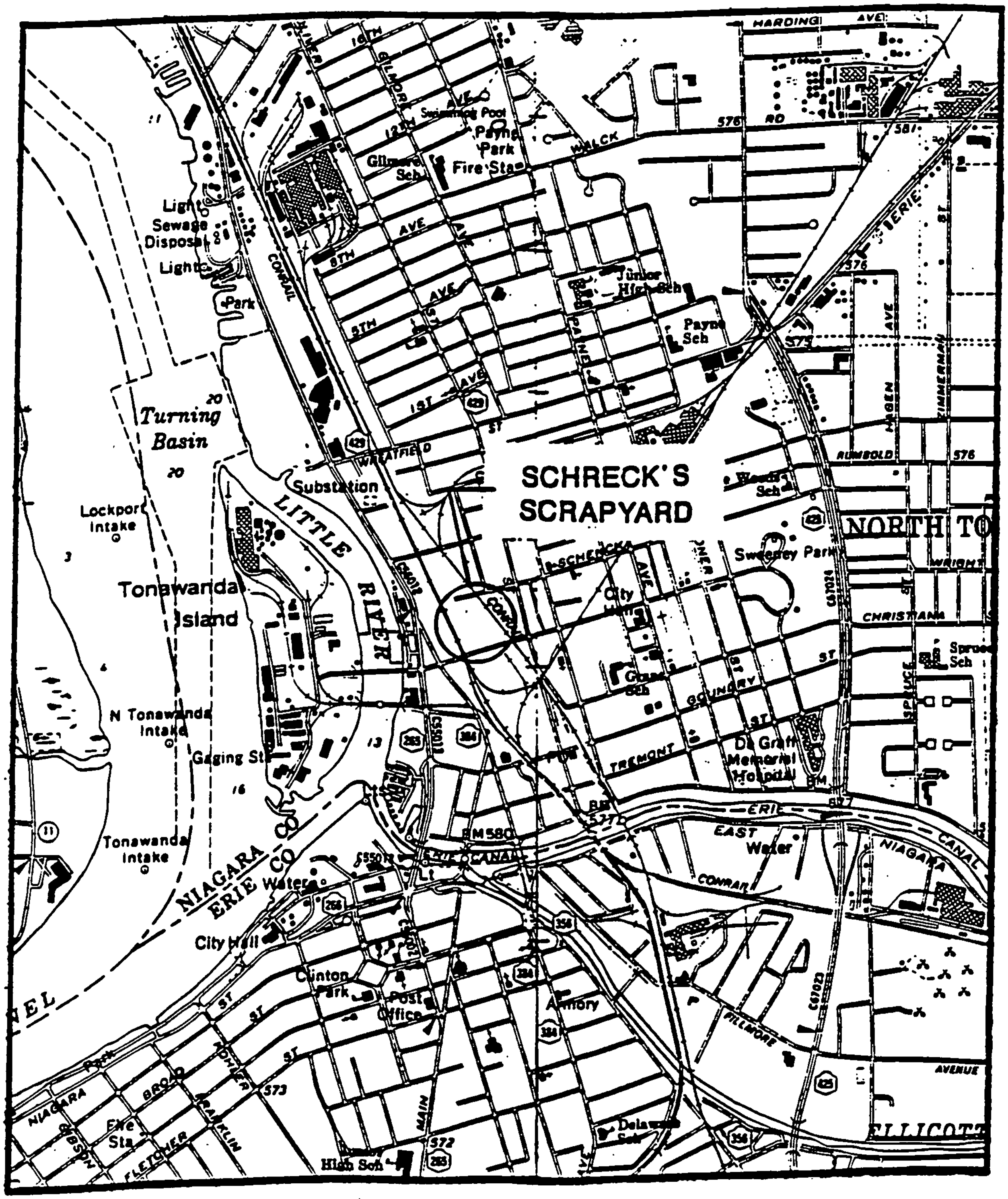
The site is located in a mixed light industrial and residential area. The scrapyard is bordered on the north by Schenck Street and the Lawless Container

Corporation located across the street (Figure 2.1). Lawless also borders the west side of the site and Tondisco Incorporated borders the south side of the site. The eastern border of the site consists of a Conrail right of way and tracks. Adjacent to and east of this right of way is an empty lot where a metal fabrication shop was once located. Although no residential property is adjacent to the site, a densely populated residential neighborhood lies approximately one block east of the site.

The approximately 1.5 acre scrapyard is in a deteriorated condition. The fencing around the site is broken in various locations providing easy access to trespassers. The site contains three significant structures: a cinder block office building; a garage; and the frame of an abandoned bailer machine with a concrete foundation. The site has a soil base which contains scrap material.

The site is essentially void of vegetative growth and surface soils have an oily appearance. The scrapyard contains various piles of scrap (tires, cars, refrigerators) and is typically filled with junk cars and automotive parts.

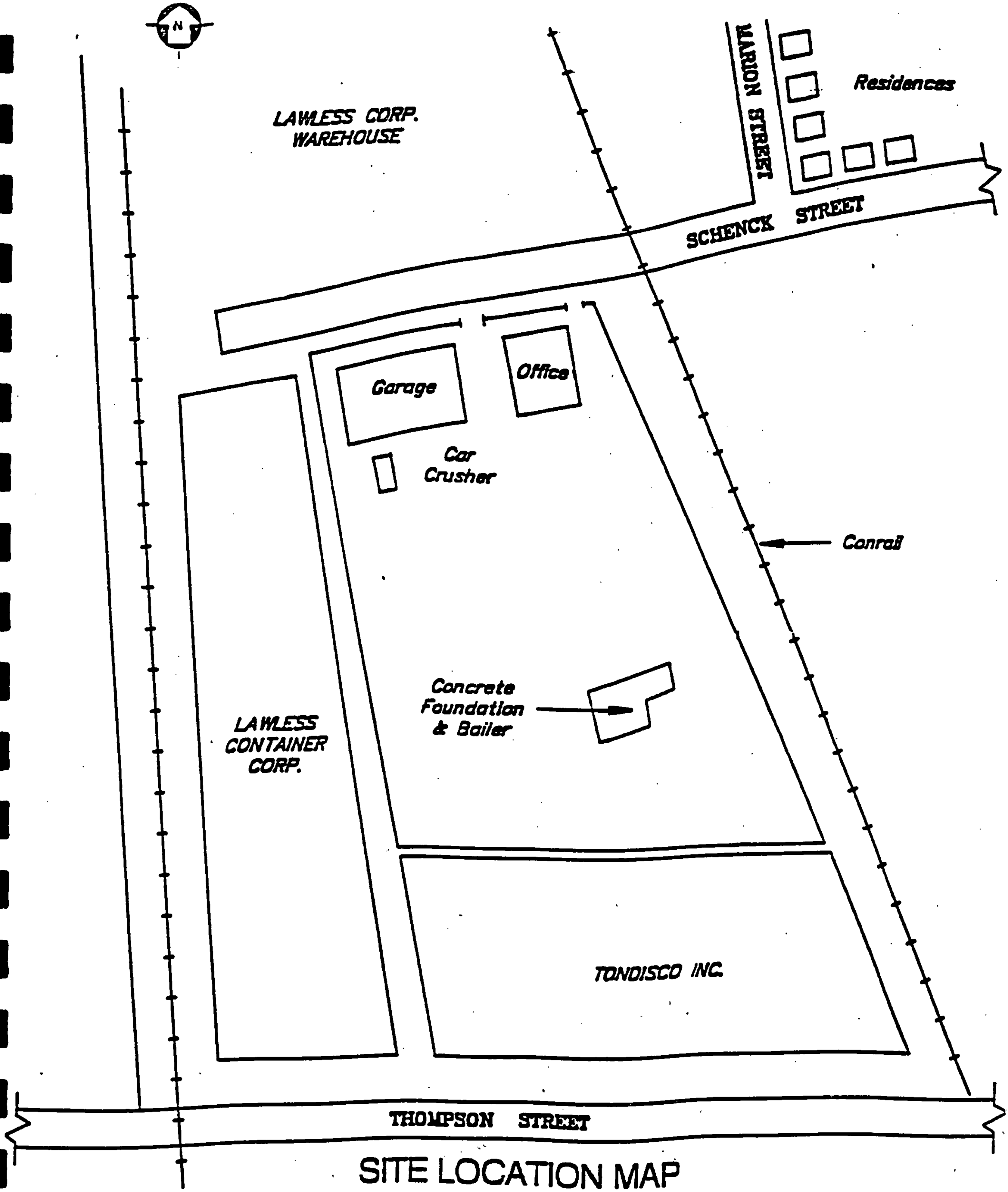
SCHRECK'S SCRAPYARD SITE
NORTH TONAWANDA, NEW YORK



SCALE : 1"=2000'

LOCATION MAP

FIGURE 1.1



SITE LOCATION MAP

SCHRECK'S SCRAPYARD
N. TONAWANDA, NEW YORK

FIGURE 1.2

1.2.3 Nature and Extent of Contamination

1.2.3.1 Soils

The Phase I and Phase II field investigations identified the following indicator chemicals in on-site soil:

Potential Carcinogens	Non-Carcinogens
PCBs	arsenic
arsenic	barium
alpha-BHC	cadmium
beta-BHC	copper
benzo(a)pyrene	lead
benzo(a)anthracene	mercury
hexachlorobenzene	nickel
benzene	silver
chloroform	zinc
cadmium	benzo(a)pyrene
lead	asbestos
nickel	
asbestos	

PCB concentrations in the upper three feet of on-site soils generally exceeds the USEPA cleanup criteria of 10 mg/kg over most of the site. On-site surface soils characteristically contain PCB concentrations ranging from 10 to the low 100's of mg/kg.

Asbestos was identified at percentage levels in four out of five surface soil samples. The presence of asbestos at such high concentrations classifies the surface soil as asbestos containing material subject to asbestos regulations.

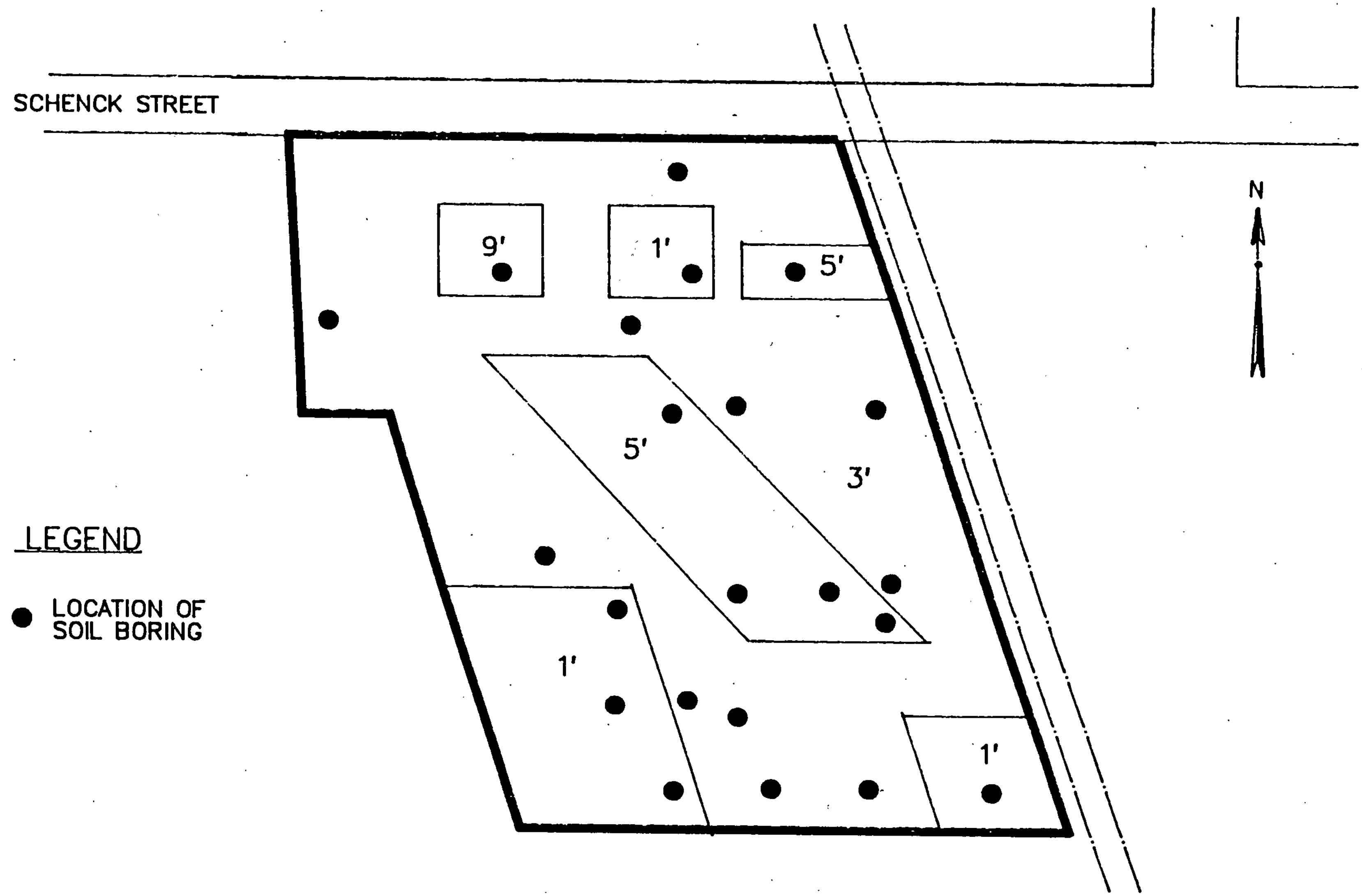
Soil samples were collected at depths up to three feet in four on-site boring locations and analyzed for an array of chemicals identified as "Target Compound List" (TCL) parameters. The primary groups of chemicals of concern found at high levels in the site soils include heavy metals, polynuclear aromatic hydrocarbons (PNAs), chlorinated benzenes, and lindane isomers.

The samples collected from the 5-9 foot interval contained low levels of VOCs which do not appear to pose a significant health risk. Semivolatiles were detected in low concentrations which would likely pose a slight health risk if these soils were ingested. There were no pesticides detected at the 5-9 foot interval. Low levels of PCB's were detected in one sample in the 5-9 foot interval, just above the 10 mg/kg cleanup action level. Metals were detected in low levels which would not appear to present a health threat. In summary, the soils would require remediation due to PCB and semi-volatiles contamination. Based upon the data, a map defining the depth of significant contamination for various areas of the site was created. Figure 1.3 indicates the required depths of remediation for these differing areas of the site with a required remediation depth range of one (1) foot to nine (9) feet.

An additional sample was collected at 17-19 feet below grade. This sample was collected in the horizon of fat clay identified in other borings around the site. This sample was collected to determine the impact of the drums buried at a similar depth upgradient of the boring. This sample contained low levels of VOCs, semi-volatiles and PCBs. The concentrations identified would not be expected to pose a significant health threat. However, some of the compounds are similar to the buried drum contents sampled and this low level of contamination may be due to leaching from the drums.

An abandoned press pit was excavated and found to contain deteriorated drums. A sample from one of the drums contained high concentrations of PCBs, semi-volatile organics, and lower concentrations of a lindane isomer and volatile organics. The contaminants found in the drum were sufficiently similar to those found in the on-site soils to suggest a common source.

The floors at the entrances of the two on-site buildings are contaminated with PCBs at levels which exceed the USEPA cleanup criteria.



DEPTH OF REQUIRED REMEDIATION

SCHRECK'S SCRAPYARD
NORTH TONAWANDA, NEW YORK

NOT TO SCALE

FIGURE 1.3

The catch basins on Schenck Street were sampled to determine the effect of storm water runoff. Analytical results of the catch basin samples did not indicate that significant concentrations of contaminants were present.

Samples of soil collected on Schenck Street identified PCB concentrations slightly above USEPA cleanup standards along the front of the site.

Surface soil samples were collected around the site, along Schenck Street and along the railroad tracks to identify the extent of off-site contamination. Although PCB's were detected in most of the samples, PCB's were only identified slightly above the USEPA cleanup criteria of 10 mg/kg in samples adjacent to the on site garage and along the railroad tracks. Soil samples collected from the railroad tracks to the east of the site contained significant concentrations of heavy metals and PNAs which would appear to pose a significant enough health threat to require remediation. Since railroad operations are often sources of heavy metals and PNAs, additional evaluation should be made prior to remediation to determine the extent of these contaminants farther down the tracks. Soils directly east of the railroad tracks contained elevated levels of metals which likely warrant remediation.

1.2.3.2 Groundwater

Six shallow groundwater wells and a deep boring confirmed the regional description of the geology at the site. The shallow groundwater under the site flows north to northeast making monitoring wells 1 and 4 upgradient and 5 and 2 downgradient. The November 1989 analytical results did not detect any PCB's and only low levels of pesticides in monitoring wells 4 and 5 on the west side of the site. The results of the volatile analysis detected only one volatile compound each in monitoring wells 3 and 5 at very low levels. Monitoring well 6, which is downgradient of the buried drums, contained high concentrations of four aromatic volatile compounds which were identified in the drum samples. Semi-volatile compounds were not detected in monitoring wells 2 and 4; semi-volatile compounds were detected at low estimated values in monitoring wells, 1, 3, 5 and 6. Metals were generally found at low levels, however, mercury was found at high concentrations in monitoring well 5. The source of the groundwater in monitoring well 5 is thought to be a sand stringer and may represent only an isolated portion of the site. In summary only low levels of contaminants were detected in the monitoring wells except for mercury in downgradient well 5. Monitoring well 6, downgradient of the buried drums, contained low levels of contaminants which may be, at least in part, from leaching of the buried drums. Although some levels detected exceed drinking water criteria, the groundwater in the area is not used as a potable source and the contaminants should be diluted to insignificant levels once the groundwater discharges to the nearby surface waters. Based on current data, the NYDEC has decided that the groundwater does not require any remediation.

1.2.4 Contaminant Fate and Transport

The contaminants found at the site generally persist in the environment. The PCBs, metals, pesticides, and the semi-volatile organics can be tracked from the site on vehicle tires and shoes and be washed off-site with stormwater runoff. The PCBs found off-site indicate that off-site tracking has transported contaminants into Schenck Street and that stormwater runoff has deposited PCBs along the railroad track which receives drainage from the site.

Trace quantities of PCBs were found in a catch basin on Schenck Street, indicating that the migration of PCBs in storm water runoff along the street and into the sewer is probably not a significant route. The sewer eventually discharges into the city waste water treatment plant.

The absence of vegetation on the site would be generally expected to increase the potential that contaminants attached to soils could become airborne and migrate from the site. However, the oil and grease entrained in the soil coupled with the density of near-surface obstacles reduces the potential that contaminants would migrate in fugitive dust. The low volatility of the compounds of primary concern and their tendency to adhere to soil would minimize their presence in the air and in dust.

The site is underlain by extensive layers of low permeability clay which would inhibit the vertical migration of groundwater at the site and groundwater contamination would be expected to be generally contained in the shallow groundwater. The contaminants of primary concern are relatively insoluble and would not be expected to be found in high concentrations in the groundwater unless they are present in a floating layer. The most likely avenues for contaminant transport in the shallow aquifer are the sand and gravel stringers. The identification of mercury in MW-5 which is supplied by a sand stringer, is a good example of how a contaminant not found at a similar concentration in any other shallow monitoring wells has concentrated in an isolated sand stringer.

Analytical results from MW-6 samples indicate that the fat clay zone, which is the next water bearing zone, has not been significantly impacted by vertical or horizontal migration of contaminants. Groundwater does not appear to be a significant means of contaminant migration.

1.2.5 Baseline Risk Assessment

PCBs, several metals, and organic compounds in on-site soils pose an unacceptable long-term risk to on-site workers. The soils would pose unacceptable risk in a residential exposure scenario. Although the soil risk is unacceptable, the risk levels are not excessively high and do not appear to pose any significant immediate health risk. The primary risk is due to the potential long-term carcinogenic risk posed by PCBs.

PCBs are present in concentrations that exceed USEPA cleanup criteria in on-site soil at depths ranging from 1 - 9 feet, on the floors of the two on-site buildings, on Schenck Street adjacent to the site, in off-site soils near the northwest corner of the site, and along part of the railroad tracks east of the site. These soils and surfaces require remediation.

Chlorinated benzene, heavy metals, and asbestos were found at concentrations which represent elevated risk levels in the same areas that would require remediation due to PCB contamination (asbestos at 0′-3′ below grade and low levels of PNA compounds to 9′ deep). Remediation to depths as shown on Figure 1.3 is expected to effectively address these additional contaminants which were identified during the field investigation. Additional sampling will be necessary prior to design to insure that these contaminants do not pose a problem at depths below those currently identified for remediation.

The concrete press pit containing buried drums poses a public health and environmental threat which requires remediation.

Other than human health concerns, no significant environmental endangerments were identified.

1.2.5.1 Remedial Action Objectives

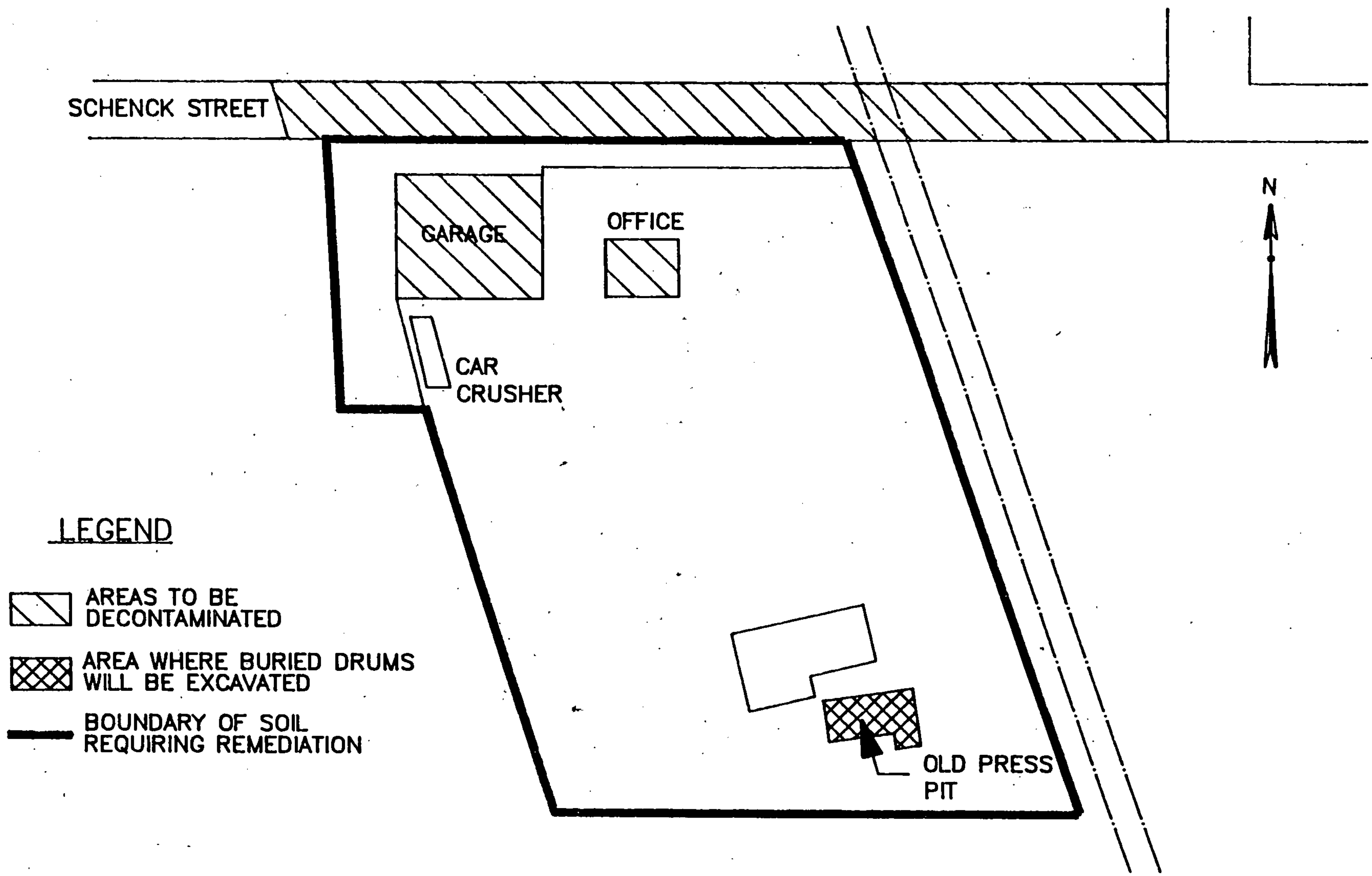
Based on the Phase I and Phase II field investigation, the remedial actions must meet the following objectives:

- minimize contact with exposed and subsurface on-site and off-site contaminated soil by meeting the USEPA PCB soil cleanup criteria of 10 mg/kg and a carcinogenic risk level of 10^{-6} for other contaminants;

- remove buried drums;

- prevent migration of contaminants via groundwater by remediating the source of contamination (soil and drums);

- minimize contact with contaminated building surfaces and Schenck Street surfaces.



EXTENT OF REMEDIATION

SCHRECK'S SCRAPYARD
NORTH TONAWANDA, NEW YORK

NOT TO SCALE

FIGURE 1.4

II. IDENTIFICATION AND SCREENING OF REMEDIAL TECHNOLOGIES

2.1 General Response Actions

The purpose of this feasibility study is to identify, evaluate and select remedial alternatives which minimize the potential present and future threats to public health, welfare and the environment at the Schreck's Scrapyard site in a cost effective manner. The remedial actions should meet the following objectives:

- o minimize contact with exposed and subsurface on-site and off-site PCB-contaminated soil by meeting the USEPA PCB soil cleanup criteria of 10 mg/kg and carcinogenic risk level of 10^{-6} for other contaminants;
- o remove buried drums;
- o prevent migration of contaminants via groundwater by remediating the source of contamination (soil and drums);
- o minimize contact with contaminated building and Schenck Street surfaces.

It has been determined that the site is underlain by extensive layers of low permeability clay which inhibits the vertical migration of groundwater.

Only low concentrations of contaminants were detected in monitoring wells except for mercury in the downgradient well MW-5. The source of groundwater in MW-5 is thought to be a sand stringer and probably represents an isolated problem. As further support to this conclusion, it has been determined that soils at the site are not EP toxic for mercury. Although some contaminants detected exceeded drinking water criteria, the groundwater in the area is not used as a potable source and the contaminants are at such low levels, any eventual discharge to surface water would probably be insignificant. Based on the current data, the NYDEC has decided that the groundwater does not require any remediation and will not be addressed further in this Feasibility Study.

EA has developed a list of general response actions and potentially feasible technologies applicable to source control and management of migration at the site.

As part of this feasibility study, all potentially feasible technologies and process options will be prescreened based on SARA requirements and will include effectiveness, implementability and cost. During this screening step, process options and entire technology types may be eliminated from further consideration based on contamination types, concentration, and/or other site-specific characteristics.

The list of preliminary technologies is presented in Tables 2.1. This list includes all potentially feasible remedial technologies and process options, applicable media, on-site/off-site applicability, and required tandem remedial technologies for each option. A "No Action" alternative is included as a baseline against which other actions can be measured.

2.2 Initial Screening of Technologies

2.2.1 Introduction

This section identifies and screens the types of technologies potentially applicable to the Schreck's Scrapyard site. These technologies are screened with regard to the following criteria:

a. There must be a demonstrated history of successful use of the technology in environments similar to the Schreck's Scrapyard site. All technologies solely of a research and development nature, and which cannot be reasonably said to be in common use, will be rejected.

b. Technologies that are not relevant to site specific problems or that cannot be applied because of physical constraints or that will tend to have uncertain outcomes because of physical constraints will be rejected.

TABLE 2.1

PRELIMINARY SOURCE CONTROL TECHNOLOGIES

SCHRECK'S SCRAPYARD

NORTH TONOWANDA, NEW YORK

REMEDIAL TECHNOLOGY	PROCESS OPTIONS	POTENTIALLY APPLICABLE MEDIA	ON-SITE/OFF-SITE APPLICABILITY	REQUIRED TANDEM REMEDIAL TECHNOLOGY
NO ACTION	N/A	N/A	N/A	N/A
ACCESS RESTRICTIONS	FENCE	SOIL/DRUM/STRUCTURE	ON	NONE
	DEED RESTRICTIONS	SOIL/DRUM/STRUCTURE	ON	NONE
SURFACE CONTROLS	GRADING			
	DIVERSION			
CAPPING	SINGLE-LAYER	SOIL/DRUM	ON	MONITORING
	MULTI-LAYER	SOIL/DRUM	ON	MONITORING
EXCAVATION	COMPLETE EXCAVATION	SOIL/DRUM	ON	DISPOSAL/TREATMENT
	PARTIAL EXCAVATION	SOIL/DRUM	ON	DISPOSAL/TREATMENT
DECONTAMINATION	HIGH PRESSURE WASH	STRUCTURE	ON	DISPOSAL/TREATMENT
	SOLVENT WASH	STRUCTURE	ON	DISPOSAL/TREATMENT
SOLIDIFICATION/ STABILIZATION	SORPTION	DRUM	ON	DISPOSAL
	CEMENT BASED	SOIL/DRUM	ON	DISPOSAL
	POZZOLAN-CEMENT BASED	SOIL/DRUM	ON	DISPOSAL
	THERMOPLASTIC MICROENCAPSULATION	SOIL/DRUM	ON	DISPOSAL
	MACROENCAPSULATION	SOIL/DRUM	ON	DISPOSAL
PHYSICAL TREATMENT	VAPOR EXTRACTION	SOIL	ON	EXCAVATION/DISPOSAL
	SOIL FLUSHING/SOIL WASHING	SOIL	ON	EXCAVATION/DISPOSAL
	LIQUID-LIQUID EXTRACTION	SOIL	ON	EXCAVATION/DISPOSAL
	SLUDGE EXTRACTION	SOIL	ON	EXCAVATION/DISPOSAL
THERMAL TREATMENT	ROTARY KILN INCINERTION	SOIL/DRUM	ON	EXCAVATION/DISPOSAL
	MULTIPLE HEARTH INCINERATION	SOIL/DRUM	ON	EXCAVATION/DISPOSAL
	FLUIDIZED BED INCINERATION	SOIL/DRUM	ON	EXCAVATION/DISPOSAL
	INFRARED INCINERATION	SOIL	ON	EXCAVATION/DISPOSAL
	LIQUID INJECTION INCINERATION	DRUM	ON	EXCAVATION/DISPOSAL
	PLASMA ARC	DRUM	ON	EXCAVATION/DISPOSAL
	THERMAL EXTRACTION	SOIL	ON	EXCAVATION/DISPOSAL
	ADVANCED ELECTRON REACTOR	SOIL/DRUM	ON	EXCAVATION/DISPOSAL
	MOLTEN SALT	DRUM	ON	EXCAVATION/DISPOSAL
	PYROLYSIS	SOIL/DRUM	ON	EXCAVATION/DISPOSAL
	VITRIFICATION	SOIL/DRUM	ON	NONE
	RADIO FREQUENCY	SOIL	ON	NONE
	WET AIR OXIDATION	SOIL	ON	EXCAVATION/DISPOSAL
CHEMICAL TREATMENT	CHEMICAL OXIDATION	SOIL	ON	EXCAVATION/DISPOSAL
	DECHLORINATION	SOIL	ON	EXCAVATION/DISPOSAL
	IRRADIATION/ULTRASONICS	SOIL	ON	EXCAVATION/DISPOSAL
BIOLOGICAL TREATMENT	IN-SITU BIODEGREDATION	SOIL	ON	NONE
	NON-HAZARDOUS LANDFILL	SOIL/DRUM	ON	EXCAVATION/PRETREATMENT/MONITOR
OFF-SITE DISPOSAL	RCRA LANDFILL	SOIL/DRUM	OFF	EXCAVATION/PRETREATMENT
	NON-HAZARDOUS LANDFILL	SOIL/DRUM	OFF	EXCAVATION/PRETREATMENT
	RCRA TREATMENT FACILITY	SOIL/DRUM	OFF	EXCAVATION/PRETREATMENT

c. Technologies that when applied may cause other significant environmental or health related impacts will be rejected.

d. Technologies which have or imply an overly long period between implementation and remedial effect, or which have long permitting delays before implementation will be rejected unless there is no other alternative that can achieve the remedial objectives in a more time effective manner.

e. Technologies which are or must be implemented in concert with (or are linked to) another technology which is rejected, will also be rejected.

In summation, the criteria used to initially evaluate the remedial source control and migration control technologies are effectiveness, implementability and cost.

The effectiveness evaluation concerns the ability of each remedial alternative to protect human health and the environment. Each alternative is evaluated with regard to the protection it would provide, and the reduction in volume, toxicity and mobility it would achieve.

The implementability evaluation is designed to assess both the technical and administrative feasibility of constructing, operating, and maintaining a remedial action alternative. Additionally, the availability of the technology is evaluated.

The cost evaluation is used to evaluate and where appropriate reject any similar technologies within a process option which do not provide a greater degree of public health and environmental protection than other more cost effective alternatives.

2.2.2 No Action

Under this option no remedial actions would be taken at the site.

- o Effectiveness. This is not an acceptable option since PCBs, several metals and organic compounds in on-site soils pose an unacceptable long-term risk to the public health.

- o Initial Screening. Due to National/Contingency Guidance requirements this remedial alternative will be retained as a baseline for comparison.

2.2.3 Access Restrictions

FENCE

The construction of a fence to restrict access would eliminate the potential for casual contact with exposed soil.

- o Effectiveness. The construction of a fence to restrict access would eliminate the potential for casual contact with exposed soil but would not reduce on-site contamination concentrations. A fence would not effectively meet the remedial objectives due to the possibility of continued migration of contaminants over time. But restricting access could act as a temporary action until remediation has been completed.

- o Implementability. This alternative can be easily implemented.

- o Cost. This alternative is relatively low cost.

- o Initial Screening. This alternative will be retained for further evaluation only as a sub-component of other more effective alternatives.

DEED RESTRICTIONS

Land use restrictions would restrict future development of the land and groundwater.

- o Effectiveness. Land use restrictions would restrict future development of the land and groundwater. A deed restriction is not an acceptable remedial alternative for the soils and drums on site due to the possibility of continued migration of contaminants over time. However this alternative in conjunction with other alternatives may be applicable.

- Implementability This alternative can be easily implemented.

- Cost. This alternative is relatively low cost.

- Initial Screening. This alternative will be retained for further evaluation only as a sub-component of other more effective alternatives.

2.2.4 Surface Controls

GRADING

Grading is the general term for techniques used to reshape the surface of covered landfills in order to manage surface water infiltration and run-off while controlling erosion. Grading is often performed in conjunction with surface sealing and revegetation as part of an integrated closure plan. Surface grading serves several functions: reduces ponding which minimizes infiltration, reduces runoff velocities to reduce soil erosion, can be a factor in reducing or eliminating leaching of wastes. Grading is considered essential to the continued performance and reliability of a cap.

- Effectiveness Grading the surface of the site would be an effective alternative in conjunction with other alternatives, such as capping or controlling the site runoff.
- Implementability This alternative can be easily implemented.

- Cost This alternative is relatively low cost.

- Initial Screening This alternative will be retained for further evaluation only as a sub-component of other more effective alternatives.

DIVERSION

Dikes and berms can be used to prevent runoff from sites or excessive erosion of newly constructed slopes until the slope is stabilized with vegetation.

- o <u>Effectiveness</u> Diversion is an effective method of controlling the dispersion of contamination through runoff from the site, however, it would not mitigate other routes of migration.

- o <u>Implementability</u> This alternative can be easily implemented.

- o <u>Cost</u> This alternative is relatively low cost.

- o <u>Initial Screening</u> This alternative will be retained for further evaluation only as a sub-component of other more effective alternatives.

2.2.5 Capping

The primary purpose of a cap is to minimize contact between infiltrating rain water and the in-place wastes. Capping reduces the migration of contaminants. Natural soil, admixed soils, or synthetic liner caps are typical materials used to construct caps.

SINGLE LAYER

The most effective single layer caps are composed of clay, concrete or bituminous asphalt.

- o <u>Effectiveness</u> A single layer cap is not an acceptable remedial alternative for the drums on site due to the possibility of continued migration due to leakage of contaminants from the drums over time. However, the use of a cap would effectively contain and mitigate the migration of contaminated soil and in conjunction with other remedial alternatives may prove to be an effective alternative.

- o <u>Implementability</u> This alternative can be easily implemented.

- o Cost This alternative is cost effective, however, a multi-layer cap provides a significantly greater level of protection at a similar cost to a single layer cap.

- o Initial Screening Due to limitations of cost this alternative will not be considered further.

MULTI-LAYER CAP

The multi-layer cap consists of an upper topsoil layer which will supported growth of vegetation. A drainage layer composed of sand is placed below the vegetative layer followed by a low permeability layer formed by a synthetic or soil liner system.

- o Effectiveness A properly installed multi-layered cap generally performs excellently for the first 20 years, however, long-term maintenance is required to assure the integrity of the cap. A multi-layer cap is not an acceptable remedial alternative for the drums on site due to the possibility of continued migration of contaminants over time. However, the use of multi-layer cap in conjunction with other remedial alternatives may prove to be an effective alternative.

- o Implementability This alternative can be implemented.

- o Cost This alternative is cost effective.

- o Initial Screening This alternative will be retained for further evaluation.

2.2.6 Excavation

Total or partial excavation of contaminated materials is the physical removal of contaminants from the site. The excavated materials can then be treated or landfilled. Excavation of contaminated materials is accomplished by common construction equipment sometimes fitted with special attachments.

COMPLETE EXCAVATION

- Effectiveness This alternative provides a simple process to move/remove contaminated materials, however it must be used in conjunction with another alternative, such as treatment, to effectively mitigate public health threats.

- Implementability This remedial alternative is readily available.

- Cost This alternative is cost effective.

- Initial Screening This alternative will be retained for further evaluation.

PARTIAL EXCAVATION

- Effectiveness This alternative provides for the removal of the highly contaminated areas, however it must be used in conjunction with another alternative, such as treatment, to effectively mitigate public health threats.

- Implementability This remedial alternative is readily available.

- Cost This alternative is cost effective.

- Initial Screening This alternative will be retained for further evaluation.

2.2.7 Decontamination

HIGH PRESSURE WASH

High pressure steam wash is a common remedial technique to clean relatively non-porous surfaces. Specific types of detergents may be added to the wash and used to clean contaminated surfaces. The washwater from this process is collected, sampled, and disposed.

- o <u>Effectiveness</u> This method is effective in decontaminating surfaces in buildings. This technology has proven effective at CERCLA sites to remove PCBs, from buildings and scrap metal.

- o <u>Implementability</u> This remedial alternative is readily available.

- o <u>Cost</u> This alternative is cost effective.

- o <u>Initial Screening</u> This alternative will be retained for further evaluation.

SOLVENT WASH

Specific solvents can be used to wash relatively non-porous surfaces and remove contaminates such as non-water soluble organics. Used solvents are collected and disposed.

- o <u>Effectiveness</u> This method is effective in decontaminating surfaces in buildings. This technology has proven effective at CERCLA sites to remove PCBs, from buildings and scrap metal.

- o <u>Implementability</u> This remedial alternative is readily available.

- o <u>Cost</u> This alternative is cost effective.

- o <u>Initial Screening</u> This alternative will be retained for further evaluation.

2.2.8 Solidification/Stabilization

Solidification is a process which mechanically binds contaminants within a solidified matrix. Stabilization is a process which limits the solubility or mobility of waste constituents.

SORPTION

Sorption involves the addition of a dry, solid substance (soil, ash, cement kiln dust) to take up free liquids and improve waste handling. Some sorbents have been used to limit the escape of volatile organic compounds.

- Effectiveness This technology is applicable to organics and inorganics in a liquid phase. The materials, once stabilized into a solid, would then be shipped to a landfill for disposal. The only liquids of concern at the site are those in the drums. This alternative would not adequately treat the drummed material so that it could be landfilled, so this alternative has no application at the site.

- Initial Screening Due to the limitations of effectiveness, this remedial alternative will not be considered further.

CEMENT BASED

This is most suitable for immobilizing metals because the pH of the cement mixture converts the metal cations into insoluble hydroxides or carbonates. However, metal hydroxides and carbonates are insoluble only over a narrow pH range and are subject to solubilization and leaching in the presence of mildly acidic leaching solutions (e.g. rain).

- Effectiveness Standard equipment such as cement mixing and handling equipment is widely available and mobile. This technology is suited for solidifying sludges and soils containing the following: heavy metals, inorganics, organics (generally no more than 20% by volume), and asbestos. However, the high metal content of the yard may indicate the presence of the soluble salts which interfere with the setting and curing of cement as well as reduce the strength of the product. A pilot study may be needed to determine if site soil conditions are such that this technology is applicable.

- Implementability This technology would not be difficult to implement.

- o Cost This alternative is cost effective.

- o Initial Screening This alternative will be retained for further evaluation.

POZZOLAN-CEMENT BASED

Pozzolan - cement based processes use siliceous material together with lime, cement, gypsum, and other suitable setting agents to immobilize heavy metals and other inorganics. The basic reaction is between the silicate material (fly-ash, slag, or other readily available pozzolanic material) and polyvalent metal ions. The solid formed varies from a moist, clay-like material to a hard dry solid similar in appearance to concrete.

- o Effectiveness It is doubtful that the material in the drums would be sufficiently stabilized to meet land disposal requirements. The process may be able to mitigate the release of organic and inorganic contaminates from the site soils. A pilot study may be needed to determine if site soil conditions are such that this technology is applicable.

- o Implementability This technology would not be difficult to implement.

- o Cost This alternative is cost effective.

- o Initial Screening This alternative will be retained for further evaluation.

THERMOPLASTIC MICROENCAPSULATION

This process involves mixing dried wastes with materials such as bitumen (asphalt), paraffin, or polyethylene and placing the mixture in a mold or container. These processes were developed mainly for radioactive or highly soluble toxic substances which are not amenable to cement-based techniques.

- o <u>Effectiveness</u> This process would be less effective than microencapsulation of the drums and would not significantly improve the handling characteristics of the soil. The alternative would be less effective than other solidification/stabilization alternatives. For these reasons, this remedial alternative will not be considered further.

- o <u>Initial Screening</u> Due to the limitations of effectiveness, this remedial alternative will not be considered further.

MACROENCAPSULATION

Macroencapsulation systems contain contaminated material by bonding an inert coating or jacket around a cemented waste mass or by sealing them in polyethylene lined drums or containers. Macroencapsulation can be used to contain very soluble toxic wastes. Leaching of the waste can be eliminated for the life of the jacketing material. This process has been used at remedial sites as drum over-packs to contain weak or leaking drums and containers.

- o <u>Effectiveness</u> This process contains the waste in isolated packages to improve handling of the waste. This process has been used at remedial sites as drum over-packs to contain weak or leaking drums and containers, such as those found at Schreck's scrapyard. This is a suitable treatment for the drums at the site. The handling of the contaminated soils would not be significantly improved by this alternative.

- o <u>Implementability</u> This remedial alternative is readily available at the scrapyard.

- o <u>Cost</u> This alternative is cost effective.

- o <u>Initial Screening</u> This alternative will be retained for further evaluation.

2.2.9 Physical Treatment

Physical treatment processes separate the waste stream by either applying physical forces or changing the physical form of the waste. In both cases, the chemical structure of the substances in the waste stream remains constant.

VAPOR EXTRACTION

Clean air is mixed with contaminated soil or water by mechanical aeration/extraction to transfer the volatile organics from the soil or water into the air stream. This treatment does not remove non-volatile organics. The air stream can be subsequently treated with activated carbon canisters and/or water scrubbers or incineration of volatile emissions in an afterburner. Vapor extraction can be accomplished with a number of different methods including:

- floating aerators
- enclosed mechanical aeration systems
- pneumatic conveyor systems
- low temperature thermal stripping system and
- in situ vacuum extraction systems

-<u>Floating Aerators</u> pump and spray the water into the air in a mist form to increase air contact which promotes phase transport of volatile organics from the water to the air.

-<u>Enclosed Mechanical Aeration System</u> treats contaminated soils in a pug mill or rotary drum system where volatile organics are released from the soil matrix by the churning action (air/soil contact). Induced air flow within the chamber captures the volatile organic emissions and the air is discharged through an air pollution control device and a properly sized stack.

-<u>Pneumatic Conveyor Systems</u> consist of a duct carrying air at high velocity, an induced draft fan to propel the air, a feeder for addition and dispersion of particulate solids into the air stream and separation equipment for final recovery of the solids from the gas stream. Several systems heat the inlet air to 300 degrees fahrenheit to induce organic contaminant volatilization.

-Low Temperature Stripping Systems consist of a similar configuration as the enclosed mechanical aeration system except that additional heat transfer surfaces may be added for soil heating. Induced air flow conveys the desorbed volatile organic/air mixture through a combustion afterburner for the destruction of the organics and the effluent air stream is discharged through a stack.

-Vacuum extraction Systems consist of a high volume vacuum pump connected via a pipe system to a network of boreholes or wells drilled in the contaminated soil zone. The vacuum pulls air through the contaminated soils, stripping volatile organics, and the air is subsequently fed through a condenser to recover free product, and/or through an emissions control systems.

VAPOR EXTRACTION

o Effectiveness This alternative only removes volatile organics. While the soils at Schreck's Scrapyard do contain some volatile organic compounds, the other organic and inorganic contaminants would be unaffected.

o Initial Screening Due to the limitations of effectiveness, this remedial alternative will not be considered further.

STEAM STRIPPING

Steam stripping uses steam to extract organic contaminants from liquids or slurry. Direct injection of steam and multiple pass heat exchangers are the two most prevalent methods of steam stripping. Steam stripping by direct injection of steam can be used to treat aqueous and mixed wastes containing organic contaminants at higher concentrations and/or having lower volatility than those waste streams which can be stripped by air.

o Effectiveness Volatile organics, phenols, ketones, and phthalate can be removed from aqueous solutions and solids via steam stripping. Metal contaminants and water miscible organics are not removable by this process which would make the process ineffective at removing all contaminants of concern from the soil.

- Initial Screening Due to the limitations of effectiveness, this remedial alternative will no longer be considered.

THIN-FILM EVAPORATORS

Thin-film Evaporators or Wiped-film Evaporators are widely used to thicken viscous liquids and slurries. A thin-film system consists basically of a large diameter heating surface on which a thin film of material is continuously wiped. The volatile portion is vaporized, leaving concentrated semi-solids.

Other types of evaporation processes include kettle, tubular, scraped surface and solar evaporators.

An unconventional evaporation technology with hazardous waste applications is the Carver-Greenfield Process. In this process oil is added to the waste stream to maintain liquid phase fluidity as the solids content increase. The oil is subsequently reclaimed and recycled.

- Implementability This alternative could not be applied to the soils.

- Initial Screening Due to the limitations in implementability, this remedial alternative will no longer be considered.

FILTRATION

Filtration is the removal of suspended solids from a fluid by passage through a granular material bed or the dewatering of sludge and soil by vacuum, high pressure, or gravity. Various sludge dewatering technologies include belt filter press, and chamber pressure filtration.

-Vacuum Filtration typically involves a mechanically supported cylindrical rotating drum covered by a filter medium. Water is drawn into the center vacuum while the solids are scrapped off the drum.

-Belt Filter Process continuously squeezes the sludge through a series of rollers forcing the water from the sludge.

-Chamber Pressure Filters consist of a collection of cloth covered plates arranged in parallel and pressed together. As the plates are compressed, filtrate exits through the cloth.

-Vacuum, belt press, and chamber pressure filtration processes are primarily used to dewater sludge.

- o <u>Effectiveness</u> This alternative would be an effective means to dewater the sludge identified near the press pit.

- o <u>Cost</u> Filtration can be implemented but for the small area of sludge identified it may not be cost effective to mobilize and establish an on-site system relative to sending it to a RCRA treatment facility.

- o <u>Initial Screening</u> Due to the limitations in cost effectiveness, this remedial alternative will no longer be considered.

SOIL FLUSHING/SOIL WASHING

These processes wash contaminants from a sludge-soil matrix using a liquid medium in a contraction washing unit. Contaminants are removed from the washing solution in a conventional wastewater treatment system. A similar process known as soil flushing can be applied on unexcavated soils (in situ) using an injection/recirculation system. These systems can be used in conjunction with mobile groundwater treatment systems.

- o <u>Effectiveness</u> This alternative is only applicable to one type contaminant at a time. Multiple applications of the technology would be required to treat the large variety of contaminants found at the site.

- Implementability The soils at Schreck's Scrapyard have low permeability and are non-homogenous which would prevent in-situ soil flushing.

- Cost Multiple washings of the soils to remove the variety of contaminants present in the soils would not be cost effective.

- Initial Screening Due to the limitations of implementability and cost, this remedial alternative will not be considered further.

LIQUID-LIQUID EXTRACTION

This process, still in the experimentation stage, utilizes the low solubility of PCBs in water to treat contaminated soil. The soil first undergoes phase separation of liquids from solids, and each phase is treated separately. Miscible solvent is added to each of the two physical phases, liquid and solid, which dissociates the PCB molecules from the inorganic substrate molecules. Almost all of the PCBs are present in the liquid phase; the solvent is extracted from the solid phase, and the decontaminated soil is discharged. The liquid phase is fed through a liquid-liquid extractor. Water is added which drives the PCBs out of solution and into the stripping solvent.

- Effectiveness Uncertain, since this process is still in the experimental stage.

- Initial Screening Due to the limitations of effectiveness this remedial alternative will not be considered further.

SLUDGE EXTRACTION

The sludge extraction process is based on the critical solution point (the conditions of temperature, pressure and density under which a liquid and its vapor become identical) of water and a solvent to remove water and oily material from sludge or solids. The feed is pretreated with an alkaline composition and then mixed with triethylamine (TEA) as it is cooled below the critical temperature. The cooling impels the separation of a liquid phase from a solid phase. The liquid phase is then heated above the critical temperature to impel the separation of an amine phase from a water phase. The amine phase contains the oily material and organic contaminants originally present in the feed. The oils and contaminants can be recovered and the TEA recycled and used to pretreat additional feed.

- o Implementability The sludge extraction method is best applied to oily sludges from abandoned lagoons, sludges containing toxic organic compounds, sludges containing heavy metals, petroleum refining sludges, and wood treating sludges containing creosote. This method is most readily applicable to sludges containing approximately 60 to 80% water, and 10 to 20% oil. The soils at the scrapyard do not contain this amount of water, or oil, and consequently this treatment alternative can not be implemented at the site.

- o Initial Screening Due to the limitations of implementability, this remedial alternative will not be considered further.

2.2.10 Thermal Treatment

Thermal destruction is a treatment method which uses high temperature oxidation under controlled conditions to degrade a substance into products that generally include CO_2, H_2O vapor, SO_2, NO_x, HCl gases and ash. Thermal destruction methods can be used to destroy organic contaminants.

ROTARY KILN INCINERATION

Rotary kilns are capable of handling a wide variety of solid and liquid wastes. The basic rotary kiln consists of the kiln and an afterburner. Wastes are fed into the kiln at the higher end and are passed through the combustion zone as the kiln rotates. Afterburners are often used to ensure complete combustion. A scrubber controls emissions.

- o Effectiveness Organic contaminants could be readily destroyed , however, the high heavy metal content also found at the scrapyard could result in elevated emissions of heavy metals which are difficult to collect with air pollution control equipment. This treatment also would not remove the inorganics and would require multiple alternatives, such as solidification and landfilling of the ash.

- Implementability This technology would be implementable at the site if metal emissions could be controlled.

- Cost This alternative is more costly than some such as capping, however, this alternative permanently destroys organic contaminants which provides a higher level of long term public health protection.

- Initial Screening This alternative will be retained for further evaluation.

MULTIPLE HEARTH INCINERATION

Multiple Hearth incinerators consist of a refractory lined steel shell, a rotating central shaft and a series of solid flat hearths. The system can treat the same wastes as the Rotary Kiln provided that solid wastes (such as soil) are pretreated by shredding and/or sorting.

- Effectiveness Organic contaminants could be readily destroyed, however, the high heavy metal content also found at the scrapyard could result in elevated emissions of heavy metals which are difficult to collect with air pollution control equipment. This treatment also would not remove the inorganics and would require multiple alternatives, such as solidification and landfilling of the ash.

- Implementability This technology would be implementable at the site if metal emissions could be controlled.

- Cost This alternative is more costly than some such as capping, however, this alternative permanently destroys organic contaminants which provides a higher level of long term public health protection.

- Initial Screening This alternative will be retained for further evaluation.

FLUIDIZED BED INCINERATION

Fluidized bed incinerators are applicable to liquid, solid, and gaseous combustible wastes, however, some wastes require pretreatment. A fluidized bed consists of an inert granular material bed, usually sand and air is introduced at the bottom which fluidizes the bed. Fluidized beds handle the same wastes that can be treated in the Rotary Kiln and are typically used for municipal wastewater sludge disposal and are well suited for high moisture wastes.

- Effectiveness Organic contaminants could be readily destroyed, however, the high heavy metal content also found at the scrapyard could result in elevated emissions of heavy metals which are difficult to collect with air pollution control equipment. This treatment also would not remove the inorganics and would require multiple alternatives, such as solidification and landfilling of the ash.

- Implementability This technology would be implementable at the site if metal emissions could be controlled.

- Cost This alternative is more costly than some such as capping, however, this alternative permanently destroys organic contaminants which provides a higher level of long term public health protection.

- Initial Screening This alternative will be retained for further evaluation.

INFRARED INCINERATION

Infrared incineration systems are designed to destroy hazardous wastes by infrared energy. Wastes are conveyed under infrared heating elements on a conveyor belt and off gases are discharged to a secondary combustion chamber to ensure complete combustion of remaining organics. Most types of solid, liquid sludge and gaseous organic wastes can be treated with the total system.

- o <u>Effectiveness</u> Organic contaminants could be readily destroyed, however, the high heavy metal content also found at the scrapyard could result in elevated emissions of heavy metals which are difficult to collect with air pollution control equipment. This treatment also would not remove the inorganics and would require multiple alternatives, such as solidification and landfilling of the ash.

- o <u>Implementability</u> This technology would be implementable at the site if metal emissions could be controlled.

- o <u>Cost</u> This alternative is more costly than some such as capping, however, this alternative permanently destroys organic contaminants which provides a high level of long term public health protection.

- o <u>Initial Screening</u> This alternative will be retained for further evaluation.

<u>LIQUID INJECTION INCINERATION</u>

Liquid injection incinerators consist of a combustion chamber and a series of atomizing devices. These devices introduce waste material into the combustion chamber in finely divided droplets mixed with air. Following combustion, the flue gases are cooled and treated to remove particulates and to absorb acid gases. This process can be applied to almost all pumpable, atomizable organic wastes.

- o <u>Implementability</u> Wastes that are not able to be treated by liquid injection incineration include: wastes with a high inorganic salt content; wastes with a high moisture content; wastes with a high heavy metal content; and nonpumpable sludges, solids, and soils. This treatment would not be applicable to soils at the site. The only liquids would be in the buried drums which contain a very small volume.

- <u>Initial Screening</u> Due to limitations of implementability, this treatment will not be considered further.

<u>PLASMA ARC</u>

The plasma arc process uses very high energy radiation to break chemical bonds directly without a series of chemical reactions. This process is applicable to liquid (pumpable) organic wastes and finely divided, fluidized sludges.

- <u>Implementability</u> The plasma arc treatment is only effective in treating liquid organic wastes and fluidized sludges. This treatment would not be applicable to soils and the liquids in the buried drums are too small in volume.

- <u>Initial Screening</u> Due to the limitations of implementability, this treatment will not be considered further.

<u>THERMAL EXTRACTION</u>

Thermal extraction technology consists of a feed section, indirect heating section, gas/solid separation section, condensing section, and a very small off-gas section. Thermal extraction process products include water, organic liquid, and organically decontaminated solids.

- <u>Effectiveness</u> Organic contaminants could be readily destroyed, however, the high heavy metal content also found at the scrapyard could result in elevated emissions of heavy metals which are difficult to collect with air pollution control equipment. This treatment also would not remove the inorganics and would require multiple alternatives, such as solidification and landfilling of the ash.

- <u>Implementability</u> This technology would be implementable at the site if metal emissions could be controlled.

- Cost This alternative is more costly than some such as capping, however, this alternative permanently destroys organic contaminants which provides a higher level of long term public health protection.

- Initial Screening This alternative will be retained for further evaluation.

ADVANCED ELECTRIC REACTOR

An advanced electric reactor (AER), also known as a high temperature fluid wall, is a process developed specifically for the detoxification of contaminated soils, although other solid and liquid wastes may also be destroyed. The AER is different from other thermal technologies in that energy is transferred to the incoming waste through radiation instead of combustion, conduction or convection.

The reactor vessel consists of a porous carbon core surrounded by carbon electrodes which heat the core to high temperatures. The wastes pass through the core via gravity where thermolysis occurs at approximately 4000 degrees Fahrenheit. Exit gases and waste solids from the reactor enter two post-reactor treatment zones to ensure complete destruction.

- Effectiveness Organic contaminants could be readily destroyed, however, the high heavy metal content also found at the scrapyard could result in elevated emissions of heavy metals which are difficult to collect with air pollution control equipment. This treatment also would not remove the inorganics and would require multiple alternatives, such as solidification and landfilling of the ash.

- Implementability This technology would be implementable at the site if metal emissions could be controlled.

- Cost This alternative is more costly than some such as capping, however, this alternative permanently destroys organic contaminants which provides a higher level of long term public health protection.

- Initial Screening This alternative will be retained for further evaluation.

MOLTEN SALT

Molten Salts act as catalysts and promote heat transfer which destroyed organic compounds.

- Implementability This treatment is only applicable to low ash, low water content solid or liquid wastes. The soils are too high in ash. The volume of waste in the buried drums is too small.

- Initial Screening Due to the limitations of implementability, this remedial alternative will not be considered further.

PYROLYSIS

The pyrolysis rotary process operates in an oxygen free environment and at lower temperatures than conventional kilns. High treatment capacity produces gas suitable for energy recovery, or which can be treated to recover condensed hydrocarbons.

- Effectiveness Organic contaminants could be readily destroyed, however, the high heavy metal content also found at the scrapyard could result in elevated emissions of heavy metals which are difficult to collect with air pollution control equipment. This treatment also would not remove the inorganics and would require multiple alternatives, such as solidification and landfilling of the ash.

- Implementability This technology would be implementable at the site if metal emissions could be controlled.

- Cost This alternative is more costly than some such as capping, however, this alternative permanently destroys organic contaminants which provides a higher level of long term public health protection.

- o <u>Initial Screening</u> This alternative will be retained for further evaluation.

VITRIFICATION

In-situ vitrification is a thermal treatment process that converts contaminated soil into a chemically inert obsidian, stable glass product. Four electrodes are inserted into the ground to the desired treatment depth. Because the soil is not electrically conductive once moisture has been driven off, a conductive mixture of flaked graphite and glass frit is placed among the electrodes to act as the starter path. An electrical potential is applied to the electrodes, which establishes an electrical current in the starter path. The power heats the surrounding soil up to 3600 degrees fahrenheit which is well above the initial melting temperature or fusion temperature. As the vitrified zone grows, it incorporates non-volatile elements and destroys organic components by pyrolysis. A hood is placed over the processing area to draw off the combustion gases into an off-gas treatment system.

- o <u>Effectiveness</u> In-situ vitrification can be used in most soils, including those saturated with water, and those containing a variety of mixed, buried materials. This technology is potentially applicable to both the soil and the buried drums at Schrecks.

- o <u>Implementability</u> In-situ vitrification technology has been demonstrated through field scale for some applications. A field scale system has been operated at production rates of up to 5 tons per hour and has produced single melts of up to 500 tons. Equipment is available for performing treatability test on specific wastes.

- o <u>Cost</u> Although costs are high, this alternative provides a greater amount of long term protection to public health and the environment.

- o <u>Initial Screening</u> This alternative will be retained for further evaluation.

RADIO FREQUENCY

The Radio Frequency heating process involves laying a row of horizontal conductors on the ground surface and exciting them with an RF generator. The Radio Frequency electrodes heat the shallow subsurface and generate superheated steam. Organics are destroyed or mobilized by vaporization, thermal decomposition, or distillation.

- o <u>Implementability</u> This process has not yet been used on a full scale basis.

- o <u>Initial Screening</u> Due to the limitations of implementability, radio frequency will not be considered further as a remedial alternative.

WET AIR OXIDATION

Wet air oxidation is a thermal treatment technology which breaks down organic materials by oxidation in a high temperature and pressure aqueous environment and in the presence of compressed air. The resulting exothermic reactions are self-sustaining and potentially capable of generating steam as a by-product.

In this process, wastes are mixed with compressed air and preheated in a heat exchanger before entering the corrosion-resistant reactor where exothermic reactions increase the temperature to a desired value. The exit stream from the reactor is used as the heating medium in the heat exchanger before it enters a separator where the spent process vapors (i.e, non-condensible gases consisting primarily of air and carbon dioxide) are separated from the oxidized liquid phase.

The reactor or pressure vessel is sized to accommodate a specific waste flow over a certain amount of time. Residence time, temperature, pressure and the possible use of a catalyst are based upon the characteristics of the waste.

- o <u>Effectiveness</u> Wet air oxidation process is designed to treat organic contaminated liquids, sludges and groundwater. Soils are processed as a

5% solid slurry however it has only been accomplished in a bench scale test. Creating a slurry of the site soils would greatly increase the volume of material while only treating a small portion of the problem, wet air oxidation will not greatly reduce the PCB concentrations nor will it effect the heavy metals or asbestos.

- o <u>Initial Screening</u> Due to the limitations of effectiveness of this option, it will no longer be considered.

2.2.11 CHEMICAL TREATMENT

Chemical treatment processes alter the chemical structure of the constituents to produce a waste residue that is less hazardous than the original waste.

CHEMICAL OXIDATION AND REDUCTION

Chemical oxidation is a process which increases the oxidation state of matter by removing electrons or adding oxygen to the atom. As a result of oxidation, a substance may be transformed, degraded, and/or immobilized in soil. Oxidizing agents may be utilized to degrade organic constituents in wastes. Some oxidizing agents are: ozone, hypochlorite, hydrogen peroxide, chlorine, potassium permanganate and UV/ozone. Heavy metal oxidation is not usually an effective treatment method because the higher the oxidation state, the more mobile the heavy metal tends to be.

Chemical reduction is a process in which the oxidation state of an atom is decreased. Reducing agents are electron donors, with reduction accomplished by adding electrons to the atom. Chemical reduction occurs naturally within some soil systems. Certain compounds are more susceptible to reduction than others because they will readily accept electrons. Reducing agents can be added to soil in place to degrade reducible compounds. Some reducing agents are: ferrous sulfate, sodium sulfate, sulfur dioxide, iron (+2), aluminum, zinc, and sodium borohydride.

- o <u>Effectiveness</u> Oxidation and reduction are not generally effective as a remedial treatment technology when there is a presence of a variety of contaminants, such as at the Schreck Scrapyard. A wide diversity of compounds may complicate the process and produce undesirable side effects. For example, increasing the oxidation state of heavy metals generally increases their mobility.

- Initial Screening Due to the limitations of effectiveness of this option, it will no longer be considered.

DECHLORINATION

Dechlorination is a process in which chlorine is chemically removed from chlorinated organic compounds such as PCBs and dioxins. This system is used primarily to dechlorinate transformer fluids. The mechanism for dechlorination involves nucleophilic displacement of chlorine atoms by polyethylene glycol, to form an alkali metal chloride (typically KCl or NaCl) and a substituted organic polymer. The reagents are air and water sensitive, therefore the process should take place in a nitrogen atmosphere.

- Effectiveness This process is primarily used for dechlorination of transformer fluids. The reaction is air and water sensitive. As such it must take place in a nitrogen atmosphere with water content minimized. The process would only be effective for the chlorinated organics and would not be effective for other organics and inorganics.

- Initial Screening Due to the limitations of effectiveness this treatment will no longer be considered.

IRRADIATION/ULTRASONICS

This process utilizes irradiation and ultrasonic techniques to neutralize contaminants by changing their composition. A slurry containing approximately 20% solid weight is prepared from the soil. The slurry is fed into a mixing tank containing detergent and sodium hydroxide and mixed. The mixture is then fed into a reactor, ozone or hydrogen is added, and the mixture is exposed to ultraviolet irradiation. During treatment microturbulence is maintained in the mixture by ultrasonics. The treated slurry is fed into a cyclone where the solid and liquid phases are separated.

- o Implementability This process is still being tested in the laboratory.

- o Initial Screening Due to the limitations of implementability, this treatment will no longer be considered.

2.2.12 BIOLOGICAL TREATMENT

Biological technologies exist for the treatment of soils contaminated at low to moderate levels with non-halogenated organics and some halogenated organics.

IN-SITU BIODEGRADATION

In-situ biodegradation is a process that uses existing indigenous aerobic bacteria, or introduced cultured strains of bacteria, to biodegrade organic compounds in soil or groundwater. In-situ biodegradation has been applied to sites contaminated with readily biodegradable nonhalogenated organics, primarily gasoline. Applications can include the following waste types: Gasoline and fuel oils, hydrocarbon solvents (e.g. benzene, toluene, xylene), nonhalogenated aromatics (e.g. ethylbenzene, styrene, phenol, cresol), and alcohols, ketones, ethers, and glycol.

- o Effectiveness This remedial alternative has been used primarily on sites contaminated with biodegradable nonhalogenated organics, typically gasoline. The elevated levels of metals, inorganics, and halogenated organics at the scrapyard would inhibit this process.

- o Initial Screening Due to the limitations of effectiveness, this treatment will not be considered further.

2.2.13 ON-SITE LANDFILL

RCRA LANDFILL

An on-site hazardous waste landfill must be designed and constructed in accordance with RCRA 40 CFR Part 264 landfill facility standards. 40 CFR Part 264 and associated guidance are concerned with the proper location, design, construction, operation, and maintenance of hazardous waste management facilities. These requirements preclude landfilling in areas of seismic instability, in a 100-year flood plain, and where the liner system integrity would be adversely affected. These requirements also preclude landfilling liquids and several types of highly mobile and/or highly toxic wastes. In addition, the on-site landfill program evaluation must address potential environmental and human health risks posed by the landfill.

- o <u>Effectiveness</u> This alternative could effectively contain and mitigate migration for contaminated soils. The buried drums could not be landfilled due to regulatory restrictions.

- o <u>Implementability</u> A RCRA landfill is hypothetically implementable on the Schreck's Scrapyard site.

- o <u>Cost</u> This alternative is cost effective.

- o <u>Initial Screening</u> This alternative will be retained for further evaluation.

NON-HAZARDOUS LANDFILL

A landfill for non-hazardous waste could be constructed on-site to meet solid waste disposal design and closure requirements.

- o <u>Effectiveness</u> This is an effective tandem remedial alternative to other treatment technologies.

- o <u>Implementability</u> This technology can be implemented at this site.

- Cost This alternative is cost effective.

- Initial Screening This alternative will be retained for further evaluation.

2.2.14 OFF-SITE DISPOSAL

RCRA LANDFILL

This option involves hauling the waste material to a RCRA permitted landfill certified to accept CERCLA waste. A detailed waste analysis is generally required and on-site pretreatment may be required. Pretreatment could include solidification, and/or free liquids removal.

- Effectiveness This alternative could effectively contain and mitigate public health and environmental threats from soils. The buried drums could not be landfilled due to regulatory restrictions.

- Implementability This remedial alternative is readily available.

- Cost This alternative is cost effective.

- Initial Screening This alternative will be retained for further evaluation.

NON-HAZARDOUS LANDFILL

Non-hazardous waste could be disposed off-site at licensed solid waste disposal facilities.

- Effectiveness This is an effective tandem remedial alternative that may accompany other treatment technologies.

- Implementability This remedial alternative is readily available.

- o <u>Cost</u> This alternative is cost effective.

- o <u>Initial Screening</u> This alternative will be retained for further evaluation.

RCRA TREATMENT FACILITY

Waste could be transported and treated at an off-site hazardous waste treatment facility.

- o <u>Effectiveness</u> This is an effective remedial alternative which could be utilized for waste from the site.

- o <u>Implementability</u> This remedial alternative is readily implementable.

- o <u>Cost</u> This alternative is cost effective.

- o <u>Initial Screening</u> This alternative will be retained for further evaluation.

2.2.15 Summary

A summary of the technologies rejected and retained for further evaluation are presented in Table 2.2. Those technologies passing the initial screening process have been grouped into seven comprehensive remedial alternatives (Table 2.3) for all effected media in or at the site. Three main areas of contamination were identified in the Phase I RI: the drummed waste in the abandoned press pit, the PCB contamination in the on-site buildings and Schenck street, and the contaminated on and off site soils.

TABLE 2.2

SUMMARY OF PRELIMINARY SOURCE CONTROL TECHNOLOGIES SCREENING

SCHRECK'S SCRAPYARD

NORTH TONOWANDA, NEW YORK

REMEDIAL TECHNOLOGY	PROCESS OPTIONS	FURTHER EVALUATION	ELIMINATED	REQUIRED TANDEM REMEDIAL TECHNOLOGY
NO ACTION	N/A		X	N/A
ACCESS RESTRICTIONS	FENCE	X		NONE
	DEED RESTRICTIONS	X		NONE
SURFACE CONTROLS	GRADING	X		
	DIVERSION	X		
CAPPING	SINGLE-LAYER		X	MONITORING
	MULTI-LAYER	X		MONITORING
EXCAVATION	COMPLETE EXCAVATION	X		DISPOSAL/TREATMENT
	PARTIAL EXCAVATION	X		DISPOSAL/TREATMENT
DECONTAMINATION	HIGH PRESSURE WASH	X		DISPOSAL/TREATMENT
	SOLVENT WASH	X		DISPOSAL/TREATMENT
SOLIDIFICATION/ STABILIZATION	SORPTION		X	DISPOSAL
	CEMENT BASED	X		DISPOSAL
	POZZOLAN-CEMENT BASED	X		DISPOSAL
	THERMOPLASTIC MICROENCAPSULATION		X	DISPOSAL
	MACROENCAPSULATION	X		DISPOSAL
PHYSICAL TREATMENT	VAPOR EXTRACTION		X	EXCAVATION/DISPOSAL
	STEAM STRIPPING		X	
	THIN FILM EVAPORATION		X	
	FILTRATION		X	
	SOIL FLUSHING/SOIL WASHING		X	EXCAVATION/DISPOSAL
	LIQUID-LIQUID EXTRACTION		X	EXCAVATION/DISPOSAL
	SLUDGE EXTRACTION		X	EXCAVATION/DISPOSAL
THERMAL TREATMENT	ROTARY KILN INCINERTION	X		EXCAVATION/DISPOSAL
	MULTIPLE HEARTH INCINERATION	X		EXCAVATION/DISPOSAL
	FLUIDIZED BED INCINERATION	X		EXCAVATION/DISPOSAL
	INFRARED INCINERATION	X	X	EXCAVATION/DISPOSAL
	LIQUID INJECTION INCINERATION		X	EXCAVATION/DISPOSAL
	PLASMA ARC		X	EXCAVATION/DISPOSAL
	THERMAL EXTRACTION	X		EXCAVATION/DISPOSAL
	ADVANCED ELECTRON REACTOR	X		EXCAVATION/DISPOSAL
	PYROLYSIS	X		EXCAVATION/DISPOSAL
	VITRIFICATION	X		NONE
	RADIO FREQUENCY		X	NONE
	WET AIR OXIDATION			
CHEMICAL TREATMENT	CHEMICAL OXIDATION/REDUCTION		X	NONE
	DECHLORINATION		X	EXCAVATION/DISPOSAL
	IRRADIATION/ULTRASONICS		X	EXCAVATION/DISPOSAL
BIOLOGICAL TREATMENT	IN-SITU BIODEGREDATION		X	NONE
ON-SITE LANDFILL	RCRA LANDFILL	X		EXCAVATION/PRETREATMENT/MONITORING
	NON-HAZARDOUS LANDFILL	X		EXCAVATION/PRETREATMENT/MONITORING
OFF-SITE DISPOSAL	RCRA LANDFILL	X		EXCAVATION/PRETREATMENT
	NON-HAZARDOUS LANDFILL	X		EXCAVATION/PRETREATMENT

TABLE 2.3
Remedial Alternatives

	Location	Action	Method
ALTERNATIVE 1	Site	No Action	None
	Drummed Waste	No Action	None
	Bldgs./Street	No Action	None
	Soils	No Action	None

	Location	Action	Method
ALTERNATIVE 2	Site	Access Restriction	Fence/Deed Restriction
	Drummed Waste	Excavation	Complete Excavation
		Stabilization	Macroencapsulation
		Offsite Disposal	RCRA Treatment Facility
	Bldgs./Street	Decontamination	High Pressure Wash/Solvent Wash
		Offsite Disposal	RCRA Treatment Facility
	Soils	Capping	Multi Layer

	Location	Action	Method
ALTERNATIVE 3	Site	Access Restriction	Fence/Deed Restriction
	Drummed Waste	Excavation	Complete Excavation
		Stabilization	Macroencapsulation
		Offsite Disposal	RCRA Treatment Facility
	Bldgs./Street	Decontamination	High Pressure Wash/Solvent Wash
		Offsite Disposal	RCRA Treatment Facility
	Soils	Capping	Multi Layer
		Solidification/ Stabilization	Cement Based/Pozzolan-Cement Based

TABLE 2.3 (Continued)
Remedial Alternatives

	Location	Action	Method
ALTERNATIVE 4	Site	Access Restriction	Fence/Deed Restriction
	Drummed Waste	Excavation	Complete Excavation
		Stabilization	Macroencapsulation
		Offsite Disposal	RCRA Treatment Facility
	Bldgs./Street	Decontamination	High Pressure Wash/Solvent Wash
		Offsite Disposal	RCRA Treatment Facility
	Soils	Onsite Disposal	RCRA Landfill

	Location	Action	Method
ALTERNATIVE 5	Site	Access Restriction	Fence/Deed Restriction
	Drummed Waste	Excavation	Complete Excavation
		Stabilization	Macroencapsulation
		Offsite Disposal	RCRA Treatment Facility
	Bldgs./Street	Decontamination	High Pressure Wash/Solvent Wash
		Offsite Disposal	RCRA Treatment Facility
	Soils	Onsite Disposal	RCRA Landfill
		Solidification/ Stabilization	Cement Based/Pozzolan-Cement Based

TABLE 2.3 (Continued)
Remedial Alternatives

	Location	Action	Method
ALTERNATIVE 6	Site	Access Restriction	Fence/Deed Restriction
	Drummed Waste	Excavation	Complete Excavation
		Stabilization	Macroencapsulation
		Offsite Disposal	RCRA Treatment Facility
	Bldg./Street	Decontamination	High Pressure Wash/Solvent Wash
		Offsite Disposal	RCRA Treatment Facility
	Soils	Thermal Treatment	Vitrification

	Location	Action	Method
ALTERNATIVE 7			
	Site	Access Restriction	Fence/Deed Restriction
	Drummed Waste	Excavation	Complete Excavation
		Stabilization	Macroencapsulation
		Offsite Disposal	RCRA Treatment Facility
	Bldgs./Street	Decontamination	High Pressure Wash/Solvent Wash
		Offsite Disposal	RCRA Treatment Facility
	Soils	Excavation	Complete/Partial Excavation
		Offsite Disposal	RCRA Treatment/RCRA Landfill

III. DETAILED EVALUATION OF ALTERNATIVES

3.1 Introduction

This section presents a detailed description followed by a detailed evaluation of the seven remedial action alternatives that have been selected based on the initial screening of technologies in Section II. These seven alternatives have been selected as being conceptually feasible for the Schreck Scrapyard site.

This section will serve to highlight the key differences between each of the alternatives, illustrating to what differing level each alternative meets the remedial design objectives. As stated in Section II., the remedial design objectives for the Schreck Scrapyard are as follows:

1. Minimize the potential human contact hazard associated with PCB's in on-site and off-site soils by meeting the USEPA soil cleanup criteria for PCB's of 10 mg/kg and a carcinogenic risk of 10^{-6} for other contaminants.

2. Remove buried drums.

3. Prevent migration of contaminants via groundwater by remediating the source of contamination (soil and drums).

4. Minimize the potential human contact hazard associated with contaminated building and Schenck Street surfaces.

A detailed comparison of the seven alternatives will be provided in Section IV based on the following detailed description and evaluation of alternatives.

3.2 List of Alternatives

The seven alternatives are summarized as follows:

Alternative S-1 : No Action

Alternative S-2 : Access Restrictions, Drum Removal, Building and Street Decontamination, Site Capping

Alternative S-3 : Access Restrictions, Drum Removal, Building and Street Decontamination, Solidification/ Stabilization of Soils, Site Capping

Alternative S-4 : Access Restrictions, Drum Removal, Building and Street Decontamination, On-site RCRA Landfill

Alternative S-5 : Access Restrictions, Drum Removal, Building and Street Decontamination, Solidification/ Stabilization with Disposal in On-site RCRA Landfill

Alternative S-6 : Access Restrictions, Drum Removal, Building and Street Decontamination, Vitrification of Soils

Alternative S-7 : Access Restrictions, Drum Removal, Building and Street Decontamination, Off-site Soil Disposal at RCRA Treatment/RCRA Landfill

3.3 Criteria for Describing and Evaluating Alternatives

3.3.1 Description of Alternatives

The detailed description for each of the seven remedial alternatives will include the following:

- The capability of the remedial alternative in terms of source control, limiting contaminant migration, or limiting the effects of migration.

- Key features of the alternative including a technical description of the technologies that make up the alternative.

- o Special phasing requirements.

- o Whether the alternative provides a single or multi-media solution.

- o Short-term and long-term operation, maintenance, and monitoring requirements.

3.3.2 Evaluation Criteria

Following its description, each alternative will be evaluated using criteria that addresses specific CERCLA requirements. These criteria are summarized in the following list:

- o Protection of Human Health and the Environment
- o Compliance with ARAR's
- o Long-Term Effectiveness
- o Extent of Reduction of Toxicity, Mobility, and Volume
- o Short-Term Effectiveness
- o Implementability
- o Cost

These seven evaluation criteria are discussed and defined in the USEPA document Guidance for Conducting RI/FS's Under CERCLA (interim final, October 1988). These seven criteria can be described as follows:

Protection of Human Health and the Environment

This criterion provides an evaluation of whether each alternative meets the requirement that it is protective of human health and the environment. The overall assessment of protection is based on a composite of factors, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARAR's.

Compliance with ARAR's

This evaluation criterion is used to determine if each alternative complies with all applicable or relevant and appropriate Federal and State regulatory requirements. ARAR's are defined in Section 121 of CERCLA. There are three general categories of ARAR's: chemical-specific, location-specific, or action-specific. A detailed analysis is conducted on each alternative to assure that it either complies with all ARAR's or that a waiver would be warranted.

Long-Term Effectiveness and Permanence

This criterion addresses the results of a remedial action in terms of the magnitude of residual risk remaining at the site after the response objectives have been met. For each alternative consideration is given to the adequacy and reliability of controls, it any, that are used to manage treatment residuals or untreated wastes that remain at the site.

Reduction of Toxicity, Mobility, and Volume

This criterion addresses the anticipated performance of the treatment technologies and their ability to permanently and significantly reduce toxicity, mobility, of the volume or hazardous substances present at the site.

Short-Term Effectiveness

This criterion addresses the effects which may occur during the construction and implementation phase until the remedial actions have been completed, and protection has been achieved. Each alternative is evaluated with respect to its effects on the community, on-site workers, and the environment, as well as on the time necessary to achieve protection.

Implementability

This criterion addresses the technical and administrative feasibility of implementing an alternative and the availability of various services and materials required for implementation. Technical feasibility considers difficulties and/or uncertainties associated with construction, operation, reliability of the technology, the ease of undertaking additional remedial measures, and the ability to monitor effectiveness. Administrative feasibility considers any difficulties that may be encountered in working with various regulatory agencies or other organizations in obtaining permits and approvals to implement the alternative. The availability of equipment, materials, capacity for off-site treatment/disposal, and timing on the availability of technologies are also considered under this criterion.

Cost

The cost criterion provides a measure of the capital cost, and the annual operation and maintenance (O&M) cost for each alternative. Capital costs consist of direct (construction) and indirect (non-construction and overhead) costs. Direct costs include expenditures for the equipment, labor, and material necessary to install remedial actions. Indirect costs include expenditures for permits, legal fees, engineering, financial, and other services that are not part of actual installation activities but are required to complete the installation. Annual O&M costs are post construction costs necessary to ensure the continued effectiveness of a remedial action. These costs are estimated to provide an accuracy of +50 percent to -30 percent. In order to provide a common basis for comparison of costs, the cost for each alternative is normalized to its present worth value.

3.4 Detailed Description and Evaluation of Remedial Alternatives

3.4.1 Alternative S-1 : No Action

3.4.1.1 Description

Under this alternative no actions would be taken to remediate environmental contamination at the Schreck Scrapyard site. This alternative is being included to serve as a comparative baseline, per requirements of the NCP.

3.4.1.2 Evaluation

Protection of Human Health and the Environment

The "no action" alternative would not meet any of the remedial objectives.

Compliance with ARAR's

An evaluation of potential ARAR's for alternative S-1, is shown on Table 3.12. The State of New York PCB Re-entry Guideline would not be met because contaminated building and roadway surfaces would not be cleaned. Land disposal facility design standards for hazardous wastes as specified in NYSDEC Part 373 are applicable to the site due to soils classified as hazardous wastes (PCB's > 50 ppm) being disposed of on-site; however, these design criteria would not be met by this alternative.

Long-Term Effectiveness and Permanence

The human contact hazard associated with soil contaminants, PCB's on building and roadway surfaces, and contaminant migration from on-site drums would not be addressed under alternative S-1. This alternative would not be effective in the long-term because none of the remedial design objectives would be met.

Reduction of Toxicity, Mobility, and Volume

Under the "no Action" alternative there would be no reduction of toxicity, mobility, or volume.

Short-Term Effectiveness

Under this alternative no short-term steps are taken to improve site conditions or reduce the risk of human contact with on-site and off-site contaminants. This alternative would not be effective in the short-term.

Implementability

Because no action is taken under this alternative there would be no obstacles to implementation.

Cost

There would be no capital or operation and maintenance costs associated with this alternative.

3.4.2 Alternative S-2: Access Restrictions, Drum Removal, Building and Street Decontamination, Site Capping

3.4.2.1 Description

The major feature of this alternative is the construction a multi-layer cap over the top of the entire site to minimize human contact and to immobilize soil contaminants.

Initially, a barrier fence would be constructed surrounding the site to assure that the possibility for casual human contact or ingestion of the on-site contaminants is minimized. All buried drums would be excavated, overpacked, and transported to an off-site commercial incinerator. The removal of drums would eliminate the risk that contaminants may migrate from drums into adjacent soils.

Structures and roadway surfaces would be cleaned with a foam-applied aqueous based solvent wash. A foam-applied solvent wash is preferable to a high pressure steam wash because PCBs can leach into the surfaces being cleaned during the steam wash and the steam wash generates more liquid waste than the solvent wash. The contaminated surface areas of buildings and the adjacent roadway would be cleaned to acceptable levels and the surface cleaning residues would be transported to an off-site RCRA treatment facility for disposal.

Subsequent to drum removal and building decontamination, construction activities would begin to install a multi-layer cap over the entire site. Prior to installing the cap contaminated soil from adjacent off-site properties would be excavated and brought on-site to be capped. For the purposes of this FS it has been assumed that the railroad track adjacent to and east of the Schreck site will be left in place in an undisturbed condition during excavation of off-site soils. An estimated 100 cubic yards of off-site soil would be moved on-site for capping. The cap would consist of a 2 ft. thick layer of impervious clay installed on top of the existing site soil, a 6 inch thick bedding layer, a 20 mil synthetic liner comprising a second impervious layer, a 1 ft. thick sand drainage layer, and a 2 ft. thick vegetative cover. Figure 3.1 illustrates the multi-layer cap design that would be used for the Schreck Scrapyard site.

Groundwater monitoring wells (1 upgradient and 3 downgradient) would be installed to assure the effectiveness of the multi-layer cap system.

Effective long term performance of the multi-layer cap would require an annual inspection program with cap maintenance when necessary. Deed restrictions would be established to eliminate any future risk regarding unacceptable property development in the future.

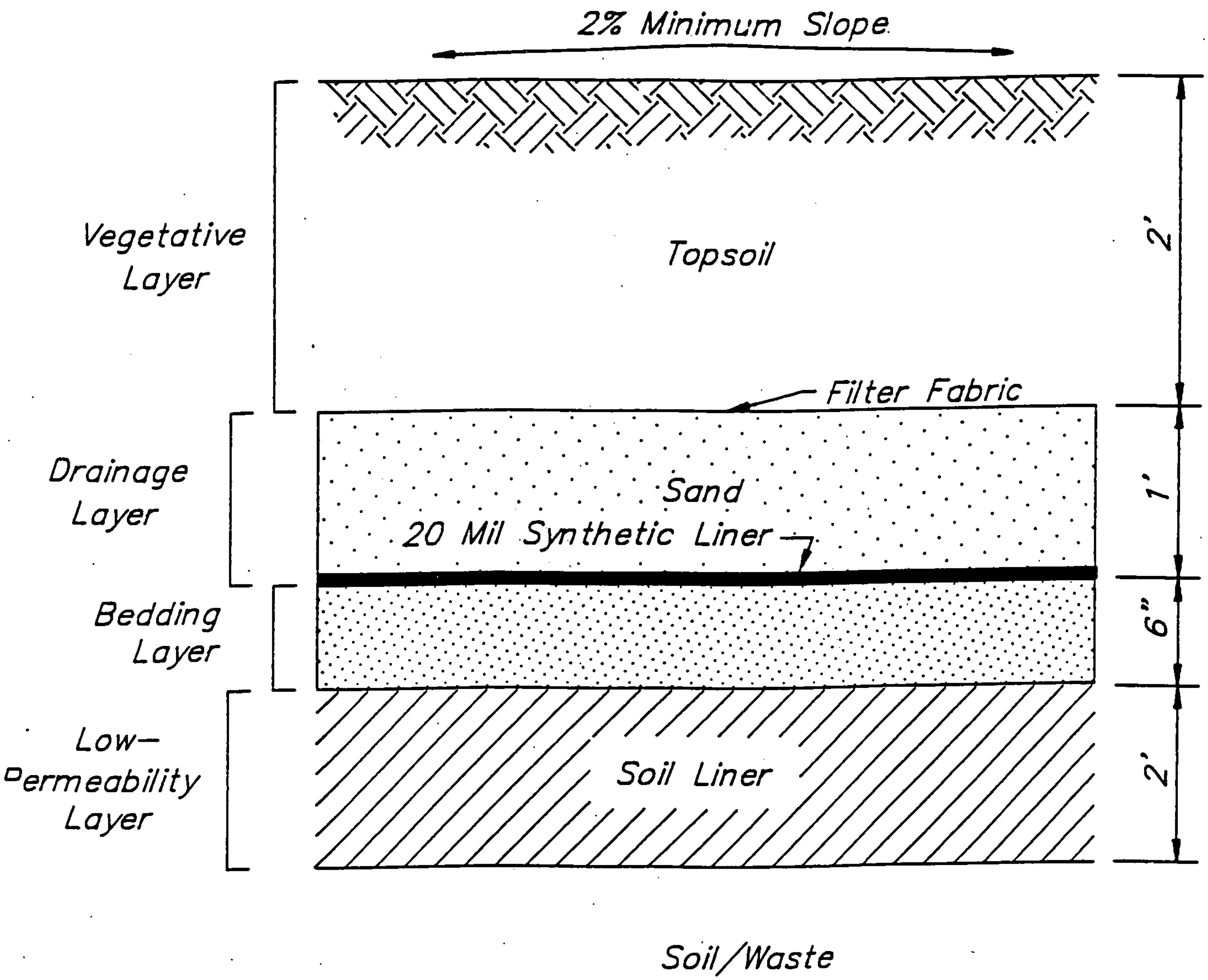


Figure 3.1 Multi-Layer Cap

SK611-1X

3.4.2.2 Evaluation

Protection of Human Health and the Environment

Short term health risks associated with on-site drum excavation, decontamination of building and roadway surfaces, and construction of the cap can be effectively managed by implementing proper controls. The required controls would be straightforward to implement such as water application for dust control, sediment barriers for erosion control, and utilizing protective equipment to control on-site worker exposure.

In the long term, implementing this alternative will eliminate human contact with the contaminated soil, contaminated surfaces, and contaminants in the on-site drums. Additionally, this alternative should provide greater protection of groundwater by reducing the mobility of hazardous constituents in the soil above the groundwater.

Compliance with ARAR's

An evaluation of potential ARARs for alternative S-2, is shown on Table 3.12. On site activities will comply with OSHA and New York State regulations that apply to health and safety. All planned off-site and on-site activities will comply with applicable RCRA/TSCA requirements. Based upon the existing site sampling data, it is expected that the soil properties are such that the contaminated soil would comply with TCLP leaching levels specified under the land ban regulations making land disposal permissible.

Long-Term Effectiveness and Permanence

This containment system is a very effective and reliable technology which will minimize the possibility of human contact with the contaminated soil, contaminated building surfaces, and contaminants in on-site drums. Additionally, this alternative will minimize contact between infiltrating rainwater and contaminated soil on site. However, long-term management is required to ensure the adequacy of the containment system. A minor risk does remain since all of the contaminated soil is left as is on-site.

Reduction of Toxicity, Mobility, and Volume

This alternative provides complete removal of drummed wastes and contaminants on building and roadway surfaces. These wastes would be treated at an off-site commercial RCRA treatment facility and disposed. Soil contaminant mobility is effectively reduced by the multi-layer cap system. However, there is no reduction in the toxicity or volume of contaminated soil because it is left in place at the site.

Short-Term Effectiveness

The time required to complete this remedial action is approximately 9 months. Short-term hazards to on-site workers would exist during all phases of this alternative due to exposure to fugitive contaminated soil and fumes. On-site workers would be properly protected against dermal contact, inhalation, and ingestion of contaminated soils during the implementation of this alternative by use of personal protective equipment.

Minor adverse community air effects may arise because of fugitive dust during the implementation of this alternative. Engineering controls would be used to minimize air contaminant releases, and contaminant levels would be expected to be within acceptable limits for protection of public health. There is also a minor potential risk to the community due to increased construction and truck traffic.

Implementabilty

The equipment and material required to construct the multi-layer cap are commercially available. The equipment and methodology required to excavate and overpack the on-site drums and to clean building and roadway surfaces are readily available. Adequate commercial incineration capacity exists for treating the drummed wastes. On-site workers could be effectively protected by being properly trained and by using appropriate protective equipment. There are no anticipated administrative or legal barriers to successful implementation of this alternative. However, it can be expected that the final site elevation will be significantly higher (approximately 6 feet) than current site elevations.

Cost

The estimated costs for alternative S-2 are summarized in Tables 3.1 (capital costs) and 3.2 (O&M costs). The major capital cost components for this alternative are surface cleaning to remove PCB's and construction of the multi-layer cap. Total capital costs are estimated to be $930,000, with annual O&M costs of $55,000. The thirty year present worth value of the annual O&M costs is $518,500. The total estimated present worth of this alternative is $1,448,500.

Table 3.1
Alternative S-2
Multi-Layer Cap

Cost Component	Cost Estimate
Direct Capital Costs	
1. Construction Costs	
Relocate off-site soils onto site	
a. equipment	1,000
b. labor	500
c. materials (backfill)	1,000
Surface cleaning of bldgs. & roadway	
a. equipment	37,500
b. labor	75,000
c. materials	40,000
Excavation and overpacking of buried drums	
a. equipment	6,500
b. labor	9,000
c. materials	5,000
d. analysis	4,000
Construction of multi-layer cap	
a. equipment	
earthwork	51,500
synthetic liner	14,500
b. labor	
earthwork	15,500
synthetic liner	59,000
c. materials	
sand	48,500
clay	61,500
topsoil	40,000
synthetic liner	24,500
Subtotal	494,500
2. Installation of 4 monitoring wells	6,500
3. Land and Site Development	
Construction of site perimeter fence	
a. labor	5,500
b. materials	5,000
Subtotal	10,500

Table 3.1 (continued)
Alternative S-2
Multi-Layer Cap

Cost Component		Cost Estimate
Direct Capital Costs (continued)		
4. Buildings and Services		
Office, Crew, and H&S Trailers		19,000
5. Disposal Costs		
Surface cleaning residue		
a. transportation		8,500
b. disposal		17,000
On-site drums		
a. transportation		5,000
b. disposal		18,000
	Subtotal	48,500
TOTAL DIRECT CAPITAL COSTS		579,000
Indirect Capital Costs		
1. Engineering and Design 30% of Direct Costs		174,000
2. Contigency Allowance 30% of Direct Costs		174,000
3. License/Permit/Legal		3,000
4. Start-up and Shakedown		0
TOTAL INDIRECT CAPITAL COSTS		351,000
TOTAL CAPITAL COSTS		930,000

Table 3.2

Annual Operation and Maintenance Costs
Alternative S-2 Multi-layer capping

No.	Item Description	Frequency (# / year)	Annual Costs Unit Cost	Annual Costs Total cost	Year/ Period
1.	Inspection Costs				
	Inspection Labor	4	1000	4000	1-30
	Report Preparation	4	500	2000	1-30
2.	Groundwater Monitoring				
	Sampling Labor	4	1000	4000	1-30
	Analysis	16	1500	24,000	1-30
	Report Preparation	4	1000	4000	1-30
3.	Cap Maintenance				
	Maintenance Cost (2% of DCC for cap)	1	7000	7000	1-30
4.	Loss of Land Value	1	10,000	10,000	1-30
		Total Annual Costs		55,000	
		Present Worth of Annual Costs		$518,500	

3.4.3 Alternative S-3 Access Restrictions, Drum Removal, Building and Street Decontamination, Solidification/ Stabilization of Soils, Site Capping

3.4.3.1 Description

The major features of this alternative include solidification/ stabilization of the contaminated soils and construction of a multi-layer cap to eliminate human contact with the contaminated soil and to immobilize soil contaminants.

Initially, a barrier fence would be constructed surrounding the site to assure that the possibility for casual human contact or ingestion of the on-site contaminants is minimized. All buried drums would be excavated, overpacked, and transported to an off-site commercial incinerator. The removal of drums would eliminate the risk that contaminants may migrate from drums into adjacent soils. Structures and roadway surfaces would be cleaned with a foam-applied aqueous based solvent wash. A foam-applied solvent wash is preferable to a high pressure steam wash because PCB's can leach into the surfaces being cleaned during the steam wash and the steam wash generates more liquid waste than the solvent wash. The contaminated surface areas of buildings and the adjacent roadway would be cleaned to acceptable levels and the surface cleaning residues would be transported to an off-site commercial RCRA treatment facility for disposal.

Subsequent to drum removal and building decontamination, contaminated soil from adjacent off-site properties would be excavated and brought on site. An estimated 100 cubic yards of off-site soil would be moved on-site for solidification/stabilization and capping. For the purpose of this FS it is assumed that the railroad tracks adjacent to the site would be left in place during excavation of off-site soils. In addition to the off-site soils, 7,400 cubic yards of on-site soils would be treated. The on-site soil volume was estimated by multiplying the surface area of each zone of contamination by the average depth of contamination for that zone (see figure 1.3). The solidification/stabilization of contaminated on-site and off-site soils would minimize the human contact hazard, and also minimize the mobility of contaminants in the soil.

Solidification/stabilization is a chemical fixation process that relies on forming chemical/physical bonds between the fixing agents and the hazardous constituents. Fixing agents typically include cement, lime, and/or silicates. Laboratory and/or pilot testing incorporating soil samples from the site would be performed during the remedial design to determine which reagents and fixation processes are suitable for this site. An in-situ fixation process would be used to minimize material handling requirements and to more effectively control fugitive dust and fume emissions.

Following completion of the soil fixation process a multi-layer cap system would be installed over the top of the treated soil to eliminate potential human contact with the soils and to further limit the potential for contaminant migration from the soils. The cap would consist of a 2 ft. thick layer of impervious clay installed on top of the treated site soil, a 6 inch thick bedding layer, a 20 mil synthetic liner comprising a second impervious layer, a 1 ft. thick sand drainage layer, and a 2 ft. thick vegetative cover (see Figure 3.1).

Groundwater monitoring wells (1 upgradient and 3 downgradient) would be installed to assure the effectiveness of the remediation measures.

Effective long term performance of the multi-layer cap would require an annual inspection program with cap maintenance when necessary. Deed restrictions would be established to eliminate any future risk regarding unacceptable property development in the future.

3.4.3.2 Evaluation

Protection of Human Health and the Environment

Short term health risks associated with on-site drum excavation, decontamination of building and roadway surfaces, stabilization/solidification, and construction of the cap can be effectively managed by implementing proper controls. The required controls would be straightforward to implement such as water application for dust control, sediment barriers for erosion control, and utilizing protective equipment to control on-site worker exposures.

In the long term, implementing this alternative will eliminate human contact with the contaminated soil, contaminated surfaces, and contaminants in the on-site drums. Additionally, this alternative should provide greater protection of groundwater by reducing the mobility of hazardous constituents in the soil above the groundwater.

Compliance with ARAR's

An evaluation of potential ARARs for alternative S-3 is shown on Table 3.12. On site activities will comply with OSHA, and New York State regulations that apply to health and safety. All planned off-site and on-site activities will comply with applicable RCRA/TSCA requirements. Based upon the existing site sampling data, it is expected that the soil properties are such that the contaminated soil would comply with TCLP leaching levels specified under the land ban regulations making land disposal permissible.

Long-Term Effectiveness

The multi-layer cap would eliminate human contact with contaminated soil and also provide a very effective and reliable method of minimizing contact between infiltrating rainwater and the contaminated soils. Removal of on-site drums and solvent wash cleaning of contaminated surfaces would also be highly effective at eliminating the human contact hazard.

Solidification/stabilization would further minimize the possible risk of human contact with contaminants and would substantially reduce the mobility of metals in the soil. The mobility of the organic contaminants may not be greatly reduced through stabilization alone. Combining stabilization/solidification with a multi-layer cap would very effectively eliminate human contact and immobilize both metals and organic contaminants, and overall would provide a high degree of long-term effectiveness and permanence. However, long-term management will be required to ensure the adequacy of the cap.

Reduction of Toxicity, Mobility, and Volume

This alternative provides complete removal of drummed wastes and contaminants on building and roadway surfaces. These wastes would be treated at an off-site commercial RCRA treatment facility and disposed. Soil contaminant mobility is effectively reduced by the multi-layer cap system. Moreover, the mobility of metals and organics in the soils is further reduced by the solidification/stabilization process. However, there is no reduction in the toxicity and the volume of contaminated soil would increase from the addition of the solidification/stabilization reagents.

Short-Term Effectiveness

The time required to complete this remedial action is approximately 12 months. Short-term hazards to the community and workers exist while the remedial actions are being implemented due to exposure to fugitive contaminated soil and fumes. On-site workers would be properly protected against dermal contact, inhalation, and ingestion of contaminated soils during the implementation of this remedial action by use of personal protective equipment.

Planned construction safeguards and engineering controls would be used to minimize air contaminant releases, and contaminant levels would be expected to be within acceptable limits for protection of public health. There is also a moderate potential risk to the community due to increased construction and truck traffic in the area.

Implementability

The equipment and material required to complete the solidification/ stabilization process and to construct the multi-layer cap are commercially available. Treatability testing would be required to identify the solidification/stabilization reagent and proper mix ratio for soils at the Schreck site. Volume increase from the solidification process is an important design parameter that would require special consideration during treatability testing since the entire Schreck site would be solidified to depths ranging from 1 - 9 feet under this alternative. The final site elevation will be significantly higher (6 - 8 feet) than current site elevations. The equipment and methodology required to excavate and overpack the on-site drums and to clean building and roadway surfaces are readily available. Adequate commercial incineration capacity exists for treating the drummed wastes. On-site workers could be effectively protected by being properly trained and by using appropriate protective equipment. There are no anticipated administrative or legal barriers to successful implementation of this alternative.

Cost

The estimated costs for alternative S-3 are summarized in Tables 3.3 (capital costs) and 3.4 (O&M costs). The major capital cost components are for solidifying the on-site soils and constructing the multi-layer cap. Total capital costs are estimated to be in the range of $1,125,500 - $1,882,500. These costs are based upon estimated unit costs for solidification/stabilization ranging from $37/yd^3 to $115/yd^3. Capital costs can be more accurately estimated following treatability testing to identify proper mix ratio and specific type of reagent required. Annual O & M costs are estimated to be $55,000. The thirty year present worth value of the annual O&M costs is $518,500. The total estimated present worth of this alternative is $1,644,000 - $2,401,000.

Table 3.3
Alternative S-3
Solidification of Soils, Multi-Layer Cap

Cost Component	Cost Estimate
Direct Capital Costs	
1. Construction Costs	
Relocate off-site soils onto site	
a. equipment	1,000
b. labor	500
c. materials (backfill)	1,000
Surface cleaning of bldgs. & roadway	
a. equipment	37,500
b. labor	75,000
c. materials	40,000
Excavation and overpacking of buried drums	
a. equipment	6,500
b. labor	9,000
c. materials	5,000
d. analysis	4,000
Construction of multi-layer cap	
a. equipment	
earthwork	51,500
synthetic liner	14,500
b. labor	
earthwork	15,500
synthetic liner	59,000
c. materials	
sand	48,500
clay	61,500
topsoil	40,000
synthetic liner	24,500
Solidification of Soils (in-situ)	
a. equipment	152,000
b. labor	110,500
c. materials (reagent)	17,000-600,000
Subtotal	774,000-1,357,000
2. Equipment Costs	
Installation of 4 monitoring wells	6,500

Table 3.3 (continued)
Alternative S-3
Solidification of Soils, Multi-Layer Cap

Cost Component		Cost Estimate
Direct Capital Costs (continued)		
3. Land and Site Development		
Construction of site perimeter fence		
a. equipment		0
b. labor		5,500
c. materials		5,000
	Subtotal	10,500
4. Buildings and Services		
Office, Crew, and H&S Trailers		23,500
5. Relocation Costs		0
6. Disposal Costs		
Surface cleaning residue		
a. transportation		8,500
b. disposal		17,000
On-site drums		
a. transportation		5,000
b. disposal		18,000
	Subtotal	48,500
TOTAL DIRECT CAPITAL COSTS		863,000-1,446,000
Indirect Capital Costs		
1. Engineering and Design 10% of Direct Costs		86,500-144,500
2. Contigency Allowance 20% of Direct Costs		173,000-289,000
3. License/Permit/Legal		3,000
4. Start-up and Shakedown		0
TOTAL INDIRECT CAPITAL COSTS		262,500-436,500
TOTAL CAPITAL COSTS		1,125,500-1,882,500

Table 3.4
Annual Operation and Maintenance Costs
Alternative S-3
Solidification/Multi-Layer Cap

No.	Item Description	Frequency (# / year)	Annual Costs Unit Cost	Annual Costs Total cost	Year/ Period
1.	Inspection Costs				
	Inspection Labor	4	1000	4000	1-30
	Report Preparation	4	500	2000	1-30
2.	Groundwater Monitoring				
	Sampling Labor	4	1000	4000	1-30
	Analysis	16	1500	24,000	1-30
	Report Preparation	4	1000	4000	1-30
3.	Cap Maintenance				
	Maintenance Cost (2% of DCC for cap)	1	7000	7000	1-30
4.	Loss of Land Value	1	10,000	10,000	1-30
			Total Annual Costs	55,000	
			Present Worth of Annual Costs	$518,500	

3.4.4 Alternative S-4 Access Restrictions, Drum Removal, Building and Street Decontamination, On-Site RCRA Landfill

3.4.4.1 Description

Alternative S-4 involves excavating and temporarily stockpiling all contaminated soils to allow for construction of an on-site RCRA landfill that would be used for final disposal of the contaminated soils. Contaminated soils as identified in Section 1.2.3 in Figure 1.3 would be excavated and stockpiled for subsequent disposal in the on-site RCRA cell. The quantity of waste to be addressed under this alternative has been estimated at 7,400 cubic yards of on-site soils and 100 cubic yards of off-site soils (railroad tracks are assumed to be left in place). The on-site soil volume estimate was developed by multiplying the surface area of each zone of contamination by the average depth of contamination for that zone, and the off-site soil volume estimate was developed by multiplying the estimated off-site contaminated area (3,000 sq. feet) by the estimated average depth of contamination off-site (1 foot). This remediation alternative would effectively eliminate human contact with the contaminated soil and also minimize the migration of contaminants into the groundwater.

Wastes contained in the estimated 50-60 on-site drums are subject to the landban; they would be excavated, overpacked, and transported to an off-site commercial RCRA incinerator. The removal of drums would eliminate the risk of migration of contaminants from drums into adjacent soils where the contaminants could pose a long-term threat to groundwater. Structures and roadway surfaces would be cleaned with a foam-applied aqueous based solvent wash. A foam-applied solvent wash is preferable to a high pressure steam wash because PCBs can leach into the surface being cleaned during the steam wash and the steam wash generates more liquid waste than the solvent wash. The contaminated surface areas of buildings and the adjacent roadway would be cleaned to acceptable levels and the surface cleaning residues would be transported to an off-site commercial RCRA treatment facility for disposal. Subsequent to drum removal and building decontamination, contaminated soils would be excavated and stockpiled to allow for construction of the RCRA landfill.

The RCRA landfill would be constructed as two cells, with each cell covering approximately one fourth (1/4) of the Schreck Scrapyard site. During construction of the first cell (cell #1), additional soils (clean soils) would be excavated and staged separately in a non-contaminated area on-site in order to establish a trench with a bottom depth of six (6) feet below existing grade. The landfill liner system for cell #1 would then be constructed in the excavated trench. Following construction of the liner system, staged contaminated soils would be placed into the cell. After completing placement of a six (6) foot layer of contaminated soil, a final cap would be constructed over the landfill cell. Upon completion of cell #1, the same procedure would be followed for construction of cell #2.

Figure 3.2 shows a schematic cross section of a typical RCRA landfill cell prior to capping. The design of the landfill cells would include two liners with leachate collection systems above and between the liners and a cap installed above the contaminated soil. Upon completion of excavation and stockpiling of soils, the landfill cells would be constructed in the following sequence: the existing native soil at the base of the depression would be compacted, a 40 mil synthetic lower liner would be installed, a secondary leachate collection system would be installed in a 1 foot thick drainage layer, a 40 mil synthetic top liner would be installed, a primary leachate collection system would be installed in a 1 foot thick drainage layer, and a filter membrane would be installed over the top drainage layer. Upon completion of the liner system, stockpiled contaminated soils would be placed in the landfill cell and compacted in 1 foot lifts using standard excavation equipment. After all contaminated soil has been placed into both cells, a multi-layer cap would be constructed. The cap would consist of a 2 ft. thick layer of impervious clay installed on top of the compacted contaminated soil, a 6 inch thick sand bedding layer, a 20 mil synthetic liner comprising a second impervious layer, a 1 ft. thick drainage layer, and a 2 ft. thick vegetative cover. Effective long-term performance of the multi-layer cap would require an annual inspection program and cap maintenance when necessary.

Leachate collection tanks would be installed for collection of leachate from the primary and secondary leachate collection systems. Leachate volumes are expected to be small; however, periodically it would be necessary to transport leachate off-site for proper disposal. Groundwater monitoring wells (1 upgradient and 3 downgradient) would be installed to assure the effectiveness of the RCRA landfill.

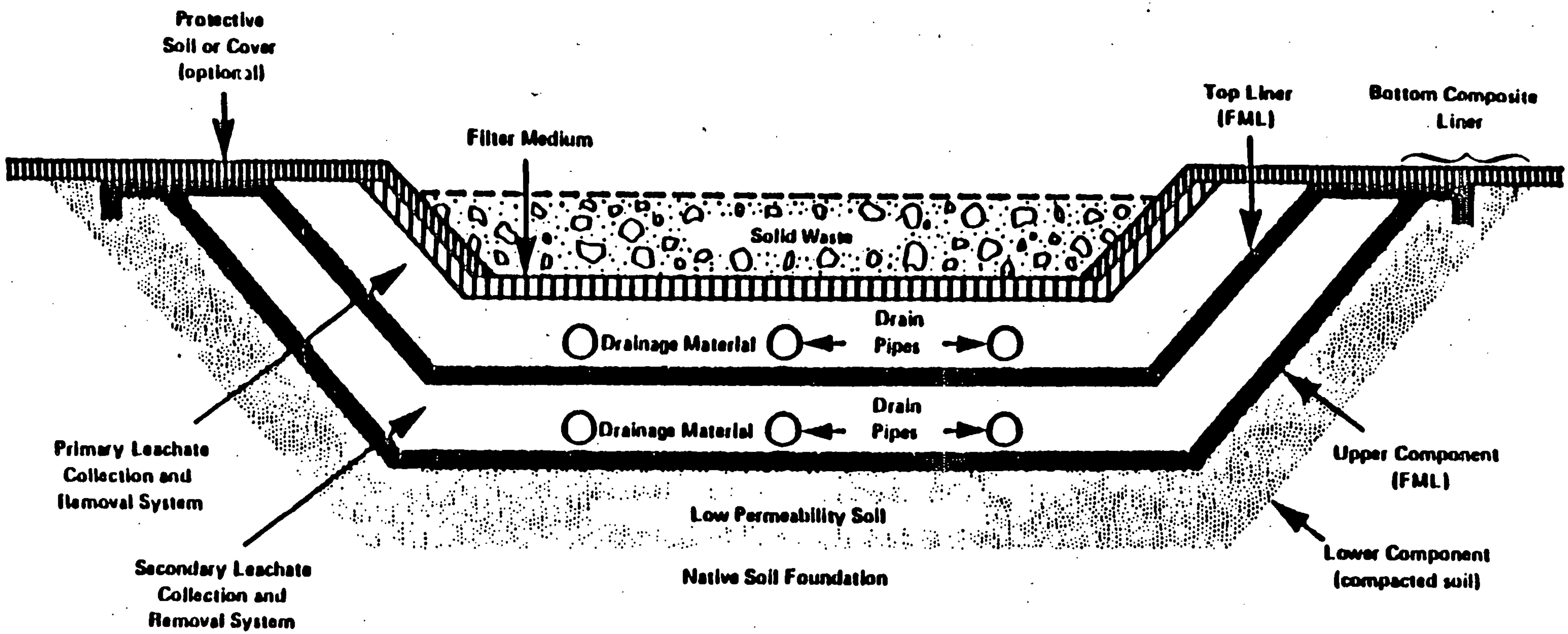


Figure 3.2 Onsite RCRA Cell

SOURCE: U.S. EPA DRAFT GUIDANCE MEMORANDUM, MAY 1985

3.4.4.2 Evaluation

Protection of Human Health and the Environment

Short-term risks associated with excavation of contaminated soils would be addressed by implementing relatively straight forward controls such as applying water for dust control, sediment barriers for erosion control, and utilizing protective equipment to control on-site worker exposure to hazardous materials and unsafe working conditions. In the long-term, implementation of this alternative would eliminate human contact with the contaminated soil, contaminated surfaces, and contaminants in on-site drums. Additionally, this alternative should provide greater protection of groundwater by reducing the mobility of hazardous constituents in the soil above the groundwater.

Compliance with ARAR's

An evaluation of potential ARARs for alternative S-4 is shown on Table 3.12. On site activities will comply with all OSHA and New York State regulations that apply to health and safety. All planned off-site and on-site activities will comply with applicable RCRA/TSCA requirements. Based upon the existing site sampling data, it is expected that the contaminated soil would comply with TCLP leaching levels specified under the land ban regulations making land disposal permissible.

Long-Term Effectiveness

RCRA landfill technology, off-site drum disposal, and building and roadway decontamination would be very effective and reliable. This alternative will eliminate human contact with contaminated soil, contaminated surfaces, and contaminants in on-site drums and also reduce the risk of contaminant migration. Groundwater monitoring would serve as an assurance that the containment system is operating effectively. Long-term management of the landfill cap, groundwater monitoring system, and leachate collection system would be required to ensure long-term effectiveness.

Reduction of Toxicity, Mobility, and Volume

This alternative provides complete removal of drummed wastes and contaminants on building and roadway surfaces. These wastes will be treated at an off-site commercial RCRA treatment facility and disposed. Installation of the RCRA landfill effectively reduces the mobility of all soil contaminants at the site. However, there is no reduction in the toxicity or volume of contaminated soil because it is all disposed of in the RCRA landfill on-site.

Short-Term Effectiveness

The time required to complete this remedial action is approximately 15 months. Short-term hazards to the community and workers may occur while the remedy is implemented due to contaminated soil particles and fumes released into the air. On-site workers would be properly protected against dermal contact, inhalation and ingestion of contaminated soils by use of personal protective equipment.

Planned construction safeguards and engineering controls would be used to minimize air contaminant releases, and contaminant levels would be expected to be within acceptable limits for protection of public health. However, stringent precautions will be required during excavation of contaminated soils to assure that excessive levels of asbestos fibers are not released to the air. There is also a moderate potential risk to the community due to increased construction and truck traffic in the area.

Implementability

The equipment and materials required to construct an on-site RCRA landfill are commercially available. RCRA landfill technology is an established and proven technology. Construction of the RCRA cells can be accomplished using common earth moving equipment. Stringent precautions would be required during excavation of contaminated soils to prevent the airborne release of excessive levels of asbestos. The equipment and methodology required to excavate and overpack the on-site drums and to clean building and roadway surfaces are readily available.

Adequate commercial incineration capacity exists for treatment of the drummed waste from this site. On-site workers could be effectively protected by being properly trained and by using appropriate protective equipment. There are no anticipated administrative or legal barriers to successful implementation of this alternative. The final elevation of the on-site landfill area will be significantly higher (approximately 8 feet) than current site elevations.

Cost

The estimated costs for alternative S-4 are summarized in Tables 3.5 (capital costs) and 3.6 (O&M costs). The major capital cost component for this alternative is construction of the on-site RCRA landfill. Total capital costs are estimated to be $1,510,500, with annual O&M costs of $55,000. The thirty year present worth value of the annual O&M costs is $518,500. The total estimated present worth of this alternative is $2,029,000.

Table 3.5
Alternative S-4
On-site RCRA Landfill

Cost Component	Cost Estimate
Direct Capital Costs	
1. Construction Costs	
Relocate off-site soils onto site	
a. equipment	1,000
b. labor	500
c. materials (backfill)	1,000
Surface cleaning of bldgs. & roadway	
a. equipment	37,500
b. labor	75,000
c. materials	40,000
Excavation and overpacking of buried drums	
a. equipment	6,500
b. labor	9,000
c. materials	5,000
d. analysis	4,000
Excavation and staging of soils	
a. equipment	29,000
b. labor	24,500
Construction of RCRA landfill	
a. equipment	120,000
b. labor	210,000
c. materials	419,500
Placement of soils into landfill	
a. equipment	37,500
b. labor	31,000
Subtotal	1,051,000
2. Equipment Costs	
Installation of 4 monitoring wells	6,500

Table 3.5 (continued)
Alternative S-4
On-site RCRA Landfill

Cost Component		Cost Estimate
Direct Capital Costs (continued)		
3. Land and Site Development		
Construction of site perimeter fence		
a. equipment		0
b. labor		5,500
c. materials		5,000
	Subtotal	10,500
4. Buildings and Services		
Office, Crew, and H&S Trailers		43,000
5. Relocation Costs		0
6. Disposal Costs		
Surface cleaning residue		
a. transportation		8,500
b. disposal		17,000
On-site drums		
a. transportation		5,000
b. disposal		18,000
	Subtotal	48,500
TOTAL DIRECT CAPITAL COSTS		1,159,500
Indirect Capital Costs		
1. Engineering and Design 10% of Direct Costs		116,000
2. Contigency Allowance 20% of Direct Costs		232,000
3. License/Permit/Legal		3,000
4. Start-up and Shakedown		0
TOTAL INDIRECT CAPITAL COSTS		351,000
TOTAL CAPITAL COSTS		1,510,500

Table 3.6
Annual Operation and Maintenance Costs
Alternative S-4
On-site RCRA Landfill

No.	Item Description	Frequency (# / year)	Annual Costs Unit Cost	Total cost	Year/ Period
1.	Inspection Costs				
	Inspection Labor	4	1000	4000	1-30
	Report Preparation	4	500	2000	1-30
2.	Groundwater Monitoring				
	Sampling Labor	4	1000	4000	1-30
	Analysis	16	1500	24,000	1-30
	Report Preparation	4	1000	4000	1-30
3.	Cap Maintenance				
	Maintenance Cost (2% of DCC for cap)	1	7000	7000	1-30
4.	Loss of Land Value	1	10,000	10,000	1-30
			Total Annual Costs	55,000	
			Present Worth of Annual Costs	$518,500	

3.4.5 Alternative S-5 Access Restrictions, Drum Removal, Building and Street Decontamination, Solidification/ Stabilization with Disposal in On-site RCRA Landfill

3.4.5.1 Description

This alternative contains the same key features as alternative S-4: construction of a site perimeter barrier fence, removal of on-site drums, building and roadway decontamination, construction of an on-site RCRA landfill, and establishment of deed restrictions. In addition to these features this alternative includes solidification/stabilization of the on-site and off-site contaminated soils. The design of the liner and multi-layer cap for the RCRA landfill would be as described for alternative S-4.

Solidification/stabilization is a chemical fixation process that relies on forming chemical/physical bonds between the fixing agents and the hazardous constituents. Fixing agents typically include cement, lime, and/or silicates. Laboratory and/or pilot testing incorporating soil samples from the site would be performed during the remedial design to determine which reagents and fixation processes are suitable for this site. For the purposes of this FS, it is assumed that the solidification/stabilization process would be performed using a pug mill or similar equipment. Excavated soils would be directly processed through the pug mill prior to being stockpiled. The stabilized end product would be deposited into the RCRA landfill in controlled lifts.

3.4.5.2 Evaluation

Protection of Human Health and the Environment

Short-term risks associated with excavation of contaminated soils would be addressed by implementing relatively straight forward controls such as applying water for dust control, sediment barriers for erosion control, and utilizing protective equipment to control on-site worker exposure to hazardous materials and unsafe work conditions. In the long-term, implementation of this alternative would eliminate human contact with the contaminated soil, contaminated surfaces, and contaminants in the on-site drums and also benefit groundwater conditions underlying the site by reducing the mobility of hazardous constituents and eliminating hydraulic conditions that may be promoting continued contaminant influx.

Compliance with ARAR's

An evaluation of potential ARARs for alternative S-5 is shown on Table 3.12. On site activities will comply with OSHA and New York State regulations that apply to health and safety. All planned off-site and on-site activities will comply with applicable RCRA/TSCA requirements. Based upon the existing site sampling data, it is expected that the contaminated soil would comply with TCLP leaching levels specified under the land ban regulations making land disposal permissible.

Long-Term Effectiveness

RCRA landfill technology, off-site drum disposal, and building and roadway decontamination would be very effective and reliable. This alternative would eliminate human contact with contaminated soil, contaminated surfaces, and contaminants in on-site drums and also reduce the risk of contaminant migration. Solidification/ stabilization further reduces risk of contaminant migration from the RCRA landfill. Overall, this alternative would provide a high level of long-term effectiveness. However long-term management of the landfill cap, groundwater monitoring system, and leachate collection system would be required to ensure long-term effectiveness.

Reduction of Toxicity, Mobility and Volume

This alternative provides complete removal of drummed wastes and contaminants on building and roadway surfaces. These wastes would be treated at an off-site commercial RCRA treatment facility. Installation of the RCRA landfill effectively reduces the mobility of all soil contaminants at the site. Solidification/stabilization would further reduce mobility of metals and slightly reduce the mobility of organic contaminants. Overall however, there is no reduction in toxicity of the contaminants and the volume of contaminated soil would increase from the addition of the solidification/stabilization reagents.

Short-Term Effectiveness

The time required to complete this remedial action is approximately 18 months. Short-term hazards to the community and workers may occur while the remedy is implemented due to contaminated soil and fumes being released into the air. The air contaminant levels could become elevated due to the multi-stage nature of the remedial action. The processes of excavation, stabilization, stockpiling, construction of the RCRA landfill, and placing treated soil into the landfill could generate increased levels of fugitive dust and fumes. Stringent precautions would be required to assure that excessive levels of asbestos fibers are not released to the air. On-site workers would be properly protected against dermal contact, inhalation and ingestion of contaminated soils by use of personal protective equipment. A fugitive dust control plan would be developed and used to minimize the hazards to the community associated with asbestos and other fugitive dust and fumes. The fugitive dust control plan would incorporate planned construction safeguards and engineering controls to minimize air contaminant releases, and contaminant levels would be expected to be within acceptable limits for protection of public health. There is also a moderate potential risk to the community due to increased construction and truck traffic in the area.

Implementability

The equipment and materials required to complete the solidification/stabilization process and to construct the on-site RCRA landfill are commercially available. Stringent precautions would be required during excavation of contaminated soils to prevent the release of excessive levels of asbestos and other hazardous constituents.

Treatability testing would be required to identify the solidification/stabilization reagent and proper mix ratio for soils at the Schreck site. Volume increase from the solidification process is an important design parameter that would require special consideration during treatability testing since the entire Schreck site would be solidified to depths ranging from 1 - 9 feet under this alternative. The final elevation of the on-site landfill area will be significantly higher (8 - 10 feet) than current site elevations.

The equipment and methodology required to excavate and overpack the on-site drums and to clean building and roadway surfaces are readily available. Adequate commercial incineration capacity exists for treatment of the drummed wastes. On-site workers could be effectively protected by being properly trained and by using appropriate protective equipment. There are no anticipated administrative or legal barriers to successful implementation of this alternative.

Cost

The estimated costs for alternative S-5 are summarized in Tables 3.7 (capital costs) and 3.8 (O&M costs). The major capital cost components are costs to solidify the on-site soils and constructing the on-site RCRA landfill. Total capital costs are estimated in the range of $2,065,000 - $2,823,000. The costs are based upon estimated unit costs for solidification/stabilization ranging from $32/yd^3 to $110/yd^3. Capital costs can be more accurately estimated following treatability testing to identify proper mix ratio and specific reagent type required. Annual O&M costs are estimated to be $55,000. The thirty year present worth value of the annual O&M costs is $518,500. The total estimated present worth of this alternative is $2,583,500 - $3,341,500.

Table 3.7
Alternative S-5
Solidification of Soils, On-site RCRA Landfill

Cost Component	Cost Estimate
Direct Capital Costs	
1. Construction Costs	
Relocate off-site soils onto site	
a. equipment	1,000
b. labor	500
c. materials (backfill)	1,000
Surface cleaning of bldgs. & roadway	
a. equipment	37,500
b. labor	75,000
c. materials	40,000
Excavation and Overpacking of buried drums	
a. equipment	6,500
b. labor	9,000
c. materials	5,000
d. analysis	4,000
Excavation and Staging of Soils	
a. equipment	29,000
b. labor	24,500
Solidification of soils (ex-situ)	
a. equipment	146,000
b. labor	79,000
c. materials (reagent)	17,000-600,000
Construction of RCRA Landfill	
a. equipment	147,000
b. labor	257,500
c. materials	514,000
Placement of soils into landfill	
a. equipment	46,000
b. labor	38,000
Subtotal	1,477,500-2,060,500
2. Equipment Costs	
Installation of 4 monitoring wells	6,500

Table 3.7 (continued)
Alternative S-5
Solidification of Soils, On-site RCRA Landfill

Cost Component		Cost Estimate
Direct Capital Costs (continued)		
3. Land and Site Development		
Construction of site perimeter fence		
a. equipment		0
b. labor		5,500
c. materials		5,000
	Subtotal	10,500
4. Buildings and Services		
Office, Crew, and H&S Trailers		43,000
5. Relocation Costs		0
6. Disposal Costs		
Surface cleaning residue		
a. transportation		8,500
b. disposal		17,000
On-site drums		
a. transportation		5,000
b. disposal		18,000
	Subtotal	48,500
TOTAL DIRECT CAPITAL COSTS		1,586,000-2,169,000
Indirect Capital Costs		
1. Engineering and Design 10% of Direct Costs		159,000-217,000
2. Contigency Allowance 20% of Direct Costs		317,000-434,000
3. License/Permit/Legal		3,000
4. Start-up and Shakedown		0
TOTAL INDIRECT CAPITAL COSTS		479,000-654,000
TOTAL CAPITAL COSTS		2,065,000-2,823,000

Table 3.8
Annual Operation and Maintenance Costs
Alternative S-5
Solidification/On-site RCRA Landfill

No.	Item Description	Frequency (# / year)	Annual Costs Unit Cost	Annual Costs Total cost	Year/ Period
1.	Inspection Costs				
	Inspection Labor	4	1000	4000	1-30
	Report Preparation	4	500	2000	1-30
2.	Groundwater Monitoring				
	Sampling Labor	4	1000	4000	1-30
	Analysis	16	1500	24,000	1-30
	Report Preparation	4	1000	4000	1-30
3.	Cap Maintenance				
	Maintenance Cost (2% of DCC for cap)	1	7000	7000	1-30
4.	Loss of Land Value	1	10,000	10,000	1-30
		Total Annual Costs		545,000	
		Present Worth of Annual Costs		$518,500	

essentially complete destruction/removal of hazardous organic contaminants by pyrolysis. The organic contaminants in the soil are pyrolized and migrate to the surface of the vitrified zone where they combust in the presence of oxygen. Hazardous inorganics (ie. metals) are effectively immobilized in the residual glass product. During the ISV process the soil melts from the surface to the desired depth, producing a stable residual that is capable of safe long term environmental exposure. The ISV process provides a reduction in soil volume in excess of 30% with a resultant depression of soil elevations in the area treated. Figures 3.3 and 3.4 illustrate the ISV process.

Due to the size of the site, the ISV process would not be performed in one step. For the Schreck Scrapyard the ISV process would involve sequential treatment of numerous segments of the site. Off-gases driven from the soil, including water vapor, volatile organics, and semi-volatile organics, would be collected in a hood positioned over the area undergoing treatment. The collected gases would then be treated in a vapor phase treatment system.

Following completion of the ISV process the area of depression would be backfilled and an adequate finished grade would be provided to promote surface run-off from the site. A vegetation cover would be provided for the site. Groundwater monitoring wells (1 upgradient and 3 downgradient) would be installed to assure the effectiveness of the ISV process.

Since the contaminated soil is a listed State of New York hazardous waste, a delisting petition would be prepared and submitted to delist the residual matrial left on-site. Upon completion of the remediation, deed restrictions would be established to eliminate any future risk regarding unacceptable property development in the future.

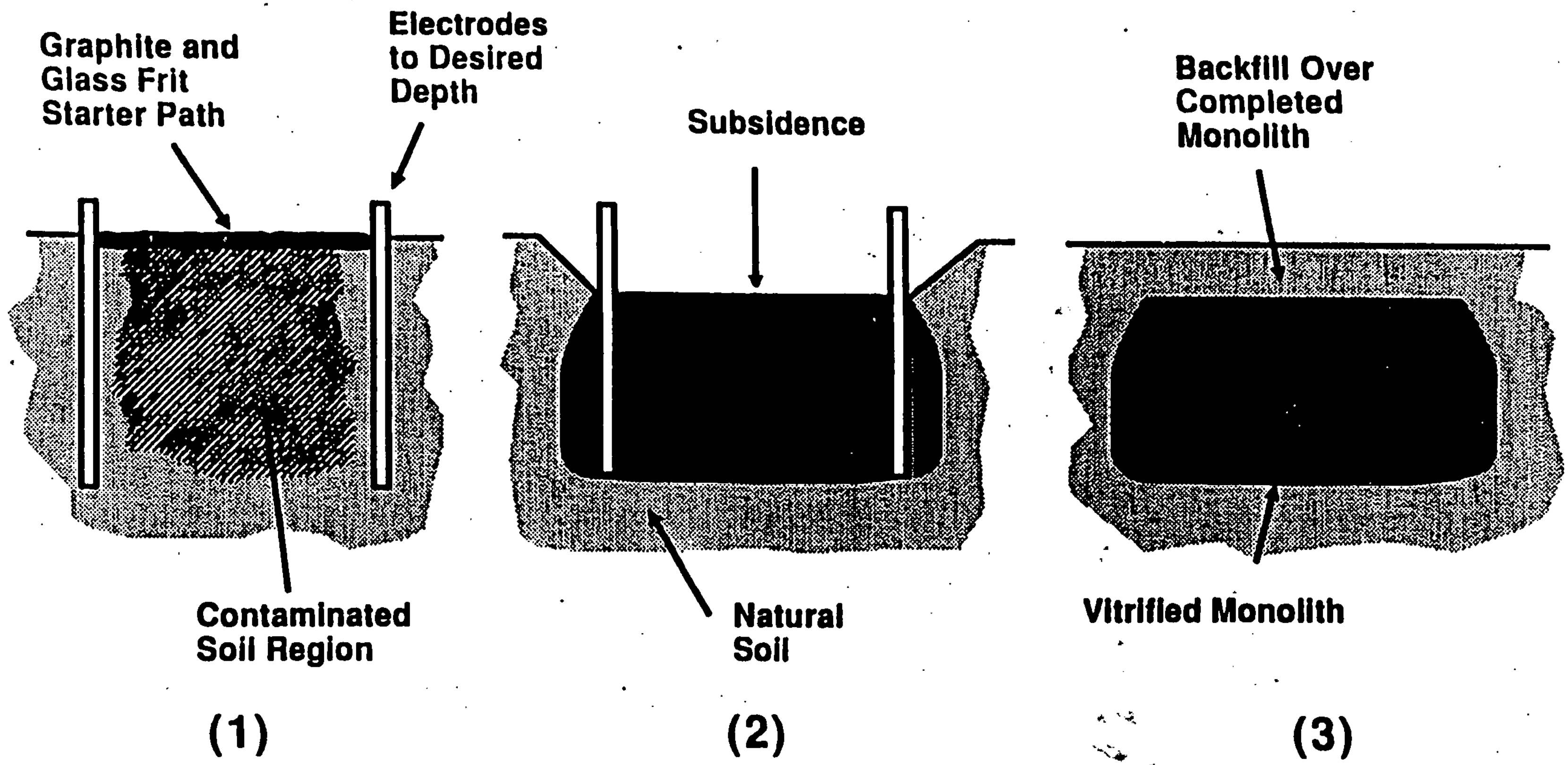


Figure 3.3 Stages of ISV Processing

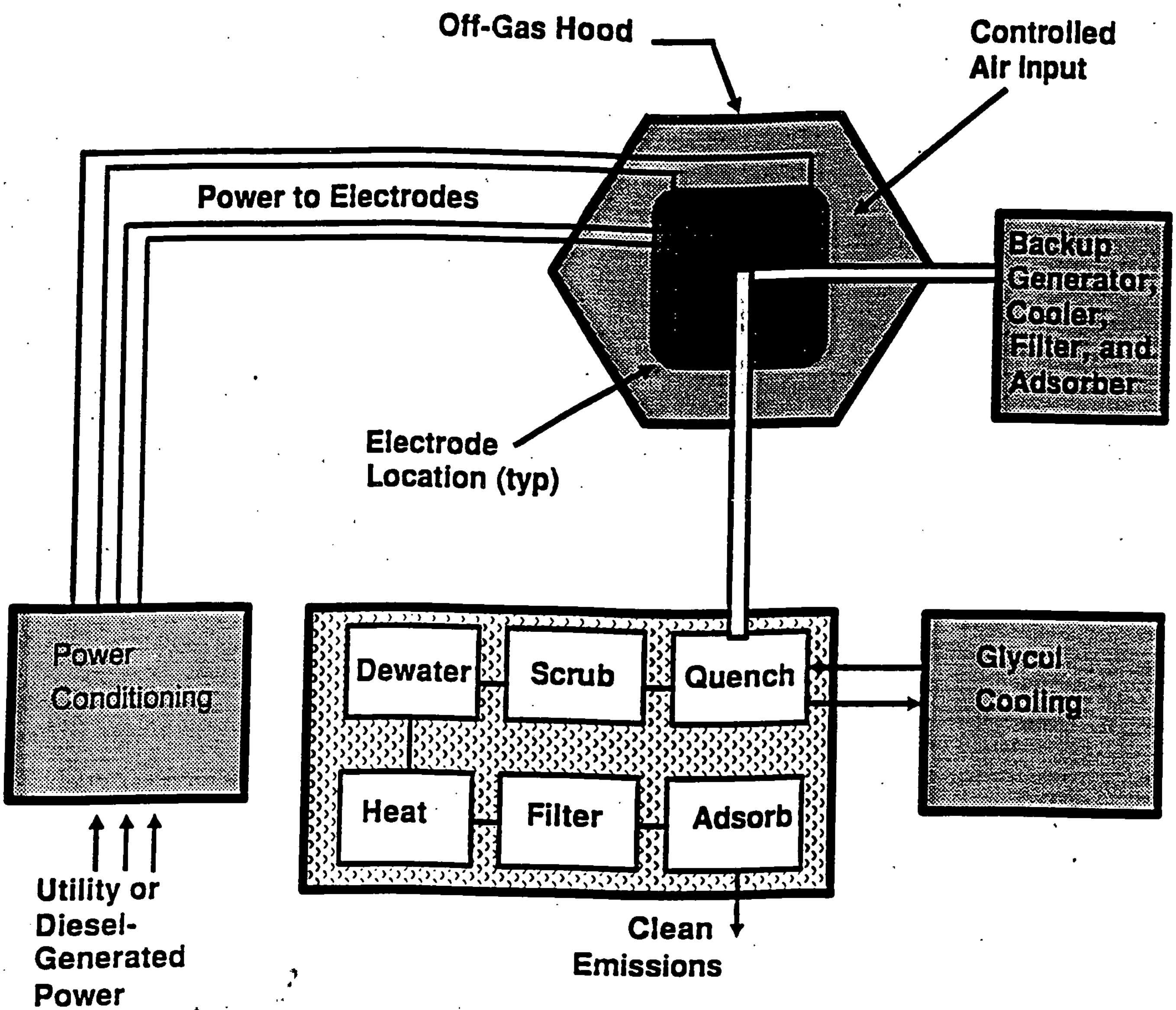


Figure 3.4 ISV Equipment System

3.4.6.2 Evaluation

Protection of Human Health and the Environment

The ISV process effectively destroys or removes hazardous organics and encapsulates/immobilizes hazardous inorganic compounds in the soil. The ISV treatment, removal of on-site drums, and cleaning of building and roadway surfaces effectively eliminates the human contact hazard and also will provide a high level of protection to groundwater.

Short-term health risks associated with alternative S-5 would be addressed by implementing straightforward controls such as protective equipment to control on-site worker exposure. Community exposures would be effectively controlled through use of the air contaminant collection system used with the ISV process.

Compliance with ARAR's

An evaluation of potential ARARs for alternative S-6 is shown on Table 3.12. On site activities will comply with OSHA and New York State regulations that apply to health and safety. All planned off-site and on-site activities will comply with applicable RCRA/TSCA requirements. It is expected that the ISV exhaust system will comply with all applicable ARARs.

Long-Term Effectiveness

In-situ vitrification provides nearly complete destruction of hazardous organics and would effectively immobilize the metals in a residual stable glass mass. Cleaning of building and roadway surfaces, and removal of on-site drums would eliminate the human contact hazard. Overall, this alternative would provide a very high level of long-term effectiveness.

Reduction of Toxicity, Mobility and Volume

Drummed wastes and contaminants on building and roadway surfaces will be removed and treated at an off-site commercial RCRA treatment facility. The soil vitrification process provides essentially complete destruction/removal of hazardous organics in the soil. The metal contaminants in the soil are effectively immobilized by the process and neither human contact or leaching can occur. Additionally, the ISV process will reduce the actual volume of contaminated soils.

Short-Term Effectiveness

The time required to complete this remedial action would be approximately 18 months. (It is expected that 3 - 9 months would be required for treatability testing, 1 -3 months for contractual arrangements, 3 - 6 months for gear-up and mobilization, and 3 - 6 months for ISV treatment.) Short-term hazards to on-site workers may exist during implementation of this alternative due to exposure to fugitive
contaminated soil and fumes. On-site workers would be properly protected against dermal contact, inhalation, and ingestion of contaminated soils during the implementation of this alternative by use of personal protective equipment.

Minor adverse effects to air quality in the surrounding community may result from fugitive dust and fumes released during the implementation of this alternative. However, engineering controls would be used to minimize air contaminant releases, and contaminant levels would be expected to be within acceptable public health protection limits. The increased risk from construction traffic associated with this alternative is expected to be very low.

Implementability

EPA currently classifies ISV as an "innovative technology" : one that has been developed to large-scale and is ready for commercial deployment, but for which there is not a significant commercial experience base. The ISV technology has been proven on sites similar to Schreck Scrapyard. However, treatability testing would be required to verify the implementability of the technology at the Schreck site. Depending upon the results of bench-scale treatability testing it may be necessary to conduct on-site demonstration testing to fully assess implementability. Backfilling the site and establishing a vegetative cover would be easily accomplished using common commercially available construction equipment. The equipment and methodology required to excavate and overpack the on-site drums, and to complete surface cleaning of structures and roadway are readily available. Adequate commercial incineration capacity exists for treating the drummed wastes. On-site workers could be effectively protected by being properly trained and by using appropriate protective equipment. There are no anticipated administrative or legal barriers to successful implementation of this alternative.

Cost

The estimated costs for alternative S-6 are summarized in Tables 3.9 (capital costs) and 3.10 (O&M costs). The major capital cost component is implementation of the ISV process at the site. Total capital costs are estimated to be $5,755,000, with annual O&M costs of $38,000 for years 1-5 and $6,000 for years 6-30. The thirty year present worth value of the annual O&M costs is $178,000. The total estimated present worth of this alternative is $5,933,000.

Table 3.9
Alternative S-6
In-situ Vitrification , Multi-Layer Cap

Cost Component	Cost Estimate
Direct Capital Costs	
1. Construction Costs	
Relocate off-site soils onto site	
a. equipment	1,000
b. labor	500
c. materials (backfill)	1,000
Surface cleaning of bldgs. & roadway	
a. equipment	37,500
b. labor	75,000
c. materials	40,000
Excavation and Overpacking of buried drums	
a. equipment	7,000
b. labor	9,000
c. materials	5,000
d. analysis	4,000
Excavation and Staging Soils for ISV	
a. equipment	21,000
b. labor	18,500
In-situ Vitrification of Soils	
a. treatability testing	55,000
b. mobilization/demobilization	220,000
c. equipment & labor for vitrofication	3,159,000
d. utilities (electricity)	769,500
e. delisting	50,000
Backfilling with Clean Soil	
a. equipment	6,500
b. labor	3,000
c. materials	10,500
Subtotal	4,493,000
2. Equipment Costs	
Installation of 4 monitoring wells	6,500

Table 3.9 (continued)
Alternative S-6
In-situ Vitrification, Multi-Layer Cap

Cost Component		Cost Estimate
Direct Capital Costs (continued)		
3. Land and Site Development		
Construction of site perimeter fence		
a. equipment		0
b. labor		5,500
c. materials		5,000
	Subtotal	10,500
4. Buildings and Services		
Office, Crew, and H&S Trailers		43,000
5. Relocation Costs		0
6. Disposal Costs		
Surface cleaning residue		
a. transportation		8,500
b. disposal		17,000
On-site drums		
a. transportation		5,000
b. disposal		18,000
	Subtotal	48,500
TOTAL DIRECT CAPITAL COSTS		4,601,500
Indirect Capital Costs		
1. Engineering and Design 5% of Direct Costs		230,000
2. Contigency Allowance 20% of Direct Costs		920,500
3. License/Permit/Legal		3,000
4. Start-up and Shakedown		0
TOTAL INDIRECT CAPITAL COSTS		1,153,500
TOTAL CAPITAL COSTS		5,755,000

Table 3.10
Annual Operation and Maintenance Costs
Alternative S-6
In-situ Vitrification

No.	Item Description	Frequency (# / year)	Annual Costs Unit Cost	Annual Costs Total cost	Year/ Period
1.	Inspection Costs				
	Inspection Labor	4	1000	4000	1-30
	Report Preparation	4	500	2000	1-30
2.	Groundwater Monitoring				
	Sampling Labor	4	1000	4000	1-5
	Analysis	16	1500	24,000	1-5
	Report Preparation	4	1000	4000	1-5
		Total Annual Costs		38,000	
		Present Worth of Annual Costs		$178,000	

3.4.7 Alternative S-7 Access Restrictions, Drum Removal, Building Decontamination, RCRA Treatment/RCRA Landfill

3.4.7.1 Description

Under this alternative the contaminated soils from the site would be excavated and transported for off-site disposal at a RCRA landfill. The estimated volume of on-site contaminated soil is 7,400 cubic yards and the estimated volume of off-site contaminated soil is 100 cubic yards (railroad tracks are assumed to be left in place). These estimates were developed by multiplying the surface area of each on-site zone of contamination by the average depth of contamination for that zone and by multiplying the estimated off-site contaminated area (3,000 sq. feet) by the estimated average depth of contamination off-site (1 foot).

Initially, a barrier fence would be constructed surrounding the site to minimize casual human contact with the on-site contaminants. All buried drums would be excavated, overpacked, and transported to an off-site commercial incinerator. Drum removal would eliminate the risk that contaminants could migrate from the drums into adjacent soils and pose a long term threat to groundwaters. Structures and roadway surfaces would be cleaned with a foam-applied aqueous based solvent wash. A foam applied solvent wash is preferable to a high pressure steam wash because PCB's can leach into the surfaces being cleaned during the steam wash and the steam wash generates more liquid waste than the solvent wash. The contaminated surface areas of buildings and the adjacent roadway would be cleaned to acceptable levels and the surface cleaning residues would be transported for treatment at an off-site commercial RCRA treatment facility.

Subsequent to drum removal and building decontamination on-site soils would be excavated using standard excavation equipment and loaded into trucks for transport to an off-site land disposal facility. The depression created by the removal of contaminated on-site soils would be filled with off-site clean soil.

3.4.7.2 Evaluation

Protection of Human Health and the Environment

Short term risks associated with excavation of contaminated soils would be addressed by implementing relatively straight forward controls such as water application for dust control, sediment barriers for erosion control, and utilizing protective equipment to control on-site workers exposure. In the long term, implementing this alternative will eliminate human contact with the contaminated soil, contaminated surfaces, and contaminants in the on-site drums. Additionally, this alternative should provide greater protection of groundwater by removing the hazardous constituents in the soil above the groundwater.

Compliance with ARAR's

An evaluation of potential ARARs for alternative S-7 is shown on Table 3.12. On site activities will comply with all OSHA, RCRA, TSCA and New York State regulations. Based upon the existing site sampling data, it is expected under this alternative, that the soil properties are such that the contaminated soil would comply with TCLP leaching levels specified under the land ban regulations making land disposal permissible.

Long-Term Effectiveness

Cleaning of building and roadway surfaces, and off-site disposal of drums would be very effective in the long-term. All contaminated soils would be disposed of off-site, eliminating the risk of human contact with contaminants and also eliminating the potential risk of contaminant migration from the site in the future.

Reduction of Toxicity, Mobility and Volume

Drummed wastes and contaminants on building and roadway surfaces would be removed and treated at an off-site commercial RCRA treatment facility. All contaminated soil would be disposed of off-site at an approved RCRA landfill which will control contaminant mobility. The volume and toxicity of the soil contaminants will not be effected; the soils will only be moved from one site (Schreck's) to another (landfill).

Short-Term Effectiveness

The time required to complete this remedial action is approximately 12 months. Short-term hazards to the community and workers exist while the remedial actions are being implemented due to exposure to fugitive contaminated soil and fumes. On-site workers would be properly protected against dermal contact, inhalation, and ingestion of contaminated soils during the implementation of this remedial action by use of personal protective equipment.

Planned construction safeguards would minimize the hazards to the community associated with fugitive dust, and contaminant levels would be expected to be within acceptable public health protection limits. However, stringent precautions would be required during excavation of contaminated soils to assure that excessive levels of asbestos fibers and other hazardous constituents are not released to the air. There is also a moderate potential risk to the community due to increased construction and truck traffic in the area.

Implementabilty

Off-site disposal of contaminated soils with the range of contaminants found at the Schreck site is an established remedial method. Off-site land disposal can be achieved at a number of permitted facilities (provided they are in compliance with EPA's off-site CERCLA waste disposal policy). Facilities with adequate capacity are available for handling the volume of contaminated soil present at the Schreck site.

The equipment and methodology required to excavate and overpack the on-site drums, and to complete surface cleaning of structures and roadway are readily available. Adequate commercial incineration capacity exists for treating the drummed wastes. On-site workers could be effectively protected by being properly trained and by using appropriate protective equipment. There are no anticipated legal or administrative barriers to successful implementation of this alternative.

Cost

The estimated cost for alternative S-7 is summarized in Table 3.11 (capital costs). The major capital cost component is the disposal cost for the disposal of contaminated soils at an off-site RCRA landfill. Total capital costs are estimated to be $4,465,000, with annual O&M costs of $0. The total estimated present worth of this alternative is $4,465,000.

Table 3.11
Alternative S-7
RCRA Treatment/RCRA Landfill

Cost Component		Cost Estimate
Direct Capital Costs		
1. Construction Costs		
Relocate off-site soils onto site		
a. equipment		1,000
b. labor		500
c. materials (backfill)		1,000
Surface cleaning of bldgs. & roadway		
a. equipment		37,500
b. labor		75,000
c. materials		40,000
Excavation and Overpacking of buried drums		
a. equipment		6,500
b. labor		9,000
c. materials		5,000
d. analysis		4,000
Excavation of on-site contaminated soil		
a. equipment		18,000
b. labor		15,500
Backfilling with clean soil		
a. equipment		33,500
b. labor		9,500
c. materials		21,500
	Subtotal	277,500
2. Equipment Costs		0
3. Land and Site Development		
Construction of site perimeter fence		
a. equipment		0
b. labor		5,500
c. materials		5,000
	Subtotal	10,500

Table 3.11 (continued)
Alternative S-7
RCRA Treatment/RCRA Landfill

Cost Component		Cost Estimate
Direct Capital Costs (continued)		
4. Buildings and Services		
Office, Crew, and H&S Trailers		23,500
5. Relocation Costs		0
6. Disposal Costs		
Contaminated site soil		
a. transportation		253,000
b. disposal		2,956,500
Surface cleaning Residue		
a. transportation		8,500
b. disposal		17,000
On-site Drums		
a. transportation		5,000
b. disposal		18,000
	Subtotal	3,258,000
TOTAL DIRECT CAPITAL COSTS		3,569,500
Indirect Capital Costs		
1. Engineering and Design 5% of Direct Costs		178,500
2. Contigency Allowance 20% of Direct Costs		714,000
3. License/Permit/Legal		3,000
4. Start-up and Shakedown		0
TOTAL INDIRECT CAPITAL COSTS		895,500
TOTAL CAPITAL COSTS		4,465,000

TABLE 3.12

PROBABLE ARARS FOR SCHRECK'S SCRAPYARD

ALTERNATIVE APPLICABILITY

REGULATION OR LAW	REGULATORY OR STATUTORY REFERENCE	APPLICABLILITY/REQUIREMENTS	S-1	S-2	S-3	S-4	S-5	S-6	S-7
RCRA FACILITY LOCATION STANDARDS	40 CFR 264.18(B)	Floodplain standard limits placement of waste in a 100 year floodplain.		x	x	x	x		
RCRA LAND DISPOSAL RESTRICTIONS	40 CFR 268	Declares restrictions on land disposal, including treatment standards for specific wastes (may apply)		x	x	x	x	x	x
RCRA LANDFILL COVER SYSTEM	40 CFR 264.310	Declares design, operation, and maintenance standards for landfill capping systems.		x	x	x	x		
RCRA CLOSURE OF HAZARDOUS WASTE FACILITIES	40 CFR 264.116	Requires survey plat filed with local authority which states the owner's obligation to restrict disturbance of the disposal unit.		x	x	x	x		
RCRA POST CLOSURE CARE	40 CFR 264.117	Mandates post closure care for the disposal unit for a period of thirty years. Section 264.117 necessitates access restrictions during the post-closure period.		x	x	x	x		
RCRA CLOSURE PLAN	40 CFR 264.112	Stipulates requirements for a written closure plan to be submitted and approved as part of the permit process.		x	x	x	x	x	
RCRA CLOSURE PERFORMANCE STANDARD	40 CFR 264.111	Mandates closure standards in addition to requiring closure to minimize future maintenance		x	x	x	x	x	
RCRA DESIGN STANDARDS FOR LANDFILLS	40 CFR 264, subpart N	Regulates design and operation of hazardous waste landfills				x	x		
DOT RULES FOR TRANSPORT OF HAZARDOUS MATERIALS	49 CFR 107	Dictates procedures for shipping hazardous wastes.		x	x	x	x	x	x
OSHA - GENERAL INDUSTRY STANDARDS	29 CFR 1910.120 29 CFR 1926	Specifies health and safety standards for hazardous waste activities under CERCLA.		x	x	x	x	x	x
IDENTIFICATION AND LISTING OF HAZARDOUS WASTE	6 NYCRR PART 371	Establishes procedures for identifying solid wastes which are subject to regulation under 6 NYCRR Parts 370 and 373		x	x	x	x	x	x
	6 NYCRR PART 373 Subparts 1,2, & 3	Regulates treatment, storage, and disposal of hazardous waste; Covers permit requirements, construction and operation standards.		x	x	x	x	x	x
PCB RE-ENTRY GUIDELINES	NEW YORK STATE DEPARTMENT OF HEALTH	Establishes guidelines for PCB clean-ups in buildings.	x	x	x	x	x	x	x
GUIDELINES FOR THE CONTROL OF TOXIC AMBIENT AIR CONTAMINANTS	NEW YORK STATE AIR GUIDE-1	Establishes guidelines for concentrations of compounds in ambient air		x	x	x	x	x	x
AIR QUALITY STANDARDS	6 NYCRR PART 157	Specifies numerically prescribed contaminant level that shall not be exceeded in a specified area of the State.		x	x	x	x	x	x
GENERAL PROVISIONS AIR POLLUTION CONTROL REGULATIONS	6 NYCRR PART 200	Regulates emissions		x	x	x	x	x	x
NATIONAL PRIMARY AND SECONDARY AMBIENT AIR QUALITY STANDARDS	40 CFR PART 40	Regulates air quality		x	x	x	x	x	x

IV. COMPARISON OF REMEDIAL ALTERNATIVES

4.0 Introduction

A total of seven remedial action alternatives were developed and evaluated for the Schreck Scrapyard site in Sections II and III of this report. These alternatives were subjected to a preliminary screening in Section II and a detailed analysis using seven specific criteria in Section III. Table 4.1 provides a brief summary and Table 4.2 a more detailed summary of the key findings of the detailed analysis.

The following seven subsections discuss the comparative analysis that has been completed for the Schreck Scrapyard remedial alternatives.

4.1 Protection of Human Health and the Environment

Alternative S-6 (ISV) provides the highest level of short term and long term protection to human health and the environment. Alternatives S-3 (soil solidification/capping), S-4 (on-site RCRA landfill), S-5 (soil solidification/on-site RCRA landfill), and S-7 (off-site RCRA landfill) have varying advantages and disadvantages with respect to each other but generally offer a similar level of overall protection that is somewhat less than provided by S-6. Alternative S-2 (multi-layer capping) is less favorably rated with regard to overall protection, primarily relating to S-2 having a higher risk of potential future contamination from unanticipated contaminant migration. Alternative S-1 (no action) is the least favorably rated because it does not eliminate the human contact hazard and also has the highest risk of potential future groundwater contamination.

4.2 Compliance with ARAR's

Alternative S-2, S-3, S-4, S-5, S-6 and S-7 are expected to comply fully with all ARAR's. Alternative S-1 (no action) will not comply with PCB re-entry guidelines because PCB contaminated surfaces are not cleaned and will not comply with NYSDEC landfill design criteria for hazardous waste disposal facilities.

4.3 Long-term Effectiveness

The most important comparative factors under "long-term effectiveness" include the risk that human contact will occur in the future, the risk of future contaminant migration into groundwater and long term maintenance requirements.

Alternative S-1 (no action) does not provide long-term effectiveness because groundwater protection is not provided and the human contact hazard is not eliminated. All of the remaining alternatives are effective in protecting groundwater, minimizing human contact with the contaminated soil, removing the drums, and cleaning the building and roadway surfaces. However, alternatives S-2, S-3, S-4, and S-5 rely on institutional controls to maintain the effectiveness of the remedy (ie. site cap). Institutional controls at a small site such as the Schreck Scrapyard are less likely to be successful than at a large site or at an off-site waste disposal facility.

The risk of human contact is greater under alternative S-2 (multi-layer cap) and S-4 (on-site RCRA landfill) than any of the on-site alternatives that includes treatment of soils (S-3, S-5, S-6) or than the off-site disposal alternative (S-7).

In terms of the risk of unanticipated contaminant migration effecting groundwater, alternatives S-3 (soil solidification/capping) and S-4 (on-site RCRA landfill) compare somewhat less favorably than S-5, S-6, and S-7. Alternative S-2 (multi-layer capping) presents a higher level of risk than S-3 and S-4, and alternative S-1 (no action) compares least favorably.

4.4 Reduction in Toxicity, Mobility, and Volume

Under this criterion, alternative S-6 (ISV) performs most favorably. Through ISV processing the overall volume of contaminated soil is reduced, hazardous organic compounds are thermally destroyed, and hazardous inorganic compounds are immobilized in a highly stable crystalline glass mass.

Alternative S-5 (soil solidification/on-site RCRA landfill) also compares very favorably against this criterion as the potential for soil contaminant mobility is reduced to a very low level. However, under alternative S-5 there is no reduction in volume or toxicity of soil contaminants.

Alternatives S-3 (soil solidification/capping), S-4 (on-site RCRA landfill), and S-7 (off-site RCRA landfill) all perform at a similar level that is somewhat reduced from the S-5 and S-6 performance level. Alternative S-2 (multi-layer capping) performs less effectively than alternatives S-3, S-4, and S-7. Finally, alternative S-1 (no action) performs least effectively against this criterion because there is no reduction in toxicity, mobility, or volume.

4.5 Short term Effectiveness

Under the short term effectiveness criterion the most significant comparative issues that arise are length of project, degree of fume and fugitive dust release from the project, and construction traffic increase. Alternative S-6 (ISV) compares most favorably against this criterion. Although the project length is considered long at 18 months, there would be only very minor air contaminant releases and very minor construction traffic associated with this alternative. Alternative S-2 (multi-layer capping) also compares favorably against this criterion. The S-2 project length is short (9 mos.) and there would be only minimal disturbance to on-site contaminated soils resulting in insignificant levels of air contaminant releases. Construction traffic under alternative S-2 would be low compared with the other alternatives.

Alternatives S-3 (soil solidification/multi-layer capping) and S-7 (off-site RCRA landfill) have a moderate short-term effectiveness level because although they both have short project lengths and moderate construction traffic risks, they have a more significant level of air contaminant release risk than S-6 or S-2. Alternatives S-4 (on-site RCRA landfill) and S-5 (soil solidification/on-site RCRA landfill) have a lower effectiveness level than S-2, S-3, S-6, and S-7 due to being relatively lengthy projects, having a higher level of air contaminant release risk, and a moderate construction traffic risk. Finally, alternative S-1 (no action) is the least effective against the short-term effectiveness criteria because no action is taken to address the hazards at the site.

4.6 Implementability

Through comparative analysis of the remedial alternatives, several factors have been identified that could impact implementability. Those factors are : degree of risk of hazardous dust and fume release, potential soil volume increase from soil treatment, and treatability of contaminated soil. The dust/fume factor potentially impacts alternatives S-3, S-4, S-5, and S-7. The soil volume increase factor potentially impacts alternatives S-3 and S-5. While the treatability factor potentially impacts the implementability of alternatives S-3, S-5. and S-6.

All alternatives are believed to be implementable with proper engineering design and control. However, for comparative purposes alternative S-1 (no action) would be most easily implemented and alternative S-2 (multi-layer cap) would be the second easiest to implement. Alternative S-3 (soil solidification/capping) would rank third in terms of comparative implementability considering solidification being conducted in-situ with a lesser degree of soil disturbance than the other options. Alternatives S-4 (on-site RCRA landfill), S-5 (soil solidification/on-site RCRA landfill), S-6 (ISV), and S-7 (off-site RCRA landfill) compare similarly with each other and somewhat less favorably than S-2 and S-3.

4.7 Cost

Costs can be compared directly as shown on Table 4.1.

Table 4.1
Comparison of Alternatives

Alternative	Capital Costs	Annual O & M	Present Worth	Protection Health/Env.	ARAR's	Long-Term Effectiveness	Reduction M/T/V	Short-Term Effectiveness	Implement-ability
S-1 No Action	0	0	0	Low	Low	Low	Low	Low	High
S-2 Multi-Layer Cap	930,000	55,000	1,448,500	Moderate	High	Moderate	Low	High	High
S-3 Solidification/Cap	1,125,500-1,882,500	55,000	1,644,000 2,401,000	High	High	High	Moderate	Moderate	High
S-4 On-Site RCRA Landfill	1,510,500	55,000	2,029,000	High	High	Moderate	Moderate	Low	Moderate
S-5 Solidification/On-Site RCRA Landfill	2,065,000-2,823,000	55,000	2,583,500 3,341,500	High	High	High	High	Low	Moderate
S-6 ISV	5,755,000	38,000	5,933,000	Very High	High	Very High	High	High	Moderate
S-7 Off-Site RCRA Landfill	4,465,000	0	4,465,000	High	High	High	Moderate	Moderate	Moderate

table41.wk1clt

TABLE [illegible]-2

DETAILED COMPARISON OF ALTERNATIVES

Alternative	Protection of Human Health & Env.	Compliance with ARAR's	Long Term Effectiveness	Reduction in Toxicity Mobility and Volume	Short Term Effectiveness	Implementability
S-1	- Not Effective	- Non-compliance with PCB re-entry guidelines. - Non-compliance with NYSDEC Part 373 land-fill criteria.	- Not effective	- No reduction	-- Not effective	- No obstacles to implementation
S-2	- Provides effective protection to health & env.	- Complies with ARARs	- Cap is expected to be effective at eliminating human contact hazard and immobilizing soil contaminants - Cap system will require long-term maintenance - All soil contaminants are left on-site untreated	- All drum wastes removed - All PCB contaminated surfaces are decontaminated - Soil contaminants immobilized, however no reduction in toxicity or volume	- Short project length (9 months) - On-site workers will use proper PPE to minimize dust/fume exposure - Community exposure will be minimized by engineering/construction controls and by on-site soils not being disturbed by excavation - Minor increased construction equipment traffic risk	- No obstacles to implementation
S-3	- Provides highly effective protection to health and env.	- Complies with ARARs	- Cap is expected to be effective at eliminating human contact hazard and immobilizing soil contaminants - Solidification will reduce mobility of soil contaminants and further reduce human contact risk - Cap system will require long-term maintenance	- All drum wastes removed. - All PCB contaminated surfaces are decontaminated - Soil contaminants immobilized (inorganics at very high effectiveness level, organics at high effectiveness level) - No reduction in toxicity or volume of soil contaminants	- Short project length (12 months) - On-site workers will use proper PPE to minimize dust/fume exposure - Community exposures will be minimized by engineering/ construction controls - In-situ solidification & capping will cause only minimal fugitive dust release since contaminated site soils are left in-place - Moderate increased construction equipment traffic risk	- Volume increase of contaminated soils from solidification process would need to be controlled

	Protection of Human Health & Env.	Compliance with ARAR's	Long Term Effectiveness	Reduction in Toxicity Mobility and Volume	Short Term Effectiveness	Implementability
S-4	- Provides highly effective protection to health and env.	- Complies with ARARs	- RCRA landfill will be effective at eliminating human contact hazard and immobilizing soil contaminants - Cap & leachate system will require long-term maintenance	- All drummed waste removed. - All PCB contaminated surfaces are decontaminated - Highly effective method is employed to immobilize soil contaminants - No reduction in toxicity or volume of soil contaminants	- Moderate project length (15 months) - On-site workers will use proper PPE to minimize dust/fume exposure - Community exposures will be minimized by engineering/construction controls - Stringent precautions will be required during excavation to prevent the release of excessive levels of asbestos - Moderate increased construction equipment traffic risk	- Great care would be required during soil excavation to prevent excessive asbestos release
S-5	- Provides highly effective protection to health and env.	- Complies with ARARs	- Landfill cap will be effective at eliminating human contact hazard - RCRA landfill will be highly effective at immobilizing soil contaminants - Solidification would further minimize human contact risk and reduce mobility of soil contaminants - Cap and leachate system will require long-term maintenance	- All drummed wastes removed - All PCB contaminated surfaces are decontaminated - Highly effective method is employed to immobilize soil contaminants - Solidification results in significant further immobilization of inorganics and slight further immobilization of organics - No reduction in toxicity or volume of soil contaminants	- Long project length (18 months) - On-site workers will use proper PPE to minimize dust/fume exposure - Community exposures will be minimized by engineering/construction controls - Fugitive dust control plan would require careful implementation to assure that asbestos and other dust levels are not excessive - Moderate increased construction equipment traffic risk	- Great care would be required during soil excavation to prevent excessive asbestos release - Volume increase of contaminated soils from solidification process would need to be controlled

	Protection of Human Health & Env.	Compliance with ARAR's	Long Term Effectiveness	Reduction in Toxicity Mobility and Volume	Short Term Effectiveness	Implementability
S-6	- Provides very high level of protection to health and env.	- Complies with ARARs	- Very high level of long-term effectiveness	- All drummed wastes removed - All PCB contaminated surfaces are decontaminated - Complete destruction/removal of hazardous organics in soil - Metals/inorganics effectively immobilized in residual crystalline glass mass - Soil volume is reduced	- Long project length (18 months) - On-site workers will use proper PPE to minimize dust/fume exposure - Engineered controls eliminate fume release from ISV processing	- Bench scale treatability testing would be required to assess ISV applicability to Schreck soils - On-site demonstration testing of ISV technology may be required
S-7	- Provides highly effective protection to health and env.	- Complies with ARARs	- High level of long-term effectiveness as all wastes are moved off-site	- All drummed wastes removed - All PCB contaminated surfaces are decontaminated - Soil contaminants displaced to an approved RCRA landfill	- Short project length (12 months) - On-site workers will use proper PPE to minimize dust/fume exposure - Stringent precautions will be required during excavation to prevent the release of excessive levels of asbestos - Moderate increased construction equipment traffic risk	- Great care would be required during soil excavation to prevent excessive asbestos release

V. PREFERRED REMEDIAL ALTERNATIVE

5.0 Introduction

A total of seven remedial action alternatives were developed, evaluated, and compared for the Schreck Scrapyard site in Sections II, III, and IV of this report. The information presented in earlier sections of the report has been used by the NYSDEC to select a preferred remedial alternative for the site. A determination has been made that on balance this preferred alternative represents the optimal remedial alternative for the site.

5.1 Preferred Alternative

Alternative S-7 (access restrictions, drum removal, building and street decontamination, off-site RCRA landfill disposal) has been selected by the NYSDEC as the optimal method of achieving the remedial objectives for the Schreck Scrapyard site. Drum removal, building/roadway decontamination, and soil excavation with disposal at a RCRA land disposal facility will effectively minimize the human contact hazard for contaminants at the site. Although other alternatives are effective in minimizing the human contact hazard, alternative S-7 provides several distinct advantages. Removal and off-site disposal, followed by backfilling the site with clean soil, will restore the property to a condition that maximizes its potential for future use. Community acceptance of this alternative is higher than for the other alternatives because contaminated soils are removed from the site as opposed to being treated on-site or otherwise left in-place on-site. Additionally, alternative S-7 is relatively easy to implement and the time required to achieve the remedial design objective is short compared to the other alternatives that are capable of achieving design objectives.

VI. CONCEPTUAL PLAN

6.1 Introduction

The purpose of this section is to present a conceptual plan that describes the selected remedial alternative and describes how this plan will meet the remedial objectives for the Schreck's Scrapyard site. Remedial objectives have been established with the support of a site-specific baseline risk assessment that characterizes risks to human health and the environment from contaminants present at the site.

6.2 Remedial Objectives

The selected remedial alternative has been developed to minimize the potential present and future threats to public health, welfare, and the environment at the Schreck's Scrapyard site in a cost effective manner. In order to achieve the required protection the following objectives have been established:

1. Minimize the potential for human contact with surface and subsurface on-site and off-site PCB-contaminated soil by meeting the U.S. EPA PCB soil cleanup criteria of 10 mg/kg and a carcinogenic risk level of 10^{-6} (ie. 1 in 1 million) for other contaminants.

2. Remove and dispose of drums that have been buried on-site.

3. Prevent migration of contaminants via groundwater by remediating the source of contamination at the site (soil and drums).

4. Minimize the potential for human contact with contaminated on-site building surfaces and Schenck Street surfaces.

6.3 Elements of Remediation

In order to achieve the site remedial objectives the following remedial actions are planned:

1. Access restrictions will be established by constructing a barrier fence around the full perimeter of the site.

2. All buried drums will be excavated, overpacked, and transported to an off-site commercial incinerator.

3. Contaminated building and roadway surfaces will be cleaned and the surface cleaning residues will be disposed of off-site at a commercial RCRA treatment facility.

4. Contaminated off-site and on-site soil will be excavated, loaded into trucks, covered and transported to an off-site commercial RCRA land disposal facility.

5. The depression created by the removal of the contaminated soils will be backfilled using clean soil from an off-site source.

6. The site will be graded to promote drainage and will be seeded to re-establish vegetative growth.

6.4 Statement of Work

The remedial action planned for the Schreck's Scrapyard site will be conducted in accordance with a remedial design/remedial action (RD/RA) workplan. This workplan will be developed prior to initiation of work at the site and will provide a detailed description of the work to be performed at the site. The workplan will include designs and specifications for all construction, decontamination, excavation, transportation, disposal, and site restoration work. Included in the workplan will be the methods that will be employed to assure that all regulatory requirements are met during the project and that the site-specific remedial objectives are achieved. Additionally, the workplan will include a detailed written Health and Safety Plan (HASP) that will be used to address any hazards that the site work could present to on-site workers or the surrounding community. A general description of the work to be performed under the planned remedial action project is presented below.

Initially, a barrier fence will be constructed surrounding the site to assure that the possibility for casual human contact or other human exposure to contaminants is minimized. The barrier fence will be provided with a locked gate in order to establish controlled access to the site.

All on-site buried drums will be excavated, overpacked, and transported to an off-site commercial RCRA facility for treatment/disposal. Methods outlined in the HASP will be utilized to assure that on-site workers are protected from hazards associated with excavating, overpacking, and loading drums for transport off-site. Transportation of the overpacked drums will be contracted to a licensed waste transporter. Currently, the NYSDEC is negotiating a consent order with the Occidential Chemical Corporation for the removal of these drums.

Contaminated on-site structures and roadway surfaces will be cleaned with an aqueous based wash process. The surface areas will be cleaned to acceptable levels and the surface cleaning residues will be containerized and transported to an off-site RCRA treatment facility for treatment/disposal. Transportation of the containerized residue will be contracted to a licensed waste transporter. Work procedures will be implemented to assure that trucks are safely loaded and residual contamination will not be tracked off-site. Safety procedures as outlined in the HASP will be followed.

Subsequent to drum removal and building/roadway surface decontamination, on-site soils will be excavated and loaded into trucks for transport to an off-site disposal facility. Disposal contracts will be entered into with a licensed, permitted RCRA land disposal facility. It is expected that the remediation contractor will use a hydraulic excavator to excavate the affected soils. The soils will then be loaded into trucks, covered, and transported off-site by a licensed waste transporter. Work procedures will be implemented to assure that trucks are safely loaded and residual contamination will not be tracked off-site. Safety procedures as outlined in the HASP will be followed.

It has been estimated that 7,400 cubic yards of on-site soil and 100 cubic yards of off-site soils will require removal. These soil volumes will be more accurately estimated during the RD/RA. Additionally during the RD/RA plans will be developed for controlling fugitive dust emissions, controlling erosion and site run-off, and establishing security measures for the site.

Following the planned excavation activities, a post-remediation assessment will be conducted to determine whether soil clean-up criteria have been met. This assessment will be carried out in accordance with an approved soil sampling and analysis plan (developed during the RD/RA). Based on the results of the assessment, any additional soils containing contaminants above the established clean-up criteria will be removed. Following a determination that the site clean-up criteria have been met, the excavated portions of the site will be backfilled using clean fill from an off-site source. The site will be graded to promote acceptable drainage and will be seeded to establish vegetative cover over the property.

RECEIVED
SEP 14 1990
N.Y.S. DEPT. OF
ENVIRONMENTAL CONSERVATION
REGION 9

85 FOREST AVENUE, LOCUST VALLEY, NEW YORK 11560 • (516) 671-8440
8000 EXCELSIOR DRIVE, SUITE 302, MADISON, WISCONSIN 53717-1914 • (608) 836-1500
122 NORTH FOURTH AVENUE, ANN ARBOR, MICHIGAN 48104 • (313) 663-2144