Five-Year Review Report

First Five-Year Review Report
for
Linemaster Switch Superfund Site
Woodstock, Connecticut

May 2004

PREPARED BY:

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Date:

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Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name: Linemaster Switch Superfund Site		
EPA ID: CTD001153923		
Region: 1	**State:** CT	**City/County:** Woodstock/ Windham

SITE STATUS	
NPL Status: **X** Final Deleted Other (specify)	
Remediation Status (choose all that apply)**:** Under Construction **X** Operating Complete	
Multiple OUs? Yes **X** No	**Construction completion date:** NA
Has Site been put into reuse? **X** Yes No	

REVIEW STATUS	
Lead Agency: **X** EPA State Tribe Other Federal Agency _____	
Author name: William Lovely	
Author title: Remedial Project Manager	**Author affiliation:** U.S. Environmental Protection Agency
Review Period: 10 / 01 / 2003 to 04 / 30 / 2004	
Date(s) of inspection: N/A (see report)	
Type of Review: **X**Post-SARA Pre-SARA NPL-Removal Only Non-NPL Remedial Action Site NPL State/Tribe-lead Regional Discretion	
Review number: **X** 1 (first) 2 (second) 3 (third) Other (specify) _____	
Triggering Action: Actual RA Start Actual RA OnSite Construction at OU #___01___ Construction Completion Other (specify) Signing of ROD	Actual RA Start at OU# _____ Previous Five-Year Review Report
Triggering action date (from WasteLAN): 05 / 27 / 1999	
Due date (five years after triggering action date): 05/ 27 / 2004	

* ["OU" refers to operable unit.]

Five-Year Review Summary Form, cont'd.

Issues:

The Dual Vapor Extraction (DVE) system is not performing as intended by the 1993 Record of Decision (ROD). More specifically, despite best efforts, dewatering of the former drywell area has been limited to about 60% of the overburden material. Consequently, there is uncertainty regarding the goal of remediating the soil and groundwater within the timeframe specified in the ROD.

Recommendations and Follow-up Actions:

Based on the DVE Optimization Report (Woodard & Curran, October 2003), the lack of dewatering is believed to be related to Site characteristics rather than engineering/operator performance. EPA authorized a temporary shutdown of the system in November 2003 to assess the effectiveness of the remedy without an aggressive "source control" component. EPA is currently performing a formal review and evaluation of the DVE and IRTS systems to determine if the cleanup objectives presented in the 1993 ROD are still achievable. Based on the outcome of that evaluation, EPA will decide whether construction activities are complete, or if further construction activities are necessary to meet the cleanup objectives presented in the ROD. Because this determination will occur after the five year review is completed, recommendations and follow-up actions presented in this review are limited to monitoring the groundwater to help ensure that people are not exposed to unsafe levels of contaminants and groundwater contaminants do not migrate off-site.

Protectiveness Statement:

The remedy at the Linemaster Switch Superfund Site currently protects human health and the environment because the groundwater pump and treat system is effectively containing the contaminants on-site, and the placement of institutional controls on the Site helps to ensure that people are not exposed to contaminated soil and groundwater. Long-term protectiveness of the remedy will be determined following a final decision regarding the DVE system. In the meantime, continued groundwater monitoring and routine O&M will help to ensure that the remedy remains protective in the short-term.

1.0 Introduction

The Environmental Protection Agency (EPA), performed a five-year review of the remedial actions selected for the Linemaster Switch Superfund site, in Woodstock, Connecticut.

The purpose of the five-year review is to determine whether the remedy being implemented at the site remains protective of human health and the environment. The methods, findings, and conclusions of the five-year review are documented in this Five-Year Review Report. In addition, this report presents issues identified during the review and provides recommendations to address them.

This Five-Year Review Report was prepared pursuant to CERCLA §121 and the National Contingency Plan. CERCLA §121 states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that the action is appropriate at such site in accordance with section [104]or [106], the president shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews and any actions taken as a result of such reviews.

The Agency interpreted this requirement further in the National Contingency Plan (NCP); 40 CFR § 300.430 (f)(4)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

This is the first five-year review for the site. The triggering action for this statutory review is the initiation of the remedial action in May 1999. The five-year review is required due to the fact that contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

2.0 SITE CHRONOLOGY

TABLE 1

DATE	EVENT
02/21/90	Site listed on the National Priorities List (NPL)
04/93	Remedial Investigation/ Feasibility Study (RI/FS) completed.
07/21/93	EPA issued a Record of Decision (ROD) for the Site.
01/04/95	Consent Decree for the Remedial Design/ Remedial Action entered by the Court.
05/27/99	Remedial Design for Phase 1A Area completed.

3.0 BACKGROUND

The Linemaster Switch Superfund Site (the Site) is located on Plaine Hill Road in the town of Woodstock, Connecticut. Comprising 90 acres, it is bounded on the north and east by Route 169, on the west by Plaine Hill Road, and on the south by Route 171. A map depicting the location of the Site is presented as Attachment 1.

3.1 Physical Characteristics

Linemaster Switch is an active manufacturing facility. The Site includes woodlands, grass meadows, wetland areas, and several ponds and streams. The manufacturing facility is situated on a hill, with topography dropping off in all directions. Surface water streams in the vicinity of the Site generally flow east or northeasterly into Roseland Lake, located about 0.75 miles east of the Site, which then drains south into the Little River. Most of the properties surrounding the Site are residential. Drinking water for the Linemaster facility and surrounding properties is provided by individual overburden and bedrock groundwater wells. The primary direction of groundwater flow is to the east-northeast, following the natural hydraulic gradient two major fracture traces identified at the Site. A map depicting the Site features is presented as Attachment 2.

3.2 Land and Resource Use

Prior to 1952, the Site property was used for residential purposes and small-scale farming. Starting in 1952, the Linemaster Switch Corporation (Linemaster) began manufacturing foot-operated switches at the Site. Currently, Linemaster manufactures electrical power switches, air valves, electrical cord sets, and metal name plates at the Site. Linemaster's manufacturing building is located near the center of the Site, and on its topographic high point. There are also two residential homes, and three smaller cottages on the property which are used occasionally for recreational purposes.

3.3 History of Contamination

As part of Linemaster's manufacturing operations, paint thinner, trichloroethylene (TCE), and other volatile organic compounds (VOCs) were used for spray painting and vapor degreasing operations. Approximately 20 to 200 gallons per year of TCE and other chemical were discharged into an on-Site drywell located in front of the east side of Linemaster's manufacturing building. The exact amount of TCE and other chemicals discharged to the drywell is unknown, but the discharge reportedly occurred from 1969 through 1979.

3.4 Initial Response

In July 1980, the Connecticut Department of Environmental Protection (CTDEP) conducted a Site inspection of the facility pursuant to the Resource Conservation and Recovery Act (RCRA) and, in July 1984, it conducted a Preliminary Assessment pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

As a result of the 1980 and 1984 CTDEP investigations, EPA conducted Site inspections at Linemaster in December 1985 and February 1986. During these inspections, EPA sampled the on-Site production well and the back-up production well, in addition to off-Site water supply wells. Results of sampling and analysis indicated the presence of VOCs in the production well, the back-up production well, and several off-Site wells. VOCs, primarily TCE, were identified at concentrations exceeding state and federal drinking water standards. TCE was identified on-Site at concentrations as high as 3,900 micrograms per liter (ug/l). TCE was detected in three off-Site water supply wells at 5,000 ug/l, 11ug/l, and 2.4 ug/l.

EPA conducted soil sampling in the area between the factory building and the paint storage shed. The results of this sampling were the basis for making a recommendation to conduct additional sampling to determine the extent of contamination.

On April 8, 1986, CTDEP issued an Abatement Order to Linemaster to investigate the extent of Site contamination, and to take the actions necessary to minimize or eliminate any contamination. A Superfund Removal Action took place in mid-1986 to provide bottled water to affected users. In February 1987, in response to State demands, Linemaster began designing an interim removal treatment system (IRTS) to address groundwater contamination. This system would treat contaminated groundwater to drinking water standards using an air stripper and activated carbon. In September 1987, an Administrative Order by Consent (AOC) was signed between EPA and Linemaster requiring Linemaster to perform a Site investigation and well monitoring, in addition to providing alternate drinking water supplies, as needed. In June 1989, Linemaster removed the drywell. The Site was added to the National Priorities List (NPL) in February 1990. Thereafter, EPA and Linemaster entered into a second AOC in September 1991 under which Linemaster agreed to perform a Remedial Investigation/ Feasibility Study (RI/FS) at the Site.

3.5 Basis for Taking Action

The Remedial Investigation/ Feasibility Study (RI/FS) for the Site was completed in 1993. The RI/FS concluded that the disposal of TCE and other hazardous substances into the drywell had contaminated soil and on-Site groundwater to levels that were above state and federal standards (see Table 2). Moreover, so long as soil in the vicinity of the drywell continued to act as a source of groundwater contamination, EPA concluded that VOC concentrations in groundwater posed an unacceptable risk to human health and the environment given the present and potential future use of the groundwater as a drinking water supply.

Table 2
List of Site Contaminants

Media	**Contaminant**	**Clean-Up Level (ppb)**	**Pre-ROD Concentrations (ppb)**	
Soil			**average**	**maximum**
	1,2- dichloroethane	4	N/A	N/A
	dichloromethane	3	N/A	N/A
	tetrachloroethene (PCE)	10	80.1	2,800
	trichloroethane (TCE)	5	122.6	4,022
	cis- 1,2-dichloroethene	50	47.2	938
	toluene	1,000	274.5	7,577
	1,1,1-trichloroethane	300	9.1	11
	xylenes	100	264.4	8,300
Groundwater				
	acetone	3,700	2,129	50,000
	arsenic	50	41.2	513
	benzene	5	44.7	54
	beryllium	4	9.7	87
	cadmium	5	63.3	757
	carbon tetrachloride	5	14	47.5
	chloroform	100	17	58.7
	chloromethane	6.5	11.8	120
	1,2- dichloroethane	5	7.8	70.9
	1,1-dichloroethene	7	109.5	813
	cis- 1,2-dichloroethene	70	803.5	26,000
	dichloromethane	5	236.6	1810
	1,2-dichloropropane	5	169.9	420
	2-hexanone	1,500	766.3	2,100
	methlyethylketone	1,800	1,366.5	38,000
	tetrachloroethene (PCE)	5	132.1	1,800
	1,1,1-trichloroethane	200	103.1	1,700
	1,1,2-trichloroethane	5	23	71.9
	trichloroethene (TCE)	5	42,931.9	800,000
	toluene	1,000	2529.6	64,000
	vinyl chloride	2	10	20.3

4.0 REMEDIAL ACTIONS

4.1 Remedy Selection

The selected remedy for the Site was contained in the 1993 ROD and included both source control and management of migration (or groundwater control) components:

- In-situ vacuum extraction of contaminated soil to remove volatile organic compounds (VOCs);
- Extraction of contaminated groundwater from the overburden and bedrock using extraction wells;
- Treatment of contaminated groundwater using air stripping with carbon emission controls;
- Environmental monitoring of soil, groundwater, surface water, and private residential wells;
- Institutional controls in the form of deed restrictions to prohibit the use of the groundwater until the cleanup levels are met; and
- Five-Year reviews

4.2 Remedy Implementation

In a Consent Decree (CD) signed with EPA on January 4, 1995, Linemaster agreed to perform the Remedial Action specified in the 1993 ROD. In an effort to reduce the time and costs typically associated with Remedial Design (RD), Linemaster agreed to perform the RD in accordance with EPA's "Design Accelerated Remedial Target Pilot Program" (DART). Using this approach, "standard" design documents such as the 30%, 60%, and 90% RD deliverables were substituted by mandatory technical meetings between EPA and Linemaster.

In December 1994, Linemaster performed a pilot test to gather data that would be used to design the Dual Vapor Extraction (DVE) system. Based on the results of this test, Linemaster concluded that there was insufficient data on soil characteristics to develop a Conceptual Remedial Design, and that enhancements to the natural characteristics of overburden would be required to achieve adequate air and groundwater flow for the performance of the DVE system. To address these two issues, Linemaster performed a second pilot study in November 1995 to delineate the extent of soil contamination to be addressed by DVE, and evaluate whether or not the permeability of the overburden could be enhanced through hydraulic fracturing[1]. Based on the results of this test, EPA

[1] Hydraulic fracturing is a technique where water is injected into a groundwater well under high pressure with a goal of expanding the size of existing pores and/or fractures within the subsurface.

concluded that that hydraulic fracturing would enhance the permeability of the overburden and therefore, design of the DVE system could proceed. However, in recognition that the extremely low permeability of the overburden may limit the ability of this system to meet the cleanup levels specified in the ROD, EPA divided the design of the DVE into two phases (i.e., Phase 1A and 1B), with the implementation of the second phase being delayed until EPA, CTDEP, and Linemaster had the opportunity to evaluate the performance of the DVE system on soil located within the vicinity of the former drywell.

During the Fall of 1996, Linemaster installed a series of hydro-fractured wells in the former drywell area. Construction of the DVE system occurred between 1997 and 1998, and in April 1998, dewatering of the former drywell area commenced. All of these activities occurred prior to EPA approving the 100% RD on May 27, 1999 because it was determined that construction and operation of the DVE system within the former drywell area would serve as a pilot study for the use of this remedial approach on other areas targeted for DVE.

EPA, CTDEP, and Linemaster have been monitoring the performance of the DVE system since it became operational in December 1998. In February 2001, Linemaster, in consultation with EPA and CTDEP, developed and implemented a DVE Optimization Plan because monitoring of the DVE system had shown that the hydro-fractured wells had only dewatered 60% of the Phase 1A area, and the VOC removal rates of the vapor extraction component of the DVE system were steadily declining. The optimization plan included, among other things, testing of the dewatering wells, increasing the subsurface vacuum, and redevelopment of the fractured wells. These tasks were intended to improve both dewatering and VOC removal rates within soil. However, as presented in the *Final Dual Vapor Extraction System Optimization Report* (Woodard & Curran, November 2003), none of the tasks performed as part of the optimization plan significantly improved the performance of the DVE system. Based on this report, EPA concluded that the low permeability soil was preventing further dewatering and VOC removal within the Phase 1A area. Consequently, EPA determined that the vapor extraction component of the DVE system was no longer significantly contributing to the remediation of the Site and that further remediation via vapor extraction should not be pursued. This determination resulted in EPA agreeing to a moratorium on the vapor extraction component of the DVE system in November 2003.

EPA is currently performing a formal review and evaluation of the DVE and IRTS systems to determine if the cleanup objectives presented in the 1993 ROD are still achievable. Based on the outcome of that evaluation, EPA will decide whether construction activities are complete, or if further construction activities are necessary to meet the cleanup objectives presented in the ROD.

4.3 Operation and Maintenance

Linemaster has been conducting Operation and Maintenance (O&M) of the remediation system in accordance with the *O&M Manual for Phase 1A Remediation* (Fuss& O'Neil, March 1999) that EPA approved on January 11, 1999. The primary activities associated with this O&M plan are weekly system inspections and sampling of the system's influent and effluent groundwater and air sampling ports to verify that there are no exceedances to allowable discharge limits. Additional O&M activities occur on an as-needed basis.

5.0 PROGRESS SINCE LAST REVIEW

This was the first five-year review for the Site.

6.0 FIVE-YEAR REVIEW PROCESS

6.1 Administrative Components

EPA, the lead agency for this five-year review, notified CTDEP and Linemaster in the Fall of 2003 that the five-year review would be completed. The Five-Year Review Team was led by William Lovely of EPA, Remedial Project Manger, for the Linemaster Switch Superfund Site, and included staff from Metcalf & Eddy (M&E) EPA's technical support contractor, and Woodard & Curran, Linemaster's contractor. Mark Lewis, of the CTDEP was also part of the review team.

From November 2003, the review team established the review schedule whose review components included:

- Community Involvement;
- Document Review;
- Data Review;
- Site Inspection;
- Local Interviews; and
- Five-Year Review Report Development and Review.

The schedule extended through April 30, 2004.

6.2 Community Involvement

EPA mailed letters on March 8, 2004 announcing EPA's review of the Linemaster Site cleanup. The mailing included the residents along Plaine Hill Road, Routes 169 and 171, and the Town Selectman. Additional copies of the fact sheet were made available to the general public at the Woodstock Town Hall. The fact sheet described the Five-Year Review process and how the community could contribute

during the review process. EPA did not receive any comments from the community.

6.3 Document Review

The five-year review consisted of a review of relevant documents including O&M records and monitoring data (Attachment 3). Applicable cleanup standards, as listed in the 1993 ROD, were also reviewed (Attachment 4).

6.4 Data Review

As part of the review, EPA evaluated the data collected by the Linemaster to evaluate the progress of the soil and groundwater cleanup. Technical assistance on the data review was provided by M&E. A summary of the data review is provided below.

Groundwater Monitoring

Groundwater monitoring is used to assess the progress of the Site cleanup and the effectiveness of the groundwater pump and treat system. This monitoring includes water table elevation measurements to confirm that the groundwater pump and treat system is effectively containing contaminated groundwater on the Linemaster property. Groundwater is gauged, sampled, and analyzed in accordance with two plans that were approved by EPA and later modified on November 15, 2000: *Interim Removal Action, Revised Start-Up Monitoring Plan* (Fuss & O'Neil, February 1992) and *Monitoring Program; Phase 1A Remedial System* (Fuss & O'Neil, March 1999). The results of this sampling are reported to EPA semi-annually.

As part of the five-year review, EPA evaluated all groundwater data collected from 1998 through 2002. A comparison of groundwater data collected during this time to data presented in the 1993 ROD shows that elevated concentrations of TCE and other VOCs remain in the groundwater with the highest concentrations being in both the overburden and bedrock groundwater located within the Phase 1A source area (Attachment 5). However, an analysis of the trends in groundwater sampling results shows that TCE and total VOC concentrations have dropped dramatically since the IRTS system became operational in 1992. This trend was particularly noticeable in monitoring wells located along the perimeter of the Site boundary where the sampling results from those wells have been reduced to trace or non-detect concentrations.

In contrast to the groundwater results collected from wells located outside of the Phase 1A area, the groundwater sampling results within this area have not dropped significantly since the DVE system became operational in 1998. An explanation for this observation will be presented later in this review. However, it is likely that the lack of dewatering and vapor extraction of soils within the Phase

1A area have prevented the reduction of contaminant concentrations within this part of the Site.

Surface Water Monitoring

Surface water samples are collected on a quarterly basis from three locations and annually from nine locations. The sampling results over the last five years have ranged from non-detect to trace levels of total VOCs. This combined with the quarterly toxicity test results reported over the last five years shows that the surface water is not being impacted by contaminated groundwater or discharges from the IRTS.

Air Monitoring

Air samples are collected on a monthly basis from the DVE and IRTS systems to help ensure that VOC emissions are within permitted limits. In addition, gas samples were collected from soils beneath the foundations of the Linemaster facility and Blakely residence to evaluate the potential for volatilization of VOCs from groundwater to indoor air spaces. Based on the results of this sampling, EPA concluded that the air emissions from the DVE and IRTS were within acceptable limits, and that volatilization of groundwater contaminants to indoor air spaces was not an issue.

Residential Monitoring

Water samples are collected from domestic water supply wells surrounding the Site to confirm that groundwater contaminants are not migrating off-Site. Samples are collected from approximately 40 wells located on Routes 169 and 171 in accordance with the schedule approved by EPA in its November 15, 2000 letter to Linemaster. Based on the results of this sampling, EPA concluded that private wells are not being impacted by groundwater contaminants at the Linemaster Site as long as the IRTS system is in operation.

In addition to the sampling of private wells, Linemaster's on-site production well is sampled on a monthly basis to confirm that the groundwater is treated to below safe drinking water standards (i.e., MCLs) prior to use. The results of this sampling demonstrate that the groundwater from the on-site production well is being adequately treated by the well's dedicated treatment system.

6.5 Site Inspection

A Site inspection was not performed as part of the five-year review because this activity was performed as part of the DVE Optimization plan discussed earlier, and the semi-annual reports provided to EPA include a summary of the performance of both the IRTS and DVE systems. A summary of the findings presented in both reports is provided below.

Since it began operation in 1992, the IRTS has successfully contained the groundwater contaminant plume on the Linemaster Site. Continued pumping of the system's six deep bedrock extraction wells has caused a dramatic reduction in the size of the groundwater contaminant plume as evidenced by the groundwater sampling results collected over the last several years. In addition, sampling results from the influent and effluent ports on the IRTS demonstrate that groundwater is adequately treated prior to being discharged to the on-site pond.

Dewatering of the Phase 1A area commenced in April 1998 following connection of the DVE fracture wells to the existing IRTS. Operation of the DVE blower commenced in December 1998 following EPA's inspection of the system in November 1998. Since that time, the effectiveness of the DVE system has been called into question given the limited amount of dewatering of the Phase 1A area (only 60% of the area has been dewatered over five years of continuous operation), and the significant drop-off in VOC mass removal rates from the DVE blower. From Spring 2001 through Fall 2003, Linemaster implemented a DVE Optimization Plan to determine if dewatering of the Phase 1A area could be improved. However, as mentioned in Section 4.2 of this review, none of the tasks performed as part of the optimization plan significantly improved the performance of the DVE system. Consequently, EPA concluded that the lack of dewatering and low VOC removal rates were the result of the low permeability soil underlying the Site, as opposed to system operation and maintenance.

6.6 Interviews

General discussions and observations were documented in meeting notes during the site inspections/on-site meeting completed over the past year. In addition, the Project Manager for Linemaster, Karl Kasper from Woodard & Curran, was interviewed at EPA Region 1 offices on April 15, 2004. A summary of this interview is provided below.

Mr. Karl Kasper is a certified geologist with 18 years of experience and has been the project manager for the Linemaster Site for the past three years. During this time, he has worked closely with Linemaster, CTDEP, and EPA to refocus the remedial activities from source reduction and management of migration to more of a containment strategy. During the early years of the pump-and-treat system (containment) and DVE system (source reduction), Mr. Kasper reports that significant amounts of VOCs were removed from the subsurface. However, in recent years, the effectiveness of these systems to remove mass has fallen away dramatically, prompting EPA to consider modifications to the DVE system, or the cleanup approach in general.

Mr. Kasper believes that this project has benefited from good communication and a good working relationship between EPA, CTDEP, and Linemaster. In his view, this has resulted in efficient and cost effective operations. Linemaster is a major

employer in the Town of Woodstock, CT and, therefore, has a high profile. While there is public interest in the project, Mr. Kasper reports that Linemaster has gained the public's trust through its past actions as a responsible party that has cooperated with EPA and CTDEP. This has resulted in minimal comments from the public.

7.0 TECHNICAL ASSESMENT

7.1 Question A: Is the Remedy Functioning as Intended by the Decision Documents?

The remedial action objectives specified in the 1993 ROD included both source control measures and management of migration measures to mitigate existing and future threats to public heath and the environment. These response objectives are:

Source Control

1. Prevent or mitigate the continued release of hazardous substances to the groundwater and surface water by removing the opportunity for contact between precipitation and groundwater and the contaminated soils;

2. Reduce the concentrations of VOCs in soil within the Zone 1 area so that concentrations of VOCs in the groundwater will not exceed drinking water standards and will not pose a risk to human health and the environment.

Management of Migration Measures

1. Eliminate or minimize the threat posed to human health and the environment by preventing exposure to groundwater contaminants;

2. Prevent further migration of groundwater contamination beyond its current extent; and

3. Restore contaminated groundwater to drinking water standards, and to a level that is protective of human health and the environment, as soon as practicable.

A comparison of the remedial action objectives presented above to the current performance of the IRTS and DVE demonstrates that the remedy has dramatically reduced the risks to human health and the environment. Pumping from both the IRTS and DVE extraction wells has prevented further migration of ground-water contamination beyond the Site, and in many parts of the Site the concentration of groundwater contaminants has been reduced to below state and federal drinking water standards. In addition, the potential for exposure to contaminated soil and groundwater has been addressed through institutional controls in the form of deed

restrictions that will limit groundwater use and excavation activities on-site. EPA expects these restrictions to be recorded in Summer 2004.

Although the operation of the DVE system and IRTS has dramatically reduced the risks associated with the Site, the DVE system has been only marginally effective at reducing the concentrations of VOCs in soil within the Phase 1A area. Linemaster, EPA, and CTDEP have collectively tried to identify and implement approaches to optimize the performance of this system. However, as presented in the *DVE Optimization Report for the Phase 1A Area* (Woodard & Curran, November 2003), it appears that the inherently low permeability of the soil within the Phase 1A is preventing both full dewatering of this area, and significant VOC mass removal rates from those soils which have been dewatered. Consequently, there is uncertainty regarding the DVE system's ability to remediate soils to a level where contaminants will no longer leach to groundwater.

7.2 Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives Used at the Time of the Remedy Selection Still Valid?

There have been no changes in the physical conditions or uses of the Site that would affect the protectiveness of the remedy.

Changes in Standards and To Be Considereds

Applicable or Relevant and Appropriate Standards identified in the 1993 ROD are included as attachment 4. Changes in standards since the 1993 ROD was completed include:

- Connecticut Remediation Standard Regulations (RSRs), Regulations of Connecticut State Agencies (R.C.S.A.) Sections 22a-133k1 to 3, and Connecticut Environmental Land Use Restriction (ELUR) Regulations, R.C.S.A. Section 22a-133-q-1 adopted pursuant to Sections 22a-133k, and 22a-133q of the Connecticut General Statutes. These regulations were adopted on January 30, 1996, thus they were not ARARs at the time of the1988 ROD. The RSRs provide specific numeric cleanup criteria for a wide variety of contaminants in soil, ground water, surface water and soil vapor. The specific cleanup criteria for groundwater is the background concentration for each contaminant in ground water, as well as the volatilization and surface water protection criteria. The RSRs specify that if remediation has reduced the concentration of a contaminant to a concentration less than the ground water protection criterion and further reduction of the concentration would be technically impracticable, then no further remediation shall be required.

- Safe Drinking Water Act, Maximum Contaminant Levels (MCLs) (40 CFR 141.11-141.16). MCLs have been promulgated for a number of organic and inorganic contaminants. These levels regulate the concentration of contaminants in drinking water supplies. On January 22, 2001, EPA published a final proposed rule that lowered the MCL for arsenic from 50 ppb to 10 ppb. The new MCL became effective on February 22, 2002

Based on the changes noted above, EPA evaluated the current cleanup levels presented in the ROD to determine if the new standards would raise issues regarding the protectiveness of the remedy. Based on that evaluation, EPA determined that the changes noted above do not currently affect the protectiveness of the remedy because the sampling results from Linemaster's production well (GW-08DB) and other potable wells are below the MCLs for each contaminant, including the new MCL for arsenic. In addition, because the RSRs are remediation and not health standards based on exposure, it is EPA's opinion that the RSRs do not raise issues regarding the protectiveness of the cleanup standards presented in the ROD.

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics

The exposure assumptions used to develop the Human Health Risk Assessment included: (1) ingestion of overburden groundwater within the Site, (2) ingestion of bedrock groundwater within the Site, (3) ingestion of groundwater outside and south of the Site, (4) ingestion of soil within the Site, and (5) inhalation of vapors during excavation of soil. These exposure scenarios remain valid. However, an additional exposure scenario was evaluated during this review because the risk assessment did not consider potential exposure from volatilization of contaminants from groundwater to indoor air spaces, EPA performed this assessment as part of this review. As mentioned in Section 6.4 of this review, the results of this sampling did not show that contaminant migration from groundwater to indoor air spaces is an issue. Consequently, EPA concluded that the exposure pathways presented in the 1993 ROD are protective.

7.3 Question C: Has Any Other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

There is no other information that could call into question the protectiveness of the remedy.

Technical Assessment Summary

According to the data reviewed, the Site inspection, and the interviews, the remedy has significantly reduced the risks associated with the Site by containing the groundwater contaminants on-site, and by preventing exposure to

contaminated soil and groundwater within the Site. However, despite best efforts, the DVE system has been unable to fully dewater the Phase 1A area. This combined with the very low VOC mass removal rates from the DVE system, raises questions regarding the system's ability to remediate soils to the cleanup levels presented in the 1993 ROD. EPA authorized a temporary shutdown of the system in November 2003, and is currently evaluating whether or not the cleanup objectives for soil can be met without continued operation of the DVE system. Based on the outcome of that evaluation, EPA will make a determination on the final status of the DVE system.

The results of groundwater samples collected from on-Site monitoring wells and off-Site drinking water wells demonstrate that the IRTS is preventing the off-site migration of groundwater contaminants. In addition, the sampling results taken from Linemaster's production well (GW-08DB) demonstrate that the treatment system on GW-08DB is treating the groundwater to the lower MCL for arsenic. EPA will continue to monitor the groundwater results to help ensure that groundwater contaminants do not migrate off-Site and exposure to elevated concentrations of soil and groundwater contaminants is prevented.

8.0 ISSUES

Based on the activities conducted during this Five-Year Review, the issues identified in Table 2 have been noted.

Table 2: Issues

Issues	Affects Current Protectiveness	Affects Future Protectiveness
Lack of dewatering & vapor extraction in the Phase 1A area	No	Yes[2]
Change in MCL for arsenic	No	Yes[3]

[2] Lack of dewatering may affect the future protectiveness of the remedy should a future evaluation(s) of the site indicate that full dewatering is necessary to meet the cleanup levels presented in the 1993 ROD.

[3] Future protectiveness of the remedy could be an issue should sampling results from GW-08DB exceed the new MCL for arsenic.

9.0 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

In response to the issues noted above, it is recommended that the actions listed in Table 3 be taken:

Table 3: Recommendations and Follow-up Actions

Issue	Recommendation and Follow-up Action	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness	
					Current	Future
Lack of dewatering & vapor extraction in the Phase 1A area	Perform technical evaluation of remedial action objectives for soil based on Site conditions.	PRP	EPA	Complete prior to the next five-year review.	No	Yes
Change in MCL for arsenic	Evaluate and consider future sampling results from GW-08DB to new arsenic MCL and implement corrective action, as appropriate.	PRP	EPA	Complete prior to the next five-year review.	No	Yes

10.0 PROTECTIVENESS STATEMENT(S)

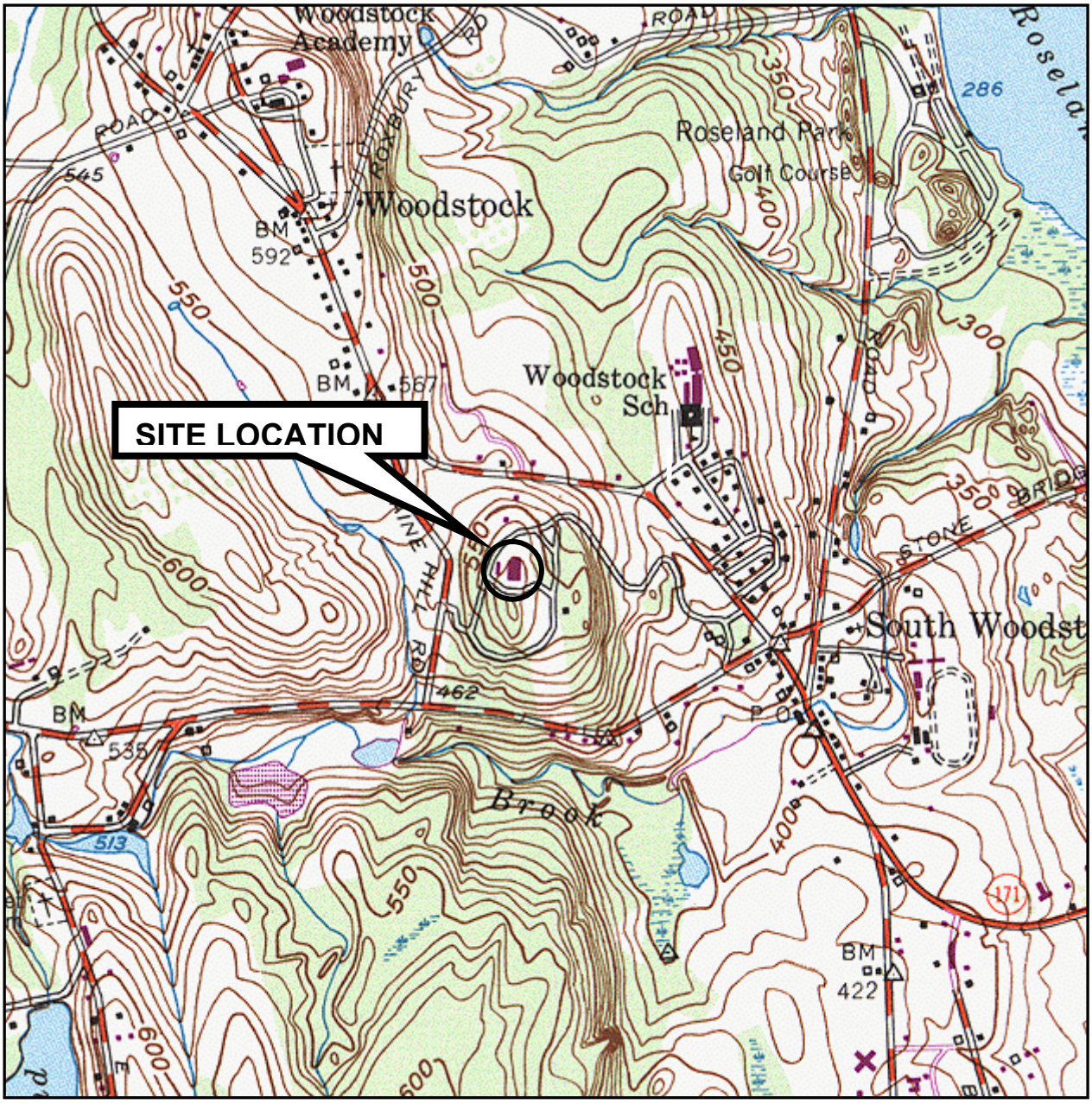
The remedy at the Linemaster Switch Superfund Site is currently protective of human health and the environment. Long-term protectiveness will be determined after EPA makes a final determination regarding the final status of the DVE system. In the interim, continued operation of the IRTS and groundwater monitoring will ensure that people are not exposed to unsafe levels of contaminants that may be present in the groundwater.

11.0 NEXT REVIEW

The next five-year review will be conducted by May 2009.

Attachments

Attachment 1



QUADRANGLE LOCATION

Source: TOPO! Interactive Maps on CD, U.S.G.S.
7.5 Minute Series Topographic Quadrangle Map
Putnam, Conn. 1955, Photorevised 1970

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DATE: Oct 2003
DWN: L. Warner
APP: J. Markey
REV.: 0

FIGURE 1-1
LINEMASTER SWITCH CORPORATION
PLAINE HILL ROAD
WOODSTOCK, CONNECTICUT
SITE LOCATION MAP

Attachment 2

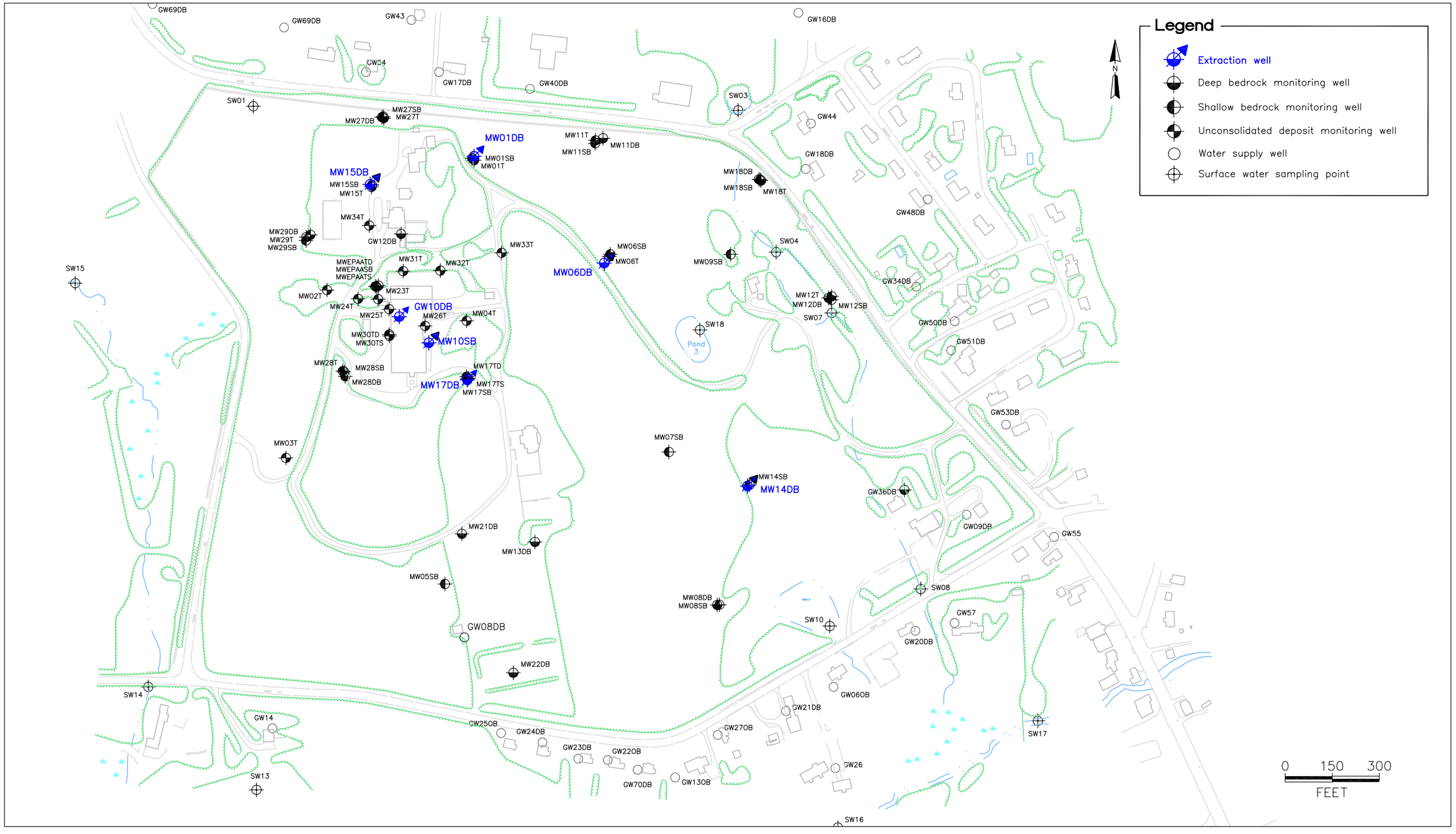

Figure 2–1
Site Plan
LineMaster Switch Corporation
Woodstock, Connecticut

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Fig2–1 – siteplan.dwg

Attachment 3

List of Documents Reviewed

U.S. Environmental Protection Agency (EPA), 1993. "Record of Decision, Linemaster Switch Superfund Site, Woodstock, Connecticut"; July 21, 1993

Fuss & O'Neill Inc., 1998. "Basis of Design Report Phase 1A Area Remediation, Linemaster Switch Corporation; Woodstock, Connecticut"; March 1998

Woodard & Curran, 2001 " Semi-Annual Monitoring Report, April – November 2000, Linemaster Switch Corporation; Woodstock, Connecticut"; March 2001

Woodard & Curran, 2001 " Semi-Annual Monitoring Report, December 2000 – May 2001, Linemaster Switch Corporation; Woodstock, Connecticut"; November 2001

Woodard & Curran, 2002 " Semi-Annual Monitoring Report, June – November 2001, Linemaster Switch Corporation; Woodstock, Connecticut"; June 2002

Woodard & Curran, 2002 " Semi-Annual Monitoring Report, December 2001– May 2002, Linemaster Switch Corporation; Woodstock, Connecticut"; September 2002

Woodard & Curran, 2003 " Semi-Annual Monitoring Report, June 2002– November 2002, Linemaster Switch Corporation; Woodstock, Connecticut"; April 2003

Woodard & Curran, 2003 " Semi-Annual Monitoring Report, December 2002 – May 2003, Linemaster Switch Corporation; Woodstock, Connecticut"; October 2003

Woodard & Curran, 2003 " Final Dual Vapor Extraction System Optimization Report, Linemaster Switch Corporation; Woodstock, Connecticut"; November 2003

Woodard & Curran, 2004 "Vapor Intrusion Evaluation Update, Linemaster Switch Corporation; Woodstock, Connecticut"; January 21, 2004

Woodard & Curran, 2004 "Vapor Intrusion Evaluation Update, Linemaster Switch Corporation; Woodstock, Connecticut"; March 18, 2004

Woodard & Curran, 2004 " Semi-Annual Monitoring Report, June 2003 – November 2003, Linemaster Switch Corporation; Woodstock, Connecticut"; April 2004

Attachment 4

TABLE 13
CHEMICAL-SPECIFIC ARARs and TBCs
FOR THE SELECTED REMEDY
LINEMASTER SWITCH CORPORATION
WOODSTOCK, CONNECTICUT

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	CONSIDERATION IN THE ROD
GROUNDWATER				
Federal Requirements	SDWA-Maximum Contaminant Levels (MCLs) (40 CFR 141.11-141.16)	Relevant and Appropriate	MCLs have been promulgated for a number of common organic and inorganic contaminants. These levels regulate the concentration of contaminants in drinking water supplies. In this case, MCLs are considered relevant and appropriate for groundwater because an aquifer at the site is used for drinking water and is a potential source of drinking water.	The risks to human health due to consumption of groundwater were assessed and concentrations of concern are compared to the MCLs. The selected remedy must attain MCLs.
	RCRA - Groundwater Protection Standard (40 CFR 264.94)	Relevant and Appropriate	The RCRA groundwater protection standard is established from groundwater monitoring of RCRA permitted treatment, storage or disposal facilities. The standard is set at either an existing or proposed RCRA-MCL, background concentration, or an alternate concentration protective of human health and the environment.	RCRA-MCLs may be used or ACLs may be developed at the site to identify levels of contamination above which human health or the environment is at risk and provide an indicator when corrective action is necessary.
State Requirements	Connecticut Standards for Quality of Public Drinking Water (Section 19-13-8102 of CT Regulations of State Agencies)	Relevant and Appropriate	Connecticut has adopted the SDWA MCLs to regulate concentrations of contaminants in public drinking water supplies. Connecticut standards are more stringent than SDWA MCL for some compounds.	Promulgated State standards are used as clean-up levels when more stringent than Federal requirements.
	Connecticut Water Quality Standards (Section 22a-426) Subpart IV - Groundwater	Applicable	Connecticut has adopted the SDWA MCLs to regulate contaminants in certain groundwater.	State standards for TCE and other constituents are exceeded in the groundwater at the site. Promulgated State standards are used as clean-up levels when more stringent than Federal requirements.

TABLE 13
(CONTINUED)
CHEMICAL-SPECIFIC ARARs and TBCs
FOR THE SELECTED REMEDY
LINEMASTER SWITCH CORPORATION
WOODSTOCK, CONNECTICUT

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	CONSIDERATION IN THE ROD
Federal Criteria Advisories and Guidance	EPA Risk Reference Doses (RfDs)	To Be Considered	RfD's are dose levels developed by EPA for noncarcinogenic effects.	EPA RfDs are used to characterize risks due to exposure to contaminants in groundwater, as well as other media.
	EPA Carcinogen Assessment Group Potency Factors	To Be Considered	EPA Carcinogenic Potency Factors are used to compute the individual incremental cancer risk resulting from exposure to carcinogens.	These factors are used to assess health risks from carcinogens present at the site.
	EPA Health Advisories and Acceptable Intake Health Assessment Documents.	To Be Considered	Intended for use in qualitative public health evaluation of remedial alternatives.	Used, if adequate data exist in assessing health risks from ingesting groundwater at the site.
	EPA Groundwater Protection Strategy	To Be Considered	Provides classification and restoration goals of groundwater based on its vulnerability, use, and value.	This strategy is considered in conjunction with the Federal SDWA and Connecticut Water Quality Standards.
	SDWA Maximum Contaminant Level Goals (MCLGs) (40 CFR 141.50 and .51)	Relevant and Appropriate (for non-zero MCLGs), otherwise To Be Considered	MCLGs are health-based limits and do not consider cost or feasibility. As health goals, MCLGs are established at levels at which no known or anticipated adverse effects on the health of persons occur and which allow for an adequate margin of safety.	Non-zero MCLGs must be attained. Zero MCLGs will be considered in assessing health risks.
	Ambient Water Quality Criteria (AWQC)	To Be Considered	AWQC are health based criteria that have been developed for 95 carcinogenic and noncarcinogenic compounds.	AWQC can be used to characterize health risks due to contaminant concentrations in drinking water.

TABLE 13
(CONTINUED)
CHEMICAL-SPECIFIC ARARs and TBCs
FOR THE SELECTED REMEDY
LINEMASTER SWITCH CORPORATION
WOODSTOCK, CONNECTICUT

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	CONSIDERATION IN THE ROD
SURFACE WATER				
Federal Criteria, Advisories and Guidance	Ambient Water Quality Criteria	To Be Considered	AWQC are health-based criteria that have been developed for 95 carcinogenic and noncarcinogenic compounds	AWQC can be used to characterize human health risks associated with either ingestion of water or consumption of aquatic organisms and to set surface water discharge limits. Because the surface water at this site is not used as a drinking water sources, the AWQC is developed to protect aquatic organisms from contaminant exposure and to protect human health from consuming contaminated biota.
Connecticut Regulatory Requirements	Water Quality Standards and Classifications	Applicable	These standards provide criteria for classifying and maintaining the quality of groundwater and surface water	Chemicals released to surface water and groundwater must not degrade the designated quality of the water.
AIR				
Federal Requirements	CAA-State Implementation Plan Emission Standards	Relevant and Appropriate	Emission standards designed to attain National Ambient Air Quality Standards	State Implementation Plan requirements are enforceable ARARs and must be attained.
	CAA-National Emission Standards for Hazardous Air Pollutants (40 CFR 61)	Relevant and Appropriate	Emission Standards for Hazardous Air Pollutants are those for which no air quality standards exist.	These standards would control the air discharge from air strippers or similar types of treatment.
Connecticut Regulatory Requirements	Air Pollution Control Regulations (22a-174-29 and 174-3)	Relevant and Appropriate	Standards were developed primarily to regulate stack emissions.	Excavation and emission controls for soils treatment and emissions from groundwater treatment systems must attain this ARAR.

TABLE 14
LOCATION-SPECIFIC ARARs and TBCs
FOR THE SELECTED REMEDY
LINEMASTER SWITCH CORPORATION
WOODSTOCK, CONNECTICUT

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	CONSIDERATION IN THE ROD
WETLANDS/FLOODPLAIN				
Federal Requirements	None	None	None	There are no areas of the site within the floodplains. No activities are contemplated that will take place in or affect wetlands.
State Requirements	None	None	None	There are no areas of the site within the floodplains. No activities are contemplated that will take place in or affect wetlands.

TABLE 15
ACTION-SPECIFIC ARARs and TBCs
FOR THE SELECTED REMEDY
LINEMASTER SWITCH CORPORATION
WOODSTOCK, CONNECTICUT

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	CONSIDERATION IN THE ROD
GROUNDWATER				
Federal Requirements	RCRA Facility Standards. (40 CFR 264)	Relevant and Appropriate	Facility standards specify design, groundwater monitoring, and closure, and post closure care for specific types of facilities.	The selected remedy must conform, to the extent feasible, to the governing technical standards. A groundwater monitoring program must be implemented pursuant to these regulations.
	RCRA - General Facility Standards (40 CFR 264.10 - 264.18).	Relevant and Appropriate	General facility requirements outline general waste analysis, security measures, inspections, and training requirements.	Any facility will be constructed, fenced, posted and operated in accordance with this requirement. All workers will be properly trained. Process wastes will be evaluated for the characteristics of hazardous wastes to assess further handling requirements.
	RCRA - Preparedness and Prevention (CFR 264.30 - 264.31)	Relevant and Appropriate	Outlines requirements for safety equipment and spill control.	Safety and communication equipment will be maintained at the site. Local authorities will be familiarized with the site operations.
	RCRA - Contingency Plan and Emergency Procedures (40 CFR 264.50 - 264.56).	Relevant and Appropriate	Outlines requirements for emergency procedures to be used following explosions, fires, etc.	Plans will be developed and implemented during site work including installation of monitoring wells and implementation of site remedies. Copies of the plans will be kept on-site.

TABLE 15
(CONTINUED)
ACTION-SPECIFIC ARARs and TBCs
FOR THE SELECTED REMEDY
LINEMASTER SWITCH CORPORATION
WOODSTOCK, CONNECTICUT

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	CONSIDERATION IN THE ROD
GROUNDWATER				
Federal Requirements	RCRA - Manifesting, Recordkeeping, and Reporting (40 CFR 264.70 - 264.77).	Relevant and Appropriate	Specifies the record keeping and reporting requirements for RCRA facilities.	Records of facility activities will be developed and maintained during remedial actions.
	RCRA - Releases from Solid Waste Management Units (40 CFR 264.90 - 264.109).	Relevant and Appropriate	Details requirements for responses to releases from Solid Waste Management Units.	A groundwater program will be developed in accordance with the requirements.
	RCRA - Closure and Post-Closure (40 CFR 264.110 - 264.120).	Relevant and Appropriate	Details specific requirements for closure and post-closure of hazardous waste facilities.	Those parts of the regulation concerned with long-term monitoring and maintenance of the site will be incorporated into the design.
	RCRA - Surface Impoundments (40 CFR 264.220 - 264.249).	Relevant and Appropriate	Details the design, construction, operation, monitoring, inspection, and contingency plans for a RCRA surface impoundment. Also provides three closure options for CERCLA sites; clean closure, containment closure, and alternate closure.	Action will comply with clean closure requirements.
	CWA - National Pollutant Discharge Elimination System (NPDES) (40 CFR 122, 125).	Applicable	Any point-source discharge must meet NPDES requirements which include compliance with corresponding water quality standards; establishment of a discharge monitoring system; and completion of regular discharge monitoring records.	Groundwater treated on-site and discharged to a surface water will need to comply with the water quality standards established by the state.

TABLE 15
(CONTINUED)
ACTION-SPECIFIC ARARs and TBCs
FOR THE SELECTED REMEDY
LINEMASTER SWITCH CORPORATION
WOODSTOCK, CONNECTICUT

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	CONSIDERATION IN THE ROD
AIR				
Federal Requirements	RCRA 40 CFR 264 Subpart AA, Air Emission Standards for Process Vents.	Relevant and Appropriate	Regulates facilities that have operations involving air emissions above particular levels, where appropriate.	The selected remedy, because it will have air emissions, must conform to these requirements.
	RCRA 40 CFR 264 Subpart BB, Air Emission Standards for Equipment Leaks.	Relevant and Appropriate	Requirements governing response to equipment leaks at facilities that may cause air emissions.	If during implementation of selected remedy, equipment leaks occur the response must be in conformance with this Subpart.
	OSWER Directive 9355.0-28, Air Stripper Control Guidance.	To Be Considered	Guidance regarding use of air emission controls at CERCLA sites.	The selected remedy should address this guidance.

TABLE 15
(CONTINUED)
ACTION-SPECIFIC ARARs and TBCs
FOR THE SELECTED REMEDY
LINEMASTER SWITCH CORPORATION
WOODSTOCK, CONNECTICUT

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	CONSIDERATION IN THE ROD
GROUNDWATER				
Connecticut Requirements	Water Quality Standards (22a-426)	Relevant and Appropriate	Reasonable controls or best management practices (BMP) may be required on a case-by-case basis.	If reasonable controls or BMP is required, treatment facility and discharges must meet these requirements.
	Water Pollution Control (22a-430).	Applicable	Contains regulations regarding discharge requirements.	Liquid discharges will need to comply with these regulations.
	Discharge Permit Regulations (22a-430)	Relevant and Appropriate	These requirements supplement the CWA NPDES requirements.	Groundwater treated on-site and discharged to a surface water will need to comply with the water quality standards and complete routine monitoring and recordkeeping activities.

Attachment 5

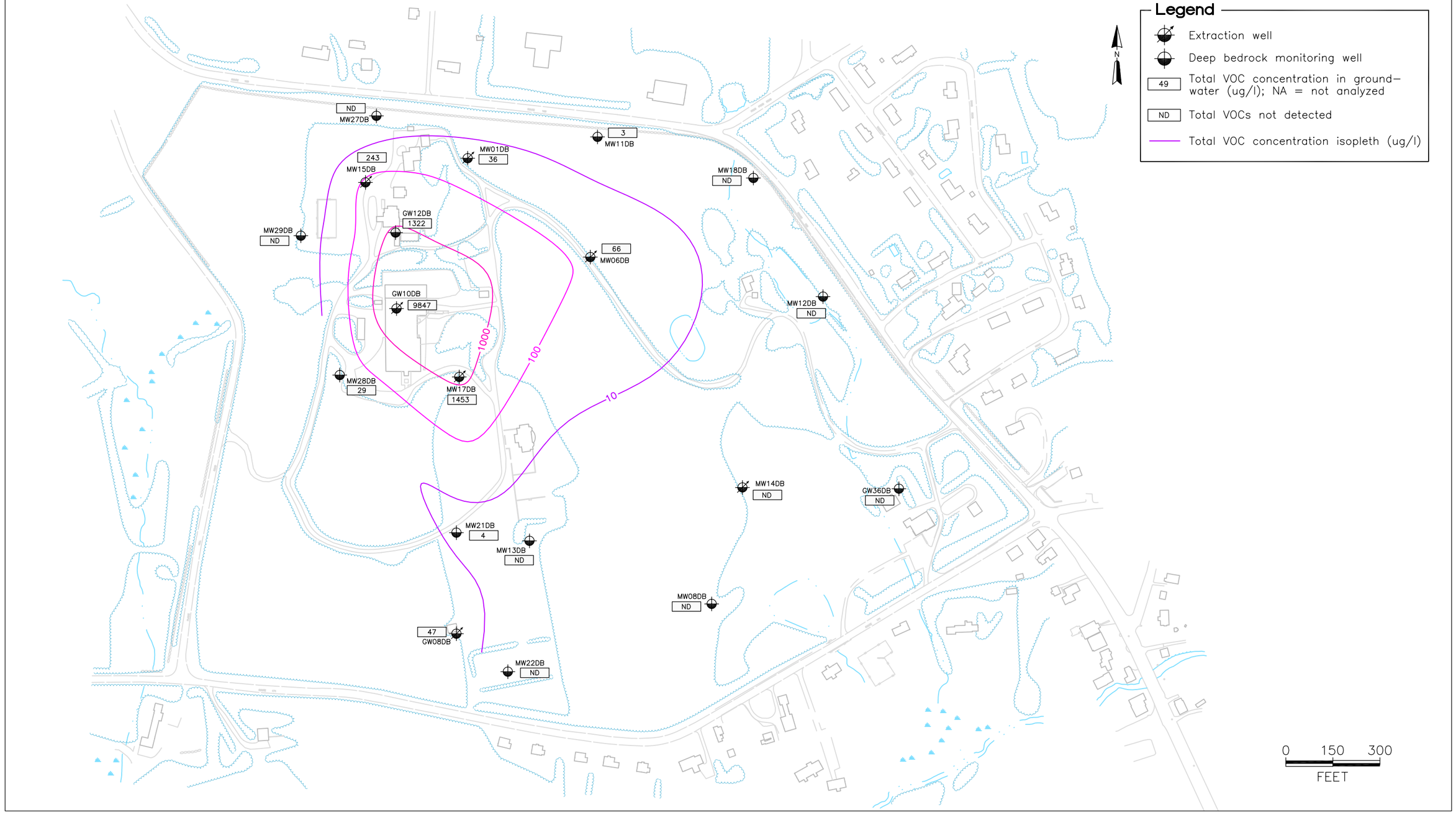

Figure 1
Deep Bedrock Total VOC Isopleth Map
June 2002
LineMaster Switch Corporation
Woodstock, Connecticut

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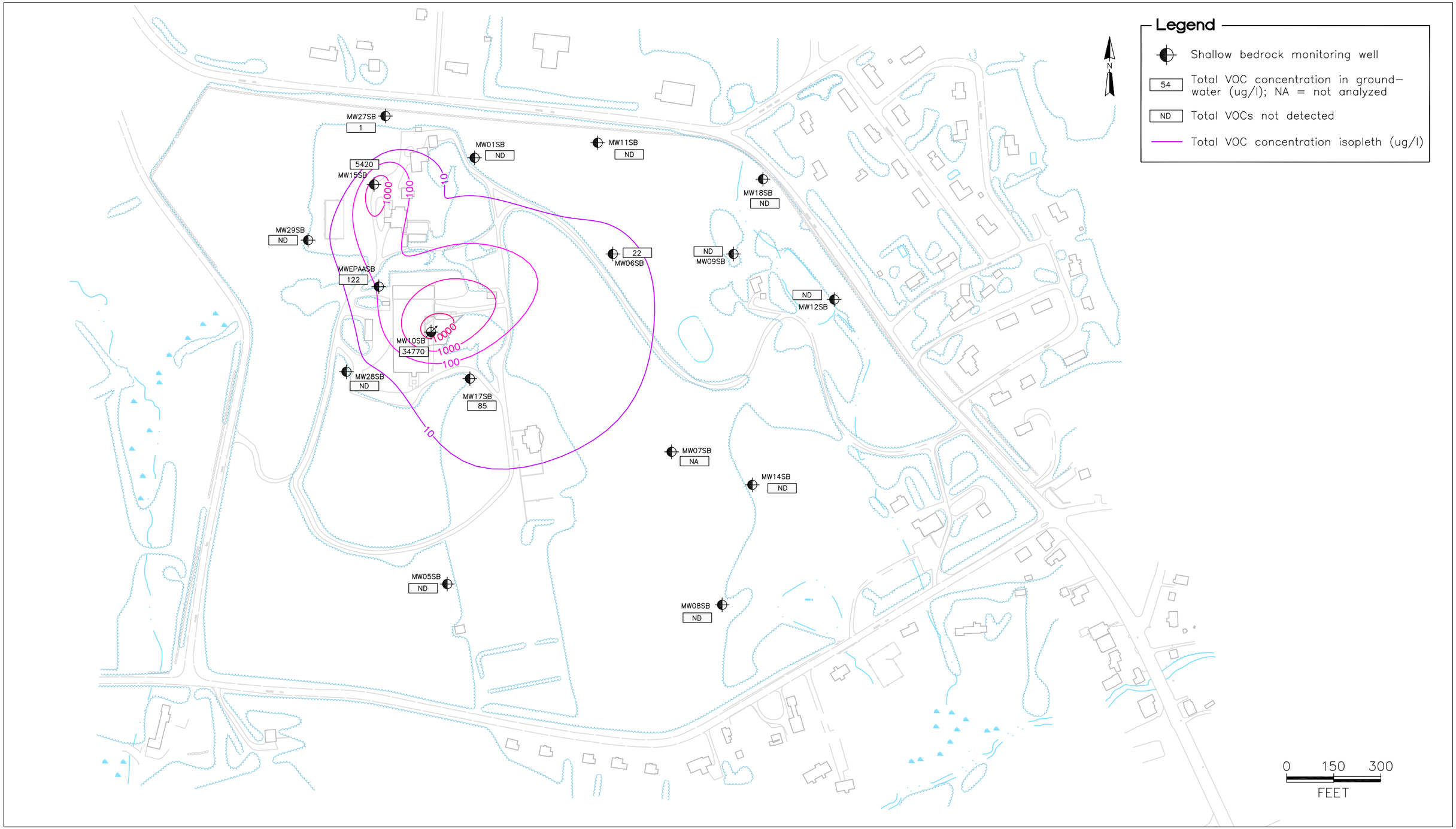

Figure 2
Shallow Bedrock Total VOC Isopleth Map
June 2002
LineMaster Switch Corporation
Woodstock, Connecticut

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shbrvoc0602.dwg/205667/lgt

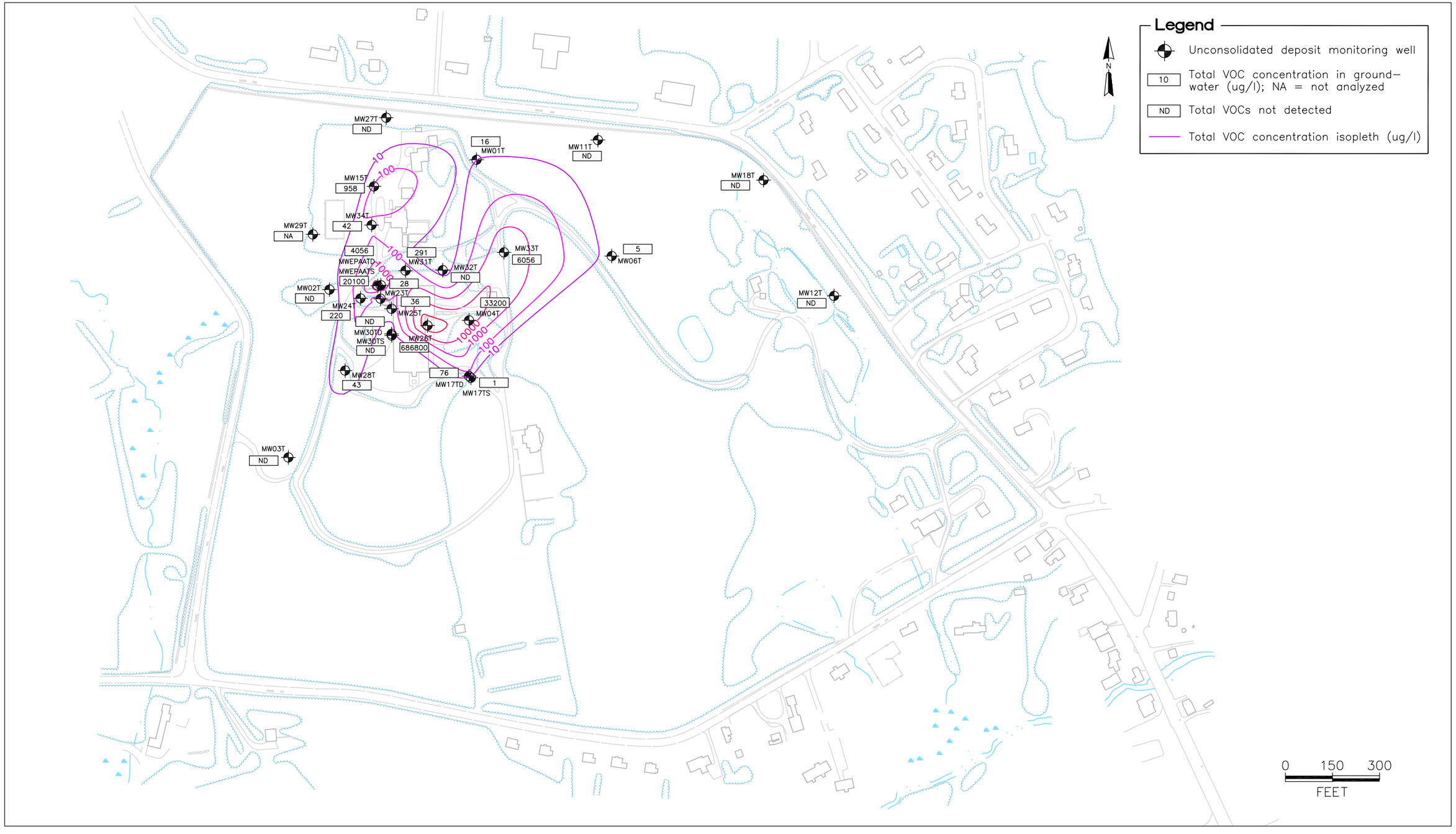

Figure 3
Unconsolidated Deposits Total VOC Isopleth Map
June 2002
LineMaster Switch Corporation
Woodstock, Connecticut

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