932001

Admin. Record

# Design-Build Site Closure Work Plan
# Witmer Road Landfill
# Niagara Falls, New York



*Prepared for*

The BOC Group
100 Mountain Avenue
Murray Hill, New Jersey 07974

*Prepared by*

EA Engineering, P.C. and Its Affiliate
EA Engineering, Science, and Technology
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Newburgh, New York 12550
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March 2000
Revision: FINAL
Project No. 12040.33

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David S. Santoro, P.E., L.S.
President, EA Engineering, P.C.

1 March 2000
Date

Charles E. McLeod, Jr., P.E.
Project Manager/Program Manager
EA Engineering, Science, and Technology

1 March 2000
Date

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Revision: FINAL
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# 1. INTRODUCTION

## 1.1 STATEMENT OF PURPOSE

EA Engineering, P.C. and its affiliate EA Engineering, Science, and Technology have been retained by The BOC Group (BOC) to perform an interim remedial closure design for the Witmer Road Landfill parcel in Niagara Falls, New York. The Witmer Road Landfill is part of the U.S. Vanadium Corporation (Vanadium) site, which has been placed on the New York State Department of Environmental Conservation (NYSDEC) Superfund list. The Vanadium site includes three separate landfilling areas, and three different Potentially Responsible Party groups have been identified by NYSDEC. The three separate landfilled areas are aligned in a roughly west to east fashion (Figure 1-1), and are commonly known (from west to east) as the SKW parcel, the Airco parcel, and the Niagara Mohawk Power Corporation/New York Power Authority (NMPC/NYPA) parcel. The closure design for the Airco parcel, which is the "middle" area of concern among the three parcels, is being performed concurrent with negotiations with NYSDEC to develop an Administrative Order on Consent, which is expected to be finalized in mid-February 2000. Following interim remedial actions for the various parcels, NYSDEC plans to issue one Record of Decision for the entire Vanadium site. This Work Plan addresses only the Airco parcel, hereafter referred to as the Airco subsite, or Witmer Road Landfill.

This Work Plan presents the background information and framework for the remedial design. A brief description of existing conditions and site history are presented in Chapter 1 (Woodward & Curan Environmental Services 1996)[1]. Chapter 2 outlines the project team required to complete the project. Chapter 3 presents a conceptual design, which details the proposed cap cross-section and proposed stormwater management plan for the site. Chapter 4 describes the closure requirements for the site, and how BOC will proceed with the pre-design and design activities to meet those regulations. The proposed design and construction schedule is presented in Chapter 5.

## 1.2 SITE SETTING

The Vanadium site in Niagara Falls, New York is currently listed as a Class 2 site in the New York State Registry of Inactive Hazardous Waste Sites (Site No. 932001). This classification indicates a significant threat to public health or the environment, and requires remedial action. The site consists of three separate properties (Figure 1-1):

1. 25-acre parcel owned by Airco Properties, Inc. (known as BOC Group after 1994)
2. 37-acre parcel owned by SKW Alloys, Inc. (SKW subsite)
3. 53-acre parcel owned by NMPC/NYPA (NMPC/NYPA subsite).

1. Woodward & Curran Environmental Services. 1996. Draft Final Characterization Report.

This report focuses on the Witmer Road Landfill, although information from the other subsites is used when necessary to develop a clearer understanding of the issues at the Witmer Road Landfill.

## 1.3 SITE HISTORY

The Airco subsite was owned and used by the Vanadium Corporation of America from 1920 to 1964 for disposal of the following materials: stainless steel (lime) slag, ferromanganese slag, ferrochrome silicon slag and dust, and ferrosilicon dust. It is estimated that during the 44 years of operation by Vanadium, 600,000 tons of slag and dust and 90,000 tons of wood, brick, and ash refuse were dumped throughout the Airco subsite and adjacent SKW and NMPC/NYPA subsites.

In 1964, the subsite was sold to Airco Inc., and operated by the Airco Alloys Division. At the time of purchase, the majority of slags onsite were sold to an independent contractor and removed from the subsite. Wastes similar to the Vanadium wastes were generated and disposed onsite from 1964 to 1971. In 1971, the disposal of slurried baghouse dusts was also initiated at the subsite.

Reportedly, between 1971 and 1979, up to 5,600 tons per year of slurried ferrochromium silicon dust and an unknown quantity of other slags and dusts were deposited on the Airco subsite and adjacent SKW subsite. From 1976 to 1979, an additional 8,000 tons per year of slurried ferrosilicon dusts were also disposed on two subsites. From 1979 to 1981, no wastes were disposed on the Airco subsite.

From 1981 through 1988, the subsite was operated as an NYSDEC-permitted landfill by the Airco Carbon Division of Airco, Inc. During this period, inert fire bricks, concrete blocks, coke, and graphite wastes were deposited on the subsite in an effort to obtain a final grade for capping and closure. By 1988, 4 acres in the southern portion of the subsite had been capped through this approach.

In August 1988, Airco, Inc. sold its Niagara Falls production facilities, but not the landfill, to the CarbideGraphite/Group. From 1988 to 1990, no wastes from the Carbide/Graphite Group production facilities were deposited at the subsite, and the landfill permit lapsed. Attempts by Carbide/Graphite Group in 1990 to renew the landfill permit were unsuccessful and, therefore, no waste disposal has occurred at the subsite since 1988. The subsite is currently owned by the BOC Group. In 1994, Airco changed its name to match part of the parent organization, to the BOC Group.

## 1.4 SITE MONITORING

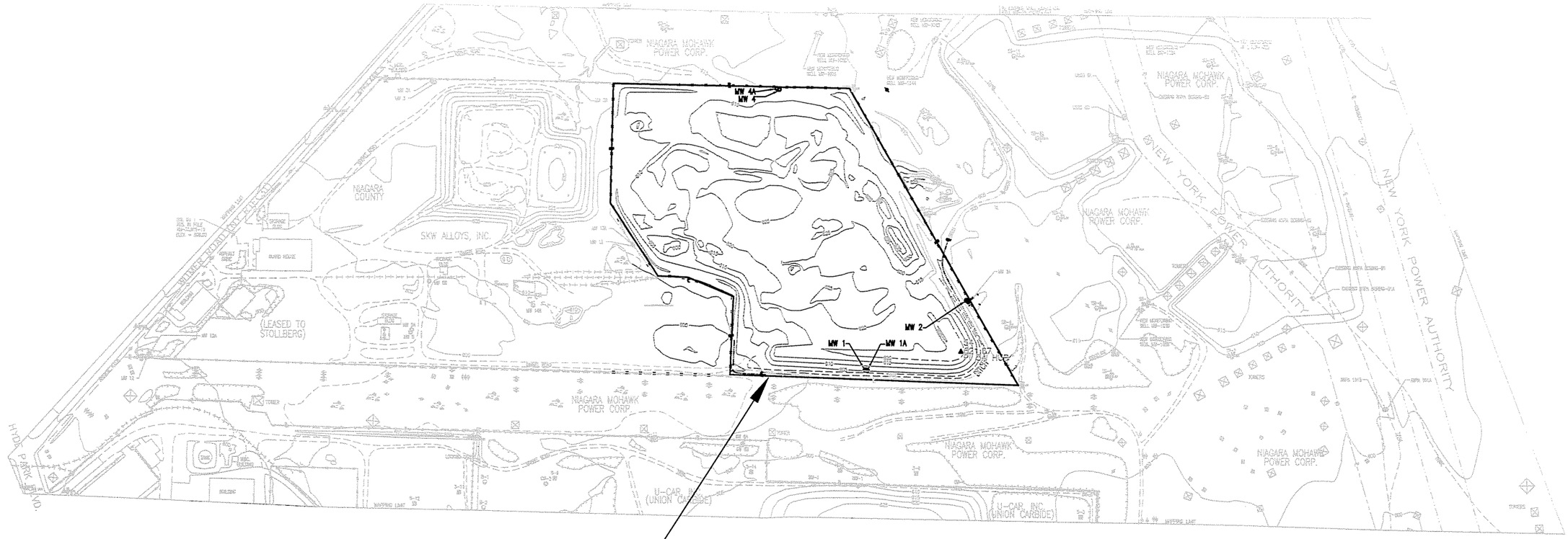
There has been a considerable amount of environmental investigation work conducted at the Airco subsite over the last 20 years. In accordance with the landfill permit requirements, quarterly ground-water and surface water sampling and analyses have been conducted at the subsite since 1979. Nearby surface water and ground-water monitoring points on the SKW and Union Carbide properties (to the south of the landfill) have also been sampled.

In 1979, numerous monitoring wells were installed at the SKW and Airco subsites by Earth Dimensions, Inc. Four ground-water monitoring well pairs were installed on the Airco subsite (MW-1/1a, MW-2/2a, MW-4/4a, and MW-13/13a), and three well pairs were installed on the SKW subsite (MW-3/3a, MW-5/5a, and MW-12/12a). Each monitoring well pair consisted of one shallow overburden well and one deep overburden well. The shallow overburden wells are screened in a silty clay layer within the overburden. The deep overburden wells are screened in the till layer directly overlying bedrock. The locations of the monitoring wells are shown on Figure 1-2. Monitoring wells MW-3R and MW-5R on the SKW property were installed in 1988 to replace wells MW-3 and MW-5. At the same time, MW-14N was installed on the SKW subsite to provide additional information. The four well pairs and two surface water locations (SW-6 and SW-6A) at the Airco subsite have been monitored quarterly since 1979.

## 1.5 PRE-DESIGN INVESTIGATION

The most recent site activities included a pre-design investigation performed by EA in December 1999 (EA 2000[2]). Details of the investigation are outlined in Chapter 4 of this Work Plan.

2. EA Engineering, Science, and Technology. 2000. Summary Report, Pre-Design Investigation Performed from 6 to 15 December 1999, Witmer Road Landfill, Niagara Falls, New York. February.




LEGEND

- UTILITY POLE
- PROPERTY IRON PIN
- TREE LINE
- APPROX. PROPERTY LINE
- JCL SURVEY CONTROL POINT
- CHAIN LINK FENCE

REFERENCES:

1. HORIZONTAL CONTROL FOR THIS PROJECT WAS TIED INTO NAD 1983. MONUMENTS SMC-20A AND SMC-45 FROM A GIS CONTROL PROJECT IN 1991 FOR THE CITY OF NIAGARA FALLS WAS USED.
2. VERTICAL CONTROL FOR THIS PROJECT WAS TIED INTO NGVD 1929. MONUMENT SMC-20A WITH AN ELEVATION OF 588.52 WAS USED. A SECONDARY BENCHMARK ( RAILROAD SPIKE IN POLE NM-73, NYT-10 ) WAS SET BY LU ENGINEERS WITH AN ELEVATION OF 599.00.
3. TOPOGRAPHIC MAPPING AND 5-FT CONTOURS FOR THIS PROJECT WERE BASED ON 1"=500' PHOTOGRAPHY OBTAINED IN THE SPRING OF 1992.
4. ALL PROPERTY LINE LOCATIONS ARE APPROXIMATE. NO BOUNDARY SURVEY WAS DONE. EXISTING SURVEYS WERE UTILITIZED FROM SKW ALLOYS, INC. DATED 18 FEBRUARY 1988, UNION CARBIDE LANDFILL SITE PLAN DATED 30 DECEMBER 1993, AND NEW YORK STATE POWER AUTHORITY DRAWING "NPPSKW.DWG."

400 200 0 400

GRAPHIC SCALE IN FEET

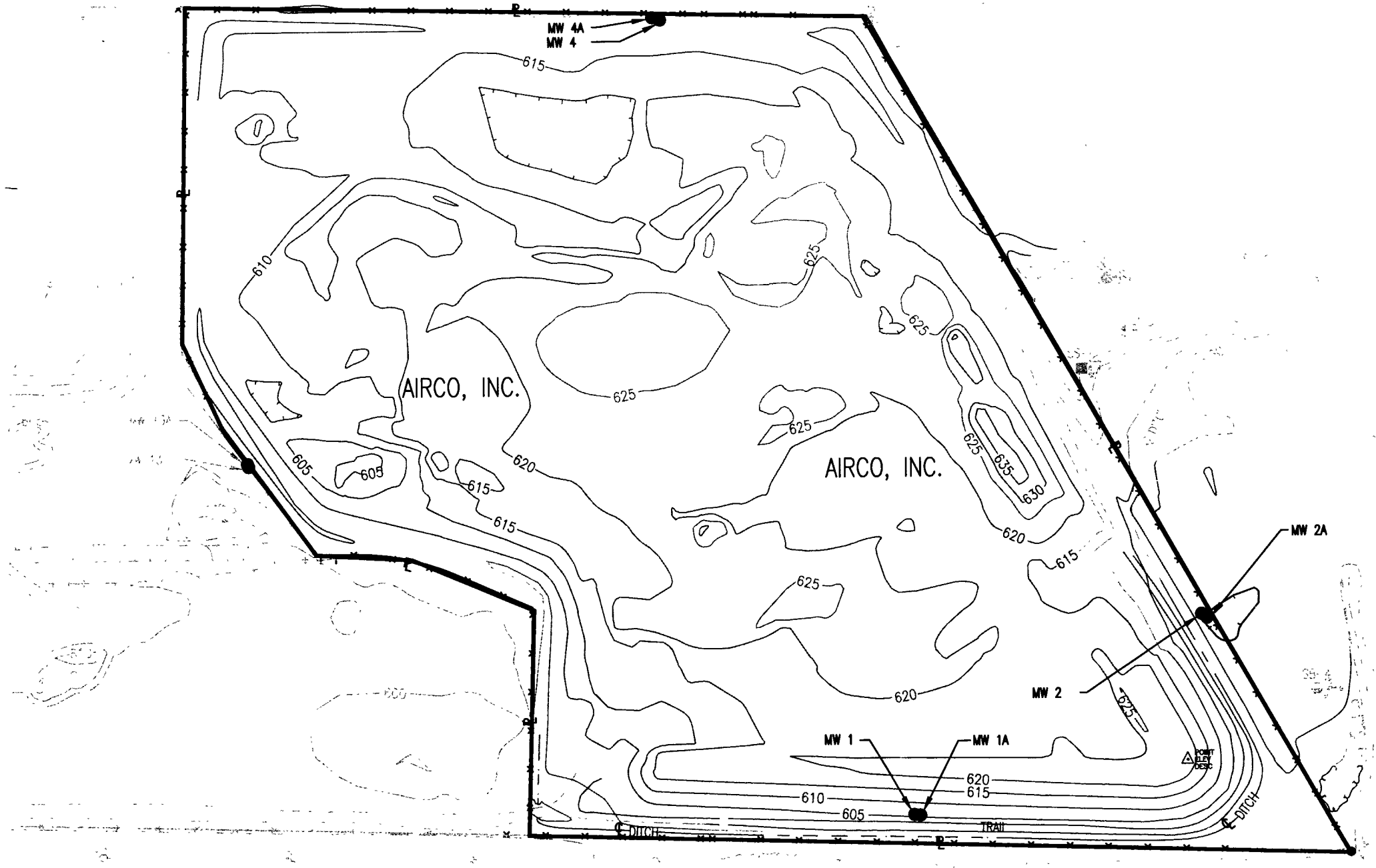
FILE: F:\INDUSTRIAL&OTHER\BOC CASES\12040.33\CAD\REVISED\FIG1-1.DWG

EA ENGINEERING, SCIENCE, AND TECHNOLOGY

WITMER ROAD LANDFILL DESIGN-BUILD
SITE CLOSURE
NIAGARA FALLS, NEW YORK

FIGURE 1-1
VANADIUM SITE

| DESIGNED BY | DRAWN BY | DATE | PROJECT NO. |
|---|---|---|---|
| MJG | JBS | 10-18-99 | 12040.33 |
| CHECKED BY | PROJECT MGR. | SCALE | FIGURE |
| PAP | CEM | AS SHOWN | 1-1 |

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250 125 0 250

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FILE: F:\INDUSTRIAL&OTHER\BOC GASES\12040.33\CAD\REVISED\FIG1-2.DWG

EA ENGINEERING, SCIENCE, AND TECHNOLOGY

WITMER ROAD LANDFILL DESIGN-BUILD
SITE CLOSURE
NIAGARA FALLS, NEW YORK

FIGURE 1-2
AIRCO SITE PLAN

| DESIGNED BY | DRAWN BY | DATE | PROJECT NO. |
|---|---|---|---|
| MJG | JBS | 11-11-99 | 12040.33 |
| CHECKED BY | PROJECT MGR. | SCALE | FIGURE |
| PAP | CEM | AS SHOWN | 1-2 |

# 2. PROJECT TEAM

This chapter presents EA's project design team and discusses the roles and responsibilities of each team member.

EA has assembled a project team to provide design-build site closure services at the Witmer Road Landfill. The team offers the full range of technical skills and experience necessary to successfully complete the project. Figure 2-1 illustrates EA's organizational structure for completing the design activities.

The following summaries provide a brief description of the experience of the key project personnel who will be assigned to the project.

**Mr. Charles E. McLeod, Jr., P.E.,** will serve as *Project Manager*. His responsibilities will include the following:

- Coordinating EA personnel to ensure successful completion of the design activities
- Attending and leading design meetings
- Managing project finances in compliance with established project budgets.

Mr. McLeod is a New York State-registered Professional Engineer who manages and leads design efforts for environmental engineering projects. He is a civil engineer with 9 years of experience involving management and administration of a variety of solid waste and environmental projects, including development of design drawings and specifications, construction project management, and post-closure monitoring.

**Mr. David Santoro, P.E., L.S.,** will serve as the *Quality Assurance/Quality Control Officer and Chief Engineer* for this project. Mr. Santoro is President of EA Engineering, P.C., and Chief Engineer and Director of Quality Control for engineering. Resulting from his more than 35 years of experience, he has become an authority on the design and management of solid and hazardous waste management facilities and site closures. He is particularly experienced in the use of liners in the design and construction of such facilities, as well as the management, certification, and permitting of construction activities for industrial and federal projects. Through such experience, he has developed a thorough understanding of chemical fate and transport and hydrogeology.

Mr. Santoro is a Senior Professional Engineer registered in New York State and is responsible for ensuring the professional quality of design. Mr. Santoro supervises professional engineering design, the preparation of contract specifications, and construction management and inspections; assists with public interaction/acceptance programs; and has provided expert testimony. Mr. Santoro has also directed the design and construction of sanitary and secure landfills and landfill closures utilizing synthetic membranes in seven states, including New York.

Mr. Santoro's responsibilities will include the following:

- Oversight of technical development
- Final review and approval of work products
- Engineer-of-Record, sealing of drawings
- Maintenance of project team integrity.

**Mr. Sam Davis, P.E.,** will serve as *Design Manager*. His responsibilities will include the following:

- Management of the design team
- Oversight of the preparation of design documents
- Attending meetings with NYSDEC to review design submittals.

Mr. Davis is a registered Professional Engineer who manages and leads design efforts for environmental engineering projects. He is a civil engineer with 14 years of experience, including management and administration of solid waste facility designs and site closures.

**Mr. Mark Gutberlet, P.E.,** will serve as the *Project Engineer*. His responsibilities will include the following:

- Leading the design effort
- Preparing the design documents.

Mr. Gutberlet is a registered Professional Engineer with 5 years of experience in environmental projects, including landfill planning and cell design, landfill closure design, landfill gas control, leachate treatment design, and soil and ground-water remediation.

**Mr. Barry Weissman, CSP, REM, CHMM,** will serve as the *Manager of Health and Safety*. His responsibilities will include the following:

- Revising the site-specific health and safety plan prior to construction-related activities
- Coordinating the kick-off meeting to discuss health and safety issues with both EA personnel and subcontractors
- Monitoring site activities through daily contact with the Site Health and Safety Officer.

Mr. Weissman is a Certified Safety Professional, a Registered Environmental Manager, and a Certified Hazardous Materials Manager with over 20 years of environmental health and safety and industrial hygiene experience.

**Mr. Steve Cackowski** will serve as the *Site Health and Safety Officer*. His responsibilities will include the following:

- Enforcing the site-specific health and safety plan
- Field calibrating the air monitoring equipment
- Performing air monitoring as outlined in the site-specific health and safety plan.

Mr. Cackowski has over 23 years of experience as an environmental scientist and has been primarily involved in health and safety projects for the past 7 years. Mr. Cackowski has performed Occupational Safety and Health Administration compliance assessments, asbestos and lead-based paint assessments, confined space hazard assessments, and has managed complex safety and health-related activities.

**Ms. Gina Calderone, C.P.G.,** will serve as the *Project Hydrogeologist*. Her responsibilities will include the following:

- Attending meetings with NYSDEC to negotiate post-closure sampling requirements.

- Preparing and submitting a post-closure monitoring and maintenance plan in accordance with Title 6, Part 360 of the New York State Codes, Rules, and Regulations (NYCRR).

Ms. Calderone is experienced with 6 NYCRR Part 360 regulations and the development and implementation of the post-closure monitoring and maintenance plans. In addition, she is trained and has experience in the delineation and permitting process of federal wetland areas in New York State, and will be involved in the wetland determination at the site. Since 1989, Ms. Calderone has been involved with closure investigations and the development and implementation of long-term monitoring programs for several municipal solid waste landfills in New York State. She has also been involved in the development of cost-effective, innovative technologies for municipal solid waste leachate treatment utilizing constructed wetland areas.

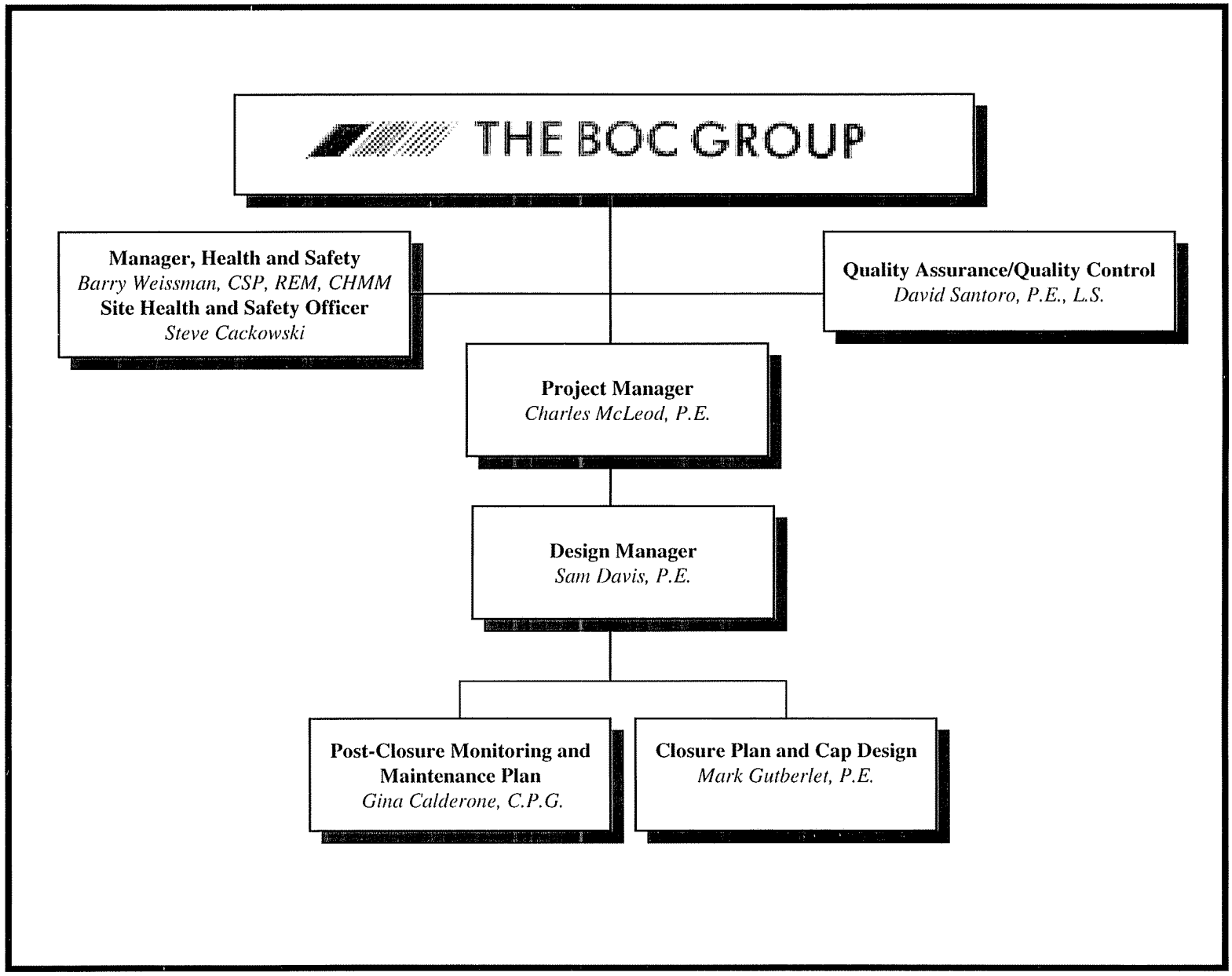



Figure 2-1. Project organization, Witmer Road Landfill design-build site closure, Niagara Falls, New York.

# 3. CONCEPTUAL DESIGN

As part of this Work Plan, a conceptual landfill closure design has been included. The conceptual design addresses the closure cap cross-section and stormwater management. These conceptual design features are discussed in this chapter.

## 3.1 BASIS OF CONCEPTUAL DESIGN

This conceptual design has been prepared to meet the 6 NYCRR Part 360, Subpart 2.15(b) and includes a description of the closure cap cross-section and stormwater management issues. Existing site plans prepared by Lu Engineers in December 1996 were used in evaluating the stormwater management issues at the site.

## 3.2 CLOSURE CAP CROSS-SECTION

Landfill capping in the State of New York must be conducted in accordance with 6 NYCRR Part 360, Subpart 2.15(d), Final Cover System. The regulations require the following capping components:

- Gas venting layer (12-in. minimum)
- Low permeability layer (18-in. $1 \times 10^{-7}$ cm/sec clay layer or a 40-mil geomembrane)
- Barrier protection layer (24-in. minimum)
- Topsoil (6-in. minimum).

## 3.3 REQUESTED VARIANCES TO FINAL COVER SYSTEM

Two variances to the capping components listed in Section 3.2 were requested in a letter to NYSDEC dated 18 January 2000. One involves eliminating the 12-in. gas vent layer and replacing that layer with a 6-in. bedding layer. Based upon the results of the soil gas survey performed during the pre-design investigation, the gas vent layer can be removed from the cross-section due to the absence of landfill gases. The replacement of this layer with a 6-in. bedding layer meets the standard of care within the industry for protection of the very low density polyethylene (VLDPE) geomembrane. The second variance involves reducing the 24-in. barrier protection layer to a 12-in. layer and adding a geocomposite drainage layer. Therefore, the proposed final capping components are as follows:

- Bedding layer (6-in.)
- Low permeability layer (40-mil VLDPE geomembrane)
- Drainage layer (geocomposite drainage net)
- Barrier protection layer (12 in.)
- Topsoil (6 in.).

Figure 3-1 details the conceptual design cross-section with the final capping components. Figure 3-2 details the conceptual design cross-section of the cap system key-in detail with native soil.

### 3.3.1 Bedding Layer

Due to the inorganic nature of the waste at this site, a gas venting layer is not required beneath the low permeability cap. The waste is primarily slag and dust from the Vanadium and Airco operations. Inert fire bricks, concrete blocks, coke, and graphite wastes were also landfilled at the site. Since none of these wastes produce organic gases due to degradation, a variance was requested to reduce the standard 12-in. layer to a 6-in. bedding layer.

The bedding layer is not a high permeable layer as depicted by the regulations for the purpose of collecting and venting landfill gases. This layer is specifically designed to protect the integrity of the low permeability layer from sharp rocks or protrusions that typically exist at the site. The characteristics of this bedding material will be determined during the design phase.

### 3.3.2 Low Permeability Layer

An economic analysis was performed on four low permeability layer alternatives that met 6 NYCRR Part 360 requirements, and one that was a variance to the Part 360 requirements. The economic analysis considered the following:

- 18 in. of $1 \times 10^{-7}$ cm/sec clay
- 40-mil polyvinyl chloride geomembrane
- 60-mil high density polyethylene geomembrane
- 40-mil VLDPE geomembrane
- Geosynthetic clay liner (variance required).

The analysis concluded that the most economical low permeability alternative is to utilize either a VLDPE geomembrane or a geosynthetic clay liner. The VLDPE geomembrane has been selected as the low permeability layer based on cost effectiveness and compliance with 6 NYCRR Part 360, and since a variance would have been required to utilize a geosynthetic clay liner.

The use of a 40-mil VLDPE geomembrane as the low permeability layer meets 6 NYCRR Part 360 requirements and is the current industry standard for closure caps. Installation of a membrane liner eliminates approximately 60,000 $yd^3$ of clay that would be required to meet the regulations, and will reduce the required construction time by approximately 60 working days. The stability of the slopes covered by the VLDPE and subsequent cover layers will be evaluated during the design phase to determine the required friction angle between the VLDPE geomembrane and the barrier protection layer to ensure a stable capping system.

### 3.3.3 Drainage Layer

The drainage layer will consist of a high density polyethylene drainage net-geotextile geocomposite. The drainage net is manufactured by extruding two sets of strands to form a 3-dimensional structure to provide planar water flow. By design, these nets carry large amounts of liquid within their structure and are often called sheet drains. Geotextile filter fabric is heat

bonded to both sides of the high density polyethylene drainage net to inhibit soil intrusion into the drainage net. The material purchase, transportation, and installation costs of geocomposites is considerably less than for an equivalent sand or gravel drainage system. Also, shear tests on composites with clayey soil indicate friction angles in excess of 30 degrees.

### 3.3.4 Barrier Protection Layer

The barrier protection layer will consist of a 12-in. layer of 1 in. minus well bonded fill. The 12-in. barrier protection layer, in lieu of the required 24-in. barrier protection layer, will provide suitable cover to protect the geocomposite drainage layer and 40-mil VLDPE geomembrane from surface loading and allow for a stable condition on the final slopes, including an adequate zone for supporting the vegetative layer. It will be sufficient to protect the geomembrane from frost action and root penetration without adversely impacting the efficiency of the final cover system. The physical characteristics of this layer will be evaluated during the preparation of the design documents.

### 3.3.5 Topsoil Layer

The required 6-in. topsoil layer is included in the conceptual design. No deviations from 6 NYCRR Part 360 are proposed for this layer. The topsoil will be free of deleterious material and with a sufficient organic content to support vegetative growth.

### 3.3.6 Consolidation of Waste Materials

To reduce closure costs, the footprint of the area to be capped will be reduced by consolidating wastes into the center of the site and, where practicable, the perimeter of the site will be excavated down to virgin clay material. This is particularly feasible along the northwestern, western, and southern perimeter, where the waste material extends from 1 to 6 ft below ground surface. Approximately 2 acres of the northwestern Airco property will be excavated to virgin clay (approximately 10,000-20,000 $yd^3$ of waste material). The remediated area will be restored with topsoil and vegetation growth and used as the support zone with staging for construction and support equipment.

## 3.4 STORMWATER MANAGEMENT

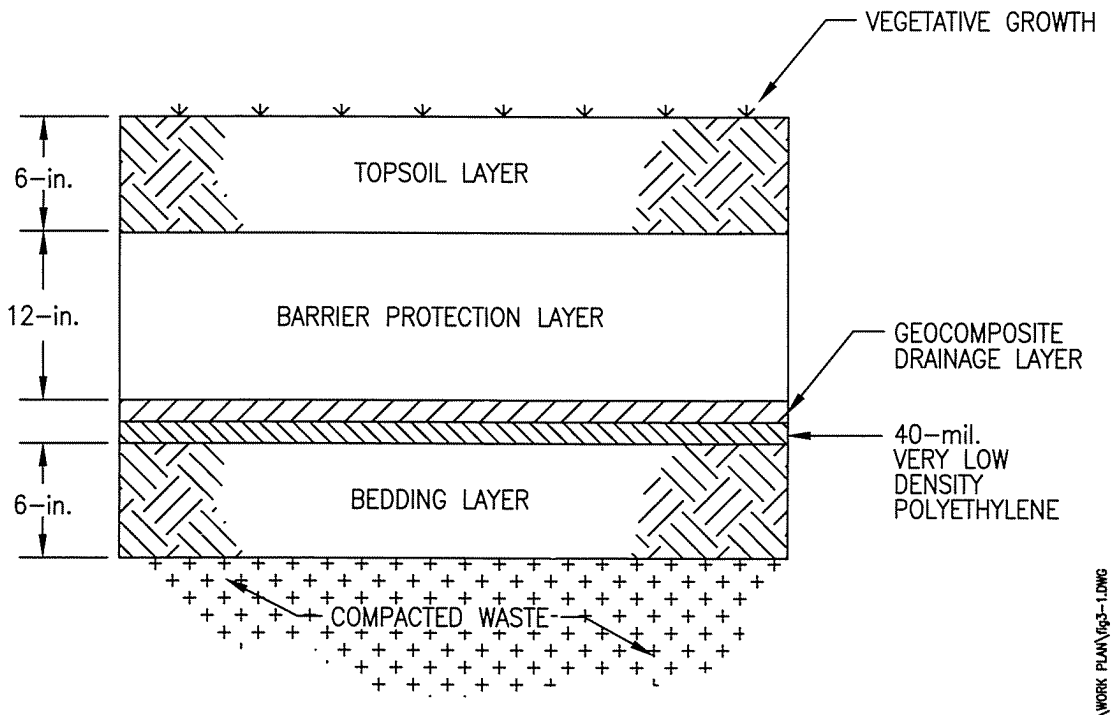
Stormwater will be managed at the site in accordance with 6 NYCRR Part 360, Subpart 2.15(k)(2). Perimeter drainage structures will be designed to handle the peak discharge from the 24-hour, 25-year storm. The cap will be graded and seeded to minimize erosion of the cover soil and minimize ponding on the landfill cap.

The existing site drainage pattern will be maintained during and after the interim closure construction as shown on Figure 3-3. Water flows around the perimeter of the landfill from a high point on the northeast corner of the site to the wetlands at the southwest corner of the site. The perimeter drainage will remain unchanged.

The perimeter drainage on the eastern property line will require encroachment onto property owned by NMPC (Figure 3-3). A variance to allow construction activities, including regrading of wastes, will be pursued. Stormwater management on the abutting property will be required to prevent stormwater in contact with waste material on the abutting property from flowing onto the Airco site.

## 3.5 EASTERN PROPERTY LINE CONCEPTUAL DETAIL

The eastern property line will require significant regrading to achieve the desired final grades. The regrading will result in the construction of a ridge on the property line that will eliminate contaminated surface flow from NMPC onto the Airco property. Figure 3-4 details a conceptual design cross-section that depicts the new drainage swales on both the Airco and NMPC subsites. A standard 6 NYCRR 360 closure section (6-in. topsoil, 24-in. barrier protection layer, and an 18-in. $10^{-7}$ clay layer) was used to address the property boundary. The proposed cap section will key into the 18-in. clay layer as shown. This detail will allow for successful key-in to the cap system in the event that an interim remedial closure of the NMPC parcel is planned in the future.

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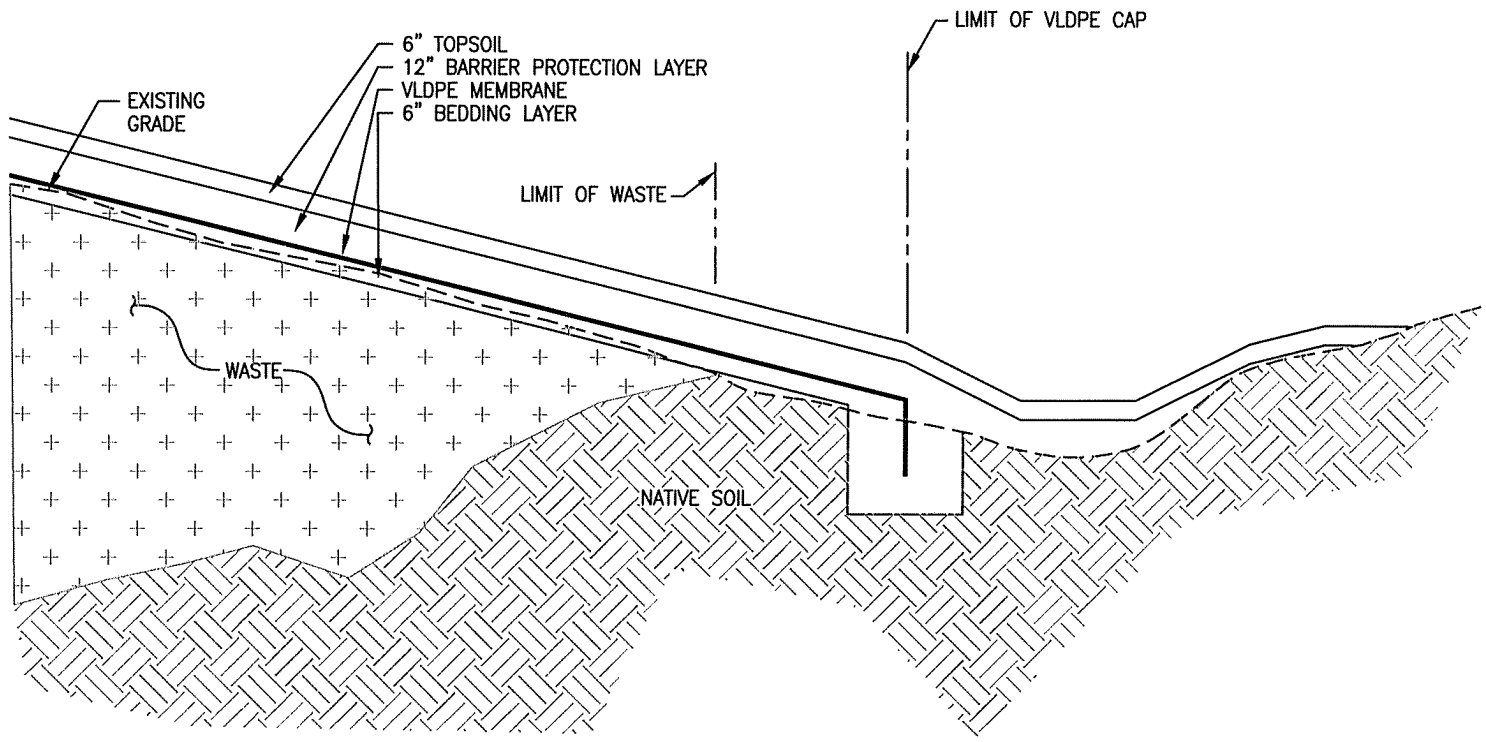
EA ENGINEERING, SCIENCE, AND TECHNOLOGY

WITMER ROAD LANDFILL DESIGN–BUILD
SITE CLOSURE
NIAGARA FALLS, NEW YORK

FIGURE 3–1
PROPOSED CAP SECTION

| PROJECT MGR | DESIGNED BY | DRAWN BY | CHECKED BY | SCALE | DATE | PROJECT NO | FIGURE |
|---|---|---|---|---|---|---|---|
| CEM | DOK | JBS | PAP | NONE | 9–22–99 | 12040.33 | 3–1 |



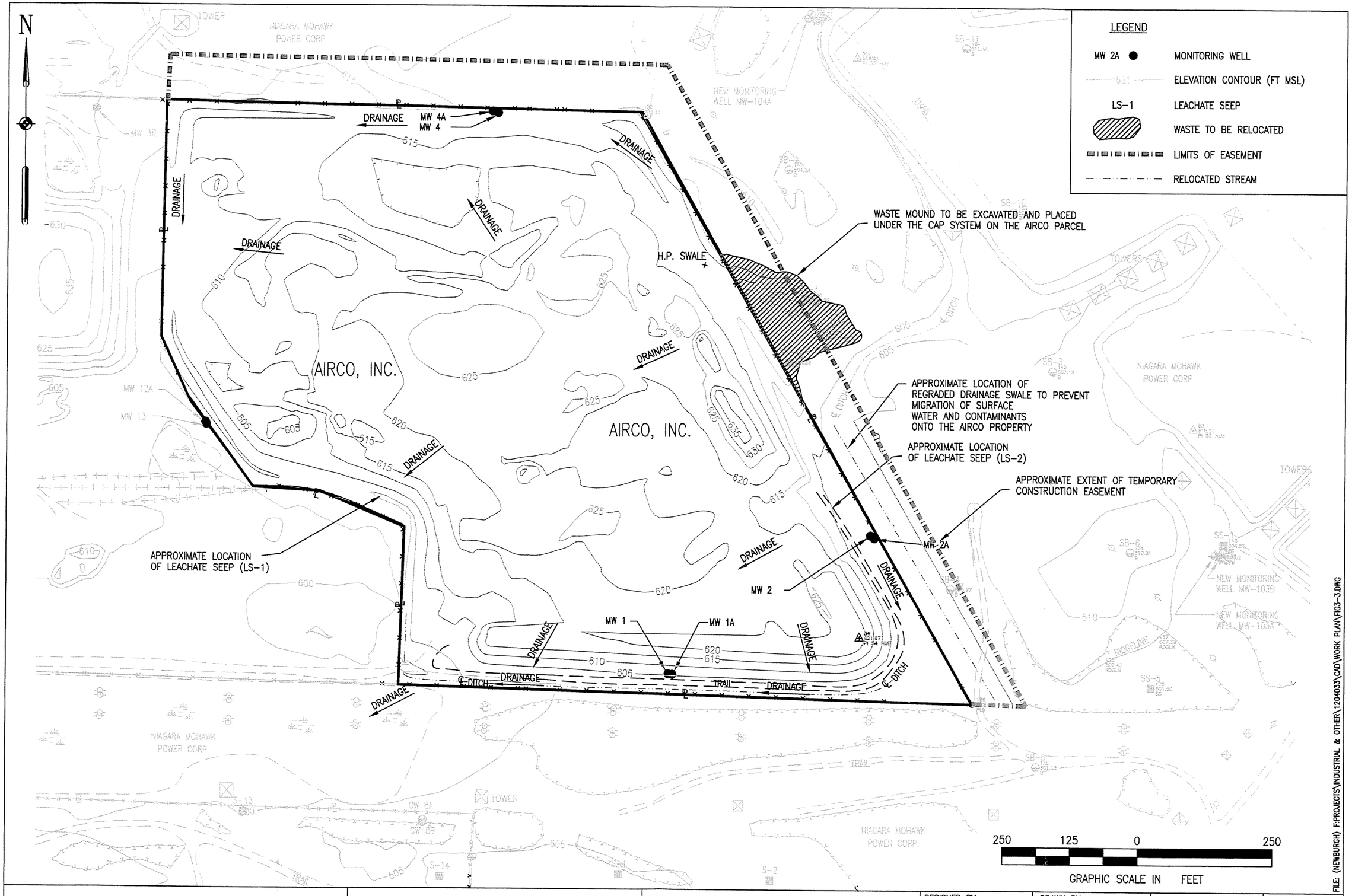

+ WASTE MATERIAL

5 2.5 0 5

GRAPHIC SCALE IN FEET

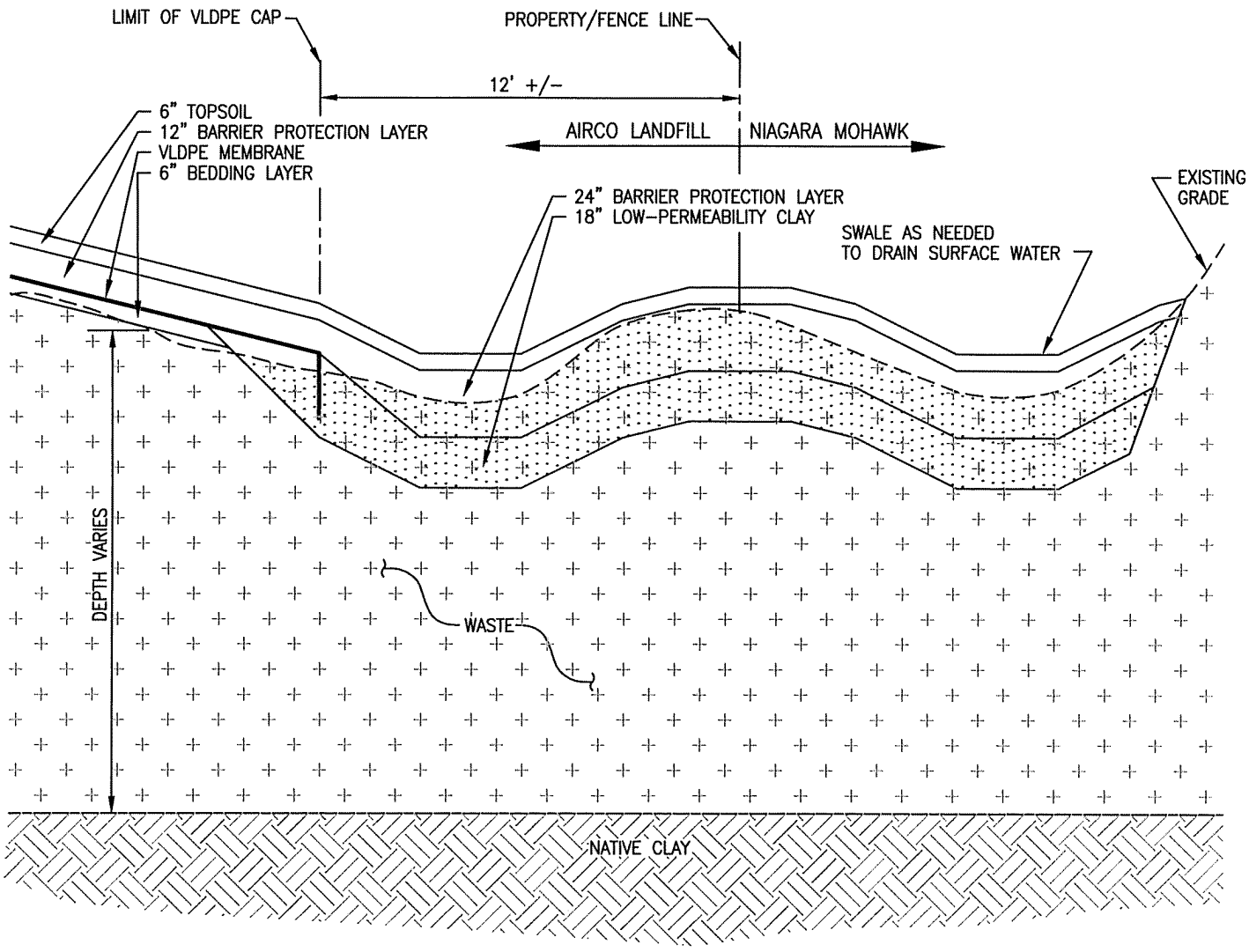
FILE: (NEWBURGH) F:\PROJECTS\INDUSTRIAL & OTHER\12040.33\CAD\WORK PLAN\FIG3-2.DWG

| | | | | | | |
|---|---|---|---|---|---|---|
| EA ENGINEERING, SCIENCE, AND TECHNOLOGY | WITMER ROAD LANDFILL DESIGN-BUILD SITE CLOSURE NIAGARA FALLS, NEW YORK | FIGURE 3-2 PROPOSED KEY-IN DETAIL TO NATIVE SOIL | DESIGNED BY DOK | DRAWN BY FDV | DATE 2-24-00 | PROJECT NO. 12040.33 |
| | | | CHECKED BY MJG | PROJECT MGR. CEM | SCALE AS SHOWN | FIGURE 3-2 |




| | | | | | | |
|---|---|---|---|---|---|---|
| EA ENGINEERING, SCIENCE, AND TECHNOLOGY | WITMER ROAD LANDFILL DESIGN-BUILD SITE CLOSURE<br>NIAGARA FALLS, NEW YORK | FIGURE 3-3<br>STORMWATER MANAGEMENT | DESIGNED BY<br>MJG | DRAWN BY<br>JBS | DATE<br>02-23-00 | PROJECT NO.<br>12040.33 |
| | | | CHECKED BY<br>PAP | PROJECT MGR.<br>CEM | SCALE<br>AS SHOWN | FIGURE<br>3-3 |

FILE: (NEWBURGH) F:\PROJECTS\INDUSTRIAL & OTHER\12040333\CAD\WORK PLAN\FIG3-3.DWG




WASTE MATERIAL

MATERIAL TO BE EXCAVATED

5 2.5 0 5

GRAPHIC SCALE IN FEET

FILE: (NEWBURGH) F:\PROJECTS\INDUSTRIAL & OTHER\12040.33\CAD\WORK PLAN\FIG3-4.DWG

EA ENGINEERING, SCIENCE, AND TECHNOLOGY

WITMER ROAD LANDFILL
DESIGN-BUILD SITE CLOSURE
NIAGARA FALLS, NEW YORK

FIGURE 3-4
WASTE EXCAVATION AT
PROPERTY LINE DETAIL

| DESIGNED BY | DRAWN BY | DATE | PROJECT NO. |
|---|---|---|---|
| DOK | FDV | 2-22-00 | 12040.33 |
| CHECKED BY | PROJECT MGR. | SCALE | FIGURE |
| MJG | CEM | AS SHOWN | 3-4 |

# 4. CLOSURE REQUIREMENTS

## 4.1 PRE-DESIGN INVESTIGATIONS

Based on conversations with NYSDEC personnel, the investigation phase has been completed to the satisfaction of NYSDEC, and additional investigative activities are not required. However, some pre-design activities were conducted by EA from 6 to 15 December 1999, including leachate and vector surveys, topographic and wetlands surveys, and preliminary determination of the extent of waste fill material.

The pre-design activities were performed prior to preparation of the closure plan and development of the final design. The information gathered during the pre-design activities will be used to develop the closure plan and final design. Each of the pre-design activities performed during the period 6-15 December 1999 is discussed below.

### 4.1.1 Leachate and Vector Survey

A surface condition investigation was conducted on 7 December 1999 to identify the presence of uncontrolled leachate at, or emanating from, the landfill. Two leachate seeps were identified at the Airco parcel. Leachate Seep LS-1 is located on the southwestern side of the property and Leachate Seep LS-2 is located on the eastern side of the property (Figure 3-3). Both seeps discharge directly into the perimeter swale, which ultimately flows into the adjoining wetlands beyond the property boundary. Both leachate seeps will be addressed during the design phase in order to eliminate uncontrolled leachate discharge from the Witmer Road Landfill.

An ecological vector survey was conducted on 7 December 1999. The survey consisted of walking the perimeter of the site four times and crossing diagonally from several directions over the landfill surface. The presence of vectors was based on direct observations of organisms and secondary observation of wildlife signs (tracks, scat, burrows, etc.). Remnant plant material indicated that the common reed *Phragmites* was the dominant wetland vegetation. Specimens of the following fauna were observed on or immediately adjacent to the site:

- Coyote (*Canis latrans*)
- Red-tailed hawk (*Buteo jamaicensis*)
- Muskrat (*Ondatra zibethicus*)
- Canada goose (*Branta canadensis*).

Signs of the following vertebrates were observed on the landfill:

- Humans (all-terrain vehicle tracks, bottles)
- Coyote/dog (tracks, scat)
- Rabbit (tracks)
- Mouse/mole (burrows, tracks).

The majority of these species do not permanently dwell on the Airco subsite, but gain access to and through the property under or through damaged portions of the perimeter fence. However, mouse/mole burrows were observed at various locations in and around the waste materials. These species are not part of the threatened or endangered list and, therefore, will not be protected during the design or construction phases.

### 4.1.2 Extent of Wetlands

A preliminary determination of the extent of wetlands regulated under the Code of Federal Regulation, Title 40, Section 6.302(a) (40 CFR 6.302 [a]) was completed by field delineation during the pre-design activities. An EA wetland delineator determined wetland limits using the 3-parameter approach described in the U.S. Army Corps of Engineers *Wetland Delineation Manual* (USACE 1987[3]). The delineation identified wetland areas that may have developed adventitiously on the landfill parcel and determined the limit of adjacent wetlands that may be affected by the design. A final wetland delineation will be conducted in the Spring of 2000, approximately 1 month following vegetative growth.

The fillward limit of wetlands was staked and flagged on 7 December 1999. In general, wetlands were observed along the southwestern, southern, and eastern perimeter of the property. A location survey of the wetland stakes was completed and the wetland limits will be mapped on design drawings. It will be necessary to encroach on the perimeter wetlands in order to excavate waste materials along the perimeter. This issue will be addressed in the design, and the wetlands will be restored as much as is practicable.

### 4.1.3 Extent of Waste Fill Materials

In order to minimize the lateral extent of the landfill cap, EA conducted a test-pitting program around the perimeter of the site to determine fill material thickness and lateral extent. This information will be used to determine where waste consolidation is feasible, and where the footprint of the landfill can be reduced. The test pits were dug utilizing a backhoe, an operator, and a supervising engineer. Excavation of the test pits was started onsite where it was likely that waste had been placed, and continued away from the landfill until no further waste was encountered.

EA's supervising engineer monitored each excavation and work space with appropriate monitoring equipment to ensure safe site operations. The supervising engineer field-staked where each test pit began, where waste placement ended, and where the test pit excavation ended; depth of the waste was recorded, if determined. These stakes were surveyed on 13 December 1999 to accurately delineate the edge of the waste. Excavated soil and waste were stockpiled alongside the test pit, and backfilled into the same excavation following completion of each test pit.

3. U.S. Army Corps of Engineers (USACE). 1987. Wetland Delineation Manual.

Twenty-nine test pits were dug around the perimeter of the landfill from 7 to 9 December 1999. The supervising engineer exercised latitude on where to place the test pits based on topography, line-of-sight, information contained in available reports, or other site conditions.

The test pit information was utilized to locate areas where additional investigation was performed utilizing a drill rig. As necessary, borings were installed to determine the vertical extent of waste material, and the geotechnical and physical characteristics of the fill and overburden materials. This information was required to determine landfill stability. Sixteen borings were installed to provide the necessary geotechnical information with an emphasis on waste delineation.

### 4.1.4 Geotechnical Analysis of Collected Samples

On 6 December 1999, 4 waste samples and 1 soil sample were collected. Geotechnical tests were run on the 4 waste samples and 1 sample of the cap material. The physical characteristics of the waste and soil samples are depicted in Table 4-1. None of the waste samples exhibited unusual physical characteristics that would inhibit construction of the cap system. The clay soil sample collected exhibited a permeability of $3.6 \times 10^{-8}$, which exceeds the $1.0 \times 10^{-7}$ requirement depicted in 6 NYCRR Part 360-2.13 (P). Some of this material could be mined for use within the cap system, particularly for use within the drainage swales. This will be taken into consideration during the design phase.

### 4.1.5 Surveying

The site was surveyed from 13 to 15 December 1999 to provide current topographic information as the basis for site civil design. An aerial survey was also performed on 10 December 1999 by a New York-licensed surveyor with a 2-ft contour interval, supplemented as necessary by the field survey to verify the results of the aerial survey and to locate utilities and other site features. The survey located woodlands, streams, structures, monitoring wells, roads, utilities, fencelines, property boundaries, and other appropriate site features.

The field survey also located the staked extent of wetlands, test pit locations, borings, and other features, and will be used to support the closure design. Survey information will be presented as part of the design submittal.

### 4.1.6 Site Access and Easement Agreements

Because the Airco subsite is the middle of the three parcels which comprise the Vanadium site, and direct access to a public road does not exist, site access agreements and/or easements with adjacent property owners will be obtained prior to construction activities.

After examining the site plan, the most logical access is from Witmer Road, northwest of the Airco site. The parcel to the north of the Witmer Road Landfill is owned by NMPC and is served by an unpaved access road with an entrance along Witmer Road. Construction traffic would use this route and access the project site from the north.

An additional construction easement will be required to allow access along the eastern and northern property boundaries for construction related activities. This will be a temporary easement and will be in place for the duration of construction of the cap system.

A meeting with NMPC personnel was attended on 11 January 2000 to discuss obtaining a permanent easement. NMPC personnel indicated that an easement was obtainable and would be granted upon successful completion of an easement application.

### 4.1.7 Required Air Monitoring During Construction Activities

Fugitive dust suppression, particulate monitoring, and subsequent action levels for such must be used and applied consistently during remedial activities at hazardous sites.

According to the Technical and Administrative Guidance Memorandum No. 4031 (Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites), the primary standards are 150 $\mu g/m^3$ over a 24-hour averaging time and 50 $\mu g/m^3$ over an annual averaging time.

Real-time monitoring for volatile compounds and particulate levels at the perimeter of the work area is necessary. Based on the New York State Community Air Monitoring Plan, the following monitoring will be performed:

- Particulates will be continuously monitored upwind, downwind, and within the work area at temporary particulate monitoring stations. If the downwind particulate level is 150 $\mu g/m^3$ greater than the upwind particulate level, the dust suppression techniques must be employed. All readings must be recorded and available for NYSDEC and New York State Department of Health personnel to review. The closure construction will be performed in accordance with Technical and Administrative Guidance Memorandum No. 4031 and the New York State Community Air Monitoring Plan.

## 4.2 CLOSURE DESIGN

### 4.2.1 Closure Plan

The closure plan will be prepared in accordance with 6 NYCRR Part 360-2.15 (b) and (c). The closure plan will include a site plan to show final grades, property lines, stormwater drainage systems, streams and water courses, roads, and structures. It will include typical details of cap components and facility structures. Based on existing information, an estimate of the maximum inventory of wastes deposited onsite during the active life of the landfill will be included. If fill materials are required to be brought onsite to achieve design, these materials will require NYSDEC approval.

In addition, the closure plan will also provide an estimate of the landfill area to be covered and a closure construction schedule. A comprehensive post-closure monitoring and maintenance closure plan is also required and is conceptually outlined in Section 4.3. The post-closure

monitoring and maintenance closure plan will provide the information needed to effectively monitor and maintain the facility for the duration of post-closure monitoring.

### 4.2.2 Contract Documents

As the project progresses, detailed engineering design and construction-level documents will be required. These documents will include a drawing set, and contractual and technical specifications.

The required closure design drawings will be prepared and submitted for review by BOC and NYSDEC when the plans and specifications are 60 percent complete. Changes or modifications will be incorporated into the 90 percent complete design documents. A revised set will be submitted to NYSDEC for final approval of the closure plan and capping design.

It is anticipated that the 60 percent design submittal will be available for review on or about 22 March 2000. A 60 percent design review meeting would be held at NYSDEC in Buffalo on or about 6 April 2000 to finalize and answer all comments generated by NYSDEC. The 90 percent complete submittal would then be submitted on or about 14 April 2000, but no later than 30 April 2000.

## 4.3 POST-CLOSURE MONITORING AND MAINTENANCE PLAN

A post-closure monitoring and maintenance plan will be developed in accordance with 6 NYCRR Part 360-2.15 for the site. The post-closure monitoring and maintenance plan will be submitted as part of the 60 percent and 90 percent design submittals. Landfill maintenance and monitoring requirements are summarized in this section.

### 4.3.1 Landfill Maintenance

Site inspections will be performed on a routine basis (to be negotiated with NYSDEC during the 13 March 2000 meeting) to ensure that the final landfill cover and drainage structures are functioning within accepted design standards. The inspections will include visual checks of all culverts, rip-rap, swales, and berms/benches, if present, to ensure erosion problems are not occurring. Erosion occurrences associated with drainage will be repaired and restored. Eroded soil or displaced rip-rap will be replaced. Exposed or unvegetated soil will be reseeded, fertilized, and mulched.

Areas of concern with final landfill cover systems typically include erosion, loss of vegetative cover, and settlement or cracking on the top or side slopes. If cracks or settlement occur, the inspector will determine if the barrier layer is affected.

The presence of any vectors (e.g., rodents, burrowing animals, etc.) on the site will be noted during the routine inspection. Extermination or treatment that will remove the vecting population(s) will be implemented, as appropriate.

Monitoring well casings, locks, fences, and gates will be inspected to ensure that they are undamaged and functional. Damages will be repaired immediately and all structures will be re-secured.

Following each inspection, a report will be prepared and submitted to BOC and NYSDEC. The inspection report will include, at a minimum, the date and time of the inspection, personnel conducting the inspection, visual observations of the inspectors, a list of items inspected, and a brief description of any repair work, if required, including the nature of the damage, the repairs completed, and the estimated cost of the repairs. The report will also describe any items that will need future attention or repairs not completed during the course of the inspection, along with other pertinent comments.

### 4.3.2 Monitoring Program

A long-term monitoring plan will be defined within the post-closure monitoring and maintenance closure plan to provide data to establish baseline conditions of the aquifer, and to monitor changing conditions. The long-term monitoring plan will be established in accordance with the regulations as defined in 6 NYCRR Part 360, and will outline the sampling program frequency, analytical procedures, and field sampling protocols. The procedures will include, but may not be limited to, ground-water sampling, surface water sampling, field quality assurance/quality control, equipment decontamination, an equipment list, and sample preservation and chain-of-custody. The results of the long-term monitoring plan will consist of the field data sheets, chain-of-custody form, and the laboratory analysis results summarized in a report. A meeting to discuss the monitoring requirements with NYSDEC has been scheduled for 13 March 2000.

# TABLE 4-1 SUMMARY OF GEOTECHNICAL RESULTS OF WASTE AND CAP MATERIAL COLLECTED ON 6 DECEMBER 1999, WITMER ROAD LANDFILL, NIAGARA FALLS, NEW YORK

| Identification | Moisture-Density Relationship (Modified) | | | |
|---|---|---|---|---|
| Sample Number | Maximum Dry Density (pfc) | Opt. Water Content (%) | Permeability (cm/sec) | Laboratory Log and Soil Description |
| Waste-1 | 50.5 | 37.0 | Not applicable | Dark gray well-graded sand with gravel (SW) |
| Waste-2 | 61.0 | 57.5 | Not applicable | Bluish gray well-graded sand with silt (SW-SM) |
| Waste-3 | 57.5 | 29.0 | Not applicable | Dark gray well-graded gravel with sand (GW) |
| Waste-4 | 44.5 | 90.0 | Not applicable | Bluish gray silty sand (SM) |
| Cap Material | 122.0 | 13.5 | 3.6E-08 | Dark brown lean clay with sand (CL) |

NOTE: SW = Well graded clean sand, gravely sand.
SM = Silty sand, poorly graded sand-silt mix.
GW = Well graded, clean gravels, grave-sand mixture.
CL = Inorganic clays of low to medium plasticity.

# 5. PROJECT SCHEDULE

This chapter presents the anticipated schedule for pre-design (complete), design, and construction activities. The schedule is based upon execution of the Consent on or before 10 March 2000. Figure 5-1 outlines the key milestones for successful implementation of this project.

## 5.1 PRE-DESIGN ACTIVITIES

The pre-design field investigation was completed from 6 to 15 December 1999. The investigation included wetlands, leachate, vector, and topographic surveys and determination of waste fill material extent. These activities were completed prior to the onset of winter weather to effectively gather the required information.

## 5.2 CLOSURE PLAN AND DESIGN ACTIVITIES

Preparation of the closure plan, including design documents, will begin following compilation and analysis of the pre-design investigation data and acceptance of the variance request by NYSDEC. Some aspects of the closure plan and design documents can be completed simultaneously. It is anticipated that completion of the closure plan and design documents, including regulatory interaction and approval, will be completed no later than 28 April 2000.

## 5.3 POST-CLOSURE MONITORING AND MAINTENANCE PLAN

Preparation of the post-closure monitoring and maintenance plan will begin concurrent with the closure plan preparation. It is anticipated that completion of the post-closure monitoring and maintenance plan, including regulatory approval, will be completed no later than 28 April 2000.

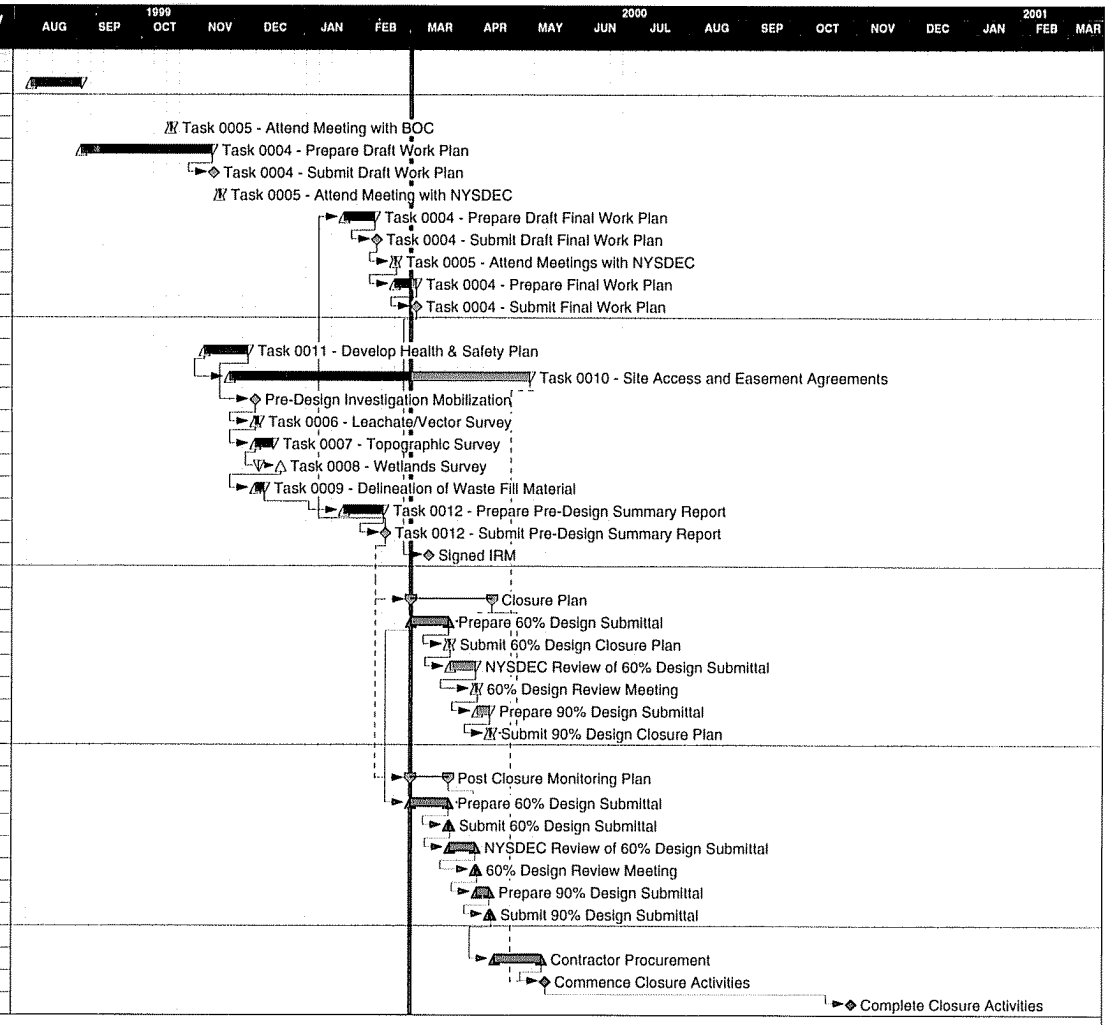
## 5.4 BID PHASE ACTIVITIES

Assuming that the closure and post-closure monitoring and maintenance plans are approved and complete prior to 28 April 2000, it is anticipated that contractors will be selected and under contract by mid-May 2000.

## 5.5 LANDFILL CLOSURE CONSTRUCTION ACTIVITIES

The mobilization of materials, equipment, and labor to commence construction-phase activities is anticipated to occur by 15 May 2000. Mobilization is contingent upon successful selection of a qualified contractor. It is anticipated that the landfill cap will be significantly complete with the bedding, low-permeable, barrier protection, and vegetative layers in place by 30 October 2000. Most of this time will be spent bringing material onto the site and placement of the 6-in. bedding layer, 12-in. barrier protection layer, and the 6-in topsoil layer.

| Description | Orig Dur | Rem Dur | Early Start | Early Finish | Total Float | % | Activity ID |
|---|---|---|---|---|---|---|---|
| +Project Start Up | | | | | | | |
| | 20 | 0 | 04AUG99 A | 31AUG99 A | | 100 | |
| Work Plan and Conceptual Design | | | | | | | |
| Task 0005 - Attend Meeting with BOC | 1 | 0 | 20OCT99 A | 20OCT99 A | | 100 | 41 |
| Task 0004 - Prepare Draft Work Plan | 20 | 0 | 01SEP99 A | 11NOV99 A | | 100 | 42 |
| Task 0004 - Submit Draft Work Plan | 0 | 0 | | 12NOV99 A | | 100 | 43 |
| Task 0005 - Attend Meeting with NYSDEC | 1 | 0 | 16NOV99 A | 16NOV99 A | | 100 | 44 |
| Task 0004 - Prepare Draft Final Work Plan | 10 | 0 | 24JAN00 A | 09FEB00 A | | 100 | 59 |
| Task 0004 - Submit Draft Final Work Plan | 0 | 0 | | 10FEB00 A | | 100 | 60 |
| Task 0005 - Attend Meetings with NYSDEC | 1 | 0 | 21FEB00 A | 21FEB00 A | | 100 | 61 |
| Task 0004 - Prepare Final Work Plan | 10 | 3 | 21FEB00 A | 03MAR00 | 15d | 70 | 62 |
| Task 0004 - Submit Final Work Plan | 0 | 0 | | 03MAR00 | 15d | 0 | 63 |
| Projected Work Activities | | | | | | | |
| Task 0011 - Develop Health & Safety Plan | 15 | 0 | 08NOV99 A | 01DEC99 A | | 100 | 50 |
| Task 0010 - Site Access and Easement Agreements | 117 | 48 | 22NOV99 A | 05MAY00 | 5d | 59 | 51 |
| Pre-Design Investigation Mobilization | 0 | 0 | 06DEC99 A | | | 100 | 52 |
| Task 0006 - Leachate/Vector Survey | 9 | 0 | 06DEC99 A | 07DEC99 A | | 100 | 53 |
| Task 0007 - Topographic Survey | 9 | 0 | 06DEC99 A | 15DEC99 A | | 100 | 54 |
| Task 0008 - Wetlands Survey | 9 | 0 | 20DEC99 A | 07DEC99 A | | 100 | 55 |
| Task 0009 - Delineation of Waste Fill Material | 9 | 0 | 06DEC99 A | 10DEC99 A | | 100 | 56 |
| Task 0012 - Prepare Pre-Design Summary Report | 15 | 0 | 24JAN00 A | 14FEB00 A | | 100 | 57 |
| Task 0012 - Submit Pre-Design Summary Report | 0 | 0 | | 15FEB00 A | | 100 | 58 |
| Signed IRM | 0 | 0 | | 10MAR00 | 15d | 0 | 64 |
| Closure Plan | | | | | | | |
| Closure Plan | 33 * | 33 * | 01MAR00 | 14APR00 | 10d | 0 | 120 |
| Prepare 60% Design Submittal | 15 | 15 | 01MAR00 | 21MAR00 | 0 | 0 | 121 |
| Submit 60% Design Closure Plan | 1 | 1 | 22MAR00 | 22MAR00 | 10d | 0 | 122 |
| NYSDEC Review of 60% Design Submittal | 10 | 10 | 23MAR00 | 05APR00 | 10d | 0 | 123 |
| 60% Design Review Meeting | 1 | 1 | 06APR00 | 06APR00 | 10d | 0 | 124 |
| Prepare 90% Design Submittal | 5 | 5 | 07APR00 | 13APR00 | 10d | 0 | 125 |
| Submit 90% Design Closure Plan | 1 | 1 | 14APR00 | 14APR00 | 10d | 0 | 126 |
| Post Closure Monitoring & Maintenance Plan | | | | | | | |
| Post Closure Monitoring Plan | 15 * | 15 * | 01MAR00 | 21MAR00 | 0 | 0 | 130 |
| Prepare 60% Design Submittal | 15 | 15 | 01MAR00 | 21MAR00 | 0 | 0 | 131 |
| Submit 60% Design Submittal | 1 | 1 | 22MAR00 | 22MAR00 | 0 | 0 | 132 |
| NYSDEC Review of 60% Design Submittal | 10 | 10 | 23MAR00 | 05APR00 | 0 | 0 | 133 |
| 60% Design Review Meeting | 1 | 1 | 06APR00 | 06APR00 | 0 | 0 | 134 |
| Prepare 90% Design Submittal | 5 | 5 | 07APR00 | 13APR00 | 0 | 0 | 135 |
| Submit 90% Design Submittal | 1 | 1 | 14APR00 | 14APR00 | 0 | 0 | 136 |
| Construction Related Activities | | | | | | | |
| Contractor Procurement | 20 | 20 | 17APR00 | 12MAY00 | 0 | 0 | 140 |
| Commence Closure Activities | 0 | 0 | 15MAY00 | | 0 | 0 | 150 |
| Complete Closure Activities | 0 | 0 | | 30OCT00 | 0 | 0 | 160 |




| | |
|---|---|
| Start date | 01AUG99 |
| Finish date | 30OCT00 |
| Data date | 01MAR00 |
| Run date | 29FEB00 |
| Page number | 1A |



Early bar
Early start point
Early finish point
Progress bar
Critical bar
Summary bar
Progress point
Critical point
Summary point
Start milestone point
Finish milestone point

**Figure 5-1. Closure schedule, Witmer Road Landfill design-build site closure, Niagara Falls, New York.**