ERM-Northeast

18

REMEDIAL DESIGN
NORTON COMPANY RESTORATION SITE
COLONIE, NEW YORK
SITE NUMBER 401010

MARCH 27, 1992

PREPARED FOR:

NORTON COMPANY
COATED ABRASIVE DIVISION
2600 10TH AVENUE
WATERVLIET, NEW YORK 12189

PREPARED BY:

ERM-ENVIROCLEAN-NORTHEAST, INC.
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ALBANY, NEW YORK 12205
ERM-ENVIROCLEAN-NORTHEAST PROJECT NO. 400.008

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1.0 INTRODUCTION

1.1 General

The Norton Company Restoration Site Remedial Design was conducted for Norton Company in response to a NYSDEC Order on Consent, Index No. A4-0268-91-07, dated January 27, 1992.

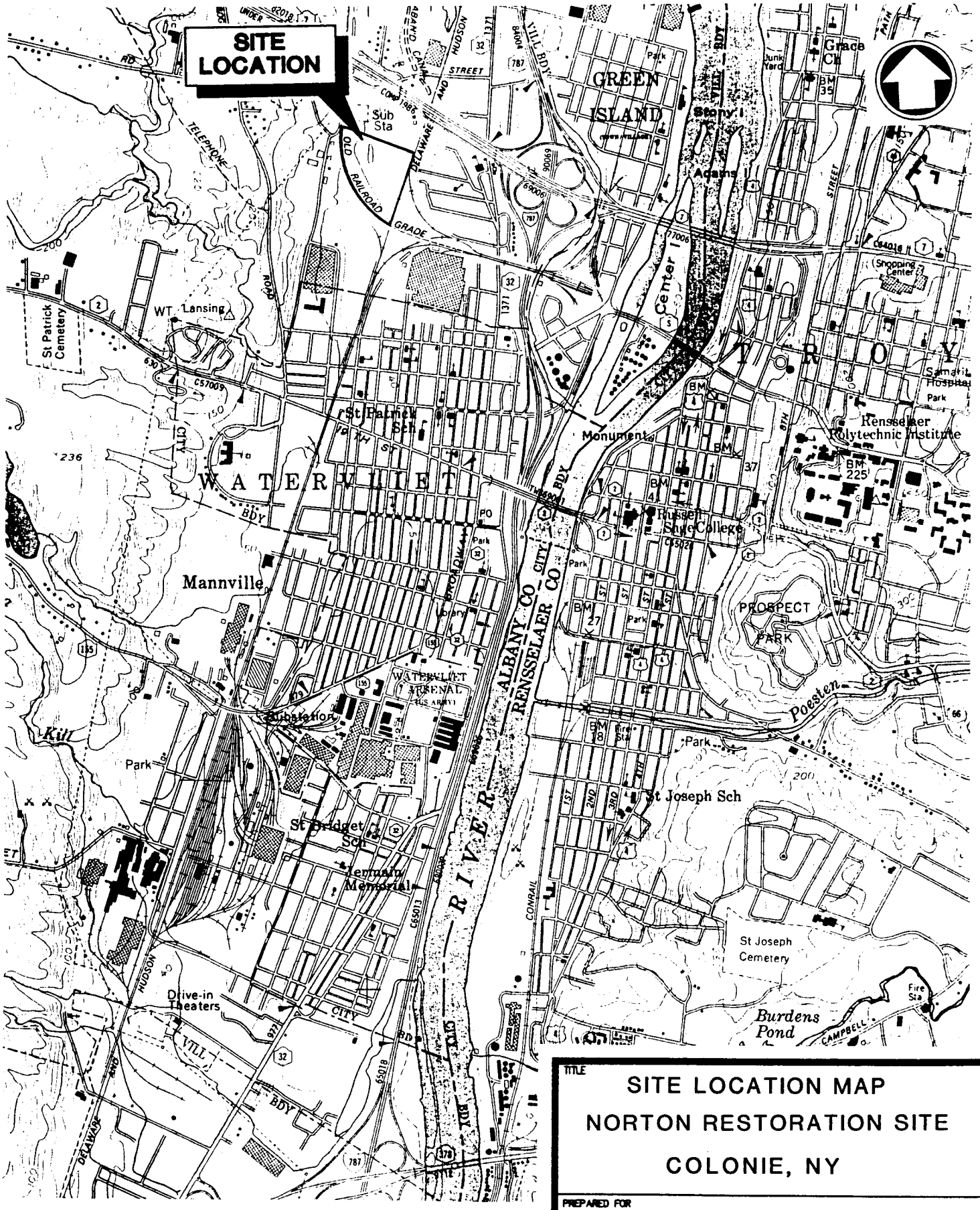
The Restoration Site was previously identified by the NYSDEC as an inactive hazardous waste site and was assigned the Site Code No. 4-01-010. The Remedial Investigation/Feasibility Study, dated October 31, 1990, recommended a remedial program for the site that was subsequently accepted by the NYSDEC in the Record of Decision, dated March 25, 1991.

Section 2.0 of the Remedial Design addresses all requirements contained in the Order on Consent, on an item by item basis. The design documents are included in the Remedial Design as Attachment 1.

1.2 Site Description

The Norton Company Restoration Site is located on Lansing Lane in the Town of Colonie, New York, north of Norton's Coated Abrasive Division Plant in the City of Watervliet, New York. The site location is depicted in Figure 1-1.

The site encompasses an area of approximately 10 acres, of which the former industrial fill area comprises a 5 acre area that will actually be remediated. For further site information, including site history and previous investigative activity, refer to the Feasibility Study, dated October 31, 1990 and revised January 18, 1991.



SOURCE: NYS DOT QUADRANGLE TROY SOUTH, NY

TITLE

SITE LOCATION MAP
NORTON RESTORATION SITE
COLONIE, NY

PREPARED FOR

NORTON COMPANY

ERM enviro clean northeast

SCALE 1":2000

DATE 3/92

FIGURE 1-1

2.0 REMEDIAL DESIGN

Section 2.0 addresses all items listed in subparagraphs IIA through IIG of the Order on Consent, in the same order they are presented there.

2.1 Implementation of the Remedial Program (II A)

2.1.1 Uncovered Hazardous Waste (II A1)

Although waste chemicals and products were disposed of in the industrial fill area over a number of years, investigative site work has not revealed any intact drums or containers of disposed waste. If any intact waste containers are uncovered during subsurface site work, specifically the installation of the slurry wall and the ground water recovery trenches, the containers will be handled in accordance with the provisions specified in the site-specific Health and Safety Plan, and staged in a segregated area which will be bermed and lined with polyethylene sheeting.

ERM-EnviroClean will assist Norton Company in classifying the contents of any uncovered containers, and in making arrangements for the disposal of these containers.

2.1.2 Recovered Contaminated Environmental Media (II A1)

All identified contamination at the site is in the form of contaminated environmental media, i.e., ground water, soil, and vapors trapped in the vadose zone. All contaminated media encountered or recovered at the site will be characterized and managed as if it were hazardous waste, as necessary, until such time that any respective media no longer exhibits hazardous concentrations of chemicals.

2.1.2.1 Soil (II A1)

All soil excavated from the industrial fill area during construction of the Remedial Program will be placed within the boundaries of the slurry wall, and beneath the impermeable geomembrane cap. All other earthwork outside the slurry wall will be conducted in areas where contamination has not been previously identified, and will consist primarily of fill operations. For these reasons, it is not expected that any surplus contaminated soil will be generated that will require off-site disposal.

2.1.2.2 Ground Water (II A2)

Ground water recovered during site remediation will initially be stored on-site in storage tanks, sampled, and then transported to an appropriate off-site treatment facility. Ground water will be handled as if it were a hazardous waste at all times, and will be disposed of as such, unless sample analysis indicates that contaminants are not present in hazardous concentrations.

On-site treatment and possible discharge to the local POTW are options that will be considered in the future. The NYSDEC will be notified of any intended changes in the operating procedures at the site.

2.1.2.3 Landfill Vapor (II A2)

The soil vapor recovery system will capture vapors present in the vadose zone between the impermeable cap and the ground water table. As the ground water level inside the slurry wall is reduced, additional unsaturated soil volumes will be exposed and cleansed by the vapor recovery system.

As stated in the January, 1992 Preliminary Engineering Design Report, recovered vapors will initially be incinerated on-site. After further evaluation by ERM-EnviroClean, a thermal oxidizer has been selected that will be more cost effective than activated carbon in treating recovered VOCs. VOCs will be treated to concentrations below the allowable emissions presented in NYCRR Part 212 and the Draft NYS Air Guide 1. Therefore, the thermal oxidizer is expected to be used for the duration of vapor treatment at the site, and activated carbon will not be required. The only treatment residual generated by the thermal oxidizer will be condensate, which will be pumped to the ground water storage tanks.

2.1.3 Site Security (II A3)

The entire site is currently secured with a six foot high chain link fence with access provided through either of two locked gates. See also Section 01080 of the Technical Specifications.

2.1.4 Health and Safety (II A4)

See Section 01517 of the Technical Specifications.

2.1.5 Quality Assurance/Quality Control (II A5)

This section presents a general overview of the Quality Assurance and Quality Control procedures that will be implemented during construction.

All materials used to construct the slurry wall will be tested to ensure compliance with design and performance criteria stated in the Technical Specifications and Drawings. Samples of the final bentonite-fill mix must meet a

permeability requirement of $1x10^{-7}$ cm/sec. In addition, the fill materials that will be imported for slurry backfill must pass required TCLP testing.

The geomembrane, which will be the critical item in the impermeable cap, will be seamed using the hot wedge welding technique. All seams will be pressure tested, and the manufacturer's standard shop testing and destructive field testing will also be performed. The Engineer will also be allowed to request additional testing on any seam or panel, at the Engineer's discretion.

All piping and hose installed on the site will be pressure tested prior to being placed in service. In addition, all water-conveying piping, tanks, and equipment will be tested with potable water to ensure leak-tight joints and fittings prior to placing the equipment on-line to handle ground water.

Quality Assurance/Quality Control procedures are presented in more detail in the following Technical Specification Sections:

Civil Contract	Mechanical Contract
01300	01300
01400	01400
02210	11001
02277	13440
15072	15072
	15073

2.1.6 Construction Monitoring (II A6)

Monitoring will be conducted during implementation of the Remedial Program, to ensure the safety of workers on the site and the safety of the public in

locations proximate to the site, and to ensure that the Remedial Program is implemented in accordance with the NYSDEC-approved Remedial Design.

ERM-EnviroClean will have a full-time resident engineer on the site during actual construction activities, who will inspect all installed work.

ERM-EnviroClean will also implement the site-specific Health and Safety Plan, and will have a full-time health and safety officer at the site. All intrusive work will be monitored, and ERM-EnviroClean will have the authority to stop work and order corrective measures in the event of a significant environmental release (i.e., a release that cannot be confined to the immediate work area). No work will be conducted which would allow an off-site release of chemicals.

Refer to Specification Sections 01517 and 01715 of each contract package for specific Health and Safety procedures.

2.2 Design Documents (II B)

The design documents are included in this Remedial Design as Attachment 1, and include one set of Drawings, the Civil Contract Technical Specifications, and the Mechanical Contract Technical Specifications. Specifications Section 01517 of each contract contains the site-specific Health and Safety Plan.

The Drawings show all work to be installed as part of the Remedial Program. The scope of work, and therefore the Specifications, has been split into two contracts to segregate hazardous intrusive work from standard general construction work, in an attempt to limit the number of workers exposed to hazardous conditions.

The Civil Contract will include all earthwork on the site, including all intrusive work within the industrial fill area. The Mechanical Contract will consist primarily of installing the control building and all piping, tanks, equipment and controls inside the building. Refer to Specification Section 01010 in each contract for further details of the scope of work for each contract.

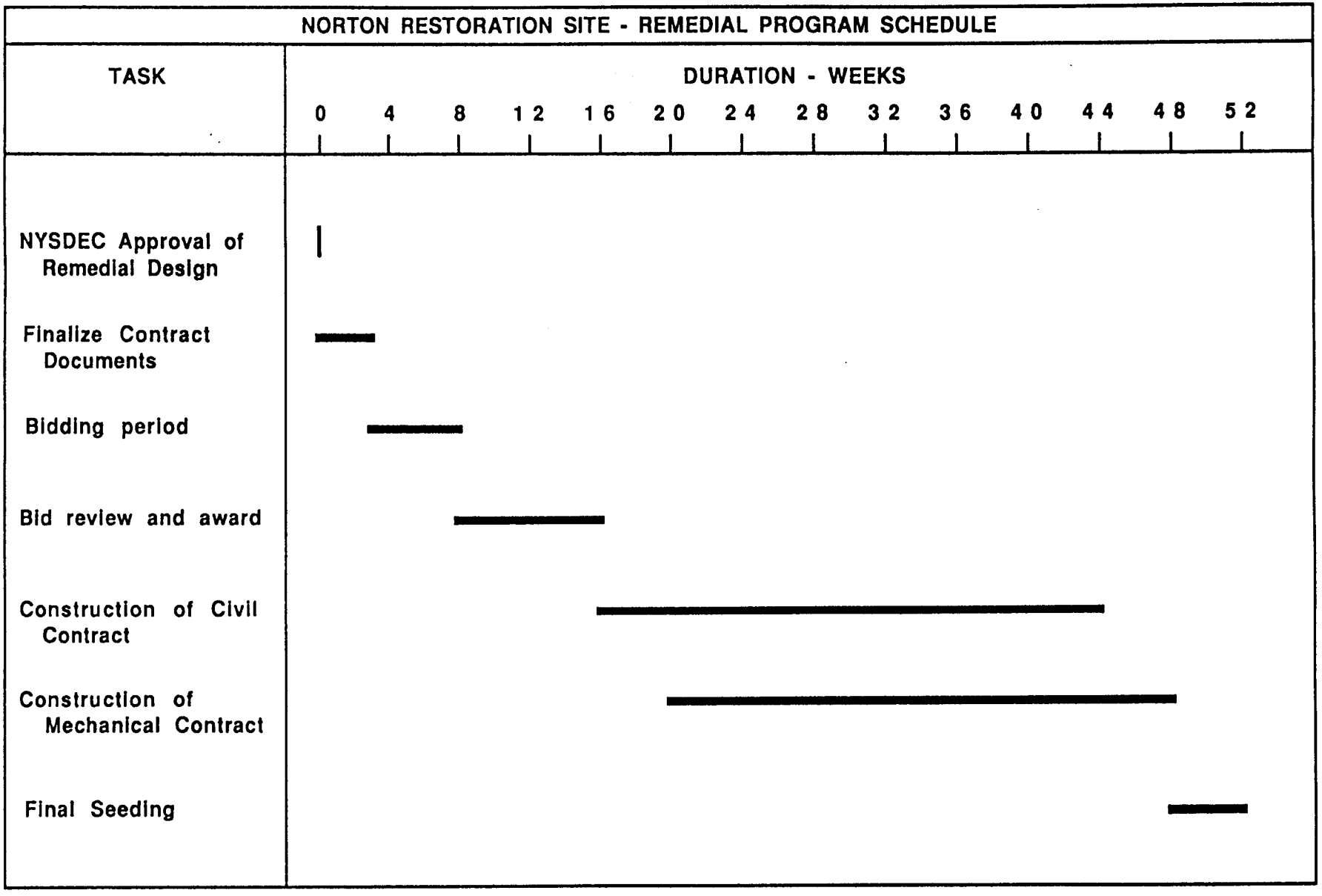
2.3 Schedule (II C)

A time schedule for implementation of the Remedial Program is included as Figure 2-1. The schedule covers the period of time from NYSDEC approval of the Remedial Design and Town of Colonie approval on building and land use, to completion of the Remedial Program.

The schedule assumes the construction phase will be implemented only when six consecutive months of good weather are expected. Therefore, it is proposed that if significant delays occur in the approval process, construction will begin in April of 1993 rather than in 1992. However, depending on the actual date of approval(s), it is possible that parts of remedial construction could begin in 1992, with completion in 1993. All options will be fully assessed upon receipt of all approvals.

Once construction has begun, the NYSDEC will receive monthly progress reports of work that has been completed, and work that is intended to begin in the near future, to assist the NYSDEC in coordinating any site visits.

FIGURE 2-1


NORTON RESTORATION SITE - REMEDIAL PROGRAM SCHEDULE
TASK
DURATION - WEEKS
0
4
8
12
16
20
24
28
32
36
40
44
48
52
NYSDEC Approval of Remedial Design
Finalize Contract Documents
Bidding period
Bid review and award
Construction of Civil Contract
Construction of Mechanical Contract
Final Seeding

2.4 Monitoring and Evaluation of Remedial Program (II D)

Monitoring and evaluation of the remedial program will consist of two principal elements :

1. Monitoring of piezometric performance of the remedial program; and
2. Monitoring of ground water quality downgradient of the restoration site.

These two monitoring elements are outlined in the following two subsections. Section 2.6 outlines the contingency plans for addressing any deficiencies in the remedial program detected by these monitoring elements.

2.4.1 Monitoring of Piezometric Performance

The remedial program includes engineered features designed to contain the waste materials within the industrial fill area of the restoration area and recover ground water from the containment area. Containment will primarily be accomplished by installation of a slurry wall, which will surround the industrial fill and be keyed into the underlying shale bedrock. Additionally, an impermeable cap will be placed over the industrial fill area to largely eliminate infiltration of precipitation into the fill. With these containment features in place, a series of ground water recovery trenches and wells will be operated to lower ground water levels in the containment area and, thereby, drain ground water from the industrial fill. Monitoring of piezometric control within the containment area will be conducted to verify the performance of the containment and ground water recovery features. Piezometric performance will be demonstrated by an inward potential hydraulic gradient across the slurry wall.

The piezometric performance monitoring network will consist of a group of four pairs of piezometers situated around the slurry wall. Each pair of piezometers will consist of one piezometer located very close (i.e., approximately 10 to 15 feet) to the inside of the slurry wall and one located on the outside edge. The inside piezometer of each pair will be an air inlet well of the vapor recovery system. These wells, detailed on Drawing C-11 of the Design Documents (Attachment 1), are four-inch diameter PVC wells which are screened throughout the fill section to the underlying hard shale and are accessible for water-level measurements at the ground surface. The outside piezometer of each pair will be a two-inch PVC piezometer with a ten-foot screen length set approximately three feet above to seven feet below the water table. The outside piezometers will be located approximately 15 to 20 feet outside the outside edge of the slurry wall, directly across the slurry wall from their paired air inlet wells.

The four piezometer pairs will include one pair on the upgradient side of the fill area and three pairs distributed along the downgradient side. The locations of piezometer pairs, identified by the designation of their inside piezometers (air inlet wells) are shown on Drawing C-5 of the Design Documents (Attachment 1). Their approximate location along the construction baseline are as follows:

Upgradient -

Air inlet well W-451, station 1+50

Downgradient -

Air inlet well W-461, station 9+50
Air inlet well W-454, station 12+00
Air inlet well W-451, station 16+50

Upon completion of the four piezometer pairs, a measuring point will be marked at the top of the riser pipes. The locations and elevations of these piezometers will then be surveyed to allow comparisons of inside and outside ground water elevations.

Each set of water-level measurements will be collected on the four piezometer pairs within a time span of approximately one-half a working day (i.e., four to five hours) or less. During the approximately six month construction phase, sets of water-level measurements will be collected once every two weeks from completed piezometers. Additionally, at one point during the latter part of the construction phase, or just prior to recovery system start-up, sets of water-level measurements will be taken twice per day for three successive days from the full network of eight piezometers. These construction-phase water levels will establish the temporal variability of static ground water levels.

During the start-up phase of the ground water recovery system, sets of water-level measurements will be collected from the four piezometer pairs on a twice per week basis for the first two weeks of operation, on a weekly basis for the next six weeks, and on a once per month basis for the duration of the first six months of operation. Thereafter, water levels will be measured on the four piezometer pairs on a quarterly basis during operation of the ground water recovery system.

Water-level measurements of the four piezometer pairs will be evaluated after each set of readings is taken. Depths to water will be subtracted from surveyed measuring point elevations to determine ground water elevations. Inside and outside ground water elevations will be compared for each piezometer pair to assess whether an inward potential hydraulic gradient is achieved.

In addition to the slurry wall piezometer pairs, water levels will be measured in the site monitoring wells on a quarterly basis during the approximately six month construction phase (i.e., twice), on a monthly basis during the first six months of operation of the ground water recovery system, on a quarterly basis through the first two years of operation, and on a semi-annual basis thereafter during operation of the system.

2.4.2 Monitoring of Ground Water Quality

Results of the Remedial Investigation indicate that ground water contamination is limited to the area around MW-1, within the industrial fill area of the restoration area. The containment and ground water recovery features of the remedial program are designed to prevent migration of contaminants downgradient of the containment area (industrial fill area). Monitoring wells will be sampled to verify that downgradient migration of contaminated ground water does not occur.

Downgradient ground water monitoring will consist of semi-annual sampling of four overburden monitoring wells and two bedrock monitoring wells. Each sampling round will include sampling of overburden wells MW-5, MW-7S, MW-8S, and MW-6S, bedrock wells MW-8D and MW-6D, one blind duplicate, one field equipment blank, and one trip blank. Each sample will be analyzed for volatile organics by EPA method 624.

Sampling will commence with the first semi-annual round of samples collected in the latter part of the approximately six-month construction period and will continue on a semi-annual basis for the first two years of the remedial program. If, after two years of operation of the remedial program, an inward potential hydraulic gradient is established and maintained and no contingency plan water-quality triggers

(Section 2.6) have been exceeded in a well for two successive sampling periods, the downgradient well sampling will be reduced to once every two years. Sampling will continue on that basis for 30 years. A re-evaluation of the monitoring program will be made every 5 years after shut down to determine if a less frequent monitoring schedule is suitable or if monitoring may be discontinued.

2.5 Operations and Maintenance (II E)

This section generally describes how the recovery system will operate, how it will be maintained, and how the performance of the recovery system can be used to assess the future condition of the site. Major items of equipment have also been identified by the equipment numbers assigned in the Design Documents, to help clarify the discussion.

A preliminary outline of an Operations and Maintenance Manual is included as Table 2-1. A detailed Operation and Maintenance Manual will be submitted within 60 days after the completion of the Remedial Program.

2.5.1 Operations

Ground water will be pumped from six recovery wells into two double-wall fiberglass storage tanks (TK-500 and TK-501). The pumping rates will be controlled by bubbler level sensors which operate on compressed air. Once the ground water is pumped to the storage tanks, the ground water will be recirculated by transfer pumps (P-500 and P-501) to minimize the settling of solids in the ground water. Locking hookups will be installed on the exterior of the building to allow tanker trucks to drain either of the tanks.

TABLE 2-1
PRELIMINARY OUTLINE OF O&M MANUAL

1.0 INTRODUCTION

- 1.1 Purpose and Scope
- 1.2 Guide to Manual Format
- 1.3 Background
- 1.4 Ground Water Quality
- 1.5 Vapor Quality
- 1.6 Design Criteria
- 1.7 Process Description
- 1.8 Design Basis
- 1.9 Operation and Maintenance Responsibilities

2.0 PERMITS

3.0 OPERATION AND CONTROLS

- 3.1 General
- 3.2 Ground Water Recovery System
- 3.3 Ground Water Storage and Recirculation
- 3.4 Ground Water Disposal/Discharge
- 3.5 Vapor Recovery System
- 3.6 Vapor Treatment System

4.0 SUPPORT SYSTEMS

- 4.1 General
- 4.2 Air Compressor
- 4.3 Condensate Pump
- 4.4 Heating, Ventilating and Air Conditioning System (HVAC)
- 4.5 Fire Protection System
- 4.6 Security System

5.0 LABORATORY TESTING AND REPORTING

- 5.1 General
- 5.2 Sampling
- 5.3 Ground Water Analysis
- 5.4 Landfill Vapor Analysis
- 5.5 Laboratory Records and Monitoring Reports

TABLE 2-1 (Continued)

6.0 OPERATION RECORDS AND REPORTS

- 6.1 General
- 6.2 Physical Records
- 6.3 Operating Records
- 6.4 Administrative Records
- 6.5 Reports

7.0 MAINTENANCE MANAGEMENT

- 7.1 General Requirements
- 7.2 Equipment Record System
- 7.3 Equipment Maintenance
- 7.4 Site Maintenance
- 7.5 Maintenance Tools and Equipment

8.0 EMERGENCY RESPONSE PLAN

- 8.1 Emergency Shutdown Procedures
- 8.2 Emergency Equipment and Materials

9.0 GENERAL HEALTH AND SAFETY

- 9.1 General
- 9.2 Safety Program
- 9.3 Safety Practices
- 9.4 Safety References

10.0 UTILITIES

- 10.1 General
- 10.2 Electric Power
- 10.3 Telephone Service
- 10.4 Sanitary Sewer Discharge (if appropriate)

TABLE 2-1 (Continued)

A drain pipe to the sewer will be installed to within approximately fifteen feet of the existing sewer line on the site. This new drain line would be connected to the existing sewer at a later time only if disposal approval is obtained from the local POTW.

Landfill vapors will be removed and treated by the vapor treatment system (VTS-600), located on a gravel pad outside the control building. The vapor treatment system will also continually remove and treat any vapors that accumulate in the headspace of the ground water storage tanks.

A small air-operated pump (P-600) will be used to drain the condensate from the vapor treatment system and transfer it to the ground water storage tanks. This pump can also be utilized to remove any liquids that accumulate in the building sump.

Alarms will include leak detection (presence of water in the building sump), leak detection on the double-wall fiberglass tanks, high tank level, and failure of any of the major equipment items. All alarms will be sent remotely to Norton Company.

Due to the nature of the site contamination, if a leak is ever detected in the building sump, all power will be shut off in the building, and all systems will be shut down to prevent the possibility of an explosion.

2.5.2 Maintenance

In addition to normal maintenance requirements, such as lubrication, calibration, and inspection of equipment, some specialized maintenance will be required as part of the site remediation.

The bubbler level sensor tubes located in the ground water recovery wells will be inspected regularly to ensure that they have not become clogged or degraded due to the ground water quality and contamination.

The storage tanks will be periodically inspected, and cleaned if necessary, to remove sediment that may settle out of the ground water. All sediments will be characterized and disposed of appropriately based on sample analysis.

The surface of the cap will be mowed regularly to prevent vegetative root structures from growing through the geomembrane.

2.5.3 Systems Monitoring

The remedial system will be monitored to ensure compliance with all regulations, and to assist in evaluating the progress of remediation at the site.

Regular inspections will be performed to ensure that no leaks have occurred in the recovery systems. Secondary containment devices consisting of sumps, double-wall pipes, cleanouts, and tanks, will be monitored regularly. The vapor treatment system will be monitored to assure that vapors are being properly treated prior to emission.

By monitoring certain operations and parameters, the progress of the remedial effort can be evaluated. Monitoring will include the time required to fill tanks, the quality of the recovered ground water, and the percent LEL of incoming vapor to the vapor treatment system.

As stated in the Record of Decision, the recovery systems will operate as long as the volume or toxicity of contaminants continues to be reduced, and ground water recovery will also continue, if required, to control migration. Previous site investigative work has shown that migration of ground water through the industrial fill area is nearly non-existent. Following construction of the slurry wall, it is not expected that ground water will migrate within the industrial fill area at all.

2.6 Contingency Plan (II F)

As discussed in Section 2.4, monitoring of the remedial program will include piezometric measurements to evaluate the potential hydraulic gradient across the slurry wall and downgradient ground water monitoring to verify containment of contaminants. Results of these monitoring aspects will be evaluated to assess whether the contingencies discussed below will be enacted.

In the event that an inward potential hydraulic gradient is not achieved across the slurry wall, as determined by water-level measurements in any of the four piezometer pairs, for two successive quarters, a calculation will be made to determine the rate of exfiltration of ground water through the slurry wall. Exfiltration rate (velocity) will be determined by the formula:

$V = \frac{Ki}{n}$, where

V = exfiltration velocity,
i = hydraulic gradient across the slurry wall,
K = hydraulic conductivity of the slurry wall, and
n = effective porosity of the slurry wall.

Using the exfiltration velocity and slurry wall thickness, the time for exfiltration of ground water through the slurry wall can be calculated (time equals thickness divided by velocity). An engineering study will be conducted and, if necessary and feasible, remedial measures will be implemented to establish an inward potential hydraulic gradient before the time for exfiltration through the slurry wall has elapsed.

Since approximately four feet of relief are present on the water table beneath the industrial fill area under static conditions, it will take some time to enact drainage within the containment area. Therefore, the above hydraulic control criteria of the contingency plan will not apply during the first three quarters of recovery system operation.

It is proposed that groundwater be monitored for the following indicator parameters: acetone, benzene, toluene, ethyl benzene and total xylenes. In the event that a ground water sample result exceeds a trigger level of 75% of the New York State Groundwater Standard for any indicator parameter, the monitoring well exhibiting the trigger exceedance will be resampled within one month of laboratory report. In the event that the resample also exceeds the trigger level, a plan for sampling monitoring wells in addition to those routinely sampled will be developed and enacted during the next sampling round. If the expanded sampling indicates that the restoration area may be the source of the trigger exceedance, subsequent sampling rounds will continue to include the additional wells. If the expanded sampling does not so indicate, subsequent sampling rounds will revert to the routine monitoring program.

In the event that a New York State Ground Water Standard is exceeded for any of the indicator parameters in any well in that following round of sampling, a hydrogeologic investigation plan will be developed and implemented to determine the source of the exceedance of the standard. The hydrogeologic investigation report will provide modifications to the water quality monitoring program, if appropriate.

In the event that a New York State Ground Water Standard is exceeded in two successive sampling rounds in a given well for any indicator parameter and the hydrogeologic investigation has determined that the restoration area is the source of the exceedance, an engineering study will be conducted to determine whether corrective actions to the remedial program are needed. Necessary corrective actions will then be implemented.

2.7 Health and Safety Plan (II G)

See Section 0517 of the Technical Specifications.