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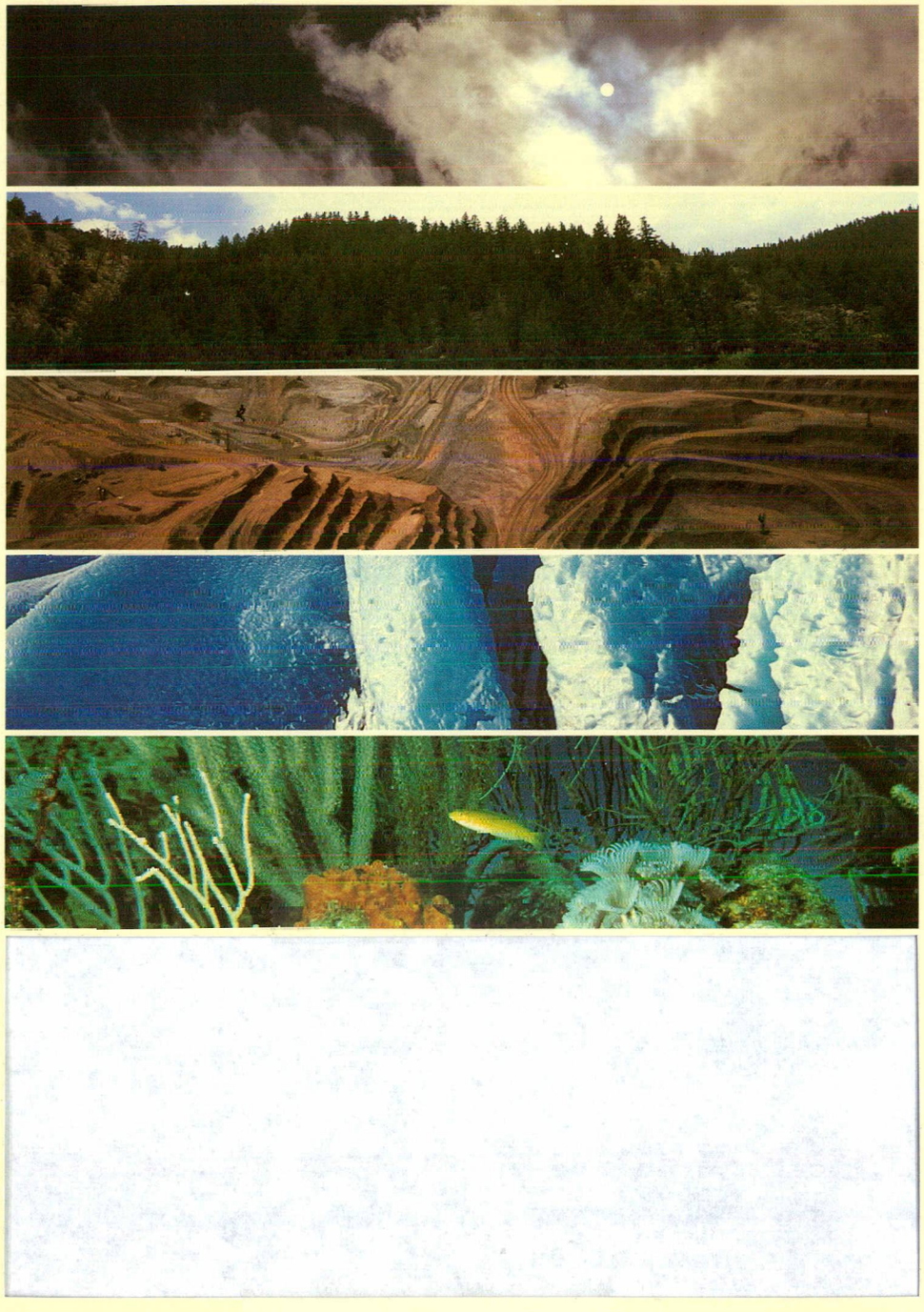

DAMES & MOORE

FEASIBILITY STUDY

RAMCO STEEL SITE
BUFFALO, NEW YORK

NYSDEC SITE NO. 915046B

DAMES & MOORE

3065 Southwestern Blvd., Suite 202
Orchard Park, New York

January 27, 1995
25848-001-152

DAMES & MOORE

3065 SOUTHWESTERN BOULEVARD, SUITE 202, ORCHARD PARK, NEW YORK 14127
(716) 675-7130 FAX: (716) 675-7136 (716) 675-7137

January 27, 1995

New York State Department of Environmental Conservation
270 Michigan Avenue
Buffalo, New York 14203

Attn: Jaspal Walia

Report Transmittal
Feasibility Study
Ramco Steel Site
(NYSDEC Site No. 915046B)
Buffalo, New York

Dear Mr. Walia:

Please find enclosed four (4) copies of the report *Feasibility Study, Ramco Steel Site, Buffalo, New York, NYSDEC Site No. 915046B.* This report is submitted on behalf of Axia, Inc. for your review.

This Feasibility Study has been completed in accordance with the Order on Consent between the NYSDEC and Axia, Inc. (#B9-0358-91-02), as certified by the undersigned Professional Engineer.

If you have any questions or comments, please contact the undersigned at your earliest convenience.

Sincerely,
DAMES & MOORE

Peter J. Smith
Project Engineer

Michael J. Hanchak
Associate

J. Britt Quimby, P.E.
Civil Engineer
NY Professional Engineer 071623-1

PS/BQ

cc: Andrew English - NYSDEC (2 copies)
Dennis Sheehan - Axia, Inc.
Neal Kayes - Cortec Group
Robert Glanville - Phillips, Lytle, et al.
Barry Fleishman - Anderson, Kill, et al.

APH:BUF:047:036.RAM

25848-001-152

FEASIBILITY STUDY

RAMCO STEEL SITE
BUFFALO, NEW YORK
NYSDEC SITE NO. 915046B

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FEASIBILITY STUDY

RAMCO STEEL SITE
BUFFALO, NEW YORK
NYSDEC SITE NO. 915046B

1.0 INTRODUCTION

This report presents the results of a Feasibility Study (FS) performed for the Ramco Steel (Ramco) site in Buffalo, New York (New York State Department of Environmental Conservation [NYSDEC] Site Registry No. 915046B). The FS work has been conducted in accordance with the Administrative Order on Consent between Axia, Inc., and NYSDEC, effective date December 22, 1994. The FS has incorporated all elements of the required work under the Order and was conducted in general accordance with the *Guidance for Conducting Remedial Investigations and Feasibility Studies under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Interim Final, U.S. Environmental Protection Agency (USEPA), October 1988*, and other applicable USEPA and NYSDEC technical and administrative guidance documents.

This FS report is based on the information and data contained in the final Remedial Investigation (RI) report for the site. This report entitled, *Remedial Investigation Report, Ramco Steel Site, Buffalo, New York, NYSDEC Site No. 915046B, August 1994*, discusses site investigative activities and conclusions and recommendations regarding the site.

1.1 PURPOSE AND ORGANIZATION

The purpose of this FS is to identify and evaluate appropriate remedial alternatives for the Ramco site in a manner consistent with the requirements of the Order on Consent, so as to support selection of the best remedy. Appropriate remedial alternatives would protect human health and the environment, with a preference for actions that employ treatment that would permanently and significantly reduce the volume, toxicity, or mobility of hazardous substances, pollutants, and contaminants.

The range of remedial alternatives developed includes alternatives that would remove or destroy hazardous substances, pollutants, or contaminants to the maximum extent feasible while remaining cost-effective, eliminating or minimizing the need for long-term maintenance. The range of alternatives includes some that would vary the degree of treatment employed, and some that involve little or no treatment, but still provide protection of human health and the environment.

This FS report is organized to present the development and screening of remedial alternatives for the Ramco site. Section 1 is an introduction to the report and provides background information such as site conditions. Section 2 provides an identification and screening of technologies, including discussions of remedial action objectives and general response actions for the site. The development of the remedial alternatives is presented in Section 3. Section 4 presents a detailed evaluation and comparison of the alternatives.

1.2 BACKGROUND INFORMATION

The components and results of the RI conducted at the Ramco site are documented in the final RI report. The purpose of the RI was to characterize site environmental conditions, evaluate the nature and extent of potential contaminants at the site, and evaluate the risks posed to human health and the environment, if any, as a result of site contaminants. The RI was conducted under a separate Order on Consent from that for the FS. The Order on Consent was between Axia, Inc., and the NYSDEC and was effective October 1992. The final RI report was approved by the NYSDEC in its October 3, 1994, correspondence.

1.2.1 SITE DESCRIPTION

The Ramco site, as defined by the NYSDEC, consists of approximately 8.46 acres, including a pond and associated surrounding land. The site address is 110 Hopkins St., Buffalo, N.Y. (Figure 1 is a location map; Figure 2 is a site map). The area to the east, formerly operated by Ramco but now operated by Niagara Cold Drawn Steel (NCDS), consists of a manufacturing building and associated parking and storage areas (as a result of a partitioning this area is now considered a separate site by NYSDEC, namely, Site No. 915046A). The Ramco RI was limited to the Ramco site as defined above. Portions of the site and the study area are located on property owned by third parties. The current or former property owners of the Ramco RI study area include the Adrian Realty Company, the City of Buffalo, the Hopkins Tift Realty Corporation, and the South Buffalo Railway Company.

At present, the Ramco site is classified by the department as a "Class 2" site in accordance with Title 6 of the New York State Code, Rules and Regulations Part 375 (6 NYCRR 375). Concerning the Ramco site, the NYSDEC's Inactive Hazardous Waste Disposal Site registry states that the pond to the rear of the plant was used to dispose waste pickle liquor, rinse water, lime sludge, iron and chrome and is the primary area of concern for the site.

Land use in the immediate vicinity of the Ramco site is commercial and industrial, with residential/light industry areas to the east. A significant portion of the areas to the north, south and west of the Ramco site is used for industrial purposes or consists of swamp-marsh areas. Significant portions of the original marsh areas have been filled, although smaller unfilled areas still exist. Residential areas exist approximately one-third mile to the east and are interspersed with light industrial areas.

Properties immediately surrounding the Ramco site include: to the north, the Alltift Landfill (which encroaches on the Ramco site), a 25-acre automobile junkyard (Skyway Autoparts, Inc.), and Greif Bros. Containers (manufacturer of fiber drums) to the north; to the south, a railroad line and an abandoned auto parts supplier (Sloan Auto Parts); to the east, Hopkins Street; to the west, a railroad right-of-way; and to the southwest, the Republic Steel Landfill. The Alltift Landfill (NYSDEC Site No. 915054) and the Republic Steel Landfill (NYSDEC Site No. 915047) are listed as inactive hazardous waste disposal sites with the NYSDEC.

The Alltift Landfill is of significant importance to the Ramco site due to its proximity to the Ramco site, the fact that it has encroached on the northern portion of the Ramco pond, and the fact that similar contaminants have been detected at the Alltift site. As stated previously, the Alltift site is also

listed as an inactive hazardous waste disposal site by the NYSDEC, requiring the completion of a remedial investigation and feasibility study for the site. The final RI report for the Alltift site was submitted to the NYSDEC in the summer of 1994, with the subsequent submittal of a draft FS report to the NYSDEC in September 1994. The Alltift RI has identified the following Alltift site conditions:

- Surface and subsurface soil contain elevated concentrations of volatile organics, semi-volatile organics, pesticides, PCBs and inorganics
- Groundwater in the shallow water-bearing zone contains elevated levels of volatile organics, semi-volatile organics, and inorganics
- Pond sediment west and south of the site contain elevated levels of volatile organics, semi-volatile organics, pesticide, PCBs, and inorganics.
- Surface water in the western on-site ponds contain elevated levels of semi-volatile organics and inorganics.

The draft FS for the Alltift site presents remedial alternatives which address media of concern for the site. The proposed remedy for the site includes: consolidation and placement of sediment from the pond areas surrounding the site (including sediment from the Ramco pond and soil/landfill materials not underlain by clay) into the landfill area; installation of a groundwater extraction system which incorporates a collection trench around the landfill area; and, capping of the landfill area.

1.2.2 SITE HISTORY

The site, including the NCDS building, has historically been used as a steel processing facility. The principal business activity for the plant area has been the processing of mill steel to produce various products. Processing of raw steel prior to use of the steel in manufacturing operations has been performed at the plant from 1929 to present day, although, the actual pickling (scale removal) processes and facility equipment have changed over the years. Beginning in 1929 and ending in 1986, a pickling process was used consisting of dipping steel in an acidic solution. In 1986, the scale removal process was changed to a shot-blasting technique which did not include the use of acid materials.

From approximately 1929 to 1979, industrial wastewater allegedly was discharged directly to the on-site pond, although conflicting information exists regarding the discharge of spent pickle liquor into the pond during the period of 1929 to 1972. A NYSDEC information request response from Axia, Inc., states that acid rinse waters were disposed of into the pond during that period; however, spent pickle liquor was sewered. Ramco's response to a similar inquiry in 1976 indicates that spent pickle liquor was disposed of in the pond. For the period of 1975 to 1979, from other information gathered by the NYSDEC, it appears that wastewater was discharged to the pond under a New York State Pollutant Elimination Discharge System (SPDES) permit.

In 1978, the pond water reportedly was neutralized with sodium hydroxide to a neutral pH. In 1979, the wastewater discharge point reportedly was eliminated, and no further industrial wastewater was directed to the pond. The discharge lines from the plant operation to the pond apparently were closed

under the supervision of the NYSDEC. From 1979 to 1986, industrial wastewater reportedly was directed to the Buffalo Sewer Authority facilities for treatment. Spent pickle liquor wastes allegedly were shipped off-site for beneficial recovery in wastewater treatment operations.

1.2.3 ENVIRONMENTAL SETTING

The following subsections describe the environmental setting of the site and surrounding areas in terms of the site geology, site conditions, surface water and groundwater conditions, and the natural habitats of the area.

Site Geology

The geology of the site is characterized primarily by four distinct units overlying bedrock, namely: fill, silty sand, sandy clay, and till. The silty sand and sandy clay units were identified consistently across the site and have also been identified as continuous units at the adjacent Alltift and Republic Steel sites. The silty sand and silty clay units are composed of native materials, with a thin zone of till material encountered in some borings at the base of the silty clay. The thickness of the sand unit varied from 0.5 to 3 feet, and the clay unit ranged in thickness from 2 to 3 feet. Hydraulic conductivities for samples of the silty clay unit collected from borings and from beneath the pond were less than 1×10^{-7} cm/sec. The silty clay unit is believed to be a confining unit between the overlying water-bearing materials and the underlying bedrock. Bedrock at the site has been identified over a majority of the site as limestone of the Skaneateles Formation. In areas toward the northwest, the limestone is absent and the underlying shale of the Marcellus Formation is encountered. Based on data from the adjacent Republic Steel and Alltift landfill sites, the Ramco site is above a bedrock ridge which is orientated in an approximate east-west direction. The bedrock slopes away from the site in the north and south directions, with overburden thicknesses increasing in these same directions.

Surface Conditions

Much of the land area surrounding the Ramco site originally consisted of low-lying areas with extensive surface water and marsh areas. These original conditions are presumably similar to those presently observed in areas to the west of the site. Over time, areas surrounding the site have been altered, primarily by filling, to create usable land areas and for use as landfill areas (Alltift and Republic Steel landfills). On-site, the "fill area" of the site and areas around railroad rights-of-way have been altered by filling low-lying areas. The original Ramco pond area was observed in aerial photographs taken in the 1930s and 1940s; however, it appears from the photos that the pond size has increased over time and the marsh areas surrounding the pond have decreased, and configuration of the pond has been altered slightly.

The Ramco pond is characterized as a 3.5-acre shallow pond with the outfall at the far north end of the pond. Depth of water in the pond ranges from approximately 1 to 3 feet, with the shallowest areas being toward the east, near the original plant discharge to the pond. A soil berm surrounds the pond except at the outfall area. The bottom of the pond is littered with debris such as tires, metal objects, wood, and miscellaneous car parts.

Three layers of sediment or natural material were observed in the Ramco site pond: a loose silty sludge material, silty sand, and silty clay. The term sediment has been used to describe all material which was sampled from the bottom of the pond. The silty-sludge material was defined as material which appears to be altered natural material or deposits resulting from wastewater discharges to the pond. The silty sand and silty clay materials beneath the pond are natural materials which is consistent with site geology. Although the silty sand and silty clay units were encountered at all sampling locations throughout the pond, the contact between the units was difficult to identify during field sampling activities, since these materials were similar in consistency.

The maximum thickness of the sludge layer, as identified from the sediment sampling, is approximately 1.8 feet at the far east end of the pond. At the far west side of the pond, the sludge thickness was approximated at 0.2 feet. The thickness of the pond sludge tended to decrease in thickness proceeding in a westerly direction away from the plant wastewater discharge point on the east edge of the pond. Figure 3 is a cross section through the center of the pond in an east-west direction, illustrating the stratigraphic sequencing below the pond. A change in sediment color from a mottled brownish-yellow to dark gray was also noted in a westerly direction across the pond. The resulting thicker deposits of sludge in the east portions of the pond and changes in color are likely the result of material precipitating out of solution near the plant wastewater discharge point, which was in the far east area of the pond. An oily sheen was observed on the water surface after disturbing the upper layer of sediments in the pond at a number of sampling locations.

Surficial materials in the fill area of the site are composed of various fill or debris materials--slag, brick, cinders, steel, concrete, tires, and wood to depths ranging from 4 to 8 feet below grade. In addition, oily waste material was found in the fill area. The oily waste was found to be intermixed with water, with no apparent interconnection or homogeneity of the various oily wastes in the area. Various other fill materials, typically slag fill around railroad tracks, has been used across the site.

Groundwater

Based on an evaluation of available groundwater elevation data, groundwater patterns in the area are characterized by radial flow from the Alltift site (Figure 4). No apparent vertical groundwater flow patterns have been observed based on water level readings from on-site wells.

Surface Water

The site and surrounding areas to the north in the prominent direction of surficial water flow are characterized by low-lying marsh areas with many stagnant surface water features. This area is also dissected by many man-made features such as elevated railroad tracks and roads which have presumably altered the natural flow patterns of the area. Surface water flow from the pond to adjacent areas has been observed to be minimal, with little or no flow from the pond. Due to the marshy conditions, surface water in the area is believed to be interconnected with shallow groundwater above the silty clay confining unit overlying bedrock.

Natural Habitats

Based on the RI work, no NYSDEC Significant Habitats or endangered species have been identified at the site or within 1 mile of the site. NYSDEC-designated wetland areas have been identified adjacent to the site and the pond is listed on the national wetlands inventory compiled by the U.S. Fish and Wildlife Service. A wetland delineation of the site using the three-parameter technique (vegetation, soil, and hydrology) was completed for the site in accordance with the *U.S. Army Corps of Engineers Wetlands Delineations Manual (January 1987)*. Based on this work, the pond area and a smaller parcel of land on-site have been delineated as wetland areas. With regard to potential ecological concerns, the important contaminant exposure route associated with the Ramco site is direct uptake of pond sediments, aquatic plants, and prey species that may consume or be in direct contact with pond sediments.

1.2.4 REMEDIAL INVESTIGATION

The purpose of the RI was to further characterize and evaluate site-specific physical properties of the site and the extent of potential contaminants on-site. Monitoring wells were installed on-site to evaluate geologic and contaminant concerns related to groundwater. Surface water and sediment sampling of the pond and adjacent areas was completed to address potential contamination of sediment and surface water within the pond and other areas. Soil contaminants were also evaluated through surface and subsurface soil sampling in the fill area located to the north of the Ramco pond and at monitoring well locations. Samples of sediment, soil, groundwater, and surface water were tested for the presence of chemical compounds. Because of potential concerns related to radiologic contamination from past operations at the plant, sediment and soil samples were also tested for radiological contaminants. Figure 5 illustrates the location of environmental media sampling which was completed as part of the RI for the site.

The results of the environmental media sampling identified contaminants within pond sediment and soil from the fill area. Elevated levels of inorganic constituents were detected in groundwater and surface water above New York State water quality standards, but are believed to be representative of background water quality conditions.

Constituents representing contaminants of potential concern in sediments and soils include semivolatile organic compounds, specifically polynuclear aromatic hydrocarbon (PAH), polychlorinated biphenyls (PCBs), and metals. No radiological contamination was identified in sediments or soils at the site.

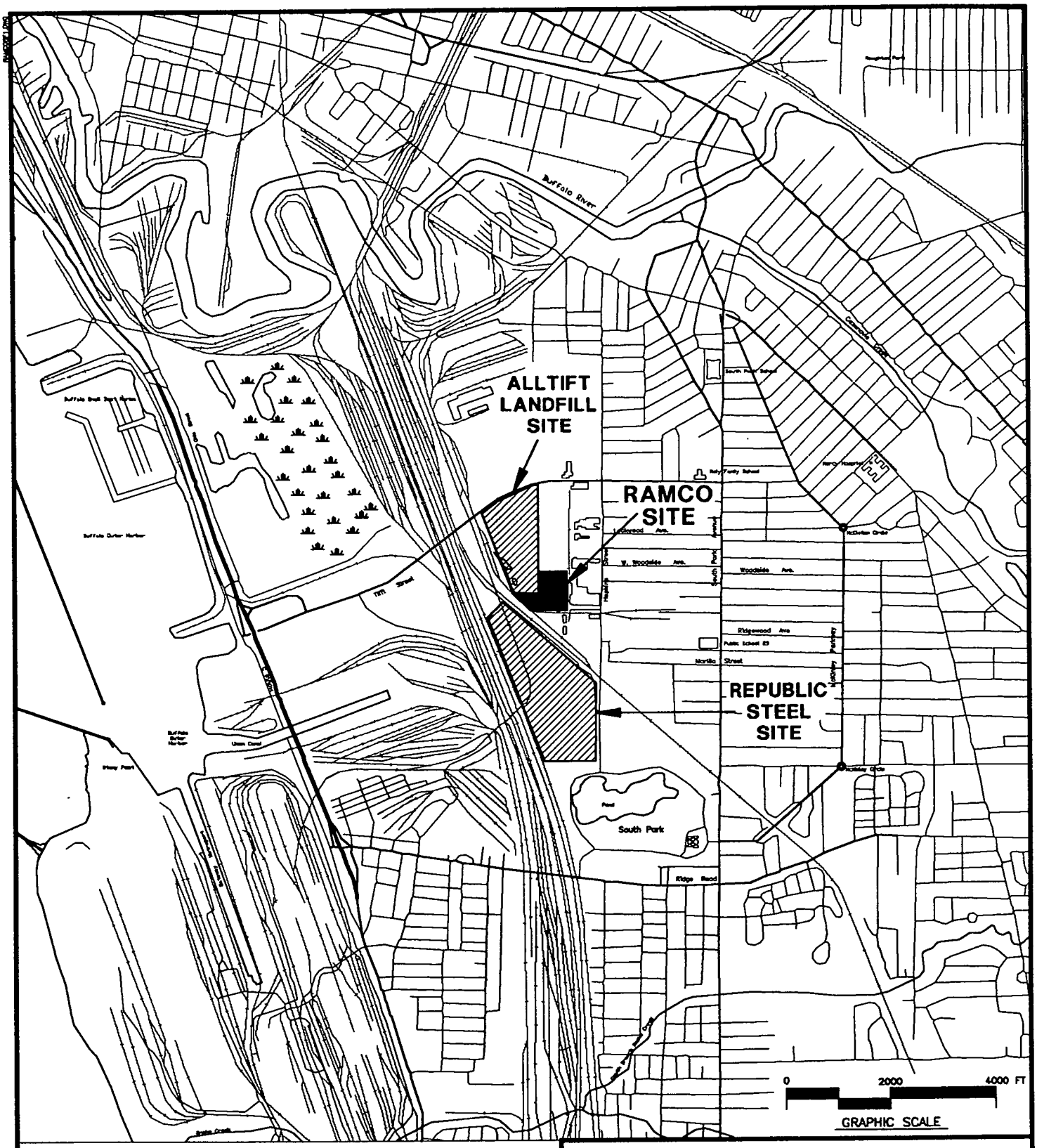
Although organic constituents were detected within pond sediments at most locations, volatile organic compounds were detected at relatively low concentrations, which are not of significant concern for the site, and detected semi-volatile organic compounds included a limited number of PAHs, also detected at low concentrations. Likewise, PCBs were detected within pond sediment and fill area soil at relatively low concentrations, below 1 ppm.

The concentrations of metals in pond sediment were compared to site background data and to data presented in *NYSDEC Sediment Criteria Guidance Document, 1989*. Based on this comparison, it was apparent that the levels of a majority of the metals are above site background levels and sediment criteria levels presented in the NYSDEC guidance.

Toxicity Characteristic Leaching Procedure (TCLP) data on sediments and soils indicates that tested materials would not be classified as hazardous by characteristic properties and that sediments and soils have a minimal potential to leach volatile organic, semivolatile organic, pesticide, or metal constituents.

Based on the results of the remedial investigation, adverse impacts to human health are not necessarily associated with exposure to chemical contaminants at the Ramco site. For ecological risk considerations, the important exposure route associated with the site is direct uptake of pond sediment, as well as consumption of plants and prey species that may consume or be in direct contact with pond sediment. The concentrations of contaminants of interest in sediments are generally above the "criteria" levels, but below the "limit of tolerance" levels presented in the *NYSDEC, Division of Fish and Wildlife, Sediment Criteria, December 1989.*

Several areas of oily waste material were encountered in the subsurface of the fill area. Although this area does not pose a significant risk to human health and the environment, under current or future use scenarios, there is concern pertaining to the fill material with regard to the future use of the property.



SOURCE:
USGS 7.5 MIN. QUADRANGLE
BUFFALO SE, NEW YORK 1965.

SCALE AS NOTED

RAMCO STEEL BUFFALO, NEW YORK
NYSDEC Site No. 915046B

FIGURE 1

SITE LOCATION MAP

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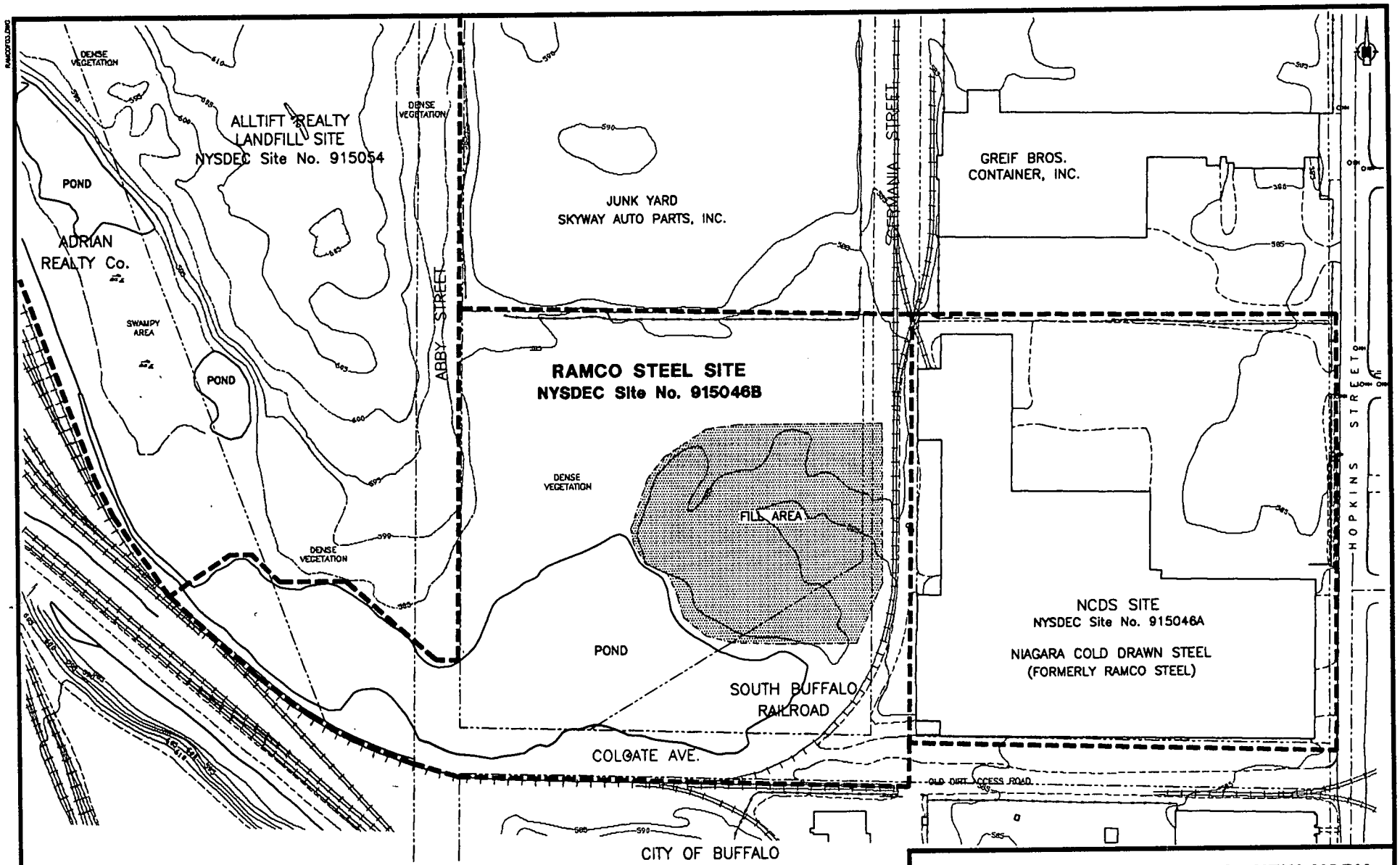
JOB No.: 25848-001-152



RAMCO STEEL BUFFALO, NEW YORK
NYSDEC Site No. 915046B

FIGURE 2

SITE LAYOUT PLAN

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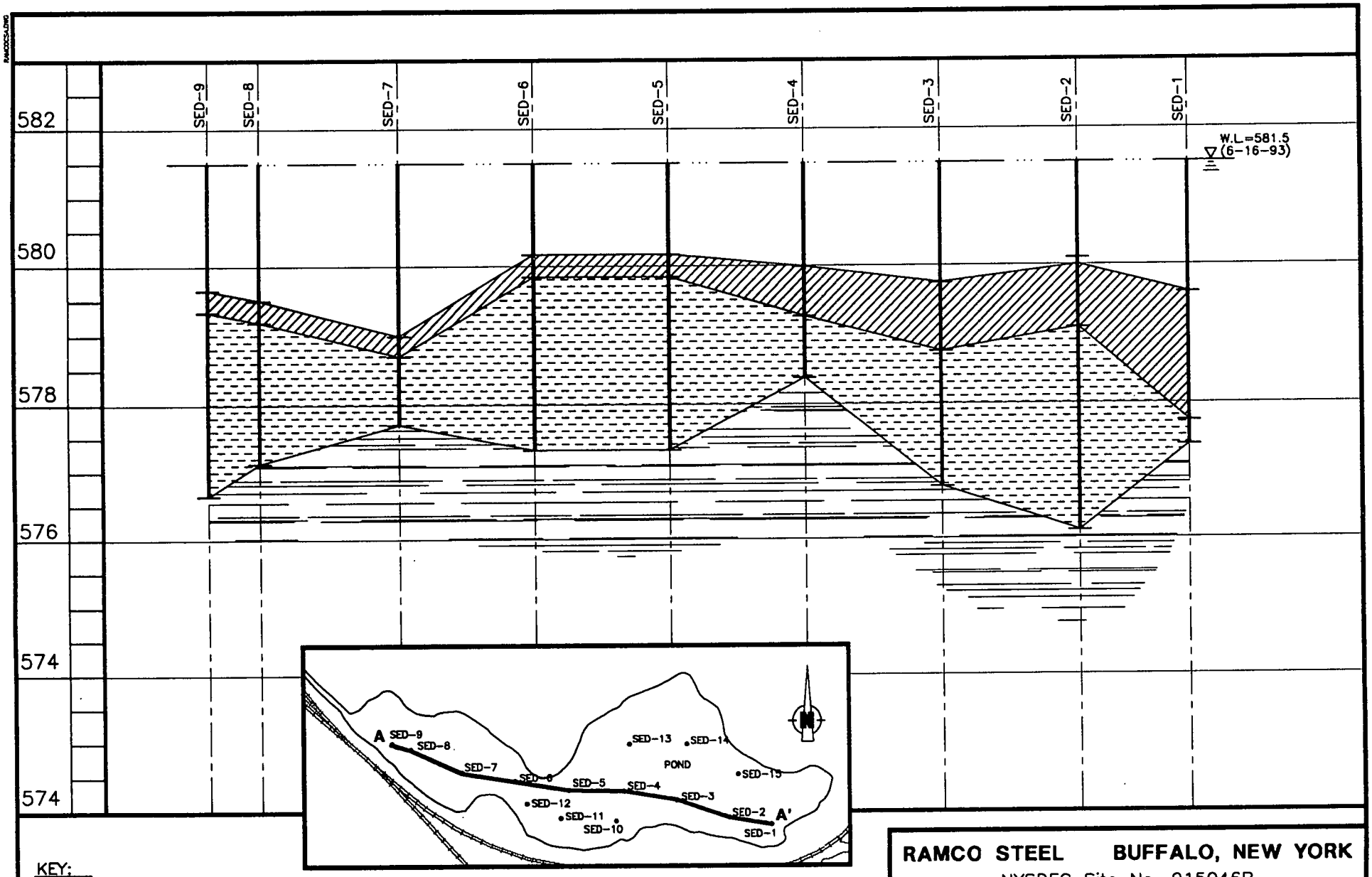

CROSS SECTION LOCATION

NOT TO SCALE

KEY:

- BROWNISH YELLOW–DARK GRAY Sludge
- OLIVE GRAY Silty Sand
- GREENISH GRAY to BROWN–GRAY to DARK GRAY Silty Clay

0 25 50 100 FT

HORIZONTAL SCALE

RAMCO STEEL BUFFALO, NEW YORK

NYSDEC Site No. 915046B

FIGURE 3

CROSS SECTION THROUGH RAMCO POND FROM WEST TO EAST

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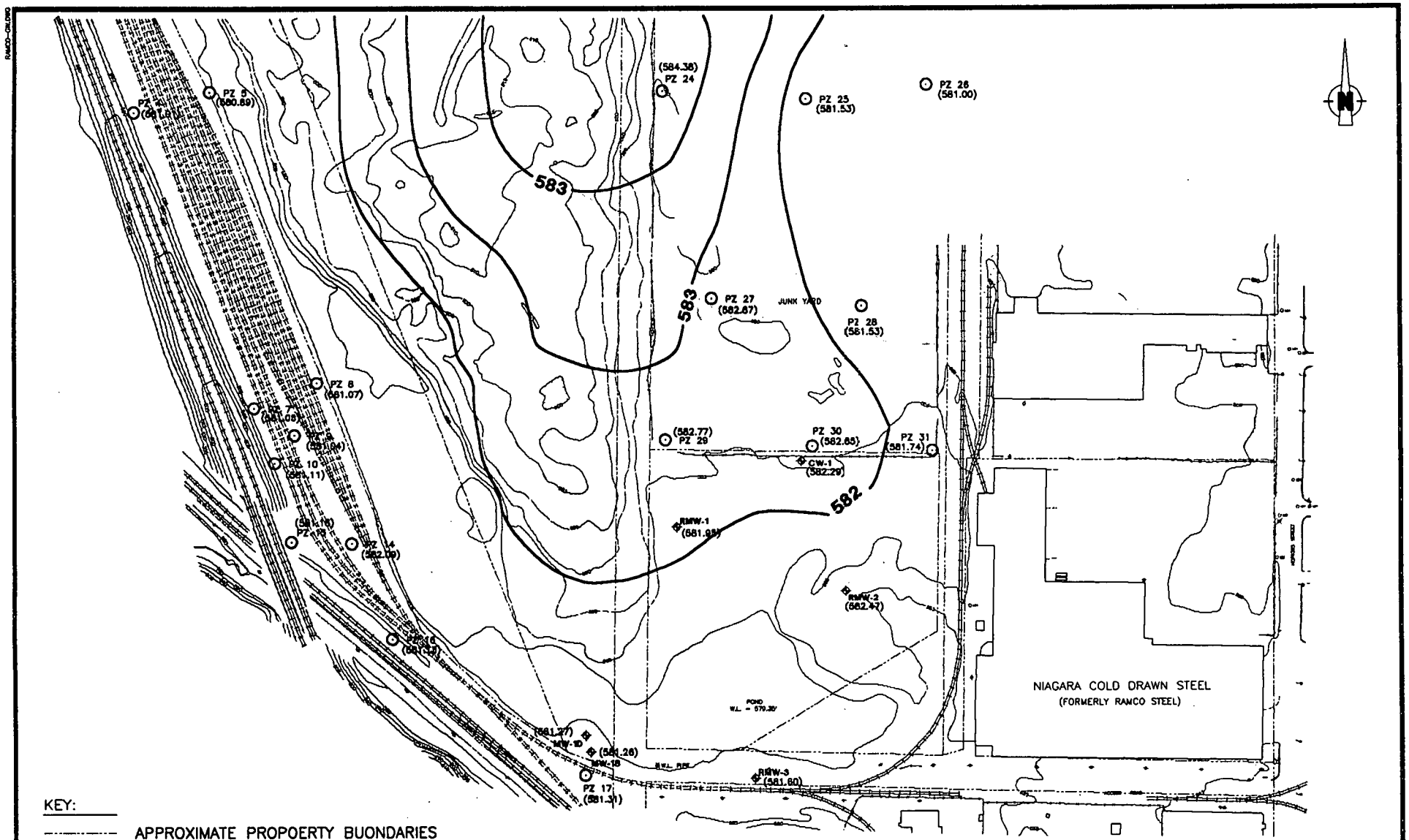


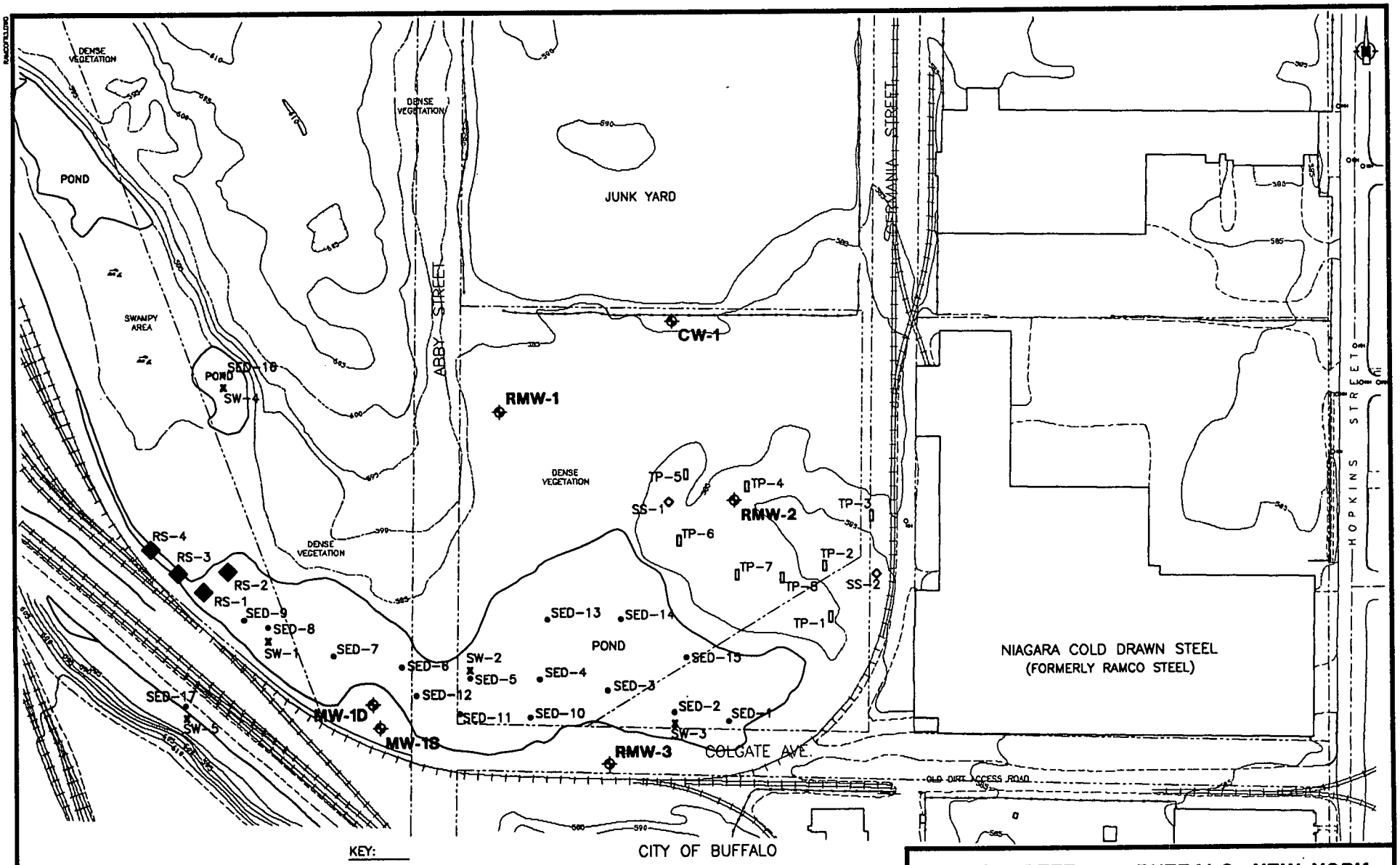
RAMCO STEEL BUFFALO, NEW YORK

NYSDEC Site No. 915046B

FIGURE 4

GROUNDWATER LEVELS
JUNE 1994

DAMES & MOORE JOB No.: 25848-001-152



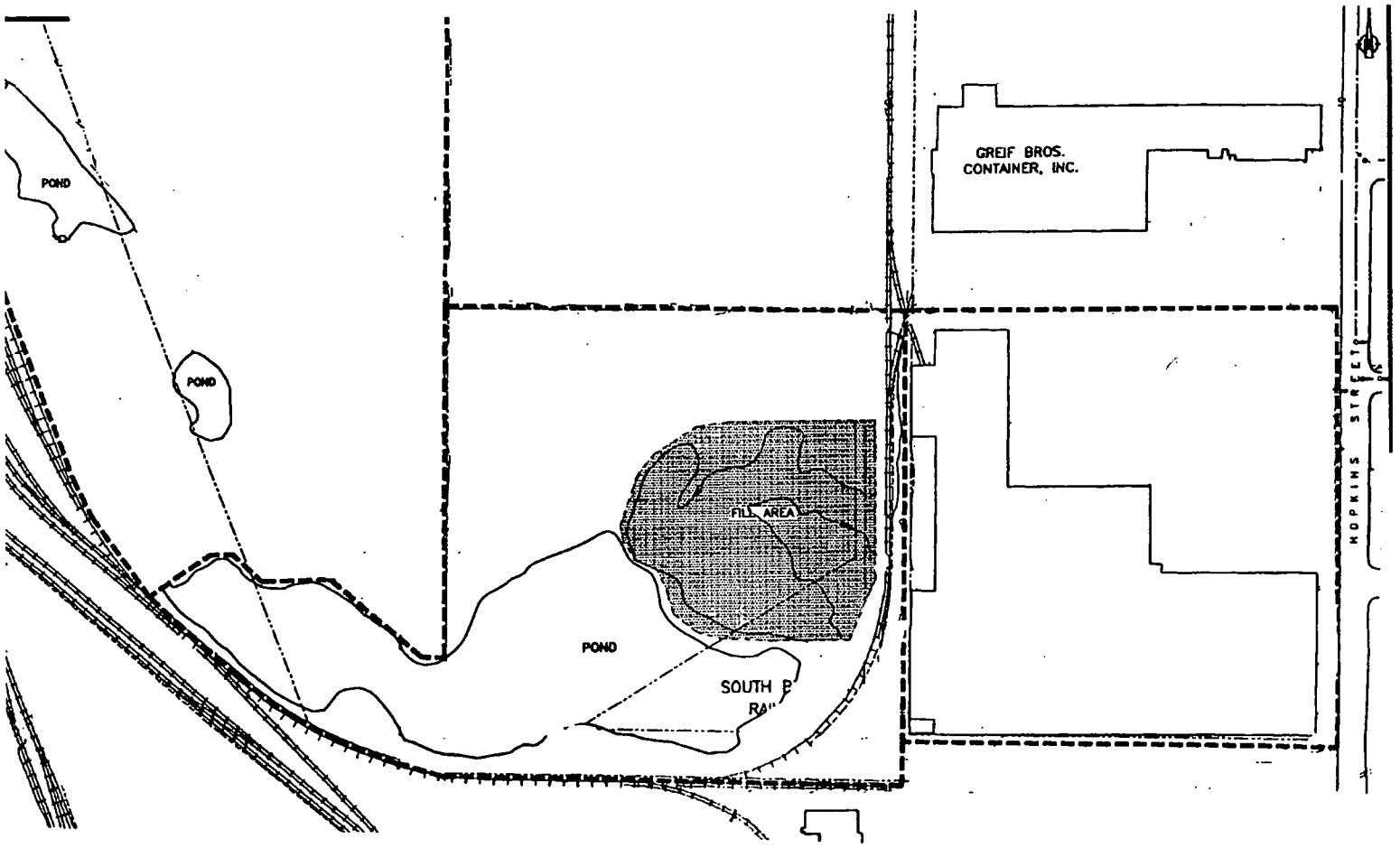
RAMCO STEEL BUFFALO, NEW YORK

NYSDEC Site No. 915046B

FIGURE 5

REMEDIAL INVESTIGATION SAMPLING POINT

DAMES & MOORE JOB No.: 25848-001-152


GREIF BROS.
CONTAINER, INC.
POND
POND
FILL AREA
POND
SOUTH
HOPKINS STREET

2

2.0 IDENTIFICATION AND SCREENING OF ALTERNATIVES

2.1 INTRODUCTION

This section identifies the areas of interest for remedial action and presents the identification and preliminary screening of applicable remedial action alternatives. The areas of interest are described in terms of environmental media and applicable or relevant and appropriate federal standards and appropriate New York State Standards, Criteria and Guidelines (SCGs), the bases for which are also presented. Remedial action objectives are established for the environmental media of concern at the Ramco site, and general response actions are identified. Based on this general information, available technologies and process options are identified and screened. The screening follows the general guidance in the NYSDEC, Technical and Administrative Guidance Memorandum (TAGM) for the Selection of Remedial Actions at Inactive Hazardous Waste Sites (HWR-90-4030), which suggests the following procedure:

1. Establish Remedial Action Objectives on the basis of chemical-specific SCGs, if possible.

2. Identify general response actions that address these issues and meet cleanup goals and criteria.

3. Identify areas of interest at the site in terms of environmental media to which general response actions can be applied.

4. Identify specific remedial action technologies for each general response action, and screen the technologies to eliminate those that are inapplicable and infeasible based on site conditions and waste characteristics.

Remedial alternatives are developed for each general response action, and consist of one or more appropriate technologies. Appropriate technologies consist of one or more process options.

2.2 NEW YORK STATE STANDARDS, CRITERIA AND GUIDELINES

Title 6, NYCRR Part 375, Inactive Hazardous Waste Disposal Site Remedial Program, addresses cleanup criteria and requires remedial actions to be undertaken in compliance with applicable or relevant and appropriate regulations and New York State SCGs. These include both state and federal standards and regulations to the extent that they are more stringent then the SCGs. Federal standards and requirements which are potential SCGs include the Toxic Substances Control Act (TSCA), the Safe Drinking Water Act (SDWA), the Clean Water Act (CWA), and the Solid Waste Disposal Act (SWDA). Also, other federal and state criteria, advisories, and guidance may be considered in developing proposed cleanup standards. This other information is referred to as "to be considered" (TBC) information and, although not legally binding, is used in developing and evaluating remedial alternatives.

There are three categories of SCGs:

- Chemical-Specific--standards or guidance which help define safe exposure levels for contaminants in the environment;

- Location-Specific--restrictions on activities at certain locations; or
- Action-Specific--technical or performance standards associated with certain remedial actions.

The following discussions identify SCGs and potentially applicable or relevant and appropriate regulations for remedial actions which may be taken to address contaminants within sediment at the Ramco site. Although SCGs are not alternative-specific, they offer a useful overview of requirements to be considered when assembling and screening remedial action alternatives. Where appropriate, standards commensurate with the nature of the contaminants found at the Ramco site are specified. A summary of potential SCGs which may be applicable to the site and remedial actions alternatives is presented in Table 1. The following subsections present discussions on specific SCGs applicable to the site, as well, SCGs are discussed in further detail in Section 4.0 -- Detailed Alternative Evaluation.

2.2.1 CHEMICAL-SPECIFIC SCGs

Chemical-specific SCGs are usually health- or risk-based numerical values or methodologies that, when applied to site-specific conditions, result in numerical values that establish an acceptable amount or concentration of a chemical that may be found in or discharged to the ambient environment. Some federal or state statutes, such as the CWA, may establish a methodology for determining site-specific discharge limitations. Other requirements are less specific in their application. Such requirements may also be SCGs, depending on site-specific considerations. If a chemical has more than one such requirement that is an SCG, the more stringent requirement is complied with in most cases.

In general, there are a limited number of chemical-specific requirements. A significant portion of the chemical-specific SCGs are related to groundwater, surface water, and air media. There are no chemical-specific SCGs for the media of concern for the Ramco site, i.e., sediment and soils. TBCs include the NYSDEC, Division of Fish and Wildlife, Sediment Criteria, December 1989, which outlines guidance on the allowable chemical constituents in sediment for the protection of a variety of environmental protection objectives. Additionally, the NYSDEC TAGM: Determination of Soil Cleanup Objectives and Cleanup Levels (HWR-92-4046) may be relevant and appropriate TBCs for site soils.

2.2.2 LOCATION-SPECIFIC SCGs

Location is a fundamental determination of site impact to human health and the environment. Location-specific SCGs are restrictions placed on the concentration of hazardous substances and performance of remedial activities based solely on site location. Examples of specific locations which are subject to special requirements include floodplains, wetlands, historic places, and sensitive ecosystems or habitats.

Portions of the Ramco site have been designated wetlands in accordance with Section 404 of the CWA. The wetland areas were determined not to be under the jurisdiction of the NYSDEC pursuant to Article 24 (Freshwater Wetlands) of the New York State Environmental Conservation Law. The site is not designated a wild, scenic, or recreational site, and it is not within the floodplain.

2.2.3 ACTION-SPECIFIC SCGs

Action-specific SCGs are usually technology- or activity-based requirements or limitations on remedial actions taken with respect to hazardous waste. These requirements are triggered by the particular remedial activities that are selected to accomplish a remedy. Because there are usually several alternatives for any remedial action conducted at a particular site, several different requirements may be necessary. Action-specific requirements do not determine the remedial alternative; rather, they indicate how a selected alternative may be implemented.

Action-specific SCGs are generally focused around the requirements of corresponding New York State and Federal regulations pertaining to hazardous waste management facilities and transport/manifesting requirements applicable to site activities or disposal requirements. Potentially applicable New York State SCGs relating to the regulation of hazardous waste are listed Table 1. Other SCGs which are action-specific include limitations, regulations, and performance specifications pertaining to groundwater, surface water, and Publicly Owned Treatment Work (POTW) discharges.

2.3 REMEDIAL ACTION OBJECTIVES

This section of the FS report identifies site-specific remedial action objectives and goals. The primary objective of the remedial action is to be protective of both human health and the environment. In addition to the requirements of the SCGs presented in the previous section, the following were considered in developing the remedial objectives:

- Contaminants of interest
- Exposure pathways and receptors
- Acceptable level for each exposure route, i.e., preliminary remediation goals.

Based on the results of the RI, two types of environmental media were identified, namely, pond sediment and fill area materials. The RI indicated that adverse impacts to human health are not necessarily associated with exposure to chemical contaminants at the Ramco site under current or future use scenarios. The important contaminant exposure route associated with the Ramco site is direct uptake of pond sediments as well as consumption of plants and prey species that may consume or be in direct contact with pond sediments. The concentrations of contaminants of interest in sediments are generally above the "criteria" levels, but below the "limit or tolerance" levels presented in the *NYSDEC, Division of Fish and Wildlife, Sediment Criteria, December 1989.*

The remedial action objective for pond sediment is to minimize, to the extent practicable, exposure of ecological concerns to sediments contained within the pond for the purpose of reducing overall risk to the environment.

Because materials within the fill area do not pose a significant current or future risk to human health and the environment, and due to the limited volume of material affected by subsurface contaminants, remedial alternatives for the fill area will be limited to excavation of affected soil and subsequent on- or off-site disposal. The disposition of materials from the fill area will be evaluated within each of

the developed remedial alternatives for addressing pond sediment. The following subsections which outline the development of remedial alternatives will focus on pond sediment as the medium of concern for the site.

2.4 GENERAL RESPONSE ACTIONS

General response actions applicable to sediment at the site have been developed to meet the remedial action objective. The range of general response actions includes source reduction and exposure pathway control measures. Source reduction measures would lower the concentrations of contaminants in media of concern. Exposure pathway control measures would prevent exposures to site-related contaminants in an effort to reduce environmental risks to an acceptable residual level.

Based on the results of the RI, sediment within the pond has been identified to contain elevated contaminant levels and is considered the primary medium of concern for the site. As a result, general response actions and subsequent screening of remedial actions have been limited to actions which will remediate pond sediment.

For the sediments, applicable general response actions include:

- No Action;
- Institutional Controls;
- Containment;
- Removal; and
- Treatment.

Consideration of the No Action response is included as a baseline evaluation. Institutional Controls could include site access restrictions, land use limitations, deed restrictions, zoning laws, and local regulatory actions that can be used to prevent exposure to contaminated media. Institutional Controls may also include environmental monitoring to evaluate site conditions over time. Containment of affected media could include the installation of a cap/cover and vertical or horizontal barriers, as well as sediment and surface water control measures. Removal actions involve the physical removal of the sediment from the pond for subsequent treatment and/or disposal. Treatment actions include the physical, chemical, or other treatment options to reduce the volume, mobility, and toxicity of the sediment.

2.5 IDENTIFICATION AND SCREENING OF REMEDIAL TECHNOLOGIES

This section presents a general discussion of potentially applicable remedial technologies for the Ramco site. Technologies to remediate the pond sediment were identified and screened based on general response actions identified in Section 2.4. Remedial technologies have been evaluated based on technical implementability and appropriateness to site conditions. Technologies which are not technically feasible or appropriate have been eliminated from future consideration. Technologies which passed this screening process are further evaluated with regard to process options in Section 2.6.

Table 2 lists the general response actions and potentially applicable remedial technologies and associated process options for sediment media. Remedial technologies which are potentially applicable to site conditions include a wide range of remedial technologies and process options under each general response action.

Remedial technologies which have been retained for further consideration are summarized in Table 3.

2.6 IDENTIFICATION AND SCREENING OF PROCESS OPTIONS

Process options are defined as specific operations, systems, or actions that contribute to an identified remedial technology. Several process options are generally used within a single technology, just as several technologies may be used within a single remedial action alternative. However, a process option by itself can constitute a remedial technology and even a remedial alternative.

Process options for pond sediment remediation were identified and screened for each remedial technology retained in Section 2.5. The purpose of this screening was to reduce the number of process options requiring further analysis, while preserving a range of alternatives for detailed evaluation.

Process options were screened using three criteria:

- Effectiveness
- Implementability
- Relative cost compared to other technology process options.

Of these three criteria, effectiveness and implementability were emphasized. Process options that were reliable but only partially addressed the sediment contamination were retained for further consideration if they could be effectively combined with other process options to remediate the sediment situation.

The effectiveness criteria considered were:

- The effectiveness of the process option in protecting human health and the environment during construction and implementation (short-term effectiveness)
- The potential effectiveness of the process option in handling the estimated area and volume of media, and meeting the cleanup goals (long-term effectiveness)
- The reliability of the process option with respect to the contaminants and conditions at the site

The implementability criteria considered were:

- Site characteristics, such as topography constraints and existing soil types
- Pretreatment requirements

- Residual(s) management
- Ease of obtaining permits
- Availability of skilled workers and equipment to perform the work
- Operation and maintenance (O&M) requirements.

Cost criteria considered were:

- Relative capital cost as compared to other process options
- Relative O&M costs as compared to other process options.

The term "relative cost" is used to compare, in qualitative terms, capital and O&M costs for each process option within a specified technology group. The assignment of low, moderate, or high cost is based on cost experience at similar sites and cost estimating references.

The No Action and Institutional Control options were not screened in this evaluation, but are used in the subsequent alternative evaluation as required to provide a baseline for comparison, and are discussed in Section 3.0 in the development of remedial alternatives for the site. Table 3 summarizes the results of the evaluation process and list process options that were retained for further evaluation.

TABLE 1
Ramco Steel Site

NEW YORK STATE STANDARDS, CRITERIA AND GUIDELINES

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Solid Waste

- 6 NYCRR Part 360 - Solid Waste Management Facilities (revised December 31, 1988)

Division of Hazardous Substances Regulation

- Description of Difference - EPA/State Regulations
- 6 NYCRR Part 364 - Waste Transporter Permits (revised December 31, 1986)
  - Part 370 - Hazardous Waste Management System: General (revised December 25, 1988)
  - Part 371 - Identification and Listing of Hazardous Wastes (revised December 25, 1988)
  - Part 372 - Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities (revised December 25, 1988)
  - Part 374 - Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities (revised December 25, 1988)
  - Part 375 - Inactive Hazardous Waste Disposal Sites
  - Part 376 - Land Disposal Restrictions

Division of Water

- 6 NYCRR Part 703 - NYSDEC Groundwater Quality Regulation
  - Part 750-757 - Implementation of NPDES Program NYS
  - Parts 701, 702, 704 - Surface Water Quality Standards
  - Part 701.15(d) and (e) Empowers DEC to Apply and Enforce Guidance where there are no Promulgated Standard

- Technical and Operations Guidance Series (TOGS)
  - 1.1.1; Nov. 11, 1991 - Ambient Water Quality Standards and Guidance Values
  - 1.2.1; March 1, 1990 - Industrial SPDES Permit Drafting Strategy for Surface Waters
  - 1.3.1; May 8, 1990 - Waste Assimilative Capacity Analysis and Allocation for Setting Water Quality Based Effluent Limits
  - 1.3.2; May 1990 - Toxicity Testing in the SPDES Permit Program
  - 1.3.4; April 1, 1987 - BPJ Methodologies
  - 1.3.4.a; Nov. 3, 1988 - BPJ Methodologies/Amendments

TABLE 1 (continued)
Ramco Steel Site

NEW YORK STATE STANDARDS, CRITERIA AND GUIDELINES

1.3.7; July 30, 1990	-	Analytical Detectability and Quantitation Guidelines for Selected Environmental Parameters
2.1.2; July 27, 1990	-	Underground Injection/Recirculation (UIR) at Groundwater Remediation Sites
2.1.3; Oct. 23, 1990	-	Primary and Principal Aquifer Determinations

Division of Air

-	6 NYCRR	Part 200	- General Provisions
-	6 NYCRR	Part 201	- Permits and Certifications
-	6 NYCRR	Part 211	- General Prohibitions
-	6 NYCRR	Part 212	- General Process Emission Sources
-	6 NYCRR	Part 257	- Air Quality Standards
-	Air Guide 1		- Guidelines for the Control of Toxic Ambient Air Contaminants

Division of Fish and Wildlife

-	6 NYCRR	Part 608	- Use and Protection of Waters
		Part 662	- Freshwater Wetlands - Interim Reports
		663	- Freshwater Wetlands Permit Regulations
		664	- Freshwater Wetlands Maps and Classifications
		665	- Local Government Implementation of the Freshwater Wetlands Act and Statewide Minimum Land - Use Regulations for Freshwater Wetlands
		Part 182	- Endangered and Threatened Species of Fish and Wildlife

- ECL Article 24 and Article 71, Title 23 - Freshwater Wetlands Act

TABLE 2
Ramco Steel Site
REMEDIAL TECHNOLOGY SELECTION CHART
FOR SEDIMENT

RESPONSE ACTION	TECHNOLOGY	PROCESS OPTION	DESCRIPTION	SCREENING COMMENTS
No Action	None	None	o No action taken	o Baseline effort for comparison
Institutional Actions	Access Restrictions	Fencing	o Chain-link fence to restrict public access	o Practical
		Deed Restriction	o Property deed annotated to restrict/limit future use of site	o Practical
Containment	Cover/Cap	Compacted Soil	o Compacted soil cover over areas of contamination	o Potentially Applicable
		Synthetic Membrane	o Man-made impervious material used in place of or in conjunction with soils	o Potentially Applicable
		Multi Layer	o Multiple layer consisting of soil, impermeable barrier, and vegetation	o Potentially Applicable
	Vertical Barriers	Slurry Wall	o Trench around areas filled with cement/bentonite slurry	o Not applicable for pond sediments
		Sheet Piling	o Steel sheeting driven around contaminated areas	o Not applicable for pond sediments
		Vibrated Beam	o Vibrating force to advance beams into ground with injection of slurry	o Not applicable for pond sediments
	Horizontal Barriers	Grout Injection	o Pressure injection of grout at depth level, through closely spaced holes	o Not applicable for pond sediments
		Liners	o Impervious soils/synthetic membrane used to prevent vertical migration	o Not applicable for pond sediments
	Sediment Control Barriers	Coffer Dams	o Installation of coffer dam structures to isolate sediment for further actions	o Practical
		Curtain Barriers	o Installation of filter fabric and other curtain barriers to isolate sediment for further actions	o Practical
		Channel Diversion	o Surface water diversion structure to prevent migration of sediments	o Practical
	Surface Controls	Dust Control	o Dust suppressants/water spraying to control dust during construction	o Practical
		Grading	o Surface reshaping to manage runoff and provide erosion controls	o Practical
		Soil Stabilization	o Technique used to minimize soil erosion and runoff	o Potentially Applicable

TABLE 2 (con't)
Ramco Steel Site
REMEDIAL TECHNOLOGY SELECTION CHART
FOR SEDIMENT

RESPONSE ACTION	TECHNOLOGY	PROCESS OPTION	DESCRIPTION	SCREENING COMMENTS
Removal	Excavation	Sediment Excavation	o Dewater area and excavate sediments with standard construction equipment	o Practical
		Dredging	o Excavated sediment using various dredging methods	o Practical
Treatment	Pretreatment	Dewatering / Drying Beds	o Solids are removed from liquid phase by mechanical methods	o Potentially Applicable
		Sedimentation	o Solids separated from liquid by gravity separation	o Potentially Applicable
	Physical Treatment	Solidification/ Stabilization	o Immobilizing contaminants by adding chemical fixatives or cement in place	o Potentially Applicable
		Encapsulation	o Mixing of soils or wastes with dry or fluid treatment chemicals	o Potentially Applicable
		Volatilization	o High temperature destruction of organic contaminants	o Not applicable for inorganics
		Vitrification	o Electrical heating of soil to produce glass-like material encapsulating contaminants	o Not feasible, non-proven technology for inorganics
		Thermal Treatment	o Incinerate all forms of waste (solid, liquid, gas)	o Not applicable
	Chemical	Extraction	o Removal of soluble contaminants by solution flushing	o Not applicable for inorganics
		Detoxification	o Neutralization, hydrolysis, oxidation reduction treatment of soils	o Not applicable
	Biological	Composting	o Natural biodegradation usually assisted with aeration	o Not applicable for inorganics
		Bioremediation	o Digest/breakdown contaminants by microbial degradation	o Not applicable for inorganics
	Disposal	On-site Disposal	o Placement of waste within on-site facility	o Practical
		Off-site Facility	o Removal of selected materials and disposal at an off-site permitted facility	o Practical

Key:

- Denotes options which are screened out

TABLE 3
Ramco Steel Site
SUMMARY OF PROCESS OPTIONS EVALUATION
FOR SEDIMENT

RESPONSE ACTION	TECHNOLOGY	PROCESS OPTION	EFFECTIVENESS	IMPLEMENTABILITY	COST	RETAIN
No Action	None	Not Applicable	Does not achieve remedial objectives	Not acceptable to local/state/ federal authorities	None	Yes
Institutional Actions	Access Restrictions	Deed Restriction	Does not reduce contamination	Must be legally binding	Negligible	Yes
		Fencing	Effective in limiting contact with soil/sediment	Easily implemented	Negligible	Yes
Containment	Capping/Covering	Compacted Soil	Effective in limiting contact with soil/sediment May be subject to erosion	Moderately Implementable	Moderate capital Moderate O&M	Yes
		Synthetic Membrane	Effective in limiting contact with soil/sediment May be subject to punctures or tears	Moderately Implementable	Moderate to high capital Moderate O&M	Yes
		Multi-Layer	Effective in limiting contact with soil/sediment No contaminant reduction	Moderately Implementable	Moderate to high capital Moderate O&M	Yes
	Control Barriers	Coffer Dams	Effective in limiting transport of sediment Limited application for pond areas	Easily implemented	High capital	No
		Curtain Barriers	Effective in limiting transport of sediment No contaminant reduction, augments other options	Easily implemented	Low capital	Yes
		Channel Diversion	Effective in limiting transport of sediment No contaminant reduction, augments other options	Easily implemented	Low capital	Yes
	Surface Controls	Dust Control	Effective in limiting transport during remediation No contaminant reduction, augments other options	Can be easily implemented	Negligible	Yes
		Grading	Effective in limiting surface water flows No contaminant reduction, augments other options	Can be easily implemented	Low to moderate capital	Yes
		Soil Stabilization	Limited effectiveness in addressing pond sediment No contaminant reduction, augments other options	Moderately Implementable	Moderate to high capital	No
Removal	Excavation	Sediment Excavation	Effective in removing soil/sediment Should be used with control barriers	Implementable with dewatering of pond areas	Moderate capital	Yes
		Dredging	Effective in removing sediment Should be used with control barriers	Implementable does not require dewatering of pond areas	Moderate to high capital	Yes

Key:

- Denotes options which are screened out

TABLE 3
Ramco Steel Site
SUMMARY OF PROCESS OPTIONS EVALUATION
FOR SEDIMENT

RESPONSE ACTION	TECHNOLOGY	PROCESS OPTION	EFFECTIVENESS	IMPLEMENTABILITY	COST	RETAIN
Treatment	Pretreatment	Dewatering/Drying	Effective for removing free water from soil/sediment Should be to augment other options	Implementable	Moderate capital Moderate O&M	Yes
		Sedimentation	Effective for separation of free water from solids Should be to augment other options	Implementable requires longer treatment time	Moderate capital Low O&M	Yes
	Physical Treatment	Solidification /Stabilization	Effective for reducing leachate from wastes	Implementable with proper design	Moderate capital	Yes
		Encapsulation	Effectiveness may be limited due to contaminants	Implementable	High capital	No
	Disposal	On-site Disposal	Effective in containing soil/sediment	Implementable	Moderate capital Moderate O&M	Yes
		Off-site Facility	Effective in containing soil/sediment off-site	Implementable	High capital No O&M	Yes

Key:

Encapsulation - Denotes options which are screened out

3.0 DEVELOPMENT AND SCREENING OF REMEDIAL ALTERNATIVES

3.1 DEVELOPMENT OF ALTERNATIVES

Remedial alternatives were developed using technologies and process options retained in Section 2.0. Additionally, screening of the developed alternatives based on criteria of effectiveness and implementability will be addressed in this section.

Remedial alternatives for pond sediment were developed for each of the following general response actions:

- No Action;
- Institutional Controls;
- Containment;
- On-site Treatment; and
- Off-site Disposal.

Table 4 lists the remedial alternatives under each of the general response actions. Applicable technologies are listed under each of the alternatives.

As previously discussed, alternatives were developed primarily to address pond sediment. Alternatives for addressing materials from the fill area have been incorporated into the developed remedial alternatives for sediment, as appropriate.

The developed alternatives are briefly discussed in this section, and in greater detail in Section 4.0--Detailed Evaluation of Alternatives.

3.1.1 ALTERNATIVE 1: NO ACTION

Under the No Action general response action, a No Action remedial alternative is identified. This would include no remedial activities, but would allow the situation to remain as at present. There would be no control over exposure to sediments and no reduction in risk associated with the site. Nor would this alternative include long-term environmental monitoring for assessment of pond conditions and interaction with other media.

3.1.2 ALTERNATIVE 2: INSTITUTIONAL CONTROLS

Under the Institutional Controls general response action, an Institutional Controls remedial alternative is identified. This alternative would incorporate fencing and deed restrictions for the purpose of limiting public access to or use of the site. Continued environmental monitoring would be conducted for evaluation of site conditions. This alternative does not address contaminant reduction, isolation, or reduction in ecologic exposure to sediments.

3.1.3 ALTERNATIVE 3: COVER

Under the Containment general response action, a Cover remedial alternative is identified. This would consist of placing a compacted soil cover over the sediment. Surface water in the pond area would be removed and the cover installed on top of the sediment. Structural backfill materials would be required to provide a firm base for the cover material. The placement of backfill material would require the filling of large portions of the pond area (Figure 6). Covering of sediment with clean soil would limit ecological exposures to contaminated sediments and would also reduce the potential for migration of pond sediment. Surface grading and reestablishment of a vegetative cover would improve site drainage and provide erosion control.

3.1.4 ALTERNATIVE 4: IN-PLACE SOLIDIFICATION/STABILIZATION

Under the On-Site Treatment general response action, the remedial alternative In-place Solidification/Stabilization has been identified. This would consist of solidifying/stabilizing contaminated sediments through the use of lime, cement, kiln dust, or other appropriate material. The objective of the solidification process would be to bind or encapsulate contaminants, which would prohibit migration of contaminants and exposure to contaminants. Surface water would be removed from the pond to allow access to the sediment. The sediment would then be mixed in-place with the solidifying/stabilizing agents (Figure 7). Prior to implementation, bench- and pilot-scale treatability studies would be required to determine suitable solidification/stabilization agents.

3.1.5 ALTERNATIVE 5: EXCAVATION/CONSOLIDATION

Also under the On-Site Treatment general response action, the remedial alternative Excavation and Consolidation has been identified. This would involve excavation of the pond sediment and consolidation of material within the adjacent Alltift Landfill. Surface water would be removed from the pond to allow access to the sediment and facilitate operations with excavation equipment. Sediment control barriers may need to be constructed during removal of surface water to prevent sediment migration. Normal excavation equipment such as backhoes, bulldozers, trucks, and dredges would be used to remove the sediment. After excavation, sediment would be placed within the Alltift Landfill area for consolidation/containment with other media from the Alltift site. Lime, cement, kiln dust, or other appropriate material may need to be added to the sediment to facilitate physical handling prior to placement at the Alltift Landfill. Excavation of the sediment is a removal action which permanently addresses site related concerns.

3.1.6 ALTERNATIVE 6: EXCAVATION, OFF-SITE DISPOSAL

Under the Off-Site Disposal general response action, an Excavation and Off-Site Disposal remedial alternative has been identified. This would involve excavation of the contaminated sediment and disposal at an off-site permitted landfill facility. Surface water will be removed from the pond to allow access to the sediment. Sediment control barriers may need to be constructed during removal of surface water to prevent sediment migration. Normal excavation equipment such as backhoes, bulldozers, and dredges would be used to remove contaminated sediment, with possible on-site staging for dewatering of the excavated sediment prior to transport off-site for disposal. Due to the characteristics of the sediment, it is anticipated that sediment contained within the pond would be

disposed as non-hazardous material at an industrial landfill permitted to accept such material. Individual facilities may require pre-treatment of the sediment to remove free liquids or stabilization to meet materials handling characteristics.

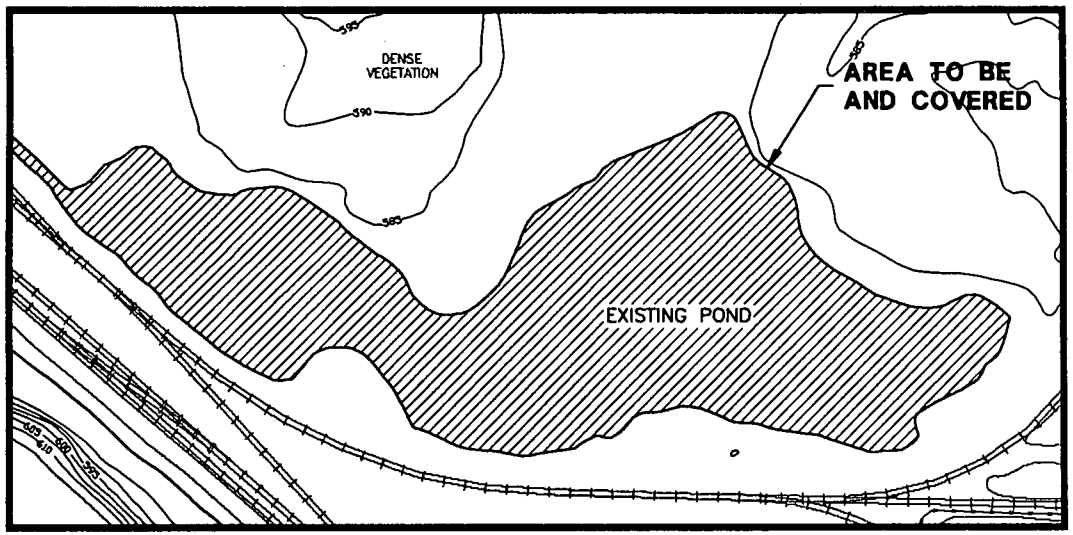
3.2 PRELIMINARY SCREENING OF ALTERNATIVES

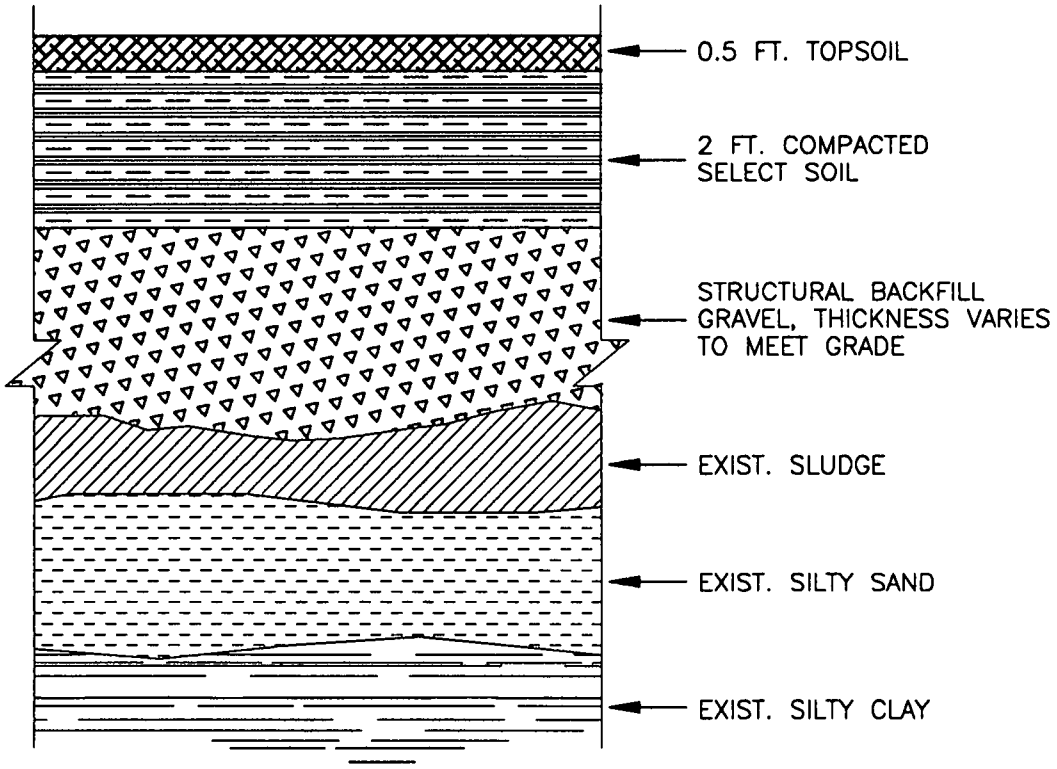
In accordance with *NYSDEC TAGM HWR-90-4030, Selection of Remedial Actions at Inactive Hazardous Waste Site*, the objective of the preliminary screening of remedial alternatives for effectiveness and implementability is to narrow the list of potential alternatives to undergo further detailed evaluation. Because the number of alternatives applicable to the remediation of the pond sediment was limited, all developed alternatives were carried through for detailed alternative evaluation. Therefore, the preliminary screening process as described in the NYSDEC TAGM, is unnecessary.

TABLE 4
Ramco Steel Site

SOIL/SEDIMENT REMEDIAL ALTERNATIVES SUMMARY

REMEDIAL ALTERNATIVE	COMMENTS
GENERAL RESPONSE ACTION: No Action	
1. NO ACTION	Provides baseline for evaluation Public health/environmental risks not addressed Requires long-term environmental monitoring Does not meet SCGs
GENERAL RESPONSE ACTION: Institutional Controls	
2. INSTITUTIONAL CONTROLS · Access Restrictions · Deed Annotation & Restrictions · Environmental Monitoring · Site Maintenance	Eliminates public contact pathway Does not eliminate ecological pathways Limits future land use Requires long-term environmental monitoring
GENERAL RESPONSE ACTION: Containment	
3. COVERING · Cover/Capping of Pond Sediment · Includes Alternative 2 · Excavate/Dispose Fill Area Soil at Off-site facility	Reduces ecologic exposure pathways by containment Minimizes potential for contamination migration Impacts current wetlands designation Would require mitigation of wetlands issues Requires long-term environmental monitoring
GENERAL RESPONSE ACTION: On-Site Treatment	
4. IN-PLACE SOLIDIFICATION/STABILIZATION · Solidify/Stabilize Sediments in Pond · Includes Alternative 2 · Excavate/Dispose Fill Area Soil at Off-site facility	Reduces ecological exposure pathways Minimizes potential for contaminant migration Maintains site wetlands designation Requires long-term environmental monitoring
5. EXCAVATION/CONSOLIDATION · Excavate Sediments from Pond · Consolidate into Alltift Landfill · Excavate/Consolidate Fill Area Soil into Alltift Landfill	Reduces ecological exposure pathway by removal Provides containment of sediments within landfill Maintains site wetlands designation No site use restrictions
GENERAL RESPONSE ACTION: Off-site Disposal	
6. EXCAVATION/OFF-SITE DISPOSAL · Excavate Sediments from Pond · Transport and Dispose Sediments at Off-site Facility · Excavate/Dispose Fill Area Soil at Off-site facility	Reduces ecological exposure pathway by removal Provides containment of sediments within landfill Maintains site wetlands designation No site use restrictions





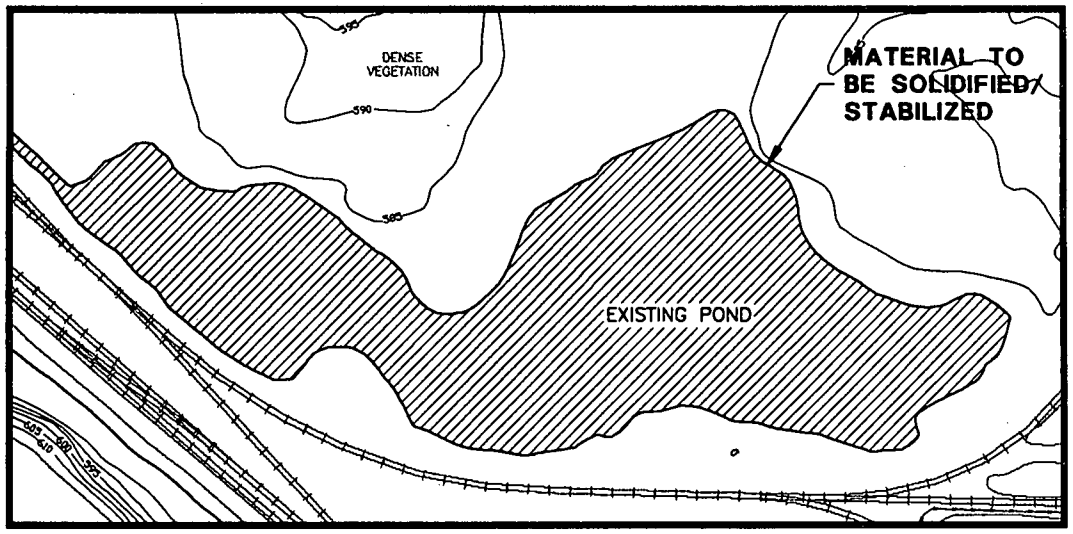
NOT TO SCALE

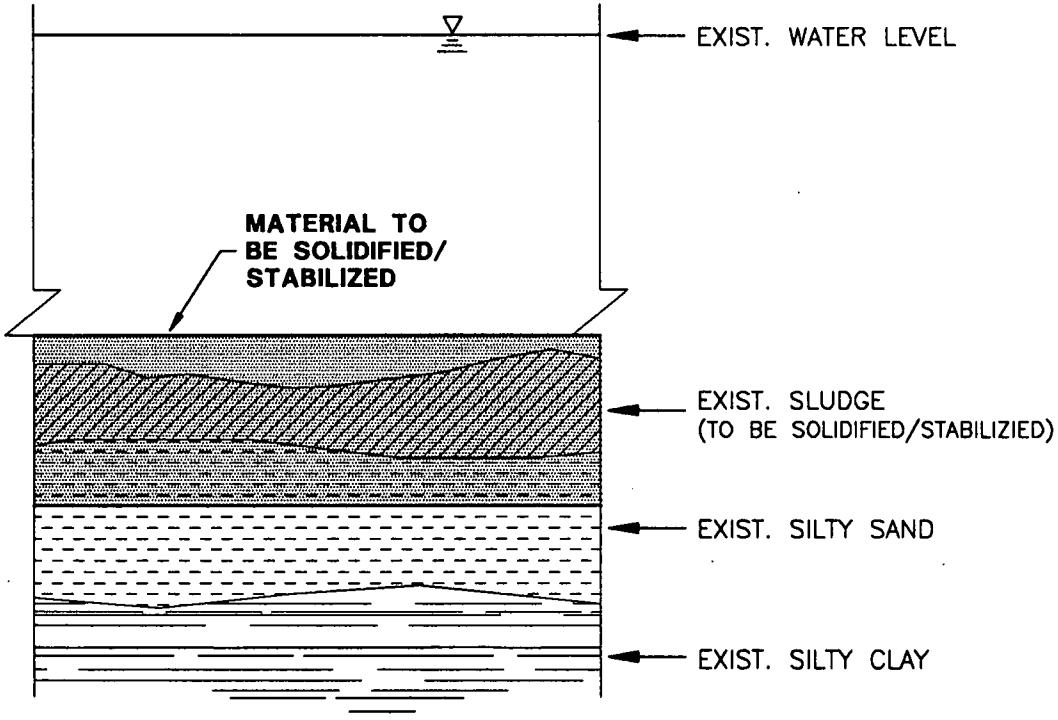
RAMCO STEEL BUFFALO, NEW YORK
NYSDEC Site No. 915046B

FIGURE 6

TYPICAL SECTION OF COVERING

DAMES & MOORE JOB No.: 25848-001-152





NOT TO SCALE

RAMCO STEEL BUFFALO, NEW YORK
NYSDEC Site No. 915046B

FIGURE 7

TYPICAL SECTION OF IN-PLACE SOLIDFICATION/STABILIZATION

DAMES & MOORE JOB No.: 25848-001-152

4.0 DETAILED ALTERNATIVE EVALUATION

In accordance with CERCLA and State guidance documentation, alternatives are to be evaluated against the following criteria:

- Overall protection of human health and the environment
- Compliance with SCGs
- Long-term effectiveness and performance
- Reductions in toxicity, mobility, and volume
- Short-term effectiveness
- Implementability
- Cost
- NYSDEC acceptance
- Community acceptance

Remedial action alternatives for the site were evaluated against the first seven of these nine criteria. The remaining two criteria, NYSDEC acceptance and community acceptance, are to be evaluated by NYSDEC.

These criteria will provide the basis for comparison between the various remedial alternatives in achieving the desired remedial objectives, and are discussed in the following sections.

4.1 COMPONENTS OF THE EVALUATION CRITERIA

4.1.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Each alternative was evaluated for the degree of mitigation of environmental and public health impacts during and after implementation. Evaluation under this criterion drew on the assessments conducted under the other evaluation criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with SCGs.

4.1.2 COMPLIANCE WITH SCGs

Each alternative was evaluated to determine compliance with the list of potential SCGs presented in Section 2.0, including:

- Chemical-specific SCGs, to determine if compliance could be achieved under this alternative,
- Location-specific SCGs, such as wetland regulations, to determine if compliance could be achieved, and
- Action-specific SCGs, such as RCRA minimum technology requirements, to determine if compliance could be achieved.

SCGs potentially applicable to site conditions, constituents, and proposed technologies were summarized in Section 2.0 of this document.

4.1.3 LONG-TERM EFFECTIVENESS AND PERMANENCE

Each remedial alternative was evaluated to determine the relative risk remaining at the site after the completion of the remedial activity, and the extent and effectiveness of controls that may be required to manage that risk. Evaluation criteria under this category included:

- The magnitude of the residual risk remaining on the site after the completion of the alternative and the volume, toxicity, and mobility of the constituents of interest at the site.
- The adequacy and reliability of controls that will be used to manage the residual risk, and the effectiveness of these controls to reduce potential exposure to the residual materials on-site.

4.1.4 REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT

Potential remedial alternatives were evaluated to determine the extent of permanent reduction of the toxicity, mobility, or volume of the constituents at the site using the following criteria:

- The treatment processes employed during remediation, and the contaminants amenable to treatment
- The quantity of the constituents of interest destroyed or treated, and how this would achieve the remedial objective(s) for the media of concern
- The degree of expected reductions in toxicity, mobility, or volume measured as a percentage of reduction
- The degree to which the treatment would be irreversible
- The type and quantity of treatment residuals that would remain following treatment

4.1.5 SHORT-TERM EFFECTIVENESS

The short-term effectiveness of each alternative was evaluated to determine potential impacts to human health or the environment during implementation, and the projected time frame to achieve the remedial goals. Evaluation criteria included:

- Protection of the public during the implementation of remedial activities
- Protection of site workers during the remedial action
- Potential adverse environmental impacts that could result during the remedial action, and the effectiveness of available mitigation measures
- Projected time frame to achieve the desired remedial objective(s)

4.1.6 IMPLEMENTABILITY

Implementability addresses the technical, administrative, and service requirements necessary to successfully initiate a remedial alternative. Specific criteria included:

- A description of the special engineering requirements of the remedy and the site preparation considerations
- Reliability of the proposed technology under operating conditions
- Ability to perform additional remedial actions, in the event that subsequent activities would be required to achieve the objectives of the remedial alternative in separate phases
- A description of operation, maintenance, and monitoring requirements of the remedial action
- Ability to obtain approvals from other agencies for implementing remedial action
- Availability to appropriate treatment, storage, and disposal facilities
- Availability of necessary equipment, labor, materials, and technology to implement the remedial action

4.1.7 COST ASSESSMENT

The initial capital cost for the implementation of each remedial alternative and the long-term O&M costs were evaluated. The costs were presented as present-worth cost and included capital and annual O&M costs, including amortization and replacement costs for equipment, if necessary.

4.2 ALTERNATIVES ANALYSIS

As a result of the screening processes presented in Sections 2.0 and 3.0, the following identified remedial alternatives were subjected to detailed analysis:

- Alternative 1: NO ACTION
- Alternative 2: INSTITUTIONAL CONTROLS
- Alternative 3: COVER
- Alternative 4: IN-PLACE SOLIDIFICATION/STABILIZATION
- Alternative 5: EXCAVATION/CONSOLIDATION
- Alternative 6: EXCAVATION, OFF-SITE DISPOSAL

In the following subsection, each alternative is evaluated separately in terms of the evaluation criteria listed above. These individual alternative evaluations are followed by a comparative analysis of the various alternatives.

4.2.1 ALTERNATIVE 1: NO ACTION

4.2.1.1 Description

The No Action alternative provides a baseline for alternative comparison. No remedial activities would be conducted to address sediment contamination. There would be no control of exposure to the contaminants in the sediment and no reduction in risks associated with the site. No environmental monitoring would be performed to assess site conditions and effects over time.

4.2.1.2 Assessment

Overall Protection of Human Health and the Environment

The No Action alternative would not reduce risk to human health or the environment.

Compliance with SCGs

This alternative would not meet chemical-specific SCGs which might be applicable to the contaminated sediments. However, due to the actions which would be required as part of the alternative, all action- and location-specific SCGs would be met.

Long-Term Effectiveness and Permanence

The No Action alternative would not actively reduce contaminant concentrations in sediment at the site. However, natural attenuation, dispersion, degradation and sedimentation of the pond might result in a decrease in contaminant concentrations or provide a cover over exposed sediment over time. Risks associated with ecological exposure to the sediment would continue and this alternative would not achieve the remedial action objective.

Reduction of Toxicity, Mobility, or Volume

This alternative provides no reduction in toxicity, mobility, or volume of contaminants.

Short-Term Effectiveness

The short-term effectiveness of the No Action alternative would be acceptable because no actions would be taken at the site.

Implementability

There are no implementability concerns posed by the alternative, since no actions would be taken.

Cost

No capital or O&M costs are associated with implementing the No Action alternative.

4.2.2 ALTERNATIVE 2: INSTITUTIONAL CONTROLS

4.2.2.1 Description

Institutional controls for the site would be in the form of deed restrictions on the use of the property and fencing of the site area to prevent public exposure to the sediments. Environmental monitoring would be conducted to assess migration potential of contaminated sediment and to provide the basis to undertake additional remedial actions in the future, if deemed necessary. Additionally, a review of potentially applicable remedial options would be performed every five years.

4.2.2.2 Assessment

Overall Protection of Human Health and the Environment

Protection of human health would be addressed through site access and use restrictions and environmental monitoring. The level of environmental risk reduction would be marginal.

Compliance with SCGs

This alternative would not meet chemical-specific SCGs which might be applicable to the contaminated sediments. However, due to the actions which would be required as part of the alternative, all action- and location-specific SCGs would be met.

Long-Term Effectiveness and Permanence

The Institutional Controls alternative would not actively reduce contaminant concentrations in sediment. However, natural processes such as attenuation, dispersion, degradation, and additional sedimentation might result in a decrease in contaminant concentrations. Potential risks associated with ecological exposure to the sediments would continue, and this alternative would not achieve the remedial action objective specified for sediment at the site. Institutional controls, such as deed restrictions limiting the use of the site would reduce potential human health risk; however, these would probably not reduce ecological risk.

Reduction of Toxicity, Mobility, or Volume

This alternative would not reduce the toxicity, mobility, or volume of sediment contaminants at the site except through natural processes.

Short-Term Effectiveness

This alternative would be effective in the short term if the access control measures and monitoring program were implemented with minimal exposure to sediment.

Implementability

This alternative could be easily implemented by establishing the appropriate restrictions and providing continuing public notice of the existence of the restrictions. Installation of fencing and or other access control measures for sediment areas could also be easily implemented.

Cost

The costs associated with implementation of this alternative would include continued environmental monitoring, legal fees associated with filing the appropriate land use restrictions, and installation of access control measures, such as fencing around the site areas.

The capital and present-worth O&M costs for this alternative are summarized in Appendix A. Capital costs, estimated at $51,700, included deed restrictions and access controls. Annual O&M costs are estimated at $51,100. Total present-worth cost for this alternatives is estimated at $686,100.

4.2.3 ALTERNATIVE 3: COVER

4.2.3.1 Description

Alternative 3 includes covering the pond sediment to reduce exposure to contaminated sediment.

Following removal of the surface water from the pond, the pond area would be filled with structural backfill and a soil cover would be placed over the backfill. The cover would result in raising the surface grade of the pond area to that of the surrounding area. Final grading of the area would be completed for control of surface water runoff. No sediment removal actions are included in this alternative. Environmental monitoring would be conducted to assess site conditions over time.

Soil from the fill area would be excavated and disposed at an off-site permitted landfill facility.

Institutional controls in the form of deed restriction and access controls would be maintained to limit future land uses and potential for human or environmental exposure.

4.2.3.2 Assessment

Overall Protection of Human Health and the Environment

The covering of sediments provides for protection of human health and the environment by isolating contaminated sediments from direct contact exposure pathways.

Continued environmental monitoring would be performed for the assessment of site conditions and effects.

Compliance with SCGs

Because the sediments would be covered by the filling of the pond area, ecological exposure pathways would be eliminated; thus, chemical-specific SCGs would not be applicable under this alternative.

Location-specific SCGs would include applicable regulations regarding impacts to wetlands designated under Section 404 of the CWA. Permitting requirements would have to be met prior to filling or disturbing designated wetland areas.

Surface water discharges or discharges to POTWs during the dewatering of the pond areas would have to comply with substantive requirements of the SPDES regulations (6 NYCRR 750-757), State Water Quality Standards (6 NYCRR 702/703), and the CWA and National Pollution Discharge Elimination System (NPDES) regulations set forth in 40 CFR 122-124. Discharges to POTWs would have to meet limitations and performance specification of the Buffalo Sewer Authority (BSA).

Long-Term Effectiveness and Permanence

Long-term effectiveness of this alternative would require regular inspection, site maintenance, environmental monitoring and assessment, and periodic repairs to the cover and fill materials placed over the sediment.

Reduction of Toxicity, Mobility, or Volume

Alternative 3 would rely on covering the sediment to contain and isolate contaminants. No additional reduction in toxicity or volume of contaminants is provided. Through containment, the mobility of contaminated sediment would be reduced.

Short-Term Effectiveness

Short-term impacts associated with the implementation of this alternative include the disturbance of the site associated with the installation of the cover materials for the pond, and physical risks associated with activities where heavy equipment is used in construction.

Activities associated with this alternative would not be expected to pose any additional risks to the public or environment. Fugitive dust hazards would be minimized by using engineering controls. Additional standard control measures such as silt fences, berms, and plastic covers would be used to minimize off-site migration of sediment.

Implementability

This alternative would not require specialized equipment or personnel to implement or maintain. Materials are readily available from numerous vendors and could be supplied without delays. O&M requirements would be minimal and would include periodic inspection and repair of the cover system, as necessary. There are minimal technology constraints on implementing this alternative.

Administrative approvals for permits associated with disturbing and filling of the pond, a designated wetland, would be required from oversight agencies including the U.S. Army Corp of Engineers. Additional requirements associated with the destruction of designated wetland areas might significantly influence the implementability of this alternative. Application and agency review of permits would contribute to the overall time-frame and level of effort involved with implementing this alternative.

Cost

The capital and present-worth O&M costs for this alternative are summarized in Appendix A. Capital costs are estimated at $1,537,900. Annual O&M costs are estimated at $53,300. Total present-worth for this alternative is estimated at $2,199,100.

4.2.4 ALTERNATIVE 4: IN-PLACE SOLIDIFICATION/STABILIZATION

4.2.4.1 Description

Alternative 4 would include the solidification/stabilization of contaminated sediments in-place, through the use of lime, cement, kiln dust, or other applicable materials. Solidification/stabilization of sediment would minimize potential ecological risks through exposure to sediment by reducing the mobility and availability of contaminants within sediment.

Surface water would be removed from the pond to allow access to the sediments for standard excavating and construction equipment. Sediment would then be mixed in-place with solidifying/stabilizing agents to bind or immobilize contaminants within the sediment.

Environmental monitoring would be conducted to assess migration potential of contaminants from the solidified sediment.

Soil from the fill area of the site would be excavated and disposed of at an off-site permitted landfill facility.

Institutional controls in the form of deed restriction and access controls would be maintained to limit future land uses and potential for human or environmental exposure.

4.2.4.2 Assessment

Overall Protection of Human Health and the Environment

Solidification/stabilization of sediments would provide for protection of human health and the environment by isolating and reducing the availability of contaminants within sediments for ecologic uptake and exposures.

Continued environmental monitoring would be provided to assess potential future contaminant migration from the area.

Compliance with SCGs

Chemical-specific SCGs applicable to sediment for this alternative include the NYSDEC Sediment Criteria guidance, which specifies acceptable levels of contaminants to assure minimal ecological risk from exposure to the solidified/stabilized sediment.

Location-specific SCGs would include applicable regulations regarding impacts to wetlands designated under Section 404 of the CWA. Permitting requirements would have to be met prior to disturbing or construction-related work in designated wetland areas.

Surface water discharges or discharges to POTWs while dewatering pond areas would have to comply with substantive SPDES requirements (6 NYCRR 750-757), State Water Quality Standards (6 NYCRR 702/703), and the CWA and NPDES discharge regulations (40 CFR 122-124). Discharges to POTWs would have to meet limitations and performance specification of the BSA.

Long-Term Effectiveness and Permanence

The solidification/stabilization of sediment would be expected to permanently immobilize contaminants within sediments. The treated sediment would require inspection, site maintenance, or environmental monitoring over a short period of time to ensure effectiveness.

Reduction of Toxicity, Mobility, or Volume

Solidification/stabilization of sediments immobilizes contaminants within the physical structure of the residual material. No additional reduction in toxicity or volume of contaminants is provided through solidification/stabilization.

Short-Term Effectiveness

Since the implementation of this alternative would be completed in-place, exposure of workers, the public, and the environment would be minimal. Short-term impacts would include hazards associated with worker contact with contaminated sediment, physical hazards associated with heavy equipment operation, and potential hazards connected with handling of solidification/stabilization agents.

Potential contact hazards would be minimized using appropriate personnel protective equipment when working with contaminated materials. Physical hazards would be minimized through the use of trained and experienced personnel, compliance with the site-specific health and safety plan, and good work practices.

Implementability

Prior to implementation, bench- and pilot-scale treatability studies would be required for detailed evaluation of the effectiveness of the various solidification technologies. The use of specialized equipment, materials, or personnel might be required for implementation of this alternative.

Administrative approvals for permits associated with disturbing and possibly filling the pond, a designated wetland, would be required from oversight agencies including the U.S. Army Corp of Engineers. Additional requirements associated with working in the area of a designated wetland might significantly influence the implementability of this alternative. Application for and agency review of permits would contribute to the overall time-frame and level of effort involved with implementing this alternative.

Cost

The capital and present-worth O&M costs for this alternative are summarized in Appendix A. Capital costs are estimated at $947,000. Annual O&M costs are estimated at $51,000. Total present-worth for this alternative is estimated at $1,156,000.

4.2.5 ALTERNATIVE 5: EXCAVATION/CONSOLIDATION

4.2.5.1 Description

Alternative 5 includes the excavation of sediment from the pond, transportation of the sediment to the adjacent Alltift Landfill, and consolidation with other materials in the landfill. Surface water within the pond would be removed to allow for access to the pond sediment by ordinary excavation equipment such as backhoes.

Following excavation, the sediment would be staged on-site for dewatering through gravity drainage. Additional dewatering of sediments may be required to reduce the free water content or to enhance the physical properties of the material prior to transport and consolidation in the Alltift Landfill. This may include mixing of the sediment with other site soil or solidification/stabilization with materials such as lime, kiln dust, or cement.

Water removed from the pond or collected from dewatering of the pond sediment will be discharged to the local POTW or to surface water areas adjacent to the site. If the water quality does not meet POTW discharge requirements or surface water requirement, as appropriate, pretreatment of the water on-site may be performed prior to discharge.

Soil from the fill area would be excavated and transported with the excavated sediment for consolidation within the Alltift Landfill, which for purposes of 6 NYCRR Part 376 would be considered a single site.

Environmental monitoring and institutional controls would not be required in the implementation of this alternative.

4.2.5.2 Assessment

Overall Protection of Human Health and the Environment

This alternative addresses protection of human health and the environment through removal actions. Consolidation of the contaminated sediment within the Alltift Landfill would remove this material from contact with surface water and eliminate ecological exposure to the contaminated sediment. This alternative would be effective in permanently removing contaminated sediments and soil from the site.

Compliance with SCGs

Chemical-specific SCGs applicable to sediment for this alternative include the NYSDEC Sediment Criteria guidance, which specifies acceptable levels of contaminants in sediment to assure minimal ecological risk through exposure to residual sediment remaining in the pond.

Location-specific SCGs would include applicable regulations regarding impacts to wetlands designated under Section 404 of the CWA. Permitting requirements would have to be met prior to disturbing or construction-related work in designated wetland areas.

The excavation and consolidation of sediment and soil from the Ramco site within the Alltift Landfill would be implemented consistent with applicable requirements of New York State and Federal regulations with the Alltift and Ramco sites considered the same site for purposes of 6 NYCRR Part 376.

Surface water discharges or discharges to POTWs during the dewatering of the pond areas would be required to comply with the substantive SPDES requirements (6 NYCRR 750-757), State Water Quality Standards (6 NYCRR 702/703), and CWA and NPDES discharge regulations (40 CFR 122-124). Discharges to POTWs would meet the limitations and performance specification of the BSA.

Long-Term Effectiveness and Permanence

Removal actions provide for effective actions and permanence in remediating site conditions. However, the long-term effectiveness of the actions would depend on management of the materials at the selected area of disposal. The overall long-term effectiveness and permanence of the alternative is dependent on the long-term monitoring, maintenance, and control of the containment areas of the Alltift Landfill, where the sediments and soils would be placed. Because of containment and control measures which would be required at the Alltift Landfill area following closure, this alternative is considered to provide long-term effectiveness and permanence.

Reduction of Toxicity, Mobility, or Volume

Treatment of excavated sediment would not be completed under this alternative. The toxicity, mobility, and volume of contaminated materials remaining on-site would be permanently reduced through implementation of this alternative because of the removal of the materials from the site.

Short-Term Effectiveness

Temporary increases in risk to worker and the community are associated with actions which include removal due to the physical handling requirements of contaminated materials. Short-term impacts would include hazards associated with worker contact with contaminated sediment and soil, physical hazards associated with heavy equipment operation, and potential hazards connected with the additional handling requirements of the materials.

Potential contact hazards would be minimized using appropriate personnel protective equipment when working with contaminated materials. Physical hazards would be minimized through the use of trained and experienced personnel and good work practices.

Implementability

This alternative does not require specialized equipment, materials, or personnel for implementation. Placement of sediment and soil into landfill areas is an established method for the containment and disposal of contaminated media.

Administrative approvals for required permits associated with disturbing and excavation of the designated wetland areas would be required from oversight agencies including the U.S. Army Corp of Engineers. Applications for and agency review of permits would contribute to the overall time-frame and level of effort involved with implementing this alternative.

Cost

The capital and present-worth O&M costs for this alternative are summarized in Appendix A. Capital costs is estimated at $878,500. No annual O&M costs would be associated with this alternative. Total present-worth for this alternative is estimated at $878,500.

4.2.6 ALTERNATIVE 6: EXCAVATION, OFF-SITE DISPOSAL

4.2.6.1 Description

Under this alternative pond sediment would be excavated and disposed at an off-site landfill facility. Excavation, material handling, and site restoration activities would be as discussed in Section 4.2.5.1. The contaminated sediment would be loaded into appropriate vehicles for transportation to a permitted landfill.

Soil from the fill area would also be excavated and transported with excavated sediment for disposal at an off-site landfill facility.

Environmental monitoring and institutional controls would not be required for implementation of this alternative.

4.2.6.2 Assessment

Overall Protection of Human Health and the Environment

This alternative would protect human health and the environment because the contaminated sediment would be removed and disposed of in a secure landfill facility. Short-term impacts could be managed through the use of engineering controls, appropriate planning of remedial activities, and good construction work practices. This alternative would be effective, permanently removing contaminated sediments and soil from the site.

Compliance with SCGs

Chemical-specific SCGs applicable to sediment for this alternative include NYSDEC Sediment Criteria guidance, which specifies acceptable levels of contaminants within sediment to assure minimal ecological risk through exposure to residual sediment in the pond.

Location-specific SCGs would include applicable regulations regarding impacts to wetlands designated under Section 404 of the CWA. Permitting requirements would have to be met prior to disturbing or construction-related work in designated wetland areas.

The transport and disposal of sediment and soil from the Ramco site would have to be implemented consistent with the requirements of New York State and Federal regulations pertaining to hazardous and solid waste management facilities and transport/manifesting requirements applicable to off-site transport and disposal.

Surface water discharges or discharges to POTWs during the dewatering of the pond areas would be required to comply with substantive SPDES requirements (6 NYCRR 750-757), State Water Quality Standards (6 NYCRR 702/703), and CWA and NPDES discharge regulations (40 CFR 122-124). Discharges to POTWs would be required to meet the limitations and performance specification of the BSA.

Long-Term Effectiveness and Permanence

This alternative would result in the removal of contaminated sediment and soil at the site and would be a permanent solution for remediating the site. Since a permitted, secure landfill facility would be used for disposal of the material, this alternative is considered to be permanent and a long-term remedy.

Reduction of Toxicity, Mobility, or Volume

Treatment of excavated sediment and soil would not be performed under this alternative. The toxicity, mobility, and volume of the contaminated materials on-site would be permanently reduced through implementation of this alternative.

Short-Term Effectiveness

Because of hazards created through the physical handling of contaminated materials, temporary increases in risk to workers and the community are associated with actions which include removal action. Short-term impacts would include hazards associated with worker contact with contaminated sediment and soil, physical hazards associated with heavy equipment operation, and potential hazards connected with the additional on- and off-site handling requirements of the materials.

Potential contact hazards would be minimized using appropriate personnel protective equipment when working with contaminated materials. Physical hazards would be minimized through the use of experienced personnel and good work practices. Appropriate transport/manifesting requirements would have to be met in order to reduce additional increases in risk to the general public and the community during transport of the materials off-site.

Implementability

This alternative would not require specialized equipment, materials, or personnel for implementation. Excavation and off-site disposal is an established remedial action for disposing of waste materials and could be implemented over a short time frame. Numerous permitted facilities are currently available to receive this material, and experienced, licensed transporters are also readily available to convey the material to the disposal facility.

The implementation of this alternative would require obtaining approvals from the disposal facility prior to transport of the material. Administrative approvals for permits associated with disturbing and excavation of the designated wetlands would be required from oversight agencies including the U.S. Army Corp of Engineers. Application for and agency review of permits, and disposal facility acceptance of the material would contribute to the overall time and level of effort requirements involved with implementing this alternative.

Cost

The capital and present-worth O&M costs for this alternative are summarized in Appendix A. Capital costs are estimated at $2,886,800. No annual O&M costs would be associated with this alternative. Total present-worth for this alternative is estimated at $2,886,800.

4.3 COMPARATIVE ANALYSIS

In this section, the remedial alternatives are compared relative to one another in terms of remedial objectives and costs. A scoring system is used based on *NYSDEC TAGM: Selection of Remedial Actions at Inactive Hazardous Waste Sites*, which assigns relative weights of significance to the seven criteria listed and discussed in Sections 4.1 and 4.2. Completed NYSDEC evaluation forms are provided in Appendix B for each identified alternative. Table 5 summarizes the scoring of the various alternatives.

Overall Protection of Human Health and the Environment

Alternative 1: No Action, provides no protection of human health or the environment. (Score 12)

Alternative 2: Institutional Controls, achieves some protection of human health and the environment through access and land use restrictions, but the reduction of environmental risk is marginal. Ecological exposure to the sediment would only be slightly reduced through site access controls. (Score 12)

Alternative 3: Cover, would provide improved ecological risk reduction by substantially eliminating ecologic pathways of exposure. However, this alternative would include filling, and thus removal of, the pond, a designated wetland area. New wetland areas would have to be created to replace the eliminated area. (Score 18)

Alternative 4: In-place Solidification/Stabilization would provides substantial protection of human health and the environment through isolation and reduction of availability of contaminants within the sediment. Since the contaminated materials would remain (though bound within the solidified sediment matrix), continued restrictions on the use of the site would be required. Similarly to Alternative 3, implementation of this alternative could adversely impact the designated wetland for the site, in which case a new wetland would have to be created to replace the former one. (Score 18)

Alternative 5: Excavation/Consolidation, and Alternative 6: Excavation/Off-site Disposal. These alternative address protection of human health and the environment by removal of contaminated sediment. Unrestricted use of the site would be anticipated after remediation. The residual risk to the public and the environment would be reduced to acceptable levels. (Score 20)

Compliance with SCGs

Alternative 1: No Action, and Alternative 2: Institutional Controls. These alternatives would not meet chemical-specific SCGs; however, it would be expected to meet action- and location-specific SCGs. (Score 6)

Alternative 3: Cover, would meet chemical-specific SCGs. Identified location-specific SCGs, such as requirements for protection of designated wetland areas, would require permits for the alteration of a wetland. It is expected that location- and action-specific SCGs would be met under this alternative. (Score 10)

Alternative 4: In-Place Solidification, Alternative 5: Excavation/Consolidation, and Alternative 6: Excavation/Off-Site Disposal. These alternatives would all be expected to meet applicable chemical-, action-, and location-specific SCGs, including location-specific SCGs relative to alteration of designated wetland areas. (Score 10)

Long-Term Effectiveness and Permanence

Alternative 1: No Action, would not provide a permanent reduction of environmental risk nor long-term control of human health risks. (Score 2)

Alternative 2: Institutional Controls, and Alternative 3: Cover. These alternatives are similar with respect to long-term effectiveness and permanence since under both alternatives contaminated sediment would remain on-site. Both alternatives would require inspection, environmental monitoring, and assessment. (Score 7)

Alternative 4: In-Place Solidification, would increase long-term effectiveness and permanence through treatment of contaminated material. Under this alternative, contaminated sediments would remain on-site, but the mobility and availability of contaminants would be permanently reduced. (Score 15)

Alternative 5: Excavation/Consolidation, and Alternative 6: Excavation/Off-Site Disposal. These alternatives offer the highest degree of long-term effectiveness and permanence through removal of the contaminated material. (Score 12)

Reduction of Toxicity, Mobility, or Volume

Alternative 1: No Action, and Alternative 2, Institutional Controls. These alternatives provide no reduction in the toxicity, mobility, or volume of contaminated sediment. (Score 0)

Alternatives 3: Cover, would provide a reduction in the mobility of contaminants in sediment through containment. However, this alternative does not provide any reduction in the toxicity or volume of contaminated sediment on-site. (Score 2)

Alternative 4: In-Place Solidification, would provide a reduction in the mobility of contaminants in sediment through treatment. It would not provide any reduction in the toxicity or volume of contaminated sediment on-site, but would immobilizes contaminants within the physical structure by physically treating the sediment. It received the highest relative score for this criterion because of the preference for remedial measures which show a reduction in the mobility, toxicity, or volume of contaminated materials by a treatment technology. (Score 8)

Alternative 5: Excavation/Consolidation, and Alternative 6, Excavation/Off-Site Disposal. These alternatives provide a reduction in the mobility of contaminants in sediment through containment on- and off-site, respectively. (Score 2)

Short-Term Effectiveness

Alternative 1: No Action, and Alternative 2: Institutional Controls. These alternatives would be anticipated to have the greatest short-term effectiveness since they present the least amount of risk to workers, the public, and the environment and would be implemented over a relatively short time frame. (Score 10)

Alternative 3: Cover, Alternative 4: In-Place Solidification, Alternative 5: Excavation/Consolidation; and Alternative 6: Excavation/Off-Site Disposal. These alternatives would present a slightly higher short-term risk to workers than Alternatives 1 and 2, since workers would be in proximity or contact with contaminated sediments during covering, solidification, or removal activities. Additionally, removal actions pose a higher potential for releases to the environment. Risks to the community due to the transport of the sediment off-site for disposal would be increased under Alterative 6. However, these risks would be mitigated through the use of trained personnel, compliance with site-specific health and safety plans, and good work practices. (Score 9)

Implementability

Alternative 1: No Action, would require essentially no effort to implement. (Score 14)

Alternative 2: Institutional Controls, would require minimal effort to implement. Limited construction activities would be required. In addition, the components of Alternative 2 have a high degree of reliability and may be easily expanded or modified at some future date if conditions require. (Score 14)

Alternative 3: Cover, and Alternative 4: In-Place Solidification. These are considered the most difficult to implement of the six alternatives evaluated. Construction activities would be substantial. Moreover, since these activities would be performed with the sediments still in-place, additional evaluation of the components of these alternatives would be required. (Score 12)

Alternative 5: Excavation/Consolidation, and Alternative 6: Excavation/Off-Site Disposal. Implementation requirements for Alternatives 5 and 6 are similar. Construction difficulties or uncertainties would be anticipated to be minimal. Moreover, these alternatives could be completed over a relatively short period of time. (Score 14)

Cost

In accordance with NYSDEC TAGM scoring criteria, the alternative with the lowest present worth was assigned the maximum score for the cost criterion of 15 and the most costly alternative was assigned a score of 0. Other alternatives were assigned a cost score inversely proportional to their present worth. Relative scores for each alternative are presented in Table 6.

Alternative 1: No Action, was the least costly alternative with no associated costs for its implementation. (Score 15)

Alternative 2: Institutional Controls, and Alternative 5: Excavation/Consolidation. These alternatives would be the least costly to implement at present worth costs of approximately $686,100 and 878,500, respectively. The significant difference between costs for these alternatives is due to the low capital costs and the high present worth O&M cost over a 30-year period for Alternative 2. Alternative 5 would not require any long-term O&M costs; thus, the present worth includes only capital costs. (Alternative 2: Score 11, Alternative 5: Score 10)

Alternatives 3: Cover, and Alternative 4: In-place Solidification. These alternatives include environmental monitoring, which would significantly increase present worth costs for these alternatives. Alternative 3 has a present worth cost of approximately $2,199,100. Alternative 4 has a present worth cost of $1,156,000. (Alternative 3: Score 4, Alternative 4: Score 9)

Alternative 6: Excavation/Off-site Disposal, has the highest capital cost of all alternatives at $2,886,800. However, this alternative would not entail any long-term O&M costs. Thus, the present worth cost equals capital cost. (Score 0)

4.4 RECOMMENDATION

The basis for recommendation of the remedial alternative to be implemented at the site was as follows:

- Only alternatives which met or exceeded SCGs, and were considered reasonably implementable, were considered.
- The alternative must be proven and have been reliably demonstrated at inactive hazardous waste sites under similar conditions to those at the Ramco site.

- Alternatives that met the above two qualifications weighed in terms of short- and long-term effectiveness as well as relative costs.

Alternative 1 was eliminated because it did not meet SCGs. Alternative 2 was eliminated because it did not meet chemical-specific SCGs for the pond sediment. Alternatives 3, 4, 5, and 6 were considered to have passed the SCG test.

All technologies included in Alternatives 3, 4, 5 and 6 are proven and have been reliably demonstrated at other sites with similar conditions. Containment technologies are proven methods for limiting mobility of contaminants, and removal actions are proven and are ordinarily applied at sites with relatively small volumes of waste, such as the Ramco site.

Alternatives 3, 4, 5, and 6 involve comparable short-term risks to site worker, the public, and the environment. Because under Alternatives 3 and 4 contaminated sediment would remains on-site, these alternatives are considered to involve a higher long-term risk than Alternatives 5 and 6. In addition, it is likely that Alternatives 3 and 4 would present the greatest long-term adverse impact on the environment, due to the potential elimination of a designated wetland. In addition, Alternative 3 would require land use restrictions to ensure its long-term effectiveness, and Alternative 4 could require additional measures to address future use of the site. Based on these considerations, Alternatives 3 and 4 are not recommended.

Following completion of Alternatives 5 and 6, it is anticipated that no restrictions would exist on future use of the site, and the site wetland would essentially be restored to an uncontaminated condition. Short- and long-term effectiveness of Alternatives 5 and 6 are also comparable. However, the capital cost of Alternative 6 is more than three-times that for Alternative 5.

Based on these considerations, Alternative 5: Excavation/Consolidation is recommended as the remedial alternative for the Ramco site. This alternative would provide long-term effectiveness in permanently removing contaminated sediment from the site. The site wetland would be restored, with no net loss in wetland area, and no anticipated restrictions on future use of the property.

TABLE 5
Ramco Steel Site

RELATIVE SCORING OF ALTERNATIVES*

EVALUATION CRITERIA	RELATIVE WEIGHT	ALTERNATIVE 1 No Action	2 Institutional Controls	3 Cover	4 In-Place Solidification	5 Excavate/ Consolidate	6 Excavate/ Off-site Disposal
Overall Protection of Human Health & Environment	20	12	12	18	18	20	20
Compliance with SCGs	10	6	6	10	10	10	10
Long-Term Effectiveness & Permanence	15	2	7	7	15	12	12
Reduction in Toxicity, Mobility, or Volume by Treatment	15	0	0	2	8	2	2
Short-Term Effectiveness	10	10	10	9	9	9	9
Implementability	15	14	14	12	12	14	14
Cost	15	15	11	4	9	10	0
TOTAL SCORE	100	59	60	62	81	77	67

* Scoring based on NYSDEC, Technical and Administrative Guidance Memorandum for the Selection of Remedial Actions at Inactive Hazardous Waste Sites, HWR-90-4030, Revised May, 1990

TABLE 6
Ramco Steel Site

ALTERNATIVE COST SUMMARY

Cost Catagory	ALTERNATIVE 1 No Action	2 Institutional Controls	3 Cover	4 In-Place Solidification	5 Excavate/ Consolidate	6 Excavate/ Off-site Disposal
Capital Cost ($)	0	$51,700	$1,537,900	$947,000	$878,500	$2,886,800
Annual O&M Costs ($)	0	$51,100	$53,300	$51,000	$0	$0
Present Worth ($) (7%)	0	$686,100	$2,199,100	$1,156,000	$878,500	$2,886,800
Relative Score*	15	11	4	9	10	0

* Scoring based on NYSDEC, Technical and Administrative Guidance Memorandum for the Selection of Remedial Actions at Inactive Hazardous Waste Sites, HWR-90-4030, Revised May, 1990

APPENDIX A

APPENDIX A

REMEDIAL ALTERNATIVE COST TABLES

Job No. 25848-001-152
Client: Axia, Inc.

Job: Ramco Steel
Subject: FS Costs - Remedial Options

Alternative 2 - Institutional Controls

- Controls to protect human health

Actions to Include:

- Fencing
- Deed restrictions on land use

	OPERATION	UNITS	QUANT.	UNIT $	TOTAL
I. CAPITAL COSTS					
A.	PERIMETER FENCING (6' Chain Link)	LF	3,000	12	$36,000
B.	WARNING/NO TRESPASSING SIGNS (installed)	EA	30	40	$1,200
C.	DEED RESTRICTIONS	LS			$2,000
D.	CONTINGENCY (20%)	LS			$7,840
		SUBTOTAL			$47,040
		ENGINEERING (10%)			$4,704
		TOTAL CAPITAL COST			$51,744
II. ANNUAL OPERATING COST					
A.	SITE MAINTENANCE (FENCE REPAIR)	LS			$2,500
B.	BI-ANNUAL INSPECTION	LS			$1,000
C.	ENVIRONMENTAL MONITORING (VOA, SV, METALS, PEST/PCB)				
	Ground water	EA	12	1,200	$14,400
	Surface water	EA	12	1,200	$14,400
	Labor	HR	80	40	$3,200
D.	MISCELLANEOUS, 20%				$7,100
E.	CONTINGENCY, 20%				$8,520
		TOTAL ANNUAL OPERATING COST			$51,120
		30 YEAR PRESENT WORTH (7% INTEREST RATE)			$634,350
III. PRESENT WORTH					
				Alternative 2	
				TOTAL PRESENT WORTH	$686,094

Job No. 25848-001-152 | Job: Ramco Steel | By: BEP
Client: Axia, Inc. | Subject: Preliminary Costs - Remedial Options | Date: 12-19-94

Alternative 3 - Cover

Actions to Include:
- Containment of sediment in-place
- Minimal sediment excavation
- Drainage of surface water from pond
- Stabilization of pond sediment
- Placement of multilayer cap over pond area
- Restoration of area

	OPERATION	UNITS	QUANT.	UNIT $	TOTAL
I. CAPITAL COST					
A.	SITE PREPARATION				
	SITE MOB	LS			$2,500
	CLEAR AND GRUB	AC	3	2,550	$7,650
	SEDIMENT BARRIER	LS			$1,000
	POND DEWATERING				
	Mob/Demob	LS			$1,000
	Sump pit construction	LS			$400
	Pump Rental (2)	MO	1	800	$800
	Pumping Oversight	WK	2	6,000	$12,000
	SITE HAUL ROAD	LS			$10,000
B.	FILL AREA REMEDIATION				
	ANALYTICAL TESTING	LS			$3,500
	EXCAVATION OF TWO AREAS	CY	370	10	$3,700
	(assume two areas both 25' x 25'x 8' depth)				
	DISPOSAL OF MATERIAL (Off-site)	TON	555	75	$41,625
	WATER COLLECT/TREATMENT	LS			$15,000
	AREA RESTORATION	LS			$10,000
C.	SEDIMENT STABILIZATION				
	SYSTEM MOB/DEMOB	LS			$1,000
	TREATABILITY/PHYSICAL TESTING	LS			$3,000
	LIME (material & delivery)	TON	2760	55	$151,800
	STABILIZATION	CY	3680	30	$110,400
	MISC. EQUIPMENT RENTAL (e.g. roll-offs for material handling)	LS			$5,000
D.	COVER MATERIALS				
	GRAVEL (delivered to site)	TON	37,000	9	$333,000
	SELECT SOIL (delivered to site)	TON	20,000	9	$180,000
	TOPSOIL (delivered to site)	TON	4,000	14	$56,000
	SEEDING, MULCHING	DAY	1	1,000	$1,000
	QA/QC Analytical/Construction Testing of Materials	EA	10	200	$2,000
E.	COVER PLACEMENT	CY	36,500	4	$127,750
F.	AIR MONITORING				
	Instrument Rental	MO	1	3,000	$3,000
	Personnel	DAY	30	440	$13,200
G.	WETLANDS MITIGATION	AC	3.5	17,500	$61,250
H.	SITE RESTORATION	LS			$5,000
I.	SITE DEMOB	LS			$2,500
J.	CONTINGENCY (20%)	LS			$233,015
		SUBTOTAL			$1,398,090
		ENGINERING (10%)			$139,809
		TOTAL CAPITAL COST			**$1,537,899**

Job No. 25848-001-152
Client: Axia, Inc.

Job: Ramco Steel
Subject: FS Costs - Remedial Options

By: BEP
Date: 12-19-94

Alternative 3 - Cover - Annual Operation and Maintenance

OPERATION	UNITS	QUANT.	UNIT $	TOTAL
II. ANNUAL OPERATION COSTS				
A. SITE MAINTENANCE	LS	5,000	1	$5,000
B. ENVIRONMENTAL MONITORING (VOA, SV, METALS, PEST/PCB)				
Ground water	EA	12	1,200	$14,400
Surface Water	EA	12	1,200	$14,400
Labor	HR	80	40	$3,200
C. MISCELLANEOUS, 20%				$7,400
D. CONTINGENCY, 20%				$8,880
		TOTAL ANNUAL OPERATING COST		$53,280
		30 YEAR PRESENT WORTH (7% INTEREST RATE)		$661,154
III. PRESENT WORTH				
			Alternative 3: Cover TOTAL PRESENT WORTH	$2,199,053

Job No. 25848-001-152 | Job: Ramco Steel | By: BEP
Client: Axia, Inc. | Subject: FS - Remedial Options | Date: 12-19-94

Alternative 4 - In-place Solidification/Stabilization

- Containment of sediment in-place
- Excavation, treatment, replacement of sediment

Actions to Include:

- Drainage of surface water from pond
- Stabilization (physical) of pond sediment
- Restoration of area

	OPERATION	UNITS	QUANT.	UNIT $	TOTAL
I..	CAPITAL COSTS				
A.	SITE PREPARATION				
	SITE MOB/DEMOB	LS			$1,000
	CLEAR AND GRUB	AC	3	2,550	$7,650
	SEDIMENT BARRIER	LS			$1,000
	POND DEWATERING				
	Mob/Demob	LS			$1,000
	Sump pit construction	LS			$400
	Pump Rental (2)	MO	1	1,000	$1,000
	Pumping Oversight	WK	2	6,000	$12,000
	SITE HAUL ROAD	LS			$10,000
B.	FILL AREA REMEDIATION				
	ANALYTICAL TESTING	LS			$3,500
	EXCAVATION OF TWO AREAS	CY	370	10	$3,700
	(assume two areas both 25' x 25'x 8' depth)				
	DISPOSAL OF MATERIAL (Off-site)	TON	555	75	$41,625
	WATER COLLECT/TREATMENT	LS			$15,000
	AREA RESTORATION	LS			$10,000
C.	SOIL/SEDIMENT SOLIDIFICATION/STABILIZATION				
	SYSTEM MOB/DEMOB	LS			$1,000
	TREATABILITY/PHYSICAL				
	TESTING	LS			$3,000
	LIME (material & delivery)	TON	4,750	55	$261,250
	STABILIZATION	CY	9,500	30	$285,000
	MISC. EQUIPMENT RENTAL				
	(e.g. roll-offs for material handling)	LS			$5,000
	AIR MONITORING				
	Instrument Rental	MO	1	3,000	$3,000
	Personnel	DAY	20	440	$8,800
D.	WETLANDS MITIGATION	AC	2	17,500	$35,000
E.	SITE RESTORATION				
	SITE GRADING/RESEEDING	LS			$5,000
F.	SITE DEMOB	LS			$2,500
G.	CONTINGENCY (20%)	LS			$143,485
		SUBTOTAL			$860,910
		ENGINEERING (10%)			$86,091
		TOTAL CAPITAL COST			$947,001

Job No. 25848-001-152 | Job: Ramco Steel | By: BEP
Client: Axia, Inc. | Subject: FS Costs - Remedial Options | Date: 12-19-94

Alternative 4 - In-place Solidification/Stabilization

- Annual Operation and Maintenance (5 yr period)

OPERATION	UNITS	QUANT.	UNIT $	TOTAL
II. ANNUAL OPERATING COSTS				
A. SITE MAINTENANCE	LS	5,000	1	$5,000
B. ENVIRONMENTAL MONITORING (VOA, SV, METALS, PEST/PCB)				
Ground water	EA	12	1,200	$14,400
Surface water	EA	12	1,200	$14,400
Labor	HR	40	40	$1,600
C. MISCELLANEOUS, 20%				$7,080
D. CONTINGENCY, 20%				$8,496
		TOTAL ANNUAL OPERATING COST		$50,976
		5 YEAR PRESENT WORTH (7% INTEREST RATE)		$209,012
III. PRESENT WORTH				
		Alternative 4: In-place Solidification TOTAL PRESENT WORTH		$1,156,013

Job No. 25848-001-152 | Job: Ramco Steel | By: BEP
Client: Axia, Inc. | Subject: FS Costs - Remedial Options | Date: 12-19-94

Alternative 5 - Excavation/Consolidation

- Excavate sediment/consolidate at Alltift Landfill

Actions to Include:

- Drainage of surface water from pond
- Excavation of pond sludge/sediment and underlying contaminated soil
- Transport materials to adjacent landfill
- Restoration of area

OPERATION	UNITS	QUANT.	UNIT $	TOTAL
I. CAPITAL COST				
A. SITE PREPARATION				
SITE MOB/DEMOB	LS			$1,000
CLEAR AND GRUB	AC	3	2,550	$7,650
SEDIMENT BARRIER	LS			$1,000
POND DEWATERING				
Mob/Demob	LS			$1,000
Sump pit construction	LS			$400
Pump Rental (2)	MO	1	800	$800
Pumping Oversight	WK	2	6,000	$12,000
SITE HAUL ROAD	LS			$25,000
B. FILL AREA REMEDIATION				
ANALYTICAL TESTING	LS			$3,500
EXCAVATION OF TWO AREAS (assume two areas both 25' x 25'x 8' depth)	CY	370	10	$3,700
DISPOSAL OF MATERIAL (Alltift Landfill)				
Spread and Compact	CY	370	5	$1,665
WATER COLLECT/TREATMENT	LS			$15,000
AREA RESTORATION	LS			$10,000
C. SOIL/SEDIMENT EXCAVATION				
EXCAVATE AND STOCKPILE				
SLUDGE	CY	3680	15	$55,200
SAND	CY	11611	15	$174,165
STABILIZE FOR DISPOSAL				
SLUDGE	CY	3680	10	$36,800
SAND	CY	11611	10	$116,110
AIR MONITORING				
Instrument Rental	MO	1	3,000	$3,000
Personnel	DAY	15	440	$6,600
CONFIRMATORY SAMPLING	EA	30	1,000	$30,000
D. DISPOSAL AT ALLTIFT LANDFILL				
LOAD, TRANSPORT, SPREAD, AND COMPACT	CY	15291	10	$152,910
ANALYTICAL TESTING	LS			$3,500
E. SITE RESTORATION				
SITE GRADING/RESEEDING	LS			$2,000
F. SITE DEMOB	LS			$2,500
G. CONTINGENCY (20%)	LS			$133,100
	SUBTOTAL			$798,600
	ENGINEERING (10%)			$79,860
	TOTAL CAPITAL COST			$878,460

Job No. 25848-001-152
Client: Axia, Inc.

Job: Ramco Steel
Subject: FS Costs - Remedial Options

By: BEP
Date: 12-19-94

Alternative 5 - Excavation/Consolidation

- Excavate sediment/consolidate at Alltift Landfill

OPERATION	UNITS	QUANT.	UNIT $	TOTAL
II. ANNUAL OPERATING COST				
	No Annual O&M Costs			
III. PRESENT WORTH				
	Alternative 5: Excavation/Consolidation TOTAL PRESENT WORTH			$878,460

Job No. 25848-001-152
Client: Axia, Inc.

Job: Ramco Steel
Subject: FS Costs - Remedial Options

By: BEP
Date: 12-19-94

Alternative 6 - Excavation/Off-site Disposal

- Excavation of pond sediment material/off-site disposal

Actions to Include:

- Drainage of surface water from pond
- Excavation of pond sludge/sediment and underlying contaminated soil
- Transport and disposal of materials to an off-site non-hazardous industrial landfill
- Restoration of area

OPERATION	UNITS	QUANT.	UNIT $	TOTAL
I. CAPITAL COST				
A. SITE PREPARATION				
SITE MOB/DEMOB	LS			$2,500
CLEAR AND GRUB	AC	3	2,550	$7,650
SEDIMENT BARRIER	LS			$1,000
POND DEWATERING				
Mob/Demob	LS			$1,000
Sump pit construction	LS			$400
Pump Rental (2)	MO	1	800	$800
Pumping Oversight	WK	2	6,000	$12,000
SITE HAUL ROAD	LS			$10,000
B. FILL AREA REMEDIATION				
ANALYTICAL TESTING	LS			$3,500
EXCAVATION OF TWO AREAS	CY	370	10	$3,700
(assume two areas both 25' x 25'x 8' depth)				
DISPOSAL OF MATERIAL (Off-site)	TON	555	75	$41,625
WATER COLLECT/TREATMENT	LS			$15,000
AREA RESTORATION	LS			$10,000
C. SOIL/SEDIMENT EXCAVATION				
EXCAVATE AND STOCKPILE				
SLUDGE	CY	3680	15	$55,200
SAND	CY	11611	15	$174,165
STABILIZATION FOR DISPOSAL				
SLUDGE	CY	3680	10	$36,800
SAND	CY	11611	10	$116,110
AIR MONITORING				
Instrument Rental	MO	1	3,000	$3,000
Personnel	DAY	15	440	$6,600
CONFIRMATORY SAMPLING	EA	30	1,000	$30,000
D. TRANSPORT/DISPOSAL				
MOB/DEMOB	LS			$1,000
LOADING	CY	15291	2	$30,582
MATERIAL TRANSPORT AND				
DISPOSAL TO OFF-SITE LANDFILL	TON	22940	75	$1,720,500
ANALYTICAL TESTING	LS			$3,500
E. SITE RESTORATION	LS			$2,000
F. SITE DEMOB	LS			$2,500
G. CONTINGENCY (20%)	LS			$458,226
	SUBTOTAL			$2,749,358
	ENGINEERING (5%)			$137,468
	TOTAL CAPITAL COST			$2,886,826

Job No. 25848-001-152
Client: Axia, Inc.

Job: Ramco Steel
Subject: FS Costs - Remedial Options

By: BEP
Date: 12-19-94

Alternative 6 - Excavation/Off-site Disposal

- Excavation of pond sediment material/off-site disposal

OPERATION	UNITS	QUANT.	UNIT $	TOTAL
II. ANNUAL OPERATING COST				
		No Annual O&M Cost		
III. PRESENT WORTH				
		Alternative 6: Excavate/Off-site Disposal		
		TOTAL PRESENT WORTH		$2,886,826

APPENDIX B

APPENDIX B

APPENDIX B

NYSDEC TAGM ALTERNATIVE EVALUATION SCREENING FORMS

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE NEW YORK STATE STANDARDS CRITERIA AND GUIDELINES (SCGs)

(Relative Weight = 10)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Compliance with chemical-specific SCGs.	Meets chemical specific SCGs such as groundwater standards.	Yes ___ 4 No X 0
2. Compliance with action-specific SCGs.	Meets SCGs such as technology standards for incineration or landfill.	Yes X 3 No ___ 0
3. Compliance with location-specific SCGs.	Meets location-specific SCGs such as Freshwater Wetlands Act.	Yes X 3 No ___ 0
TOTAL (Maximum = 10)		6

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

(Relative Weight = 20)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Use of the site after remediation.	Unrestricted use of the land and water. (If answer is yes, go to the end of the Table.)	Yes ___ 20 No X 0
TOTAL (Maximum = 20)		
2. Human health and the environment exposure after the remediation.	i) Is the exposure to contaminants via air route acceptable?	Yes X 3 No ___ 0
	ii) Is the exposure to contaminants via groundwater/surface water acceptable?	Yes X 4 No ___ 0
	iii) Is the exposure to contaminants via sediments/soils acceptable?	Yes ___ 3 No X 0
SUBTOTAL (Maximum = 10)		
3. Magnitude of residual public health risks after the remediation.	i) Health risk	≤1 in 1,000,000 X 5
	ii) Health risk	≤1 in 100,000 ___ 2
SUBTOTAL (Maximum = 5)		
4. Magnitude of residual environmental risks after the remediation.	i) Less than acceptable	___ 5
	ii) Slightly greater than acceptable	___ 3
	iii) Significant risk still exists	X 0
SUBTOTAL (Maximum = 5)		
TOTAL (Maximum = 20)		12

LONG-TERM EFFECTIVENESS AND PERMANENCE

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. On-site or off-site treatment or land disposal.	• On-site treatment* • Off-site treatment* • On-site or off-site land disposal	___ 3 ___ 1 X 0
SUBTOTAL (Maximum = 3)		
* Treatment is defined as destruction or separation/ treatment or solidification/ chemical fixation of inorganic wastes		
2. Permanence of the remedial alternative.	• Will the remedy be classified as permanent in accordance with Section 2.1(a), (b), or (c). (If answer is yes, go to Factor 4.)	Yes ___ 3 No X 0
SUBTOTAL (Maximum = 3)		
3. Lifetime of remedial actions.	• Expected lifetime or duration of effectiveness of the remedy.	25-30 yr. ___ 3 20-25 yr. ___ 2 15-20 yr. ___ 1 <15 yr. X 0
SUBTOTAL (Maximum = 3)		
4. Quantity and nature of waste or residual left at the site after remediation.	i) Quantity of untreated hazardous waste left at the site.	None ___ 3 <25% ___ 2 25-50% ___ 1 ≥50% X 0
	ii) Is there treated residual left at the site? (If answer is no, go to Factor 5.)	Yes ___ 0 No X 2
	iii) Is the treated residual toxic?	Yes ___ 0 No ___ 2
	iv) Is the treated residual mobile?	Yes ___ 0 No ___ 1
SUBTOTAL (Maximum = 5)		

LONG-TERM EFFECTIVENESS AND PERMANENCE (Continued)

(Maximum Score = 25)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
5. Adequacy and reliability of controls.	i) Operation and maintenance required for a period of:	<5 yr. ___ 1 >5 yr. X 0
	ii) Are environmental controls required as a part of the remedy to handle potential problems? (If answer is no, go to "iv").	Yes X 0 No ___ 1
	iii) Degree of confidence that controls can adequately handle potential problems.	Moderate to very confident ___ 1 Somewhat to not confident X 0
	iv) Relative degree of long-term monitoring required (compare with other remedial alternatives).	Minimum ___ 2 Moderate ___ 1 Extensive X 0
SUBTOTAL (Maximum = 4)		
TOTAL (Maximum = 15)		2

IF THE TOTAL IS LESS THAN 10, PROJECT MANAGER MAY REJECT THE REMEDIAL ALTERNATIVE FROM FURTHER CONSIDERATION.

IMPLEMENTABILITY

(Maximum Score = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Technical Feasibility		
a. Ability to construct technology.	i) Not difficult to construct. No uncertainties in construction.	X 3
	ii) Somewhat difficult to construct. No uncertainties in construction.	___ 2
	iii) Very difficult to construct and/or significant uncertainties in construction.	___ 1
b. Reliability of technology.	i) Very reliable in meeting the specified process efficiencies or performance goals.	X 3
	ii) Somewhat reliable in meeting the specified process efficiencies or performance goals.	___ 2
c. Schedule of delays due to technical problems.	i) Unlikely.	X 2
	ii) Somewhat likely.	___ 1
d. Need of undertaking additional remedial action, if necessary.	i) No future remedial actions may be anticipated.	___ 2
	ii) Some future remedial actions may be necessary.	X 1
SUBTOTAL (Maximum = 10)		
2. Administrative Feasibility		
a. Coordination with other agencies.	i) Minimal coordination is required.	X 2
	ii) Required coordination is normal.	___ 1
	iii) Extensive coordination is required.	___ 0
SUBTOTAL (Maximum = 2)		

IMPLEMENTABILITY (Continued)

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
3. Availability of Services and Materials		
a. Availability of prospective technologies.	i) Are technologies under consideration generally commercially available for the site-specific application?	Yes X 1 No ___ 0
	ii) Will more than one vendor be available to provide a competitive bid?	Yes X 1 No ___ 0
b. Availability of necessary equipment and specialists.	i) Additional equipment and specialists may be available without significant delay.	Yes X 1 No ___ 0
SUBTOTAL (Maximum = 3)		
TOTAL (Maximum = 15)		14

IF THE TOTAL IS LESS THAN 8, PROJECT MANAGER MAY REJECT THE REMEDIAL ALTERNATIVE FROM FURTHER CONSIDERATION

REDUCTION OF TOXICITY, MOBILITY OR VOLUME

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Volume of hazardous waste reduced (reduction in volume or toxicity). If Factor 1 is not applicable, go to Factor 2.	i) Quantity of hazardous waste destroyed or treated. Immobilization technologies do not score under Factor 1.	99-100% ___ 8 90-99% ___ 7 80-90% ___ 6 60-80% ___ 4 40-60% ___ 2 20-40% ___ 1 <20% X 0
	ii) Are there untreated or concentrated hazardous waste produced as a result of (i)? If answer is no, go to Factor 2.	Yes ___ 0 No ___ 2
SUBTOTAL (Maximum = 10) If subtotal = 10, go to Factor 3.	iii) After remediation, how is the untreated, residual hazardous waste material disposed?	Off-site land disposal ___ 0 On-site land disposal ___ 1 Off-site destruction or treatment ___ 2
2. Reduction in mobility of hazardous waste.	i) Quantity of Available Wastes Immobilized After Destruction/Treatment	90-100% ___ 2 60-90% ___ 1 <60% ___ 0
If Factor 2 is not applicable, go to Factor 3.	ii) Method of Immobilization - Reduced mobility by containment. - Reduced mobility by alternative treatment technologies.	___ 0 ___ 3
SUBTOTAL (Maximum = 5)		
3. Irreversity of the destruction or treatment or immobilization of hazardous waste.	Completely irreversible.	___ 5
	Irreversible for most of the hazardous waste constituents.	___ 3
	Irreversible for only some of the hazardous waste constituents.	___ 2
	Reversible for most of the hazardous waste constituents.	X 0
SUBTOTAL (Maximum = 5)		
TOTAL (Maximum = 15)		0

SHORT-TERM EFFECTIVENESS

(Relative Weight = 10)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Protection of community during remedial actions.	• Are there significant short-term risks to the community that must be addressed? (If answer is no, go to Factor 2.)	Yes ___ 0 No X 4
	• Can the risk be easily controlled?	Yes ___ 1 No ___ 0
	• Does the mitigative effort to control risk impact the community life-style?	Yes ___ 0 No ___ 2
SUBTOTAL (Maximum = 4)		
2. Environmental Impacts	• Are there significant short-term risks to the environment that must be addressed? (If answer is no, go to Factor 3.)	Yes ___ 0 No X 4
	• Are the available mitigative measures reliable to minimize potential impacts?	Yes ___ 3 No ___ 0
SUBTOTAL (Maximum = 4)		
3. Time to implement the remedy.	• What is the required time to implement the remedy?	≤2 yr. X 1 ≥2 yr. ___ 0
	• Required duration of the mitigative effort to control short-term risk.	≤2 yr. X 1 ≥2 yr. ___ 0
SUBTOTAL (Maximum = 2)		
TOTAL (Maximum = 10)		10

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE NEW YORK STATE STANDARDS CRITERIA AND GUIDELINES (SCGs)

(Relative Weight = 10)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Compliance with chemical-specific SCGs.	Meets chemical specific SCGs such as groundwater standards.	Yes ___ 4 No X 0
2. Compliance with action-specific SCGs.	Meets SCGs such as technology standards for incineration or landfill.	Yes ___ 3 No X 0
3. Compliance with location-specific SCGs.	Meets location-specific SCGs such as Freshwater Wetlands Act.	Yes ___ 3 No X 0
TOTAL (Maximum = 10)		0

ALTERNATIVE 2: INSTITUTIONAL CONTROLS

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

(Relative Weight = 20)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Use of the site after remediation.	Unrestricted use of the land and water. (If answer is yes, go to the end of the Table.)	Yes ___ 20 No X 0
TOTAL (Maximum = 20)		
2. Human health and the environment exposure after the remediation.	i) Is the exposure to contaminants via air route acceptable?	Yes X 3 No ___ 0
	ii) Is the exposure to contaminants via groundwater/surface water acceptable?	Yes X 4 No ___ 0
	iii) Is the exposure to contaminants via sediments/soils acceptable?	Yes ___ 3 No X 0
SUBTOTAL (Maximum = 10)		
3. Magnitude of residual public health risks after the remediation.	i) Health risk	≤1 in 1,000,000 X 5
	ii) Health risk	≤1 in 100,000 ___ 2
SUBTOTAL (Maximum = 5)		
4. Magnitude of residual environmental risks after the remediation.	i) Less than acceptable	___ 5
	ii) Slightly greater than acceptable	___ 3
	iii) Significant risk still exists	X 0
SUBTOTAL (Maximum = 5)		
TOTAL (Maximum = 20)		12

LONG-TERM EFFECTIVENESS AND PERMANENCE

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. On-site or off-site treatment or land disposal.	• On-site treatment* • Off-site treatment* • On-site or off-site land disposal	___ 3 ___ 1 X 0
SUBTOTAL (Maximum = 3)		
* Treatment is defined as destruction or separation/ treatment or solidification/ chemical fixation of inorganic wastes		
2. Permanence of the remedial alternative.	• Will the remedy be classified as permanent in accordance with Section 2.1(a), (b), or (c). (If answer is yes, go to Factor 4.)	Yes ___ 3 No X 0
SUBTOTAL (Maximum = 3)		
3. Lifetime of remedial actions.	• Expected lifetime or duration of effectiveness of the remedy.	25-30 yr. X 3 20-25 yr. ___ 2 15-20 yr. ___ 1 <15 yr. ___ 0
SUBTOTAL (Maximum = 3)		
4. Quantity and nature of waste or residual left at the site after remediation.	i) Quantity of untreated hazardous waste left at the site.	None ___ 3 <25% ___ 2 25-50% ___ 1 ≥50% X 0
	ii) Is there treated residual left at the site? (If answer is no, go to Factor 5.)	Yes ___ 0 No X 2
	iii) Is the treated residual toxic?	Yes ___ 0 No ___ 2
	iv) Is the treated residual mobile?	Yes ___ 0 No ___ 1
SUBTOTAL (Maximum = 5)		

LONG-TERM EFFECTIVENESS AND PERMANENCE (Continued)

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
5. Adequacy and reliability of controls.	i) Operation and maintenance required for a period of:	<5 yr. ___ 1 >5 yr. X 0
	ii) Are environmental controls required as a part of the remedy to handle potential problems? (If answer is no, go to "iv").	Yes X 0 No ___ 1
	iii) Degree of confidence that controls can adequately handle potential problems.	Moderate to very confident X 1 Somewhat to not confident ___ 0
	iv) Relative degree of long-term monitoring required (compare with other remedial alternatives).	Minimum ___ 2 Moderate X 1 Extensive ___ 0

SUBTOTAL (Maximum = 4)

TOTAL (Maximum = 15) 7

IF THE TOTAL IS LESS THAN 10, PROJECT MANAGER MAY REJECT THE REMEDIAL ALTERNATIVE FROM FURTHER CONSIDERATION.

IMPLEMENTABILITY

(Maximum Score = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Technical Feasibility		
a. Ability to construct technology.	i) Not difficult to construct. No uncertainties in construction.	X 3
	ii) Somewhat difficult to construct. No uncertainties in construction.	___ 2
	iii) Very difficult to construct and/or significant uncertainties in construction.	___ 1
b. Reliability of technology.	i) Very reliable in meeting the specified process efficiencies or performance goals.	X 3
	ii) Somewhat reliable in meeting the specified process efficiencies or performance goals.	___ 2
c. Schedule of delays due to technical problems.	i) Unlikely.	X 2
	ii) Somewhat likely.	___ 1
d. Need of undertaking additional remedial action, if necessary.	i) No future remedial actions may be anticipated.	___ 2
	ii) Some future remedial actions may be necessary.	X 1
SUBTOTAL (Maximum = 10)		
2. Administrative Feasibility		
a. Coordination with other agencies.	i) Minimal coordination is required.	X 2
	ii) Required coordination is normal.	___ 1
	iii) Extensive coordination is required.	___ 0
SUBTOTAL (Maximum = 2)		

IMPLEMENTABILITY (Continued)

(Maximum Score = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
3. Availability of Services and Materials		
a. Availability of prospective technologies.	i) Are technologies under consideration generally commercially available for the site-specific application?	Yes X 1 No ___ 0
	ii) Will more than one vendor be available to provide a competitive bid?	Yes X 1 No ___ 0
b. Availability of necessary equipment and specialists.	i) Additional equipment and specialists may be available without significant delay.	Yes X 1 No ___ 0
SUBTOTAL (Maximum = 3)		
TOTAL (Maximum = 15)		14

IF THE TOTAL IS LESS THAN 8, PROJECT MANAGER MAY REJECT THE REMEDIAL ALTERNATIVE FROM FURTHER CONSIDERATION

REDUCTION OF TOXICITY, MOBILITY OR VOLUME

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Volume of hazardous waste reduced (reduction in volume or toxicity). If Factor 1 is not applicable, go to Factor 2.	i) Quantity of hazardous waste destroyed or treated. Immobilization technologies do not score under Factor 1.	99-100% ___ 8 90-99% ___ 7 80-90% ___ 6 60-80% ___ 4 40-60% ___ 2 20-40% ___ 1 <20% X 0
	ii) Are there untreated or concentrated hazardous waste produced as a result of (i)? If answer is no, go to Factor 2.	Yes X 0 No ___ 2
SUBTOTAL (Maximum = 10) If subtotal = 10, go to Factor 3.	iii) After remediation, how is the untreated, residual hazardous waste material disposed?	Off-site land disposal ___ 0 On-site land disposal ___ 1 Off-site destruction or treatment ___ 2
2. Reduction in mobility of hazardous waste.	i) Quantity of Available Wastes Immobilized After Destruction/Treatment	90-100% ___ 2 60-90% ___ 1 <60% ___ 0
If Factor 2 is not applicable, go to Factor 3.	ii) Method of Immobilization	
	- Reduced mobility by containment.	___ 0
	- Reduced mobility by alternative treatment technologies.	___ 3
SUBTOTAL (Maximum = 5)		
3. Irreversity of the destruction or treatment or immobilization of hazardous waste.	Completely irreversible.	___ 5
	Irreversible for most of the hazardous waste constituents.	___ 3
	Irreversible for only some of the hazardous waste constituents.	___ 2
	Reversible for most of the hazardous waste constituents.	X 0
SUBTOTAL (Maximum = 5)		
TOTAL (Maximum = 15)		0

SHORT-TERM EFFECTIVENESS

(Relative Weight = 10)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Protection of community during remedial actions.	• Are there significant short-term risks to the community that must be addressed? (If answer is no, go to Factor 2.)	Yes ___ 0 No X 4
	• Can the risk be easily controlled?	Yes ___ 1 No ___ 0
	• Does the mitigative effort to control risk impact the community life-style?	Yes ___ 0 No ___ 2
SUBTOTAL (Maximum = 4)		
2. Environmental Impacts	• Are there significant short-term risks to the environment that must be addressed? (If answer is no, go to Factor 3.)	Yes ___ 0 No X 4
	• Are the available mitigative measures reliable to minimize potential impacts?	Yes ___ 3 No ___ 0
SUBTOTAL (Maximum = 4)		
3. Time to implement the remedy.	• What is the required time to implement the remedy?	≤2 yr. X 1 ≥2 yr. ___ 0
	• Required duration of the mitigative effort to control short-term risk.	≤2 yr. X 1 ≥2 yr. ___ 0
SUBTOTAL (Maximum = 2)		
TOTAL (Maximum = 10)		10

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE NEW YORK STATE STANDARDS CRITERIA AND GUIDELINES (SCGs)

(Relative Weight = 10)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Compliance with chemical-specific SCGs.	Meets chemical specific SCGs such as groundwater standards.	Yes X 4 No __ 0
2. Compliance with action-specific SCGs.	Meets SCGs such as technology standards for incineration or landfill.	Yes X 3 No __ 0
3. Compliance with location-specific SCGs.	Meets location-specific SCGs such as Freshwater Wetlands Act.	Yes X 3 No __ 0
TOTAL (Maximum = 10)		10

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

(Relative Weight = 20)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Use of the site after remediation.	Unrestricted use of the land and water. (If answer is yes, go to the end of the Table.)	Yes ___ 20 No X 0
TOTAL (Maximum = 20)		
2. Human health and the environment exposure after the remediation.	i) Is the exposure to contaminants via air route acceptable?	Yes X 3 No ___ 0
	ii) Is the exposure to contaminants via groundwater/surface water acceptable?	Yes X 4 No ___ 0
	iii) Is the exposure to contaminants via sediments/soils acceptable?	Yes X 3 No ___ 0
SUBTOTAL (Maximum = 10)		
3. Magnitude of residual public health risks after the remediation.	i) Health risk	≤1 in 1,000,000 X 5
	ii) Health risk	≤1 in 100,000 ___ 2
SUBTOTAL (Maximum = 5)		
4. Magnitude of residual environmental risks after the remediation.	i) Less than acceptable	___ 5
	ii) Slightly greater than acceptable	X 3
	iii) Significant risk still exists	___ 0
SUBTOTAL (Maximum = 5)		
TOTAL (Maximum = 20)		18

LONG-TERM EFFECTIVENESS AND PERMANENCE

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. On-site or off-site treatment or land disposal.	• On-site treatment* • Off-site treatment* • On-site or off-site land disposal	___ 3 ___ 1 X 0
SUBTOTAL (Maximum = 3)		
* Treatment is defined as destruction or separation/ treatment or solidification/ chemical fixation of inorganic wastes		
2. Permanence of the remedial alternative.	• Will the remedy be classified as permanent in accordance with Section 2.1(a), (b), or (c). (If answer is yes, go to Factor 4.)	Yes ___ 3 No X 0
SUBTOTAL (Maximum = 3)		
3. Lifetime of remedial actions.	• Expected lifetime or duration of effectiveness of the remedy.	25-30 yr. X 3 20-25 yr. ___ 2 15-20 yr. ___ 1 <15 yr. ___ 0
SUBTOTAL (Maximum = 3)		
4. Quantity and nature of waste or residual left at the site after remediation.	i) Quantity of untreated hazardous waste left at the site.	None ___ 3 <25% ___ 2 25-50% ___ 1 ≥50% X 0
	ii) Is there treated residual left at the site? (If answer is no, go to Factor 5.)	Yes ___ 0 No X 2
	iii) Is the treated residual toxic?	Yes ___ 0 No ___ 2
	iv) Is the treated residual mobile?	Yes ___ 0 No ___ 1
SUBTOTAL (Maximum = 5)		

LONG-TERM EFFECTIVENESS AND PERMANENCE (Continued)

(Maximum Score = 25)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
5. Adequacy and reliability of controls.	i) Operation and maintenance required for a period of:	<5 yr. ___ 1 >5 yr. X 0
	ii) Are environmental controls required as a part of the remedy to handle potential problems? (If answer is no, go to "iv").	Yes X 0 No ___ 1
	iii) Degree of confidence that controls can adequately handle potential problems.	Moderate to very confident X 1 Somewhat to not confident ___ 0
	iv) Relative degree of long-term monitoring required (compare with other remedial alternatives).	Minimum ___ 2 Moderate X 1 Extensive ___ 0

SUBTOTAL (Maximum = 4)

TOTAL (Maximum = 15) 7

IF THE TOTAL IS LESS THAN 10, PROJECT MANAGER MAY REJECT THE REMEDIAL ALTERNATIVE FROM FURTHER CONSIDERATION.

IMPLEMENTABILITY

(Maximum Score = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Technical Feasibility		
a. Ability to construct technology.	i) Not difficult to construct. No uncertainties in construction.	X 3
	ii) Somewhat difficult to construct. No uncertainties in construction.	___ 2
	iii) Very difficult to construct and/or significant uncertainties in construction.	___ 1
b. Reliability of technology.	i) Very reliable in meeting the specified process efficiencies or performance goals.	X 3
	ii) Somewhat reliable in meeting the specified process efficiencies or performance goals.	___ 2
c. Schedule of delays due to technical problems.	i) Unlikely.	X 2
	ii) Somewhat likely.	___ 1
d. Need of undertaking additional remedial action, if necessary.	i) No future remedial actions may be anticipated.	___ 2
	ii) Some future remedial actions may be necessary.	X 1
SUBTOTAL (Maximum = 10)		
2. Administrative Feasibility		
a. Coordination with other agencies.	i) Minimal coordination is required.	___ 2
	ii) Required coordination is normal.	___ 1
	iii) Extensive coordination is required.	X 0
SUBTOTAL (Maximum = 2)		

IMPLEMENTABILITY (Continued)

(Maximum Score = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
3. Availability of Services and Materials		
a. Availability of prospective technologies.	i) Are technologies under consideration generally commercially available for the site-specific application?	Yes X 1 No ___ 0
	ii) Will more than one vendor be available to provide a competitive bid?	Yes X 1 No ___ 0
b. Availability of necessary equipment and specialists.	i) Additional equipment and specialists may be available without significant delay.	Yes X 1 No ___ 0
SUBTOTAL (Maximum = 3)		
TOTAL (Maximum = 15)		12

IF THE TOTAL IS LESS THAN 8, PROJECT MANAGER MAY REJECT THE REMEDIAL ALTERNATIVE FROM FURTHER CONSIDERATION

REDUCTION OF TOXICITY, MOBILITY OR VOLUME

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Volume of hazardous waste reduced (reduction in volume or toxicity). If Factor 1 is not applicable, go to Factor 2.	i) Quantity of hazardous waste destroyed or treated. Immobilization technologies do not score under Factor 1.	99-100% ___ 8 90-99% ___ 7 80-90% ___ 6 60-80% ___ 4 40-60% ___ 2 20-40% ___ 1 <20% ___ 0
	ii) Are there untreated or concentrated hazardous waste produced as a result of (i)? If answer is no, go to Factor 2.	Yes ___ 0 No ___ 2
SUBTOTAL (Maximum = 10) If subtotal = 10, go to Factor 3.	iii) After remediation, how is the untreated, residual hazardous waste material disposed?	Off-site land disposal ___ 0 On-site land disposal ___ 1 Off-site destruction or treatment ___ 2
2. Reduction in mobility of hazardous waste.	i) Quantity of Available Wastes Immobilized After Destruction/Treatment	90-100% X 2 60-90% ___ 1 <60% ___ 0
If Factor 2 is not applicable, go to Factor 3.	ii) Method of Immobilization - Reduced mobility by containment. - Reduced mobility by alternative treatment technologies.	X 0 ___ 3
SUBTOTAL (Maximum = 5)		
3. Irreversity of the destruction or treatment or immobilization of hazardous waste.	Completely irreversible.	___ 5
	Irreversible for most of the hazardous waste constituents.	___ 3
	Irreversible for only some of the hazardous waste constituents.	___ 2
	Reversible for most of the hazardous waste constituents.	X 0
SUBTOTAL (Maximum = 5)		
TOTAL (Maximum = 15)		2

SHORT-TERM EFFECTIVENESS

(Relative Weight = 10)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Protection of community during remedial actions.	• Are there significant short-term risks to the community that must be addressed? (If answer is no, go to Factor 2.)	Yes ___ 0 No X 4
	• Can the risk be easily controlled?	Yes ___ 1 No ___ 0
	• Does the mitigative effort to control risk impact the community life-style?	Yes ___ 0 No ___ 2
SUBTOTAL (Maximum = 4)		
2. Environmental Impacts	• Are there significant short-term risks to the environment that must be addressed? (If answer is no, go to Factor 3.)	Yes X 0 No ___ 4
	• Are the available mitigative measures reliable to minimize potential impacts?	Yes X 3 No ___ 0
SUBTOTAL (Maximum = 4)		
3. Time to implement the remedy.	• What is the required time to implement the remedy?	≤2 yr. X 1 ≥2 yr. ___ 0
	• Required duration of the mitigative effort to control short-term risk.	≤2 yr. X 1 ≥2 yr. ___ 0
SUBTOTAL (Maximum = 2)		
TOTAL (Maximum = 10)		9

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE NEW YORK STATE STANDARDS CRITERIA AND GUIDELINES (SCGs)

(Relative Weight = 10)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Compliance with chemical-specific SCGs.	Meets chemical specific SCGs such as groundwater standards.	Yes X 4 No ___ 0
2. Compliance with action-specific SCGs.	Meets SCGs such as technology standards for incineration or landfill.	Yes X 3 No ___ 0
3. Compliance with location-specific SCGs.	Meets location-specific SCGs such as Freshwater Wetlands Act.	Yes X 3 No ___ 0
TOTAL (Maximum = 10)		10

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

(Relative Weight = 20)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Use of the site after remediation.	Unrestricted use of the land and water. (If answer is yes, go to the end of the Table.)	Yes ___ 20 No X 0
TOTAL (Maximum = 20)		
2. Human health and the environment exposure after the remediation.	i) Is the exposure to contaminants via air route acceptable?	Yes X 3 No ___ 0
	ii) Is the exposure to contaminants via groundwater/surface water acceptable?	Yes X 4 No ___ 0
	iii) Is the exposure to contaminants via sediments/soils acceptable?	Yes X 3 No ___ 0
SUBTOTAL (Maximum = 10)		
3. Magnitude of residual public health risks after the remediation.	i) Health risk	≤1 in 1,000,000 X 5
	ii) Health risk	≤1 in 100,000 ___ 2
SUBTOTAL (Maximum = 5)		
4. Magnitude of residual environmental risks after the remediation.	i) Less than acceptable	___ 5
	ii) Slightly greater than acceptable	X 3
	iii) Significant risk still exists	___ 0
SUBTOTAL (Maximum = 5)		
TOTAL (Maximum = 20)		18

LONG-TERM EFFECTIVENESS AND PERMANENCE

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. On-site or off-site treatment or land disposal.	• On-site treatment* • Off-site treatment* • On-site or off-site land disposal	X 3 __ 1 __ 0
SUBTOTAL (Maximum = 3)		
* Treatment is defined as destruction or separation/ treatment or solidification/ chemical fixation of inorganic wastes		
2. Permanence of the remedial alternative.	• Will the remedy be classified as permanent in accordance with Section 2.1(a), (b), or (c). (If answer is yes, go to Factor 4.)	Yes X 3 No __ 0
SUBTOTAL (Maximum = 3)		
3. Lifetime of remedial actions.	• Expected lifetime or duration of effectiveness of the remedy.	25-30 yr. __ 3 20-25 yr. __ 2 15-20 yr. __ 1 <15 yr. __ 0
SUBTOTAL (Maximum = 3)		
4. Quantity and nature of waste or residual left at the site after remediation.	i) Quantity of untreated hazardous waste left at the site.	None X 3 <25% __ 2 25-50% __ 1 ≥50% __ 0
	ii) Is there treated residual left at the site? (If answer is no, go to Factor 5.)	Yes X 0 No __ 2
	iii) Is the treated residual toxic?	Yes __ 0 No X 2
	iv) Is the treated residual mobile?	Yes __ 0 No X 1
SUBTOTAL (Maximum = 5)		

LONG-TERM EFFECTIVENESS AND PERMANENCE (Continued)

(Maximum Score = 25)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
5. Adequacy and reliability of controls.	i) Operation and maintenance required for a period of:	<5 yr. X 1 >5 yr. ___ 0
	ii) Are environmental controls required as a part of the remedy to handle potential problems? (If answer is no, go to "iv").	Yes X 0 No ___ 1
	iii) Degree of confidence that controls can adequately handle potential problems.	Moderate to very confident X 1 Somewhat to not confident ___ 0
	iv) Relative degree of long-term monitoring required (compare with other remedial alternatives).	Minimum ___ 2 Moderate X 1 Extensive ___ 0
SUBTOTAL (Maximum = 4)		
TOTAL (Maximum = 15)		15

IF THE TOTAL IS LESS THAN 10, PROJECT MANAGER MAY REJECT THE REMEDIAL ALTERNATIVE FROM FURTHER CONSIDERATION.

IMPLEMENTABILITY

(Maximum Score = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Technical Feasibility		
a. Ability to construct technology.	i) Not difficult to construct. No uncertainties in construction.	___ 3
	ii) Somewhat difficult to construct. No uncertainties in construction.	X 2
	iii) Very difficult to construct and/or significant uncertainties in construction.	___ 1
b. Reliability of technology.	i) Very reliable in meeting the specified process efficiencies or performance goals.	X 3
	ii) Somewhat reliable in meeting the specified process efficiencies or performance goals.	___ 2
c. Schedule of delays due to technical problems.	i) Unlikely.	X 2
	ii) Somewhat likely.	___ 1
d. Need of undertaking additional remedial action, if necessary.	i) No future remedial actions may be anticipated.	X 2
	ii) Some future remedial actions may be necessary.	___ 1
SUBTOTAL (Maximum = 10)		
2. Administrative Feasibility		
a. Coordination with other agencies.	i) Minimal coordination is required.	___ 2
	ii) Required coordination is normal.	___ 1
	iii) Extensive coordination is required.	X 0
SUBTOTAL (Maximum = 2)		

IMPLEMENTABILITY (Continued)

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
3. Availability of Services and Materials		
a. Availability of prospective technologies.	i) Are technologies under consideration generally commercially available for the site-specific application?	Yes X 1 No ___ 0
	ii) Will more than one vendor be available to provide a competitive bid?	Yes X 1 No ___ 0
b. Availability of necessary equipment and specialists.	i) Additional equipment and specialists may be available without significant delay.	Yes X 1 No ___ 0
SUBTOTAL (Maximum = 3)		
TOTAL (Maximum = 15)		12

IF THE TOTAL IS LESS THAN 8, PROJECT MANAGER MAY REJECT THE REMEDIAL ALTERNATIVE FROM FURTHER CONSIDERATION

REDUCTION OF TOXICITY, MOBILITY OR VOLUME

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Volume of hazardous waste reduced (reduction in volume or toxicity). If Factor 1 is not applicable, go to Factor 2.	i) Quantity of hazardous waste destroyed or treated. Immobilization technologies do not score under Factor 1.	99-100% ___ 8 90-99% ___ 7 80-90% ___ 6 60-80% ___ 4 40-60% ___ 2 20-40% ___ 1 <20% ___ 0
	ii) Are there untreated or concentrated hazardous waste produced as a result of (i)? If answer is no, go to Factor 2.	Yes ___ 0 No ___ 2
SUBTOTAL (Maximum = 10) If subtotal = 10, go to Factor 3.	iii) After remediation, how is the untreated, residual hazardous waste material disposed?	Off-site land disposal ___ 0 On-site land disposal ___ 1 Off-site destruction or treatment ___ 2
2. Reduction in mobility of hazardous waste.	i) Quantity of Available Wastes Immobilized After Destruction/Treatment	90-100% X 2 60-90% ___ 1 <60% ___ 0
If Factor 2 is not applicable, go to Factor 3.	ii) Method of Immobilization	
	- Reduced mobility by containment.	___ 0
	- Reduced mobility by alternative treatment technologies.	X 3
SUBTOTAL (Maximum = 5)		
3. Irreversity of the destruction or treatment or immobilization of hazardous waste.	Completely irreversible.	___ 5
	Irreversible for most of the hazardous waste constituents.	X 3
	Irreversible for only some of the hazardous waste constituents.	___ 2
	Reversible for most of the hazardous waste constituents.	___ 0
SUBTOTAL (Maximum = 5)		
TOTAL (Maximum = 15)		8

SHORT-TERM EFFECTIVENESS

(Relative Weight = 10)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Protection of community during remedial actions.	• Are there significant short-term risks to the community that must be addressed? (If answer is no, go to Factor 2.)	Yes ___ 0 No X 4
	• Can the risk be easily controlled?	Yes ___ 1 No ___ 0
	• Does the mitigative effort to control risk impact the community life-style?	Yes ___ 0 No ___ 2
SUBTOTAL (Maximum = 4)		
2. Environmental Impacts	• Are there significant short-term risks to the environment that must be addressed? (If answer is no, go to Factor 3.)	Yes X 0 No ___ 4
	• Are the available mitigative measures reliable to minimize potential impacts?	Yes X 3 No ___ 0
SUBTOTAL (Maximum = 4)		
3. Time to implement the remedy.	• What is the required time to implement the remedy?	≤2 yr. X 1 ≥2 yr. ___ 0
	• Required duration of the mitigative effort to control short-term risk.	≤2 yr. X 1 ≥2 yr. ___ 0
SUBTOTAL (Maximum = 2)		
TOTAL (Maximum = 10)		9

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE NEW YORK STATE STANDARDS CRITERIA AND GUIDELINES (SCGs)

(Relative Weight = 10)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Compliance with chemical-specific SCGs.	Meets chemical specific SCGs such as groundwater standards.	Yes X 4 No ___ 0
2. Compliance with action-specific SCGs.	Meets SCGs such as technology standards for incineration or landfill.	Yes X 3 No ___ 0
3. Compliance with location-specific SCGs.	Meets location-specific SCGs such as Freshwater Wetlands Act.	Yes X 3 No ___ 0
TOTAL (Maximum = 10)		10

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

(Relative Weight = 20)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Use of the site after remediation.	Unrestricted use of the land and water. (If answer is yes, go to the end of the Table.)	Yes X 20 No ___ 0
TOTAL (Maximum = 20)		
2. Human health and the environment exposure after the remediation.	i) Is the exposure to contaminants via air route acceptable?	Yes ___ 3 No ___ 0
	ii) Is the exposure to contaminants via groundwater/surface water acceptable?	Yes ___ 4 No ___ 0
	iii) Is the exposure to contaminants via sediments/soils acceptable?	Yes ___ 3 No ___ 0
SUBTOTAL (Maximum = 10)		
3. Magnitude of residual public health risks after the remediation.	i) Health risk	≤1 in 1,000,000 ___ 5
	ii) Health risk	≤1 in 100,000 ___ 2
SUBTOTAL (Maximum = 5)		
4. Magnitude of residual environmental risks after the remediation.	i) Less than acceptable	___ 5
	ii) Slightly greater than acceptable	___ 3
	iii) Significant risk still exists	___ 0
SUBTOTAL (Maximum = 5)		
TOTAL (Maximum = 20)		20

LONG-TERM EFFECTIVENESS AND PERMANENCE

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. On-site or off-site treatment or land disposal.	• On-site treatment* • Off-site treatment* • On-site or off-site land disposal	___ 3 ___ 1 X 0
SUBTOTAL (Maximum = 3)		
* Treatment is defined as destruction or separation/ treatment or solidification/ chemical fixation of inorganic wastes		
2. Permanence of the remedial alternative.	• Will the remedy be classified as permanent in accordance with Section 2.1(a), (b), or (c). (If answer is yes, go to Factor 4.)	Yes ___ 3 No X 0
SUBTOTAL (Maximum = 3)		
3. Lifetime of remedial actions.	• Expected lifetime or duration of effectiveness of the remedy.	25-30 yr. X 3 20-25 yr. ___ 2 15-20 yr. ___ 1 <15 yr. ___ 0
SUBTOTAL (Maximum = 3)		
4. Quantity and nature of waste or residual left at the site after remediation.	i) Quantity of untreated hazardous waste left at the site.	None X 3 <25% ___ 2 25-50% ___ 1 ≥50% ___ 0
	ii) Is there treated residual left at the site? (If answer is no, go to Factor 5.)	Yes ___ 0 No X 2
	iii) Is the treated residual toxic?	Yes ___ 0 No ___ 2
	iv) Is the treated residual mobile?	Yes ___ 0 No ___ 1
SUBTOTAL (Maximum = 5)		

LONG-TERM EFFECTIVENESS AND PERMANENCE (Continued)

(Relative Weight = 25)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
5. Adequacy and reliability of controls.	i) Operation and maintenance required for a period of:	<5 yr. X 1 >5 yr. ___ 0
	ii) Are environmental controls required as a part of the remedy to handle potential problems? (If answer is no, go to "iv").	Yes X 0 No ___ 1
	iii) Degree of confidence that controls can adequately handle potential problems.	Moderate to very confident X 1 Somewhat to not confident ___ 0
	iv) Relative degree of long-term monitoring required (compare with other remedial alternatives).	Minimum X 2 Moderate ___ 1 Extensive ___ 0

SUBTOTAL (Maximum = 4)

TOTAL (Maximum = 15) 12

IF THE TOTAL IS LESS THAN 10, PROJECT MANAGER MAY REJECT THE REMEDIAL ALTERNATIVE FROM FURTHER CONSIDERATION.

IMPLEMENTABILITY

(Maximum Score = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Technical Feasibility		
a. Ability to construct technology.	i) Not difficult to construct. No uncertainties in construction.	X 3
	ii) Somewhat difficult to construct. No uncertainties in construction.	___ 2
	iii) Very difficult to construct and/or significant uncertainties in construction.	___ 1
b. Reliability of technology.	i) Very reliable in meeting the specified process efficiencies or performance goals.	X 3
	ii) Somewhat reliable in meeting the specified process efficiencies or performance goals.	___ 2
c. Schedule of delays due to technical problems.	i) Unlikely.	X 2
	ii) Somewhat likely.	___ 1
d. Need of undertaking additional remedial action, if necessary.	i) No future remedial actions may be anticipated.	X 2
	ii) Some future remedial actions may be necessary.	___ 1
SUBTOTAL (Maximum = 10)		
2. Administrative Feasibility		
a. Coordination with other agencies.	i) Minimal coordination is required.	___ 2
	ii) Required coordination is normal.	X 1
	iii) Extensive coordination is required.	___ 0
SUBTOTAL (Maximum = 2)		

IMPLEMENTABILITY (Continued)

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
3. Availability of Services and Materials		
a. Availability of prospective technologies.	i) Are technologies under consideration generally commercially available for the site-specific application?	Yes X 1 No ___ 0
	ii) Will more than one vendor be available to provide a competitive bid?	Yes X 1 No ___ 0
b. Availability of necessary equipment and specialists.	i) Additional equipment and specialists may be available without significant delay.	Yes X 1 No ___ 0
SUBTOTAL (Maximum = 3)		
TOTAL (Maximum = 15)		14

IF THE TOTAL IS LESS THAN 8, PROJECT MANAGER MAY REJECT THE REMEDIAL ALTERNATIVE FROM FURTHER CONSIDERATION

REDUCTION OF TOXICITY, MOBILITY OR VOLUME

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Volume of hazardous waste reduced (reduction in volume or toxicity). If Factor 1 is not applicable, go to Factor 2.	i) Quantity of hazardous waste destroyed or treated. Immobilization technologies do not score under Factor 1.	99-100% ___ 8 90-99% ___ 7 80-90% ___ 6 60-80% ___ 4 40-60% ___ 2 20-40% ___ 1 <20% ___ 0
	ii) Are there untreated or concentrated hazardous waste produced as a result of (i)? If answer is no, go to Factor 2.	Yes ___ 0 No ___ 2
SUBTOTAL (Maximum = 10) If subtotal = 10, go to Factor 3.	iii) After remediation, how is the untreated, residual hazardous waste material disposed?	Off-site land disposal ___ 0 On-site land disposal ___ 1 Off-site destruction or treatment ___ 2
2. Reduction in mobility of hazardous waste.	i) Quantity of Available Wastes Immobilized After Destruction/Treatment	90-100% X 2 60-90% ___ 1 <60% ___ 0
If Factor 2 is not applicable, go to Factor 3.	ii) Method of Immobilization	
	- Reduced mobility by containment.	X 0
	- Reduced mobility by alternative treatment technologies.	___ 3
SUBTOTAL (Maximum = 5)		
3. Irreversity of the destruction or treatment or immobilization of hazardous waste.	Completely irreversible.	___ 5
	Irreversible for most of the hazardous waste constituents.	___ 3
	Irreversible for only some of the hazardous waste constituents.	___ 2
	Reversible for most of the hazardous waste constituents.	X 0
SUBTOTAL (Maximum = 5)		
TOTAL (Maximum = 15)		2

SHORT-TERM EFFECTIVENESS

(Relative Weight = 10)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Protection of community during remedial actions.	• Are there significant short-term risks to the community that must be addressed? (If answer is no, go to Factor 2.)	Yes ___ 0 No X 4
	• Can the risk be easily controlled?	Yes ___ 1 No ___ 0
	• Does the mitigative effort to control risk impact the community life-style?	Yes ___ 0 No ___ 2
SUBTOTAL (Maximum = 4)		
2. Environmental Impacts	• Are there significant short-term risks to the environment that must be addressed? (If answer is no, go to Factor 3.)	Yes X 0 No ___ 4
	• Are the available mitigative measures reliable to minimize potential impacts?	Yes X 3 No ___ 0
SUBTOTAL (Maximum = 4)		
3. Time to implement the remedy.	• What is the required time to implement the remedy?	≤2 yr. X 1 ≥2 yr. ___ 0
	• Required duration of the mitigative effort to control short-term risk.	≤2 yr. X 1 ≥2 yr. ___ 0
SUBTOTAL (Maximum = 2)		
TOTAL (Maximum = 10)		9

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE NEW YORK STATE STANDARDS CRITERIA AND GUIDELINES (SCGs)

(Relative Weight = 10)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Compliance with chemical-specific SCGs.	Meets chemical specific SCGs such as groundwater standards.	Yes X 4 No ___ 0
2. Compliance with action-specific SCGs.	Meets SCGs such as technology standards for incineration or landfill.	Yes X 3 No ___ 0
3. Compliance with location-specific SCGs.	Meets location-specific SCGs such as Freshwater Wetlands Act.	Yes X 3 No ___ 0
TOTAL (Maximum = 10)		10

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

(Relative Weight = 20)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Use of the site after remediation.	Unrestricted use of the land and water. (If answer is yes, go to the end of the Table.)	Yes X 20 No ___ 0
TOTAL (Maximum = 20)		
2. Human health and the environment exposure after the remediation.	i) Is the exposure to contaminants via air route acceptable?	Yes ___ 3 No ___ 0
	ii) Is the exposure to contaminants via groundwater/surface water acceptable?	Yes ___ 4 No ___ 0
	iii) Is the exposure to contaminants via sediments/soils acceptable?	Yes ___ 3 No ___ 0
SUBTOTAL (Maximum = 10)		
3. Magnitude of residual public health risks after the remediation.	i) Health risk	≤1 in 1,000,000 ___ 5
	ii) Health risk	≤1 in 100,000 ___ 2
SUBTOTAL (Maximum = 5)		
4. Magnitude of residual environmental risks after the remediation.	i) Less than acceptable	___ 5
	ii) Slightly greater than acceptable	___ 3
	iii) Significant risk still exists	___ 0
SUBTOTAL (Maximum = 5)		
TOTAL (Maximum = 20)		20

LONG-TERM EFFECTIVENESS AND PERMANENCE

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. On-site or off-site treatment or land disposal.	• On-site treatment* • Off-site treatment* • On-site or off-site land disposal	___ 3 ___ 1 X 0
SUBTOTAL (Maximum = 3)		
* Treatment is defined as destruction or separation/ treatment or solidification/ chemical fixation of inorganic wastes		
2. Permanence of the remedial alternative.	• Will the remedy be classified as permanent in accordance with Section 2.1(a), (b), or (c). (If answer is yes, go to Factor 4.)	Yes ___ 3 No X 0
SUBTOTAL (Maximum = 3)		
3. Lifetime of remedial actions.	• Expected lifetime or duration of effectiveness of the remedy.	25-30 yr. X 3 20-25 yr. ___ 2 15-20 yr. ___ 1 <15 yr. ___ 0
SUBTOTAL (Maximum = 3)		
4. Quantity and nature of waste or residual left at the site after remediation.	i) Quantity of untreated hazardous waste left at the site.	None X 3 <25% ___ 2 25-50% ___ 1 ≥50% ___ 0
	ii) Is there treated residual left at the site? (If answer is no, go to Factor 5.)	Yes ___ 0 No X 2
	iii) Is the treated residual toxic?	Yes ___ 0 No ___ 2
	iv) Is the treated residual mobile?	Yes ___ 0 No ___ 1
SUBTOTAL (Maximum = 5)		

LONG-TERM EFFECTIVENESS AND PERMANENCE (Continued)

(Maximum Score = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
5. Adequacy and reliability of controls.	i) Operation and maintenance required for a period of:	<5 yr. X 1 >5 yr. ___ 0
	ii) Are environmental controls required as a part of the remedy to handle potential problems? (If answer is no, go to "iv").	Yes ___ 0 No X 1
	iii) Degree of confidence that controls can adequately handle potential problems.	Moderate to very confident ___ 1 Somewhat to not confident ___ 0
	iv) Relative degree of long-term monitoring required (compare with other remedial alternatives).	Minimum X 2 Moderate ___ 1 Extensive ___ 0
SUBTOTAL (Maximum = 4)		
TOTAL (Maximum = 15)		12

IF THE TOTAL IS LESS THAN 10, PROJECT MANAGER MAY REJECT THE REMEDIAL ALTERNATIVE FROM FURTHER CONSIDERATION.

IMPLEMENTABILITY

(Maximum Score = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Technical Feasibility		
a. Ability to construct technology.	i) Not difficult to construct. No uncertainties in construction.	X 3
	ii) Somewhat difficult to construct. No uncertainties in construction.	___ 2
	iii) Very difficult to construct and/or significant uncertainties in construction.	___ 1
b. Reliability of technology.	i) Very reliable in meeting the specified process efficiencies or performance goals.	X 3
	ii) Somewhat reliable in meeting the specified process efficiencies or performance goals.	___ 2
c. Schedule of delays due to technical problems.	i) Unlikely.	X 2
	ii) Somewhat likely.	___ 1
d. Need of undertaking additional remedial action, if necessary.	i) No future remedial actions may be anticipated.	X 2
	ii) Some future remedial actions may be necessary.	___ 1
SUBTOTAL (Maximum = 10)		
2. Administrative Feasibility		
a. Coordination with other agencies.	i) Minimal coordination is required.	___ 2
	ii) Required coordination is normal.	X 1
	iii) Extensive coordination is required.	___ 0
SUBTOTAL (Maximum = 2)		

IMPLEMENTABILITY (Continued)

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
3. Availability of Services and Materials		
a. Availability of prospective technologies.	i) Are technologies under consideration generally commercially available for the site-specific application?	Yes X 1 No ___ 0
	ii) Will more than one vendor be available to provide a competitive bid?	Yes X 1 No ___ 0
b. Availability of necessary equipment and specialists.	i) Additional equipment and specialists may be available without significant delay.	Yes X 1 No ___ 0
SUBTOTAL (Maximum = 3)		
TOTAL (Maximum = 15)		14

IF THE TOTAL IS LESS THAN 8, PROJECT MANAGER MAY REJECT THE REMEDIAL ALTERNATIVE FROM FURTHER CONSIDERATION

REDUCTION OF TOXICITY, MOBILITY OR VOLUME

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Volume of hazardous waste reduced (reduction in volume or toxicity). If Factor 1 is not applicable, go to Factor 2.	i) Quantity of hazardous waste destroyed or treated. Immobilization technologies do not score under Factor 1.	99-100% ___ 8 90-99% ___ 7 80-90% ___ 6 60-80% ___ 4 40-60% ___ 2 20-40% ___ 1 <20% ___ 0
	ii) Are there untreated or concentrated hazardous waste produced as a result of (i)? If answer is no, go to Factor 2.	Yes ___ 0 No ___ 2
SUBTOTAL (Maximum = 10) If subtotal = 10, go to Factor 3.	iii) After remediation, how is the untreated, residual hazardous waste material disposed?	Off-site land disposal ___ 0 On-site land disposal ___ 1 Off-site destruction or treatment ___ 2
2. Reduction in mobility of hazardous waste.	i) Quantity of Available Wastes Immobilized After Destruction/Treatment	90-100% X 2 60-90% ___ 1 <60% ___ 0
If Factor 2 is not applicable, go to Factor 3.	ii) Method of Immobilization	
	- Reduced mobility by containment.	X 0
	- Reduced mobility by alternative treatment technologies.	___ 3
SUBTOTAL (Maximum = 5)		
3. Irreversity of the destruction or treatment or immobilization of hazardous waste.	Completely irreversible.	___ 5
	Irreversible for most of the hazardous waste constituents.	___ 3
	Irreversible for only some of the hazardous waste constituents.	___ 2
	Reversible for most of the hazardous waste constituents.	X 0
SUBTOTAL (Maximum = 5)		
TOTAL (Maximum = 15)		2

SHORT-TERM EFFECTIVENESS

(Relative Weight = 10)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Protection of community during remedial actions.	• Are there significant short-term risks to the community that must be addressed? (If answer is no, go to Factor 2.)	Yes ___ 0 No X 4
	• Can the risk be easily controlled?	Yes ___ 1 No ___ 0
	• Does the mitigative effort to control risk impact the community life-style?	Yes ___ 0 No ___ 2
SUBTOTAL (Maximum = 4)		
2. Environmental Impacts	• Are there significant short-term risks to the environment that must be addressed? (If answer is no, go to Factor 3.)	Yes X 0 No ___ 4
	• Are the available mitigative measures reliable to minimize potential impacts?	Yes X 3 No ___ 0
SUBTOTAL (Maximum = 4)		
3. Time to implement the remedy.	• What is the required time to implement the remedy?	≤2 yr. X 1 ≥2 yr. ___ 0
	• Required duration of the mitigative effort to control short-term risk.	≤2 yr. X 1 ≥2 yr. ___ 0
SUBTOTAL (Maximum = 2)		
TOTAL (Maximum = 10)		9