2/26/2009

Clean Copy

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF ENVIRONMENTAL REMEDIATION
PRAP/ROD ROUTING SLIP

TO: Sal Ervolina, Assistant Division Director
FROM: The attached is submitted for your approval by:

NAME	INITIAL	DATE
Project Manager: David G. Pratt	DGP	2-26-09
Section Chief/RHWRE: Bart Putzig	BHP	2-26-09
Bureau Director: Robert Knizek	Rek	2-27-09

DATE: 2/26/2009

RE: **Site Name** Lapp Insulator Company **Site Code** 819017

City LeRoy **County** Genesee

☒ **PRAP** S13435

- ☐ Draft PRAP
- ☒ Clean copy of the PRAP
- ☒ Redline/Strikeout version of the PRAP
- ☒ Copies of edits to PRAP (Sal's/Dale's)
- ☒ Site Briefing Report
- ☒ NYSDOH concurrence letter *waiting*
- ☐ USEPA concurrence letter
- ☐ OGC Referral
  - ☐ Attached
  - ☒ Not Required: Explain: *Responsible Party signed an order.*
- ☐ Project Reviews (IGP-13) (if waived, explain why)
  - ☐ Scoping RI date: ______________
  - ☐ Scoping FS date: ______________

PRAP Release Approvals

Ass't Div Director: [signature]
Sal Ervolina 2/27/09

Division Director: [signature]
Dale Desnoyers

Dale has another copy

☐ **ROD**

- ☐ Draft ROD
- ☐ Signature-ready copy of the ROD
- ☐ Redline/Strikeout version of the ROD
- ☐ Copies of edits to ROD (Sal's/Dale's)
  - ☐ Site Briefing Report
- ☐ NYSDOH concurrence letter
- ☐ USEPA concurrence letter

ROD Signoff

Ass't Div Director: ______________
Sal Ervolina

☐ **BRIEFING**

Date: ______________ **Time:** ______________ **Room:** ______________

c: Dale Desnoyers
Other reviewers who are invited to Briefing

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF ENVIRONMENTAL REMEDIATION
Site Briefing Report

Site Code	819017	**Site Name**	Lapp Insulator Company		
Classification	02	**Address**	130 Gilbert Street		
Region	8	**City**	LeRoy	**Zip**	14482
Latitude	42.9711	**Town**	LeRoy	**Project Manager**	David G. Pratt
Longitude	-78.0061	**County**	Genesee		
Site Type	Structure, Lagoon, Landfill			**Estimated Size**	66.0000

Site Description

The Lapp Insulator Site is located on Gilbert Street, south of Route 5, in the Village and Town of LeRoy, Genesee County. The site is located on the outskirts of the village in a mixed residential and industrial area. The site is comprised of approximately 66 acres and lies between a railroad line and Oatka Creek. The Lapp Insulator Company has been manufacturing electrical insulators at this location since 1917. The site consists of many different operation areas that are located in buildings, former and current storage tank areas, drum storage areas, settling lagoons, a drum crushing area and two landfill areas. The two landfill areas were mainly used for disposing of waste porcelain insulators. Some of the operations at the facility used trichloroethene (TCE) degreasing vapors, as well as "baths" that contained tetrachloroethylene (PCE or "perc"). Other operations at the site included the use of resin impregnated bushings, transformer oils, and extensive clay and ceramic working. The site is located adjacent to Oatka Creek, a class C stream which turns into a class B stream when it spills over a dam that is located along the eastern corner of the property. A Consent Order was signed with Lapp Insulator for a Remedial Investigation/Feasibility Study (RI/FS).

Contaminants of Concern (Including Materials Disposed)	Quantity Disposed
F001 WASTE FROM VAPOR DEGREASER	UNKNOWN

Analytical Data Available for : Groundwater, Surface Water, Soil, Sediment
Applicable Standards Exceeded for: Groundwater, soil

Site Environmental Assessment

Oatka Creek, adjacent to the site, receives surface water and groundwater discharge from the site. Although VOCs in groundwater discharge do not appear to be adversely affecting surface water and sediment in Oatka Creek at this time, the potential for future impacts remains.

Moderate levels of some SVOCs, metals and PCBs were identified in Oatka Creek sediments; however, no active sources of these compounds were identified on-site. The levels present in the sediments are not at levels of concern.

Site contamination has impacted the groundwater resource in the overburden and bedrock aquifer. The overburden/shallow bedrock aquifer is a source of drinking water in the area. Quarterly sampling of the closest private wells did not indicate impacts.

Site Health Assessment

Human exposure to site-related contamination on and near the site is not likely. Exposure to contaminated groundwater is not expected since public water serves most of the area and data indicates that the private drinking wells in use are not impacted. Buildings or pavement cover the soil contamination and the proposed remedy will maintain this cover and ensure proper handling of any contaminated soils should they be encountered during non-routine maintenance. The potential for exposure from soil vapor intrusion will be evaluated and, as necessary, addressed for any future buildings developed on the site.

Remedy Description and Cost

Remedy Description for Operable Unit 01

1. A remedial design program would be implemented to provide the details necessary for the construction, operation, maintenance, and monitoring of the remedial program.

2. The targeted excavation and off-Site disposal of contaminated soil would occur in Areas A and C. The Area A soil excavation would be approximately 11,000 square feet in area and two feet in depth. The Area C soil contaminant mass would be approximately 27,300 square feet in area and target the four to six foot depth interval. Based on RI data, much of the Area C soil above four feet could be stockpiled on-Site and then placed back in the excavation upon removal of the four to six foot interval. The area and depth of soil to be excavated would be confirmed during the design of the remedy. Clean soil would be brought on-Site to balance the excavation of the affected areas. Additional work associated with excavation in Area C would include removal and disposal of the concrete pad. The soils from the hot spots would be characterized prior to delivery to an off-Site landfill.

3. Installation of a soil or asphalt cover would occur in Areas A and C. The Area A soil barrier would be approximately 11,000 square feet in area. The Area C soil and asphalt barrier would be approximately 27,300 square feet in area. The soil cover constructed over Areas A and C to prevent exposure to residually contaminated soils would be one-foot thick and would consist of clean soil underlain by an indicator, such as orange plastic snow fence, to demarcate the cover soil from the subsurface soil. The top six inches of soil would be of sufficient quality to support vegetation. Clean soil would constitute soil that meets the Division of Environmental Remediation's criteria for backfill or local site background. Non-vegetated Area A areas (roadways, parking lots, etc.) would be covered by eight inches of stone, four inches of base, three inches of binder, and 1.5 inches of topcoat. The existing asphalt cover over Area C and the existing soil cover over Area D would be maintained.

4. An in-situ chemical oxidation system would be installed and implemented in Area C & D overburden groundwater. A more detailed design would be generated during the design phase.

5. Additional overburden and shallow bedrock groundwater monitoring wells would be installed. Specific quantities and locations would be evaluated during the remedy design.

6. A monitoring program would be implemented to track the groundwater conditions after the in-situ chemical oxidation in the overburden is complete.

7. Imposition of an institutional control in the form of an environmental easement that would require (a) limiting the use and development of the property to industrial use; (b) compliance with the approved site management plan; (c) restricting the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by NYSDOH; and (d) the property owner to complete and submit to the Department a periodic certification of institutional and engineering controls.

8. Development of a site management plan which would include the following institutional and

engineering controls: (a) management of the final cover system to restrict excavation below the soil cover's demarcation layer or pavement. (b) development and implementation of a site-specific health and safety plan to ensure that future excavated soil would be tested, properly handled to protect the health and safety of workers and the nearby community, and would be properly managed in a manner acceptable to the Department; (c) continued evaluation of the potential for vapor intrusion for any new buildings built on the site or change of use of existing buildings, and would include provisions for mitigation of any impacts identified; (d) monitoring of groundwater; (e) identification of any use restrictions on the site; and, (f) provisions for the continued proper operation and maintenance of the components of the remedy.

9. The property owner would provide a periodic certification of institutional and engineering controls, prepared and submitted by a professional engineer or such other expert acceptable to the Department, until the Department notifies the property owner in writing that this certification is no longer needed. This submittal would: (a) contain certification that the institutional controls and engineering controls put in place are still in place and are either unchanged from the previous certification or are compliant with Department-approved modifications; (b) allow the Department access to the site; (c) certify that any new buildings or existing buildings with use changes had soil vapor intrusion evaluations performed and, if necessary, mitigation systems installed; and (d) state that nothing has occurred that would impair the ability of the control to protect public health or the environment, or constitute a violation or failure to comply with the site management plan unless otherwise approved by the Department.

10. The operation of the components of the remedy would continue until the remedial objectives have been achieved, or until the Department determines that continued operation is technically impracticable or not feasible.

Total Cost	$3,400,000
Capital Cost	$2,900,000
OM&M Cost	$30,000

Issues / Recommendations

PROPOSED REMEDIAL ACTION PLAN

Lapp Insulator Company

Village of LeRoy, Genesee County, New York
Site No. 819017

February 2009

Prepared by:

Division of Environmental Remediation
New York State Department of Environmental Conservation

STATE OF NEW YORK
DEPARTMENT OF HEALTH

Flanigan Square 547 River Street Troy, New York 12180-2216

Richard F. Daines, M.D.
Commissioner

Wendy E. Saunders
Executive Deputy Commissioner

February 27, 2009

Mr. Dale Desnoyers, Director
Division of Environmental Remediation
NYS Department of Environmental Conservation
625 Broadway - 12th Floor
Albany, NY 12233-7011

Re: Proposed Remedial Action Plan
Lapp Insulator Company
Site #819017
Leroy (V), Genesee County

Dear Mr. Desnoyers:

Staff reviewed the February 2009 draft *Proposed Remedial Action Plan* for the Lapp Insulator Company Site located in the Village of Leroy, Genesee County. Based on that review, I understand that the proposed remedy includes: (a) targeted excavation and off-site disposal of contaminated soil; (b) installation of a soil or asphalt barrier in two areas of concern; (c) maintenance of the existing asphalt cover and soil covers in two areas of concern; (d) in-situ chemical oxidation treatment in overburden groundwater in two areas of concern; (e) and implementation of a groundwater monitoring program.

In addition, a site management plan will be developed to include the following institutional and engineering controls: (a) management of the final cover system to restrict excavation below the soil cover's demarcation layer or pavement. (b) development and implementation of a site-specific health and safety plan to ensure that future excavated soil would be tested, properly handled to protect the health and safety of workers and the nearby community, and would be properly managed in a manner acceptable to the NYSDEC; (c) continued evaluation of the potential for vapor intrusion for any buildings developed on the site, including provision for mitigation of any impacts identified; (d) monitoring of groundwater; (e) identification of any use restrictions on the site; and, (f) provisions for the continued proper operation and maintenance of the components of the remedy.

I further understand that institutional controls in the form of an environmental easement would be placed on the property that would require: 1 (a) limiting the use and development of the property to industrial use; (b) compliance with the approved site management plan; (c) restricting the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by NYSDOH; and (d) the property owner to complete and submit to the NYSDEC a periodic certification that the institutional and engineering controls remain in place and continue to be effective.

Based on this information, I believe the proposed remedy is protective of public health and concur with it. If you have any questions, please contact me at (518) 402-7880.

Sincerely,

Steven M. Bates, Assistant Director
Bureau of Environmental Exposure Investigation

ecc: G. A. Carlson, Ph.D. /A. Salame-Alfie Ph.D.
G. Litwin / D. Miles / File
R. Van Houten - WNYRO
R. Knizek – DEC
B. Putzig – DEC Region 8

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PROPOSED REMEDIAL ACTION PLAN

Lapp Insulator Company
Village of LeRoy, Genesee County, New York
Site No. 819017
February 2009

SECTION 1: SUMMARY AND PURPOSE OF THE PROPOSED PLAN

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), is proposing a remedy for the Lapp Insulator Company Site. The presence of hazardous waste has created significant threats to human health and/or the environment that are addressed by this proposed remedy. As more fully described in Sections 3 and 5 of this document, the use of solvents at the site have resulted in the disposal of hazardous wastes, including volatile organic compounds (VOCs) such as trichloroethene (TCE) and 1,1,1-trichloroethane (TCA). These wastes have contaminated the soil and groundwater at the site, and have resulted in:

- a significant threat to human health associated with the potential exposure to contaminated groundwater, soil and soil vapors.
- a potential environmental threat associated with the impacts of contaminants to Oatka Creek by VOCs in groundwater.

To eliminate or mitigate these threats, the Department proposes targeted source area soil excavations, soil and asphalt covers, treatment of overburden groundwater using in-situ chemical oxidation, and groundwater monitoring.

The proposed remedy, discussed in detail in Section 8, is intended to attain the remediation goals identified for this site in Section 6. The remedy must conform with officially promulgated standards and criteria that are directly applicable, or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, criteria and guidance are hereafter called SCGs.

This Proposed Remedial Action Plan (PRAP) identifies the preferred remedy, summarizes the other alternatives considered, and discusses the reasons for this preference. The Department will select a final remedy for the site only after careful consideration of all comments received during the public comment period.

The Department has issued this PRAP as a component of the Citizen Participation Plan developed pursuant to the New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR) Part 375. This document is a summary of the information that can be found in greater detail in the September 2005 "Remedial Investigation (RI) Report", the March 2007 "Feasibility Study" (FS), and other relevant documents. The public is encouraged to review the project documents, which are available at the following repositories:

Woodward Memorial Library
7 Wolcott Street
LeRoy, NY 14482
Phone: 585-768-8300
M-Th 9am - 8:30pm, Fri 9am - 5pm
Sat 10am - 4pm

David Pratt, P.E.
Environmental Engineer 2
Division of Environmental Remediation
New York State Department of Environmental Conservation - Region 8 Office
6274 E. Avon - Lima Road
Avon, NY 14414
(585) 226 - 5355
M - F, 8:45 am - 4:45 pm

The Department seeks input from the community on all PRAPs. A public comment period has been set from {dates} to provide an opportunity for public participation in the remedy selection process. A public meeting is scheduled for {date} at the {location} beginning at {time}.

At the meeting, the results of the RI/FS will be presented along with a summary of the proposed remedy. After the presentation, a question-and-answer period will be held, during which verbal or written comments may be submitted on the PRAP. Written comments may also be sent to Mr. Pratt at the above address through {date comment period ends}.

The Department may modify the proposed remedy or select another of the alternatives presented in this PRAP, based on new information or public comments. Therefore, the public is encouraged to review and comment on all of the alternatives identified here.

Comments will be summarized and addressed in the responsiveness summary section of the Record of Decision (ROD). The ROD is the Department's final selection of the remedy for this site.

SECTION 2: SITE LOCATION AND DESCRIPTION

The Lapp Insulator Site is located on Gilbert Street, south of Route 5, in the Village and Town of LeRoy, Genesee County (Figure 1). The site is located on the outskirts of the village in a mixed residential and industrial area. The site is comprised of approximately 66 acres and lies between a railroad line and Oatka Creek.

The Lapp Insulator Site is located within the flat-lying Erie-Ontario Lowlands. The Site topography is nearly flat, dipping slightly from west to east toward Oatka Creek. The maximum relief of the Site is a drop in elevation of approximately 30 feet at the steep rock bank at the adjacent Oatka Creek.

Overburden soil thickness at the Site ranges from approximately 10 to 30 feet. Fill material was used to level topographically low areas and provide support to the steep bank of Oatka Creek along the eastern edge of the property. Two distinct areas contain most of the fill material at the Site. These two areas are the Northeast and the South fill areas, illustrated on Figure 2. Where present, fill is the uppermost overburden unit and was encountered up to 30 feet thick in the South fill area. The fill material consists primarily of anthropogenic materials including brick, coal, cinders, and fragments of porcelain from insulators mixed with disturbed natural soil material of clay, silt, sand, and gravel. The native overburden material at the Site is glacial till which is composed of unsorted silt with clay, sand, and gravel. This till is deposited directly on the underlying bedrock and, where not covered by fill, is present at the ground surface.

Bedrock was measured at the Site at depths ranging from 10 to 30 feet below grade. A total of four distinct bedrock units were encountered during rock well drilling at the Site. These are, in descending order: Levanna Shale, Stafford Limestone, Oatka Creek Shale, and Onondaga Limestone. Levanna Shale is present directly beneath overburden deposits at the Site. Levanna Shale is a light olive gray shale near the top and weathered fissile dark gray or black shale near the base. Levanna Shale was observed along the eastern border of the Site at the western bank of Oatka Creek where it is exposed along a steep cliff approximately 30 feet high. This rock unit also underlies the creek by an estimated additional 50 feet. The thickness of this unit beneath the Site ranges from 50 to 70 feet.

Groundwater at the site flows from west to east toward the creek (see Figures 3 and 4) The creek is a discharge for the overburden, shallow rock, and intermediate zones. Groundwater in the deepest rock zone flows downward.

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

Since 1917 Lapp has been actively engaged in the manufacture and production of ceramic insulators and electrical transformer bushings. Lapp discontinued manufacture of bushings in 2004 (The bushings portion of the business is leased to PCore electronics, which continues to operate in the buildings on-site on the east side of Gilbert Street). Historical records indicate that oils, petroleum based products, and chlorinated solvents; including 1,l,l-trichloroethane (TCA), trichloroethene (TCE), and tetrachloroethene (PCE), were stored and utilized for production at the Lapp Site, primarily on the east side of Gilbert Street. Further, two areas of the Site, referred to as the Northeast and South fill areas have been used for the disposal of crushed ceramic insulators.

3.2: Remedial History

In 1996, the Department first listed the site as a Class 2a site in the Registry of Inactive Hazardous Waste Disposal Sites in New York (the Registry). Class 2a was a temporary classification assigned to a site that had inadequate and/or insufficient data for inclusion in any of the other classifications. In 1998, the Department listed the site as a Class 2 site in the Registry. A Class 2 site is a site where hazardous waste presents a significant threat to the public health or the environment and action is required.

Previous investigations conducted to assess environmental conditions at the Site include:

- Phase I Environmental Due Diligence Examination (ENSR, 1991)
- Phase II Environmental Due Diligence Examination (ENSR, 1992)
- Phase I Site Characterization Report (ENSR, 1995)
- Supplemental Site Soil Characterization (Haley & Aldrich, 1995)

Results indicated that the groundwater and soil were impacted with site-related volatile organic compounds.

A remedial measure was attempted by Lapp Insulator without Department concurrence or involvement in December 1995. The remedial measure consisted of a soil vapor extraction system with a single extraction well placed in each of three areas of concern (Areas A, B, and C). The system was deemed ineffective at adequately addressing the contamination at the Site and was ultimately shut down in September 1999.

An Order on Consent between Lapp Insulator and the Department was signed in 2001. RI work activities required under the 2001 Order on Consent are presented in the November 2000 RI/FS Work Plan (Malcolm Pirnie, Inc.).

The RI work activities began in October 2001 with Site characterization tasks, installation of an upgradient deep bedrock monitoring well, and sampling of several media including soil, groundwater, surface water and sediments. Results of the Phase I RI were submitted to the Department in the form of a Technical Memorandum in November 2002, (Malcolm Pirnie, Inc.).

A second phase of investigation was performed to confirm and expand upon the information obtained from the initial phase of investigation. The Phase II field program was performed in July and August 2003 and included installation of bedrock monitoring wells, and sampling of several media including sediment, surface water, water seep, and groundwater. The 2005 RI report (Malcolm Pirnie, Inc.) provides the results of both phases of remedial investigation at the Lapp Site. The March 2007 FS report provided the remedial alternatives described in this document.

SECTION 4: ENFORCEMENT STATUS

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers.

The Department and the Lapp Insulator Company entered into a Consent Order on August 21, 2001. The Order obligates the responsible parties to implement an RI/FS remedial program. After the remedy is selected, the Department will approach the PRPs to implement the selected remedy under an Order on Consent.

SECTION 5: SITE CONTAMINATION

A remedial investigation/feasibility study (RI/FS) has been conducted to evaluate the alternatives for addressing the significant threats to human health and/or the environment.

5.1: Summary of the Remedial Investigation

The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site. The RI was conducted between October 2001 and August 2003. The field activities and findings of the investigation are described in the RI report.

Soil, soil gas, groundwater, surface water, water seep and sediment sampling occurred in several phases. In addition to the on-site sampling, adjacent homeowner drinking water supply wells were sampled several times.

5.1.1: Standards, Criteria, and Guidance (SCGs)

To determine whether the soil, groundwater, and surface water contains contamination at levels of concern, data from the investigation were compared to the following SCGs:

- Groundwater, drinking water, and surface water SCGs are based on the Department's "Ambient Water Quality Standards and Guidance Values" and Part 5 of the New York State Sanitary Code.
- Soil SCGs are based on the Department's Soil Cleanup Objectives in 6 NYCRR Part 375-6.

Based on the RI results, in comparison to the SCGs and potential public health and environmental exposure routes, certain media and areas of the site require remediation. These are summarized in Section 5.1.2. More complete information can be found in the RI report.

5.1.2: Nature and Extent of Contamination

This section describes the findings of the investigation for all environmental media that were investigated.

As described in the RI report, many soil, groundwater, surface water, soil gas, and sediment samples were collected to characterize the nature and extent of contamination. As summarized in Table 1, the main categories of contaminants that exceed their SCGs are volatile organic compounds (VOCs). For comparison purposes, where applicable, SCGs are provided for each medium. Chemical concentrations are reported in parts per billion (ppb) for water and parts per million (ppm) for soil and sediment.

The majority of the 66 acre site did not have contamination at levels of concern. As a result of soil, groundwater, surface water, and sediment sampling, as well as a site-wide soil gas survey, four "hot spot" areas of concern have been identified at the site (Areas A, B, C, and D - see Figure 2):

Area A is located near the southeast corner of Building 23, the former machine shop area. Historical information indicates that handling of solvents occurred at the loading dock at the southeast corner of the building and that underground storage tanks (USTs) containing TCA and TCE were formerly located here.

Area B is located east of Building 31, and is currently used as a storage warehouse. Past activities in this area included a shipping and receiving dock and warehouse area. A gasoline UST was formerly located at the southeast corner of Building 31. TCE was the primary VOC detected at Area B. 1,2- Dichloroethene (1,2-DCE) and 1,1-Dichloroethane (1,l-DCA) were also detected at the same locations as the TCE detections.

Area C is located at the former hazardous materials storage pad in the southern portion of the Site. The sampling program in this hot spot area encompassed the concrete storage pad and extended southeast to the top of the steep embankment adjacent to Oatka Creek. Overall the data collected from Area C indicated no well defined area of contamination from past use, but instead showed scattered detections of primarily chlorinated VOCs encompassing approximately 27,300 square feet. The primary VOCs detected in the soil samples collected from Hot Spot Area C are TCE, PCE, and TCA.

Area D is located adjacent to the south side of Area C in the northwest corner of the Southeast fill area. The primary VOCs detected (TCE and TCA) in the soil samples from Area D are similar to those detected at Area C.

Table 1 summarizes the degree of contamination for the contaminants of concern in surface soil, subsurface soil, sediment, groundwater, and surface water and compares the data with the SCGs for the site. Table 2 summarizes background sample data used for comparison to on-site detections. The following are the media which were investigated and a summary of the findings of the investigation.

Surface Soil 0-6 inches

Much of the site is covered with pavement or buildings; therefore, surface soil samples could not be obtained in many areas. In the hot spot areas, there were detections of VOC contaminants. Some semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and inorganic compounds were detected in surface soil site-wide, but not at levels of significant concern. Although no significant areas of surface soil contamination of concern were found at the site, the surface soil contamination identified during the RI/FS will be addressed in the remedy selection process.

Subsurface Soil

Subsurface VOC soil contamination at levels above unrestricted values occurred mainly in Areas A and C. Figure 5 depicts the areas of VOC impacted subsurface soils in Areas A and C. Areas B and D also had VOC contamination present, but at levels only slightly above unrestricted use SCGs. SVOCs and PCBs were not present above SCGs in subsurface soil at the site. There was only one detection of a pesticide slightly above unrestricted use SCGs. No inorganic compounds were detected at levels of significant concern. Table 1 compares detected levels with unrestricted use SCGs.

Subsurface soil contamination identified during the RI/FS will be addressed in the remedy selection process.

Groundwater

Groundwater contamination at the site consists mainly of VOCs, with the highest VOC levels in the four main areas of concern. Figures 6, 7, and 8 show maximum levels of groundwater contamination at the four areas of concern. The groundwater contaminant plumes extend to the cliff wall above Oatka Creek.

VOCs:

- Area A: Overburden groundwater was not present in Area A. In the shallow bedrock in Area A, VOC contamination was present at elevated levels. Intermediate and deep bedrock VOC contamination was also present, but at levels significantly less then the shallower bedrock.

- Area B: The highest VOC detections in the Area B overburden groundwater were found in a temporary micro-well (PMW-12) installed during a pre-RI investigation conducted by Lapp in 1995. The detections were not replicated, but a bedrock monitoring well slightly downgradient of Area B showed VOC contaminants at levels above groundwater standards. It is possible that the vapor extraction system that Lapp installed (described above) did address some overburden groundwater contamination in this area.

- Areas C & D: VOC contamination in Areas C and D groundwater is present in both the overburden and shallow bedrock groundwater at levels of concern. The intermediate groundwater well installed in Area D was dry.

SVOCs, Pesticides, PCBs, & Inorganics (metals):

- SVOCs were detected at only trace levels at the site, all below the groundwater standards.

- No pesticides were detected in site groundwater.

- There was only one low level detection of PCBs in groundwater; however, this detection was from a micro-well with high turbidity. Given the lack of any other discernable PCB contamination at the site and the very low level detected in this sample, PCBs are not considered a significant groundwater concern.

- Inorganics (metals) detected in site groundwater did not suggest any sources other than naturally occurring conditions.

Private groundwater supply wells near the site were sampled in 1995 and low level detections of VOCs were found in three of five wells sampled. Re-sampling in 1998 did not detect VOCs. As part of the RI, additional samples were obtained from the residential wells every three months for a year. No levels were detected. Given the lack of contaminants and the apparent location of the residential wells upgradient of the site, it does not appear that the site was the source of the short term contamination detected in 1995. Therefore, it does not appear that the site is impacting the private groundwater supply wells.

Groundwater contamination identified during the RI/FS will be addressed in the remedy selection process.

Surface Water

Two surface water sampling events were conducted to determine if any site contaminants have migrated to Oatka Creek. A total of ten samples were collected, two rounds from five locations; one upstream location, three locations adjacent to the site, and one location downstream of the site. Samples were also collected (once each round) from the only visible seep discharging from the steep embankment along the eastern side of the site, adjacent to Oatka Creek.

No VOCs, SVOCs, Pesticides, or PCBs were detected in the surface water samples at concentrations above the water quality standards. However, several VOCs that were detected in on-site groundwater samples (1,1,1-TCA, TCE, 1,1-DCA) were also detected in surface water samples at concentrations below the water quality standards for Class C surface waters.

The only metals detected in the surface water samples at concentrations above the surface water quality standards were iron and aluminum. Since the concentrations of these naturally occurring metals were relatively consistent upstream and downstream of the Site, it can be concluded that these concentrations are not due to an on-site source.

A single visibly flowing seep exists southeast of Area A, along the steep embankment adjacent to Oatka Creek. This location was sampled during both events. Several VOCs, including TCE and TCA, were detected at low concentrations in both seep samples; however, the concentrations were below the Department's Class C surface water criteria. No SVOCs, pesticides, or PCBs were detected in the seep samples, and no metals were detected at concentrations above the water quality standards.

Since the RI/FS did not detect surface water contamination of concern, surface water will not be addressed in the remedy selection process.

Sediments

Sediment samples were taken at approximately the same locations as the five surface water sampling locations in Oatka Creek. These samples were collected during each of two events for a total of ten samples plus duplicates (one each event). Results were compared to the sediment criteria from the Department's Technical Guidance for Screening Contaminated Sediments. Only one VOC, benzene, was detected above the sediment criteria. It was detected at the downstream sample location (SED-5) and only once, during the Phase I sampling event only. This benzene detection may be the result of runoff from street traffic, as SED-5 is located close to and downstream of the Munson Street Bridge. No other VOCs were detected above the sediment criteria; however, low levels of several other VOCs were detected in the sediment samples, including TCA, TCE, 1,1-DCA, and 1,2-DCE.

A total of nine SVOCs were detected at concentrations above the Department's Sediment Screening Criteria. However, these detections occurred in only one location (SED-3), and in only one round of samples collected at that location. These concentrations were not repeated in the other round from SED-3, or in any other sediment samples, indicating that the areal extent of elevated SVOCs is limited.

No pesticides were detected above the Department's Sediment Screening Criteria in any of the sediment samples.

PCBs were detected in the Phase I sampling event at the SED-3 and SED-4 sample locations at concentrations above the Department's Sediment Screening Criteria. However, the PCB detections could not be replicated in the second sampling event, even in samples collected from these same locations; implying that the areal extent of any potentially PCB contaminated sediment would be very limited.

The metals mercury, magnesium, cadmium, chromium, copper, lead, manganese, nickel, silver, and zinc were detected at concentrations above the Department's Sediment Screening Criteria in at least one of the ten sediment samples collected. All of the metals exceedances were either only slightly above criteria, or were consistent from upstream to downstream (implying that they are naturally occurring). Based on the analytical results and the locations at which they were found, no site-related source of metals contamination was indicated.

Since the RI/FS did not detect sediment contamination of concern, sediments will not be addressed in the remedy selection process.

Soil Vapor/Sub-Slab Vapor/Air

A site-wide soil gas survey was performed during the RI. The soil gas survey was used as a screening tool to attempt to identify previously unknown VOC source areas. The survey results confirmed that the four known hot spots (Areas A, B, C, and D) appear to be the only major sources of VOC contaminants at the Lapp Insulator Site. Other sporadic low level detections were identified around the hot spot areas and along the eastern site boundary. These lower level detections do not appear to indicate the presence of other major sources of VOC contamination. No known completed exposure pathways currently exist at the site. Given the levels of VOCs in the soil gas, soil vapor intrusion could become a potential pathway of concern at the site. The source of the VOCs and the potential for exposure will be addressed in the remedy selection and site management process.

5.2: Interim Remedial Measures

An interim remedial measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before completion of the RI/FS.

Although Lapp installed and operated a soil vapor extraction system in Areas A, B, and C during the late 1990s, there were no Department approved IRMs performed at this site during the RI/FS.

5.3: Summary of Human Exposure Pathways:

This section describes the types of human exposures that may present added health risks to persons at or around the site. A more detailed discussion of the human exposure pathways can be found in Section 8 of the RI report. An exposure pathway describes the means by which an individual may be exposed to contaminants originating from a site. An exposure pathway has five elements: [1] a contaminant source, [2] contaminant release and transport mechanisms, [3] a point of exposure, [4] a route of exposure, and [5] a receptor population.

The source of contamination is the location where contaminants were released to the environment (any waste disposal area or point of discharge). Contaminant release and transport mechanisms carry contaminants from the source to a point where people may be exposed. The exposure point is a location where actual or potential human contact with a contaminated medium may occur. The route of exposure is the manner in which a contaminant actually enters or contacts the body (e.g., ingestion, inhalation, or direct contact). The receptor population is the people who are, or may be, exposed to contaminants at a point of exposure.

An exposure pathway is complete when all five elements of an exposure pathway exist. An exposure pathway is considered a potential pathway when one or more of the elements currently does not exist, but could in the future.

As stated in the RI, contaminated soil and groundwater underlie the Site. In addition, elevated levels of VOCs were detected in the soil vapor, which could impact the indoor air quality via the soil vapor intrusion pathway.

As a result, under the existing and potential uses of the Site, potentially exposed populations and their related exposure pathways include:

Lapp Employees:

- Exposure to contaminated surface soil via incidental ingestion and dermal contact by site workers whose work responsibilities involve work outdoors or who may take breaks outdoors is minimal since much of the Site is covered.

- The potential for soil vapor intrusion to impact indoor air exists near the hot spot areas. Low levels of site-related VOCs were detected in soil vapor near some regularly occupied buildings; however, given the low levels and the large, open, industrial usage of these buildings, even though this pathway was not evaluated, these levels are not suspected to impact indoor air quality.

Trespassers:

- As the Site is not fenced and would likely not be in the future, trespassers may gain access to the Site. Since their activities would not typically involve digging, and because gravel and/or vegetation cover the hot spot areas, the risk associated with this potential pathway is minimal.

Construction/Utility Workers:

- Construction/utility workers who may be required to open a utility excavation on-Site could be exposed to VOCs in surface and subsurface soil via direct contact or incidental ingestion, and to VOCs in soil and groundwater via inhalation of VOCs volatilized from these media.

Public:

- Most of the community is served by public water and thus do not drink the groundwater. For those few homes which use a private well for drinking water, the water was tested and it was determined that the site has not contaminated their drinking water. Therefore, groundwater contamination is not a public health concern. Furthermore, the surface water and sediment in Oatka Creek are not contaminated at levels of concern by the Site. Based on the very low concentrations of VOCs in soil vapor on the site boundary and the hydrogeologic conditions, including a gully separating the Site from the nearest offsite receptor, the potential for soil vapor intrusion into off-site structures is not expected.

5.4: Summary of Environmental Assessment

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts include existing and potential future exposure pathways to fish and wildlife receptors, as well as damage to natural resources such as aquifers and wetlands.

The Fish and Wildlife Impact Analysis, which is included in the RI report, presents a detailed discussion of the existing and potential impacts from the site to fish and wildlife receptors.

Oatka Creek, adjacent to the site, receives surface water and groundwater discharge from the site. Although VOCs in groundwater discharge do not appear to be adversely affecting surface water and sediment in Oatka Creek at this time, the potential for future impacts remains.

Moderate levels of some SVOCs, metals and PCBs were identified in Oatka Creek sediments; however, no active sources of these compounds were identified on-site. The levels present in the sediments are not at levels of concern.

Site contamination has impacted the groundwater resource in the overburden and bedrock aquifer. The overburden/shallow bedrock aquifer is a source of drinking water in the area. Quarterly sampling of the closest private wells did not indicate impacts.

SECTION 6: SUMMARY OF THE REMEDIATION GOALS

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375. At a minimum, the remedy selected must eliminate or mitigate all significant threats to public health and/or the environment presented by the hazardous waste disposed at the site through the proper application of scientific and engineering principles.

The remediation goals for this site are to eliminate or reduce to the extent practicable:

- potential exposures of persons at or around the site to volatile organic compounds in soil, soil vapor, and groundwater;

- environmental exposures of flora or fauna to volatile organic compounds in surface water;
- the release of contaminants from soil into groundwater that may create exceedances of groundwater quality standards; and

Further, the remediation goals for the site include attaining to the extent practicable:

- ambient groundwater quality standards; and,
- Soil SCGs based on remedial program soil cleanup objectives.

SECTION 7: SUMMARY OF THE EVALUATION OF ALTERNATIVES

The selected remedy must be protective of human health and the environment, be cost-effective, comply with other statutory requirements, and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for the Lapp Insulator Site were identified, screened and evaluated in the FS report which is available at the document repositories established for this site. For the purposes of this PRAP, an additional alternative (Alternative 3A) is presented as a modification of Combination Alternative 3 proposed in the FS.

A summary of the remedial alternatives that were considered for this site is discussed below. The present worth represents the amount of money invested in the current year that would be sufficient to cover all present and future costs associated with the alternative. This enables the costs of remedial alternatives to be compared on a common basis. As a convention, a time frame of 30 years is used to evaluate present worth costs for alternatives with an indefinite duration. This does not imply that operation, maintenance, or monitoring would cease after 30 years if remediation goals are not achieved.

7.1: Description of Remedial Alternatives

The following potential remedies were considered to address the contaminated soils, groundwater, and soil vapor at the site.

The No Action Alternative is evaluated as a procedural requirement and as a basis for comparison. It requires continued monitoring only, allowing the site to remain in an unremediated state. This alternative would leave the site in its present condition and would not provide any additional protection to human health or the environment.

No Action Alternative: No Action - with Groundwater Monitoring

Present Worth: *$410,000*
Capital Cost: *$71,000*
Annual Costs:
(Years 1-30): *$22,000*

This alternative would consist of annual monitoring of 15 groundwater monitoring wells. The capital costs also include the cost of decommissioning 26 other monitoring wells on site. This monitoring program assumes 5 overburden and 10 bedrock monitoring wells would be monitored.

Alternative #1: (FS Remedial Combination 1) Protective Soil Cover with Downgradient Phytoremediation

Present Worth: *$1,400,000*
Capital Cost: *$770,000*
Annual Costs:
(Years 1-30): *$39,000*

This alternative would include the installation of a soil cover over the soil hot spots and a phytoremediation system downgradient from groundwater hot spots. A site-wide groundwater monitoring program would be implemented.

The soil cover would be placed over Areas A and C (areas shown in Figure 5) to eliminate direct contact of impacted soils in those areas. The Area A cover would consist of a clean soil cover with a demarcation layer in vegetated areas and asphalt paving in parking lot/driveway areas. A clean soil cover with a demarcation layer would act as a cover for Area C.

The phytoremediation system would consist of approximately 5000 hybrid-poplar tree cuttings extending from hot spot A to hot spot D along the creek drop-off. The intent of the trees would be to capture contaminants from the groundwater via the tree roots. These trees are very fast growing and should begin to have an effect on groundwater within the first few growing seasons.

The installation of additional sub-slab soil vapor mitigation systems has not been deemed necessary at this time for the current use of the on-site buildings. However, the Site Management Plan would require a soil vapor intrusion evaluation if building use changes were proposed (e.g. - new office space in a basement, etc.). The periodic certification would certify that such an evaluation occurred if any building use changes were made.

The groundwater monitoring program would monitor the effectiveness of the remedy and track contaminant levels site-wide over time. This monitoring program assumes 5 overburden and 10 bedrock monitoring wells would be monitored.

Alternative #2: (FS Remedial Combination 2) Targeted Excavation and Soil Cover with Downgradient Phytoremediation

Present Worth: *$2,900,000*
Capital Cost: *$2,300,000*
Annual Costs:
(Years 1-30): *$39,000*

This alternative would include targeted soil excavation and off-Site disposal of accessible soil contamination in Areas A and C (areas shown in Figure 5), installation of covers over Areas A and C, and installation of a phytoremediation system downgradient of groundwater hot spots. A site-wide groundwater monitoring program would be implemented.

A total of approximately 3,000 cubic yards of soil would be excavated. The Area A soil excavation would be approximately 11,000 square feet in area and two feet in depth. This was determined during the FS to represent the removal of approximately 80% of the mass of VOC contamination in Area A. The Area C soil excavation is estimated to be approximately 27,300 square feet in area and target the four to six foot depth interval. This was determined during the FS to represent the removal of approximately 90% of the mass of VOC contamination in Area C. The precise area and depth of the targeted excavations would be better defined during the design of the remedy.

The Area A cover would consist of a clean soil cover with a demarcation layer in vegetated areas and asphalt paving in parking lot/driveway areas. A clean soil cover with a demarcation layer would act as a cover for Area C.

The phytoremediation system would consist of approximately 5,000 hybrid-poplar tree cuttings extending from hot spot A to hot spot D along the creek drop-off. The intent of the trees would be to capture contaminants from the groundwater via the tree roots. These trees are very fast growing and should begin to have an effect on groundwater within the first few growing seasons.

The installation of additional sub-slab soil vapor mitigation systems has not been deemed necessary at this time for the current use of the on-site buildings. However, the Site Management Plan would require a soil vapor intrusion evaluation if building use changes were proposed (e.g. - new office space in a basement, etc.). The periodic certification would certify that such an evaluation occurred if any building use changes were made.

The groundwater monitoring program would monitor the effectiveness of the remedy and track contaminant levels site-wide over time. This monitoring program assumes 5 overburden and 10 bedrock monitoring wells would be monitored.

Alternative #3: (FS Remedial Combination 3) Targeted Excavation and Soil Cover with Targeted Groundwater Chemical Oxidation

Present Worth: *$12,200,000*
Capital Cost: *$11,200,000*
Annual Costs:
(Years 1-30): *$68,000*

This combination alternative would include targeted soil excavation and off-Site disposal (areas shown in Figure 5), installation of covers over Areas A and C and targeted in-situ chemical oxidation treatment in overburden and bedrock groundwater Hot Spots A, C and D. A site-wide groundwater monitoring program would be implemented.

A total of approximately 3,000 cubic yards of soil would be excavated. The Area A soil excavation would be approximately 11,000 square feet in area and two feet in depth. This was determined during the FS to represent the removal of approximately 80% of the mass of VOC contamination in Area A. The Area C soil excavation is estimated to be approximately 27,300 square feet in area and target the four to six foot depth interval. This was determined during the FS to represent the removal of approximately 90% of the mass of VOC contamination in Area C. The precise area and depth of the targeted excavations would be better defined during the design of the remedy.

The Area A cover would consist of a clean soil cover with a demarcation layer in vegetated areas and asphalt paving in parking lot/driveway areas. A clean soil cover with a demarcation layer would act as a cover for Area C.

In-situ chemical oxidation would be used to target the portion of groundwater that contains the highest concentration of contaminants (see Figure 9).

The installation of additional sub-slab soil vapor mitigation systems has not been deemed necessary at this time for the current use of the on-site buildings. However, the Site Management Plan would require a soil vapor intrusion evaluation if building use changes were proposed (e.g. - new office space in a basement, etc.). The periodic certification would certify that such an evaluation occurred if any building use changes were made.

The groundwater monitoring program would monitor the effectiveness of the remedy and track contaminant levels site-wide over time. This monitoring program assumes 5 overburden and 10 bedrock monitoring wells would be monitored.

Alternative #3A: Targeted Excavation and Soil Cover with Targeted Overburden Groundwater Chemical Oxidation

Present Worth:	*$3.4M*
Capital Cost:	*$2.9M*
Annual Costs: (Years 1-30):	*$30,000*

This combination alternative would include targeted soil excavation and off-Site disposal (areas shown in Figure 5), installation of covers over Areas A and C and targeted in-situ chemical oxidation treatment in overburden groundwater in Hot Spots C and D. A site-wide groundwater monitoring program would be implemented. Furthermore, the existing asphalt cover over Area C and the existing soil cover over Area D would be maintained.

A total of approximately 3,000 cubic yards of soil would be excavated. The Area A soil excavation would be approximately 11,000 square feet in area and two feet in depth. This was determined during the FS to represent the removal of approximately 80% of the mass of VOC contamination in Area A. The Area C soil excavation is estimated to be approximately 27,300 square feet in area and target the four to six foot depth interval. This was determined during the FS to represent the removal of approximately 90% of the mass of VOC contamination in Area C. The precise area and depth of the targeted excavations would be better defined during the design of the remedy.

The Area A cover would consist of a clean soil cover with a demarcation layer in vegetated areas and asphalt paving in parking lot/driveway areas. A clean soil cover with a demarcation layer would act as a cover for Area C.

In-situ chemical oxidation would be used to target the portions of overburden groundwater in Areas C & D that contain the highest concentration of contaminants (see Figure 9). The in-situ chemical oxidation costs in Alternative 3A are based on an average of similar treatments at other Department sites.

The groundwater monitoring program would monitor the effectiveness of the remedy and track contaminant levels site-wide over time. This monitoring program assumes 5 overburden and 10 bedrock monitoring wells would be monitored.

The installation of additional sub-slab soil vapor mitigation systems has not been deemed necessary at this time for the current use of the on-site buildings. However, the Site Management Plan would require a soil vapor intrusion evaluation if building use changes were proposed (e.g. - new office space in a basement, etc.). The periodic certification would certify that such an evaluation occurred if any building use changes were made.

Alternative #4: (FS Remedial Combination 4) Targeted Excavation and Soil Cover with In-Well Air Stripping

Present Worth:	*$5,700,000*
Capital Cost:	*$4,000,000*
Annual Costs:	

(Years 1-30): *$117,000*

This combination alternative would include targeted soil excavation and off-Site disposal (areas shown in Figure 5), installation of covers over Areas A and C, and groundwater treatment using in-well air stripping. A site-wide groundwater monitoring program would be implemented.

A total of approximately 3,000 cubic yards of soil would be excavated. The Area A soil excavation would be approximately 11,000 square feet in area and two feet in depth. This was determined during the FS to represent the removal of approximately 80% of the mass of VOC contamination in Area A. The Area C soil excavation is estimated to be approximately 27,300 square feet in area and target the four to six foot depth interval. This was determined during the FS to represent the removal of approximately 90% of the mass of VOC contamination in Area C. The precise area and depth of the targeted excavations would be better defined during the design of the remedy.

The Area A cover would consist of a clean soil cover with a demarcation layer in vegetated areas and asphalt paving in parking lot/driveway areas. A clean soil cover with a demarcation layer would act as a cover for Area C.

The in-well air stripping remediation would be designed to treat the groundwater in-situ (in place). The proposed treatment would consist of installing up to 97 wells in the overburden and shallow bedrock in Areas A and C (see Figure 9). This approach would target the portion of groundwater where the highest contaminant concentrations were identified.

The installation of additional sub-slab soil vapor mitigation systems has not been deemed necessary at this time for the current use of the on-site buildings. However, the Site Management Plan would require a soil vapor intrusion evaluation if building use changes were proposed (e.g. - new office space in a basement, etc.). The periodic certification would certify that such an evaluation occurred if any building use changes were made.

The groundwater monitoring program would monitor the effectiveness of the remedy and track contaminant levels site-wide over time. This monitoring program assumes 5 overburden and 10 bedrock monitoring wells would be monitored.

Alternative #5: (FS Remedial Combination 5) Targeted Excavation and Soil Cover with Targeted Groundwater Chemical Oxidation followed by Bioaugmentation/Enhancement

Present Worth: *$12,700,000*
Capital Cost: *$11,700,000*
Annual Costs:
(Years 1-30): *$68,000*

This combination alternative would include targeted soil excavation and off-Site disposal (areas shown in Figure 5), installation of covers over Areas A and C, and targeted in-situ chemical oxidation treatment in groundwater Hot Spots A, C and D, followed by bioaugmentation / enhancement "polishing" once groundwater contaminant levels are sufficiently reduced though chemical oxidation. A site-wide groundwater monitoring program would be implemented.

A total of approximately 3,000 cubic yards of soil would be excavated. The Area A soil excavation would be approximately 11,000 square feet in area and two feet in depth. This was determined during the FS to represent the removal of approximately 80% of the mass of VOC contamination in Area A. The Area C soil excavation is estimated to be approximately 27,300 square feet in area and target the four to six foot depth interval. This was determined during the FS to represent the removal of approximately 90% of the mass of VOC contamination in Area C. The precise area and depth of the targeted excavations would be better defined during the design of the remedy.

The Area A cover would consist of a clean soil cover with a demarcation layer in vegetated areas and asphalt paving in parking lot/driveway areas. A clean soil cover with a demarcation layer would act as a cover for Area C.

In-situ chemical oxidation would be used to target the portion of groundwater that contains the highest concentration of contaminants (see Figure 9). Bioaugmentation and/or nutrient enhancement would then be applied within the same footprint in order to enhance the bio-degradation of residual VOCs.

The installation of additional sub-slab soil vapor mitigation systems has not been deemed necessary at this time for the current use of the on-site buildings. However, the Site Management Plan would require a soil vapor intrusion evaluation if building use changes were proposed (e.g. - new office space in a basement, etc.). The periodic certification would certify that such an evaluation occurred if any building use changes were made.

The groundwater monitoring program would monitor the effectiveness of the remedy and track contaminant levels site-wide over time. This monitoring program assumes 5 overburden and 10 bedrock monitoring wells would be monitored.

7.2 Evaluation of Remedial Alternatives

The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375, which governs the remediation of inactive hazardous waste disposal sites in New York.

The first two evaluation criteria are termed "threshold criteria" and must be satisfied in order for an alternative to be considered for selection.

1. Protection of Human Health and the Environment. This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the Department has determined to be applicable on a case-specific basis.

The next five "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

3. Short-term Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

4. Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.

5. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

7. Cost-Effectiveness. Capital costs and annual operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision. The costs for each alternative are presented in Table 3.

This final criterion is considered a "modifying criterion" and is taken into account after evaluating those above. It is evaluated after public comments on the Proposed Remedial Action Plan have been received.

8. Community Acceptance - Concerns of the community regarding the RI/FS reports and the PRAP are evaluated. A responsiveness summary will be prepared that describes public comments received and the manner in which the Department will address the concerns raised. If the selected remedy differs significantly from the proposed remedy, notices to the public will be issued describing the differences and reasons for the changes.

SECTION 8: SUMMARY OF THE PROPOSED REMEDY

The Department is proposing Alternative #3A: targeted soil excavation, targeted groundwater treatment, soil/asphalt cover, and enhanced groundwater monitoring as the remedy for this site. The elements of this remedy are described at the end of this section.

The proposed remedy is based on the results of the RI and the evaluation of alternatives as outlined in Section 7.2 above.

Alternative 3A is being proposed because, as described below, it satisfies the threshold criteria and provides the best balance of the primary balancing criteria described in Section 7.2. It would achieve the remediation goals for the site by removing source area soils and also by remediating the groundwater contamination to the maximum extent technically feasible. This remedy would best create the conditions needed to restore groundwater quality to the extent practicable. Alternatives 3, 4, and 5 would also comply with the threshold selection criteria but to a lesser degree or with lower certainty due to concerns over technical practicability.

The No Action Alternative and Alternatives 1 and 2 would not satisfy the two threshold criteria. Since the groundwater in the source areas (hot spots) would not be addressed at all, compliance with SCGs for groundwater would not be obtained (threshold criteria #2). Further, installation of a phytoremediation system downgradient of these source areas, as proposed in Alternatives 1 and 2, has the potential to treat or contain only very shallow groundwater migration toward Oatka Creek. Deeper overburden and bedrock groundwater would not be significantly affected, possibly resulting in continued contaminant migration toward Oatka Creek (threshold criteria #1).

Although Alternative 3A would not directly remediate the bedrock groundwater at the site, it would remediate overburden groundwater to the extent technically feasible, and may have an impact on shallow bedrock contaminant levels in portions of the site.

Alternatives 3, 4, and 5 were designed to actively target the highest levels of overburden and bedrock groundwater contamination in the source areas. Alternative 3A was designed to actively target the highest levels of overburden groundwater contamination in source areas C & D. Given the size of the site, there would still be areas on-site with groundwater contamination that would not be directly addressed by these alternatives. These areas would need to be addressed by groundwater use restrictions and would require monitoring to ascertain the extent to which the remediation of the source areas improves the groundwater quality site-wide.

Because Alternatives 3, 3A, 4, and 5 satisfy the threshold criteria, the five balancing criteria are particularly important in selecting a final remedy for the site.

Alternatives 3, 3A, 4, and 5 have essentially the same short-term effectiveness and impacts. The targeted excavation and cover installation work is the same for each. Alternatives 3, 3A, 4, and 5 also have similar soil boring installation requirements, with Alternatives 3, 3A, and 5 requiring borings and Alternative 4 requiring specially designed wells. Alternative 3A would require fewer and shallower wells, resulting in marginally less short term impacts. Short-term effectiveness for meeting groundwater SCGs is poor for each alternative. Both in-situ chemical oxidation and in-well air stripping take time to effectively address high levels of groundwater contamination.

The long term effectiveness of Alternative 4 is questionable. There is a strong tendency at sites with low groundwater permeability (such as Lapp) for the in-well air stripping technology in Alternative 4 to create preferential pathways, limiting the effectiveness of the remediation. Only the groundwater in the immediate areas around the wells would be effectively addressed.

Alternatives 3 and 5 have similar long term effectiveness in that they would attempt to address the most significant groundwater contamination, with Alternative 5 adding bioremediation in an attempt to continue to address residual contamination after the in-situ chemical oxidation has been completed. However, the technical practicability, and hence the long-term effectiveness, of the bedrock groundwater remediation portions of Alternatives 3 and 5 is questionable. It has been the Department's experience that in-situ chemical oxidation of bedrock at sites with similar conditions to Lapp is not effective. The main problem with in-situ chemical oxidation in bedrock at these sites is the difficulty with adequately disbursing the chemical reagents throughout the bedrock fracture network. Additionally, there are concerns over whether there would be adequate residence time (the amount of time needed for the chemical reagent to be in direct contact with the contaminants). These same concerns (disbursing the reagents and residence time) also apply to the application of the follow-up bioremediation in Alternative 5.

The long term effectiveness of Alternative 3A would be slightly less than Alternatives 3 & 5. Also, no bioremediation would be attempted (as in Alternative 5). Further, no attempt would be made to address bedrock groundwater contamination due to technical impracticability. Alternative 3A would best address the long-term effectiveness by remediating the overburden groundwater to the extent feasible and monitoring bedrock groundwater.

Both in-situ chemical oxidation (Alternatives 3, 3A, and 5) and in-well air stripping (Alternative 4) are subject to "rebound" of contaminant levels after treatment. However, due to the potential for establishing preferential pathways (and missing areas of contamination) the in-well air stripping is particularly susceptible to rebound.

The implementability of Alternatives 3, 3A, 4, and 5 is similar. The excavation of soil, installation of covers, and drilling of borings are all common construction practices. Disruption to site manufacturing activities would also be similar, with Alternative 3A causing the least initial disruptions.

Alternatives 3, 3A, 4, and 5 would all reduce the volume of contaminated soil by excavation and off-site disposal. Of Alternatives 3, 3A, 4, and 5, Alternative 5, if successful, would best reduce the volume and mobility of both the most significantly contaminated groundwater and some remaining residual groundwater contamination in the source areas. However, as discussed above, the Department believes the remediation of the bedrock groundwater at this site to be technically impracticable. The Department also believes the in-well air stripping technology to be technically impracticable at this site.

The costs for Alternatives 3 and 5 would be similar at $12,200,000 to $12,700,000, respectively, with the additional cost for Alternative 5 consisting of the bioremediation of the residual contaminants. Alternative 4 would cost approximately $5,700,000, about half as much as Alternatives 3 and 5. Alternative 3A would cost approximately $3,400,000.

The estimated present worth cost to implement the proposed remedy is $3,400,000. The cost to construct the remedy is estimated to be $2,900,000 and the estimated average annual costs for 30 years is $30,000.

The elements of the proposed remedy are as follows:

1. A remedial design program would be implemented to provide the details necessary for the construction, operation, maintenance, and monitoring of the remedial program.

2. The targeted excavation and off-Site disposal of contaminated soil would occur in Areas A and C. The Area A soil excavation would be approximately 11,000 square feet in area and two feet in depth. The Area C soil contaminant mass would be approximately 27,300 square feet in area and target the four to six foot depth interval. Based on RI data, much of the Area C soil above four feet could be stockpiled on-Site and then placed back in the excavation upon removal of the four to six foot interval. The area and depth of soil to be excavated would be confirmed during the design of the remedy. Clean soil would be brought on-Site to balance the excavation of the affected areas. Additional work associated with excavation in Area C would include removal and disposal of the concrete pad. The soils from the hot spots would be characterized prior to delivery to an off-Site landfill.

3. Installation of a soil or asphalt cover would occur in Areas A and C. The Area A soil barrier would be approximately 11,000 square feet in area. The Area C soil and asphalt barrier would be approximately 27,300 square feet in area. The soil cover constructed over Areas A and C to prevent exposure to residually contaminated soils would be one-foot thick and would consist of clean soil underlain by an indicator, such as orange plastic snow fence, to demarcate the cover soil from the subsurface soil. The top six inches of soil would be of sufficient quality to support vegetation. Clean soil would constitute soil that meets the Division of Environmental Remediation's criteria for backfill or local site background. Non-vegetated Area A areas (roadways, parking lots, etc.) would be covered by eight inches of stone, four inches of base, three inches of binder, and 1.5 inches of topcoat. The existing asphalt cover over Area C and the existing soil cover over Area D would be maintained.

4. An in-situ chemical oxidation system would be installed and implemented in Area C & D overburden groundwater. A more detailed design would be generated during the design phase.

5. Additional overburden and shallow bedrock groundwater monitoring wells would be installed. Specific quantities and locations would be evaluated during the remedy design.

6. A monitoring program would be implemented to track the groundwater conditions after the in-situ chemical oxidation in the overburden is complete.

7. Imposition of an institutional control in the form of an environmental easement that would require (a) limiting the use and development of the property to industrial use; (b) compliance with the approved site management plan; (c) restricting the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by NYSDOH; and (d) the property owner to complete and submit to the Department a periodic certification of institutional and engineering controls.

8. Development of a site management plan which would include the following institutional and engineering controls: (a) management of the final cover system to restrict excavation below the soil

cover's demarcation layer or pavement. (b) development and implementation of a site-specific health and safety plan to ensure that future excavated soil would be tested, properly handled to protect the health and safety of workers and the nearby community, and would be properly managed in a manner acceptable to the Department; (c) continued evaluation of the potential for vapor intrusion for any new buildings built on the site or change of use of existing buildings, and would include provisions for mitigation of any impacts identified; (d) monitoring of groundwater; (e) identification of any use restrictions on the site; and, (f) provisions for the continued proper operation and maintenance of the components of the remedy.

9. The property owner would provide a periodic certification of institutional and engineering controls, prepared and submitted by a professional engineer or such other expert acceptable to the Department, until the Department notifies the property owner in writing that this certification is no longer needed. This submittal would: (a) contain certification that the institutional controls and engineering controls put in place are still in place and are either unchanged from the previous certification or are compliant with Department-approved modifications; (b) allow the Department access to the site; (c) certify that any new buildings or existing buildings with use changes had soil vapor intrusion evaluations performed and, if necessary, mitigation systems installed; and (d) state that nothing has occurred that would impair the ability of the control to protect public health or the environment, or constitute a violation or failure to comply with the site management plan unless otherwise approved by the Department.

10. The operation of the components of the remedy would continue until the remedial objectives have been achieved, or until the Department determines that continued operation is technically impracticable or not feasible.

Since the remedy results in untreated hazardous waste remaining at the site, a long-term monitoring program would be instituted. Additional overburden and shallow bedrock groundwater monitoring wells would be installed. Specific locations would be further evaluated during the remedy design. This program would allow the effectiveness of the soil removal and in-situ chemical oxidation to be monitored and would be a component of the long-term management for the site.

TABLE 1
Nature and Extent of Contamination
(October 2001 Sampling Dates)

SURFACE SOIL

Surface Soil	Contaminants of Concern	Concentration Range Detected (ppm)[a]	SCG[b] (ppm)[a]	Frequency of Exceeding SCG
Volatile Organic Compounds (VOCs)	1,1,1-Trichloroethane	0.009-100	0.68	3 of 11
	1,1-Dichloroethane	0.002-6.7	0.27	3 of 11
	Cis-1,2-Dichloroethene	0.002-3.2	0.25	3 of 11
	Trichloroethene	0.002-23	0.47	6 of 11
	Xylene	0.003-0.26	0.26	4 of 11
Semivolatile Organic Compounds (SVOCs)	None above SCG			
PCB/Pesticides	PCBs (total)	0.15 - 1.4	0.1	4 of 8
Inorganic Compounds	Calcium	23,000-95,000	SB[d]	3 of 4
	Iron	23,000	SB[d]	1 of 4
	Lead	14-160	63	2 of 4
	Sodium	ND-250	SB[d]	1 of 4
	Zinc	47-4,500	109	2 of 4
	Antimony	ND-0.6	DL[e]	1 of 4
	Cadmium	0.1-5.9	2.5	1 of 4
	Chromium	9.7-89	30	1 of 4
	Magnesium	4,300-10,000	SB[d]	1 of 4
	Thallium	ND-0.2	DL[e]	2 of 4

TABLE 1
Nature and Extent of Contamination (Continued)

SUBSURFACE SOIL

Subsurface Soil	Contaminants of Concern	Concentration Range Detected (ppm)[a]	SCG[b] (ppm)[a]	Frequency of Exceeding SCG
Volatile Organic Compounds (VOCs)	1,1,1-Trichloroethane	0.002-110	0.68	5 of 43
	1,1-Dichloroethane	0.25-2	0.27	4 of 43
	1,1-Dichloroethene	0.001-0.63	0.33	1 of 43
	Acetone	0.005-0.12	0.05	2 of 43
	Benzene	0.004-0.065	0.06	1 of 43
	Trichloroethene	0.001-45	0.47	8 of 43
	Xylene	0.001-0.7	0.26	3 of 43
Semivolatile Organic Compounds (SVOCs)	None above SCG			
PCB/Pesticides	4,4'-DDE	ND-0.016	0.0033	1 of 9
Inorganic Compounds	Antimony	ND-0.3	DL[e]	1 of 9
	Calcium	1,300-88,000	SB[d]	5 of 9
	Copper	9.7-65	50	1 of 9
	Lead	5-67	63	1 of 9
	Magnesium	1,000-17,000	SB[d]	5 of 9
	Thallium	0.2-0.4	DL[e]	5 of 9

TABLE 1
Nature and Extent of Contamination (Continued)

GROUNDWATER

Groundwater	Contaminants of Concern	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)[a]	Frequency of Exceeding SCG
OVERBURDEN GROUNDWATER				
Volatile Organic Compounds (VOCs)	Chloroethane	ND-22	5	2 of 12
	1,1-Dichloroethane	5-3,200	5	9 of 17
	1,2-Dichloroethane	ND-5	0.6	1 of 12
	1,1-Dichloroethene	72-690	5	8 of 17
	cis-1,2-Dichloroethene	6-35	5	6 of 12
	Trans-1,2-Dichloroethene	2-6	5	1 of 12
	Methylene Chloride	14-60	5	2 of 12
	1,1,1-Trichloroethane	23-49,000	5	10 of 17
	1,1,2-Trichloroethane	4-65	1	5 of 17
	Trichloroethene	2-76,000	5	10 of 17
	Vinyl Chloride	4-12	2	3 of 12
Semivolatile Organic Compounds (SVOCs)	None above SCG			
PCB/Pesticides	Aroclor	ND-0.15	0.09	1 of 3
Inorganic Compounds	Iron	110-14,000	300	2 of 3
	Magnesium	25,000-40,000	35,000	2 of 3
	Sodium	58,000-590,000	20,000	3 of 3
	Antimony	3-6	3	1 of 3
	Manganese	86-1,000	300	1 of 3

TABLE 1
Nature and Extent of Contamination (Continued)

Groundwater	Contaminants of Concern	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)[a]	Frequency of Exceeding SCG
SHALLOW BEDROCK GROUNDWATER				
Volatile Organic Compounds (VOCs)	Acetone	8-3,900	50	1 of 14
	Benzene	ND-18	1	1 of 14
	Chloroethane	18-36	5	2 of 14
	1,1-Dichloroethane	29-30,000	5	8 of 14
	1,1-Dichloroethene	15-1,000	5	5 of 14
	cis-1,2-Dichloroethene	33-1,900	5	7 of 14
	Trans-1,2-Dichloroethene	2-100	5	2 of 14
	Tetrachloroethane	4-6	5	1 of 14
	Toluene	4-15	5	1 of 14
	1,1,1-Trichloroethane	410-120,000	5	6 of 14
	1,1,2-Trichloroethane	ND-2	1	1 of 14
	Trichloroethene	15-37,000	5	8 of 14
	Vinyl Chloride	7-14	2	3 of 14
	m&p-Xylene	1-13	5	1 of 14
	o-Xylene	2-5	5	1 of 14
Semivolatile Organic Compounds (SVOCs)	None above SCG			
PCB/Pesticides	None above SCG			
Inorganic Compounds	Iron	2,500-6,800	300	3 of 3
	Magnesium	47,000-77,000	35,000	3 of 3
	Sodium	22,000-160,000	20,000	3 of 3

TABLE 1
Nature and Extent of Contamination (Continued)

Groundwater	Contaminants of Concern	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)[a]	Frequency of Exceeding SCG
INTERMEDIATE BEDROCK GROUNDWATER				
Volatile Organic Compounds (VOCs)	Acetone	9-52	50	1 of 8
	Benzene	9-17	1	5 of 8
	Chloroethane	ND-5	5	2 of 8
	1,1-Dichloroethane	56-190	5	4 of 8
	cis-1,2-Dichloroethene	2-47	5	2 of 8
	Ethylbenzene	4-13	5	2 of 8
	Toluene	2-7	5	2 of 8
	1,1,1-Trichloroethane	13-77	5	4 of 8
	Trichloroethene	3-110	5	2 of 8
	Vinyl Chloride	ND-5	2	1 of 8
	m&p-Xylene	3-13	5	4 of 8
Semivolatile Organic Compounds (SVOCs)	None above SCG			
PCB/Pesticides	None above SCG			
Inorganic Compounds	Iron	680-1,500	300	2 of 2
	Magnesium	47,000-120,000	35,000	2 of 2
	Sodium	90,000-300,000	20,000	2 of 2
	Barium	ND-1,100	1,000	1 of 2

TABLE 1
Nature and Extent of Contamination (Continued)

Groundwater	Contaminants of Concern	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)[a]	Frequency of Exceeding SCG
DEEP BEDROCK GROUNDWATER				
Volatile Organic Compounds (VOCs)	Acetone	11-300	50	3 of 4
	Benzene	17-63	5	4 of 4
	2-Butanone	6-51	50	1 of 4
	Chloroethane	ND-29	5	1 of 4
	Chloroform	ND-11	7	1 of 4
	1,1-Dichloroethane	ND-24	5	1 of 4
	Ethylbenzene	7-29	5	4 of 4
	Toluene	7-100	5	4 of 4
	m&p-Xylene	27-130	5	4 of 4
	o-Xylene	4-46	5	3 of 4
Semivolatile Organic Compounds (SVOCs)	None above SCG			
PCB/Pesticides	None above SCG			
Inorganic Compounds	Iron	5,700	300	1 of 1
	Magnesium	320,000	35,000	1 of 1
	Sodium	3,900,000	20,000	1 of 1

TABLE 1
Nature and Extent of Contamination (Continued)

SURFACE WATER

Surface Water	Contaminants of Concern	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)[a]	Frequency of Exceeding SCG
Volatile Organic Compounds (VOCs)	None above SCG			
Semivolatile Organic Compounds (SVOCs)	None above SCG			
PCB/Pesticides	None above SCG			
Inorganic Compounds	Iron	34-1,200	300	6 of 12
	Aluminum	46-390	100	9 of 12

SEDIMENTS

SEDIMENTS	Contaminants of Concern	Concentration Range Detected (ppm)[a]	SCG[b] (ppm)[a]	Frequency of Exceeding SCG
Volatile Organic Compounds (VOCs)	Benzene	ND-0.009	0.006	1 of 10
Semivolatile Organic Compounds (SVOCs)	Acenaphthene	0.96-1.7	1.4	1 of 10
	Phenanthrene	0.053-13	1.2	2 of 10
	Fluoranthene	0.093-18	10.2	2 of 10
	Benzo(a)anthracene	0.11-7.8	0.013	4 of 10
	Chrysene	0.14-8.1	0.013	8 of 10
	Bis(2-ethylhexyl)phthalate	ND-4,500	1.995	1 of 10
	Benzo(b)fluorathene	0.14-6.7	0.013	8 of 10
	Benzo(k)fluorathene	0.066-4.1	0.013	3 of 10
	Benzo(a)pyrene	0.092-6.3	0.013	6 of 10
	Indeno(1,2,3-cd)pyrene	0.12-4.3	0.013	4 of 10
PCB/Pesticides	PCBs	0.07-0.28	0.000008	2 of 10

TABLE 1
Nature and Extent of Contamination (Continued)

SEDIMENTS (Continued)

Inorganic Compounds	Mercury	0.02-0.27	SEL[c] -1.3	0 of 10
			LEL -0.15	1 of 10
	Cadmium	0.1-0.92	SEL -9	0 of 10
			LEL -0.6	2 of 10
	Chromium	4-48.8	SEL -110	0 of 10
			LEL -26	1 of 10
	Silver	0.1-7.4	SEL -2.2	0 of 10
			LEL -1	6 of 10
	Copper	11.9-173	SEL -110	2 of 10
			LEL -16	8 of 10
	Lead	7.3-210	SEL -110	0 of 10
			LEL -31	5 of 10
	Manganese	160-487	SEL - 1,100	0 of 10
			LEL -460	1 of 10
	Nickel	6.7-32.7	SEL -50	0 of 10
			LEL -16	9 of 10
	Zinc	28-286	SEL -270	1 of 10
			LEL -120	3 of 10

[a] ppb = parts per billion, which is equivalent to micrograms per liter, ug/L, in water;
ppm = parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;
ug/m^3 = micrograms per cubic meter

[b] SCG = standards, criteria, and guidance values (soil levels are compared to unrestricted use soil cleanup objectives from Part 375-6)

[c] LEL = Lowest Effects Level and SEL = Severe Effects Level. A sediment is considered to be contaminated if either of these criteria is exceeded. If both criteria are exceeded, the sediment is severely impacted. If only the LEL is exceeded, the impact is considered to be moderate.

[d] SB = Site Background. See Table 2 below.

[e] DL = Detection Limit - Antimony & Thallium levels were compared to detection limits since neither was detected in background samples

ND = Not Detected

Table 2
Background Sampling Results

Sample Location	TAGM 4046	Eastern USA Background	Part 375 un-restricted	BKGRND-1	BKGRND-2	BKGRND-2 Duplicate	BKGRND-3
Depth (feet)				0-2	0-2	0-2	0-2
Date				10/19/01	10/19/01	10/19/01	10/19/01
VOCs (mg/kg)							
Toluene	1.5	-	0.7	0.002 J	0.003	0.001 J	0.012
Benzene	6	-	0.06				0.003
Ethylbenzene	5.5	-	1				0.001
m&p-Xylene	1.2	-	0.26				0.007
o-xylene	1.2	-	0.26				0.002 J
SVOCs (mg/kg)							
Carbazole	-	-	-				0.18 J
2-Methylnaphthalene	36.4	-	-				0.035 J
Dibenzofuran	6.2	-	-				0.048 J
1,2,4-Trichlorobenzene	-	-	-	0.035			
Naphthalene	13	-	12				0.07 J
4-Chloro-3-Methylphenol	0.24	-	-	0.12 J			
Acenaphthylene	41	-	20				0.44 J
Fluorene	50	-	30				0.18 J
Diethylphthalate	7.1	-	-	0.09 J	0.096 J	0.024 J	0.068 J
Phenanthrene	50	-	100				3.2
Anthracene	50	-	100				0.3
Fluoranthene	50	-	100			0.033 J	6.1
Pyrene	50	-	100	0.25 J		0.22 J	4.1
Benzo(a)anthracene	0.224	-	1				3.1
Chrysene	0.4	-	1				4.1
Benzo(b)fluoranthene	1.1	-	1				5.2
Benzo(k)fluoranthene	1.1	-	0.8				1.9 J
Benzo(a)pyrene	0.061	-	1			0.17 J	1.2 J
Indeno(1,2,3-cd)pyrene	3.2	-	0.5			0.12 J	1.4 J
Dibenzo(a,h)anthracene	0.014	-	0.33				0.062 J
Benzo(ghi)perylene	50	-	100				0.075 J

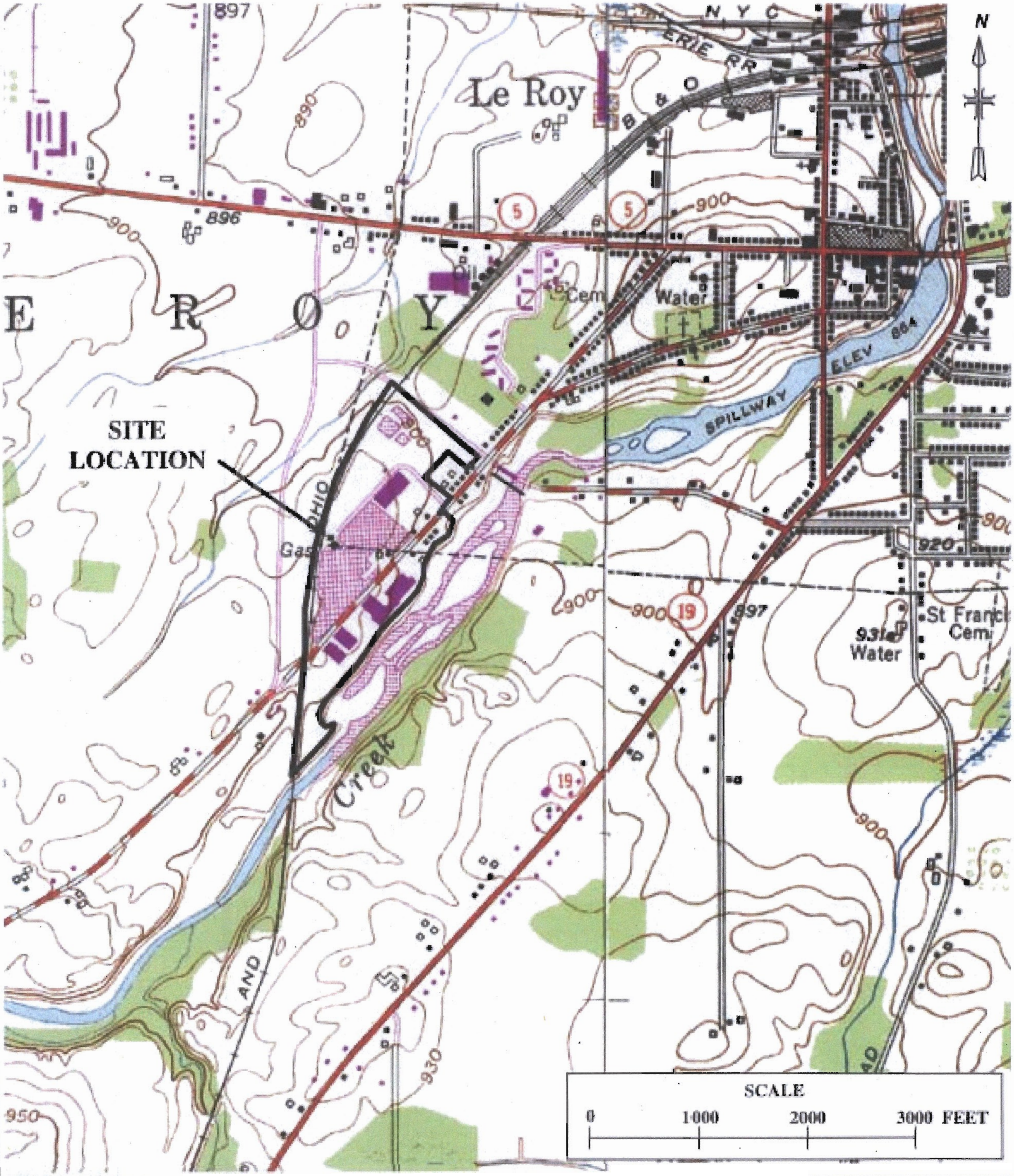
Table 2 (cont.)
Background Sampling Results

Pesticides / PCBs							
PCBs (total) - mg/kg	1	-	0.1				
Inorganics (mg/kg)							
Cyanide (total)	-	-	27				
Mercury	0.1	0.001 - 0.2	0.18				0.005 J
Calcium	SB	130 - 35,000	-	1,800 J	1,600 J	1,7000 J	21,000 J
Iron	2,000 or SB	2,000-550,000	-	4,400 J	11,000 J	12,000 J	15,000 J
Magnesium	SB	100 - 5,000	-	1,200 J	1,300 J	1,400 J	5,900 J
Potassium	SB	8,500 - 43,000	-	220 J	300 J	300 J	800 J
Sodium	SB	6,000 - 8,000	-				87 J
Aluminum	SB	33,000	-	3,800 J	6,400 J	6,200 J	7,100 J
Arsenic	7.5 or SB	3 - 12	13		1.8 J	1.8 J	3.5 J
Barium	300 or SB	15 - 600	350	43 J	40 J	40 J	47 J
Beryllium	0.16 or SB	0 - 1.75	7.2	0.2 J	0.3 J	0.3 J	0.4 J
Cadmium	1 or SB	0.1 - 1	2.5				0.2 J
Chromium	10 or SB	1.5 - 40	30-tri 1-hex	4.8 J	8.2 J	8 J	9.1 J
Cobalt	30 or SB	2.5 - 60	-	2.3 J	3.1 J	3.1 J	5.9 J
Copper	25 or SB	1 - 50	50	4.3 J	6.3 J	6.4 J	15 J
Lead	SB	4 - 500	63	5.4 J	8.6 J	8.6 J	23 J
Manganese	SB	50 - 5,000	1600	38 J	160 J	170 J	360 J
Nickel	13 or SB	0.5 - 25	30	6.8 J	6.9 J	6.8 J	13 J
Vanadium	150 or SB	1 - 300	-	6.0 J	13 J	13 J	13 J
Zinc	20 or SB	9 - 50	109	27 J	29 J	29 J	59 J

Table 3
Remedial Alternative Costs *

Remedial Alternative	Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
No Further Action - Groundwater Monitoring	$71,000	$22,000	$410,000
Alternative 1: Protective soil cover with downgradient phytoremediation	$770,000	$39,000	$1.4 M
Alternative 2: Targeted excavation and soil cover with downgradient phytoremediation	$2.3 M	$39,000	$2.9 M
Alternative 3: Targeted excavation and soil cover with targeted groundwater chemical oxidation	$11.2 M	$68,000	$12.2 M
Alternative 3A: Targeted excavation and soil cover with targeted overburden groundwater chemical oxidation	$2.9M	$30,000	$3.4M
Alternative 4: Targeted excavation and soil cover with in-well air stripping	$4.0 M	$117,000	$5.7 M
Alternative 5: Targeted excavation and soil cover with targeted groundwater chemical oxidation followed by bioaugmentation/enhancement	$11.7 M	$68,000	$12.7 M

* Alternative costs presented in this table are based on the Feasibility Study, March 2007. Additionally, in-situ chemical oxidation costs in Alternative 3A are based on an average of similar treatments at other Department sites.



MALCOLM PIRNIE

January 2007

Project No.: 2932-031

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FEASIBILITY STUDY

Figure 1
Site Location

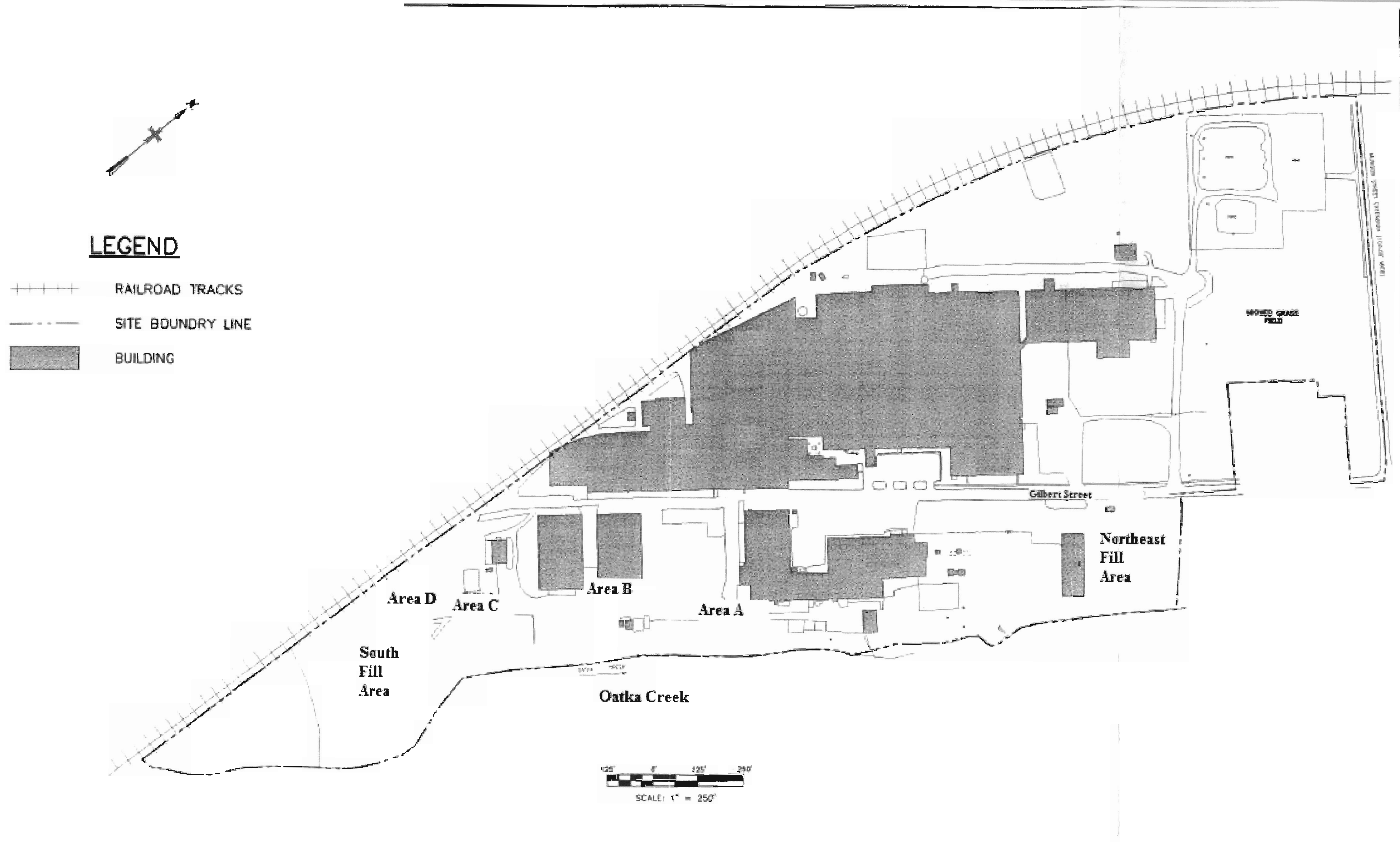

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Figure 2
Site Layout

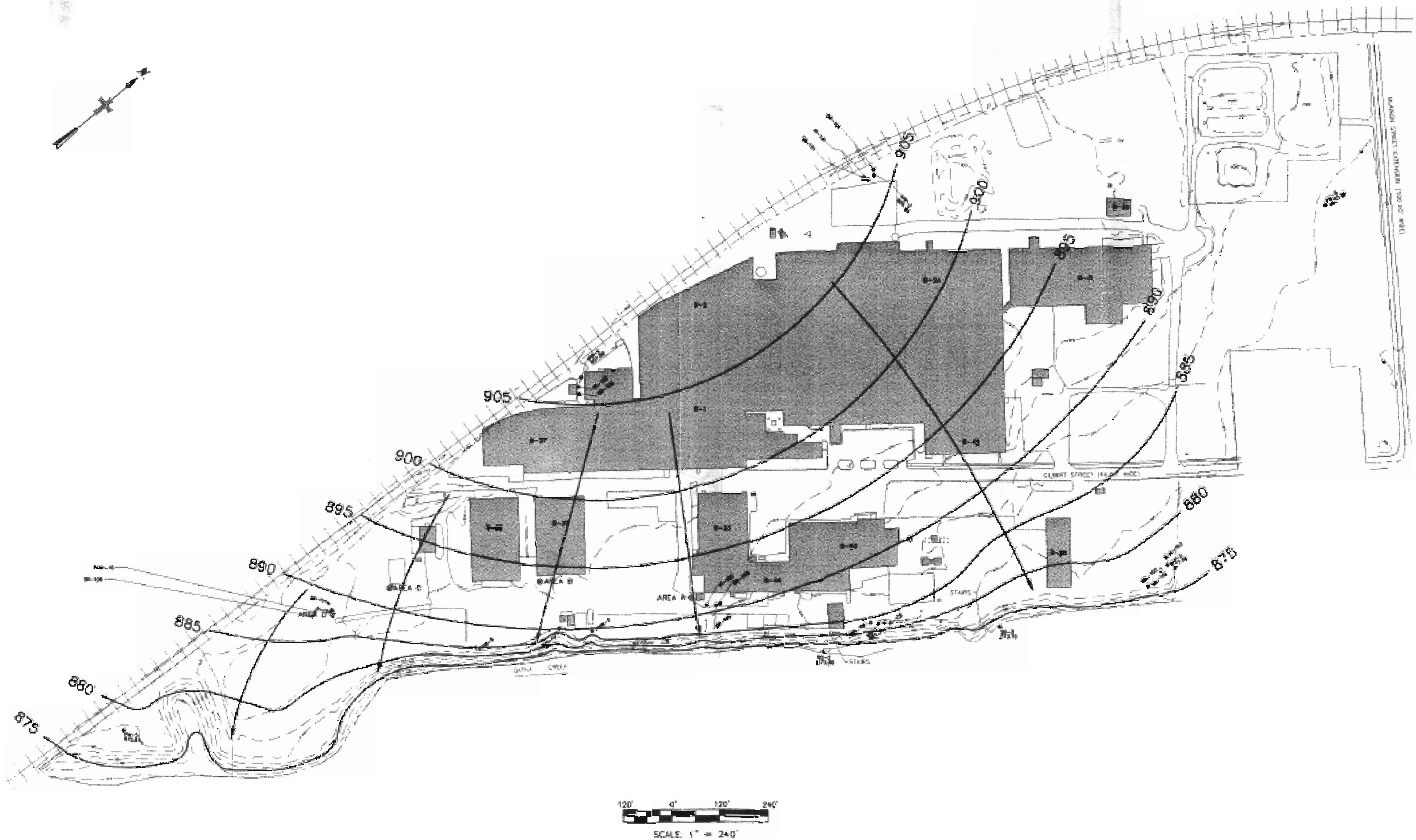

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FIGURE 3
OVERBURDEN (WATERTABLE) GROUNDWATER EQUIPOTENTIAL MAP
AUGUST 26, 2003

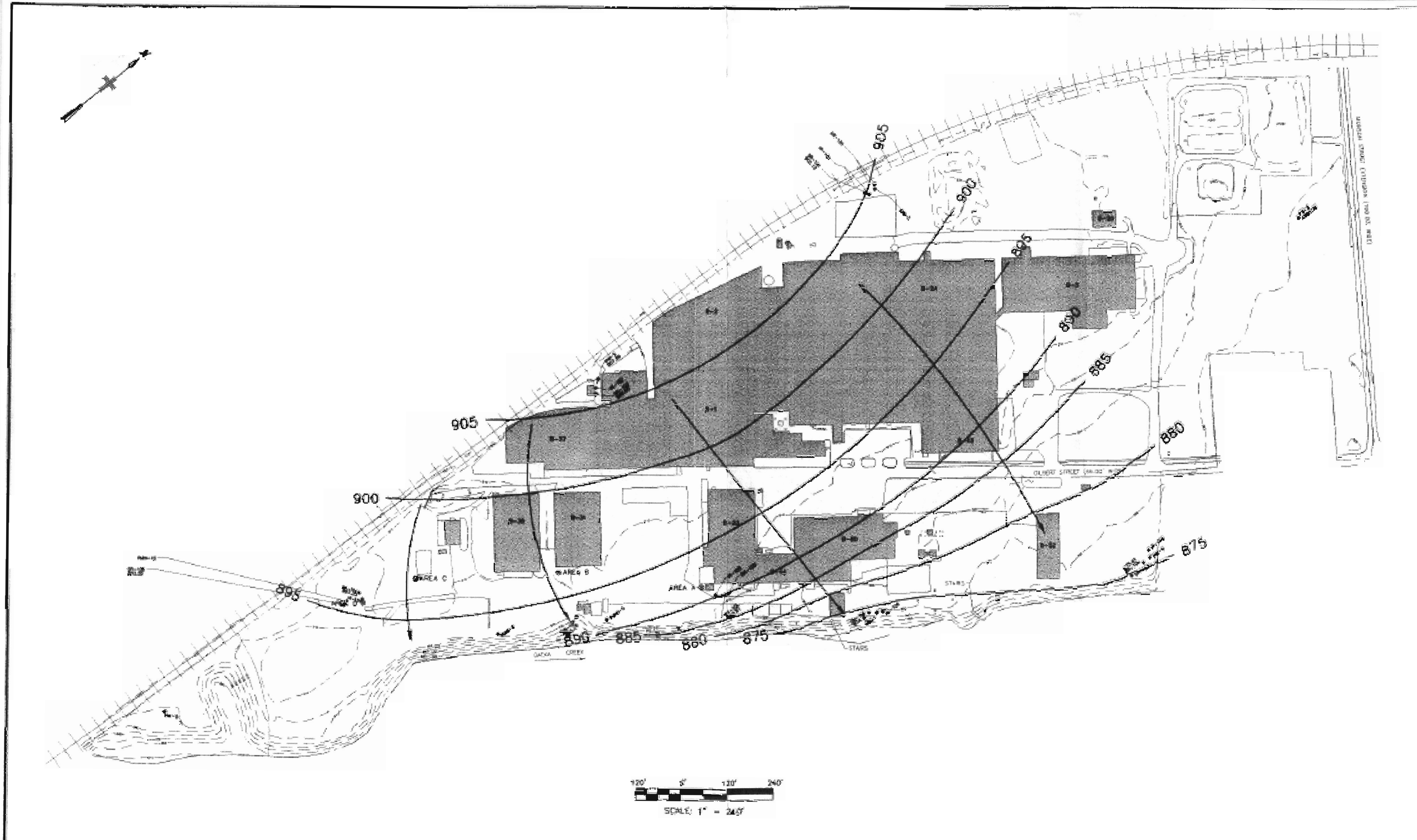

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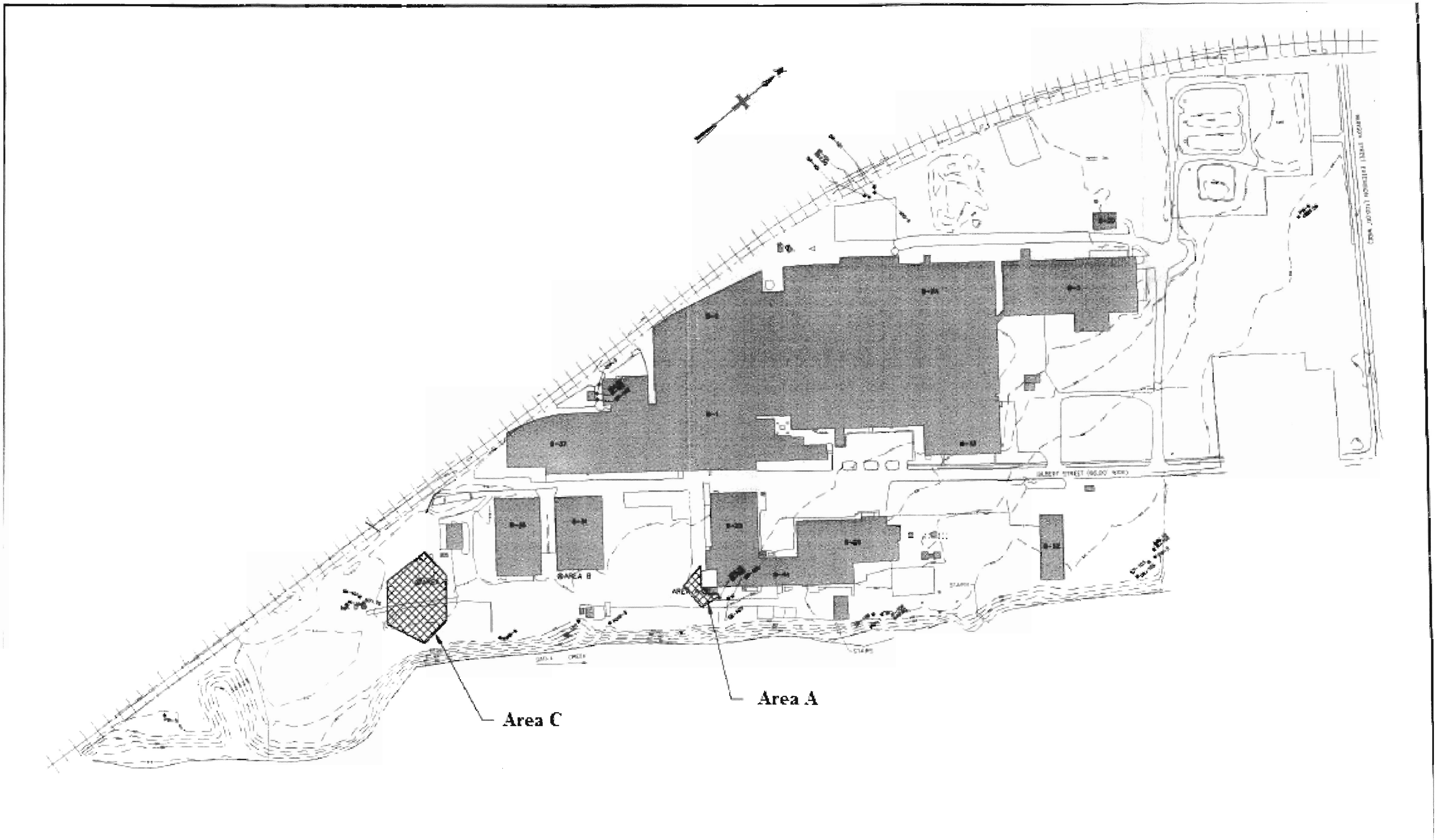
FIGURE 4
SHALLOW BEDROCK GROUNDWATER
EQUIPOTENTIAL MAP AUGUST 26, 2003



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120' 0' 120' 240'
SCALE: 1" = 240'

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Figure 5
VOC Impacted Subsurface Soil

Area A Data - Highest Groundwater Detections

Overburden GW - Dry

Shallow Bedrock: (17.5 - 28.2 feet below grade)

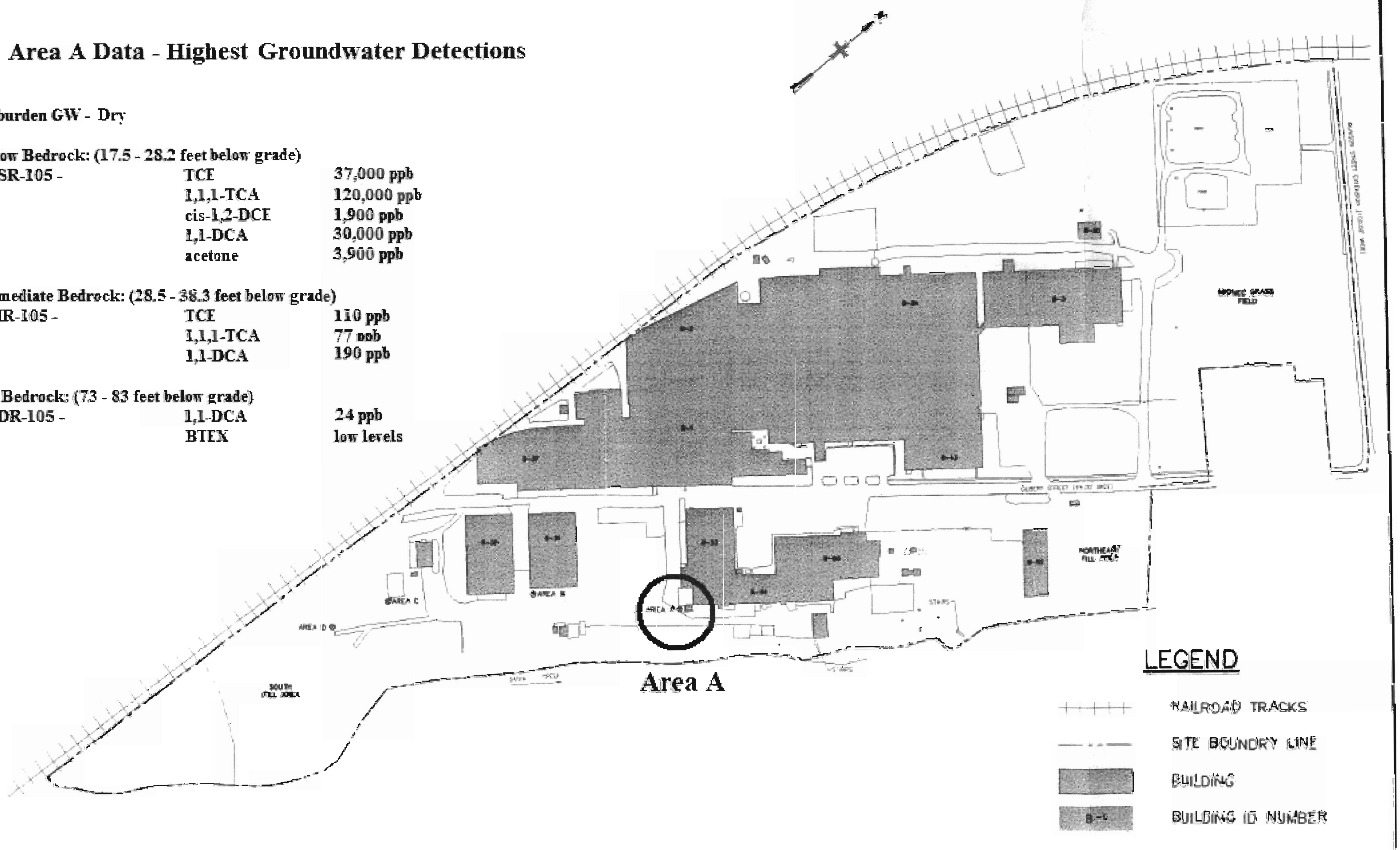
MW SR-105 -	**TCE**	**37,000 ppb**
	1,1,1-TCA	**120,000 ppb**
	cis-1,2-DCE	**1,900 ppb**
	1,1-DCA	**30,000 ppb**
	acetone	**3,900 ppb**

Intermediate Bedrock: (28.5 - 38.3 feet below grade)

MW IR-105 -	**TCE**	**110 ppb**
	1,1,1-TCA	**77 ppb**
	1,1-DCA	**190 ppb**

Deep Bedrock: (73 - 83 feet below grade)

MW DR-105 -	**1,1-DCA**	**24 ppb**
	BTEX	**low levels**



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SCALE: 1" = 250'

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Figure 6
Area A Groundwater Data

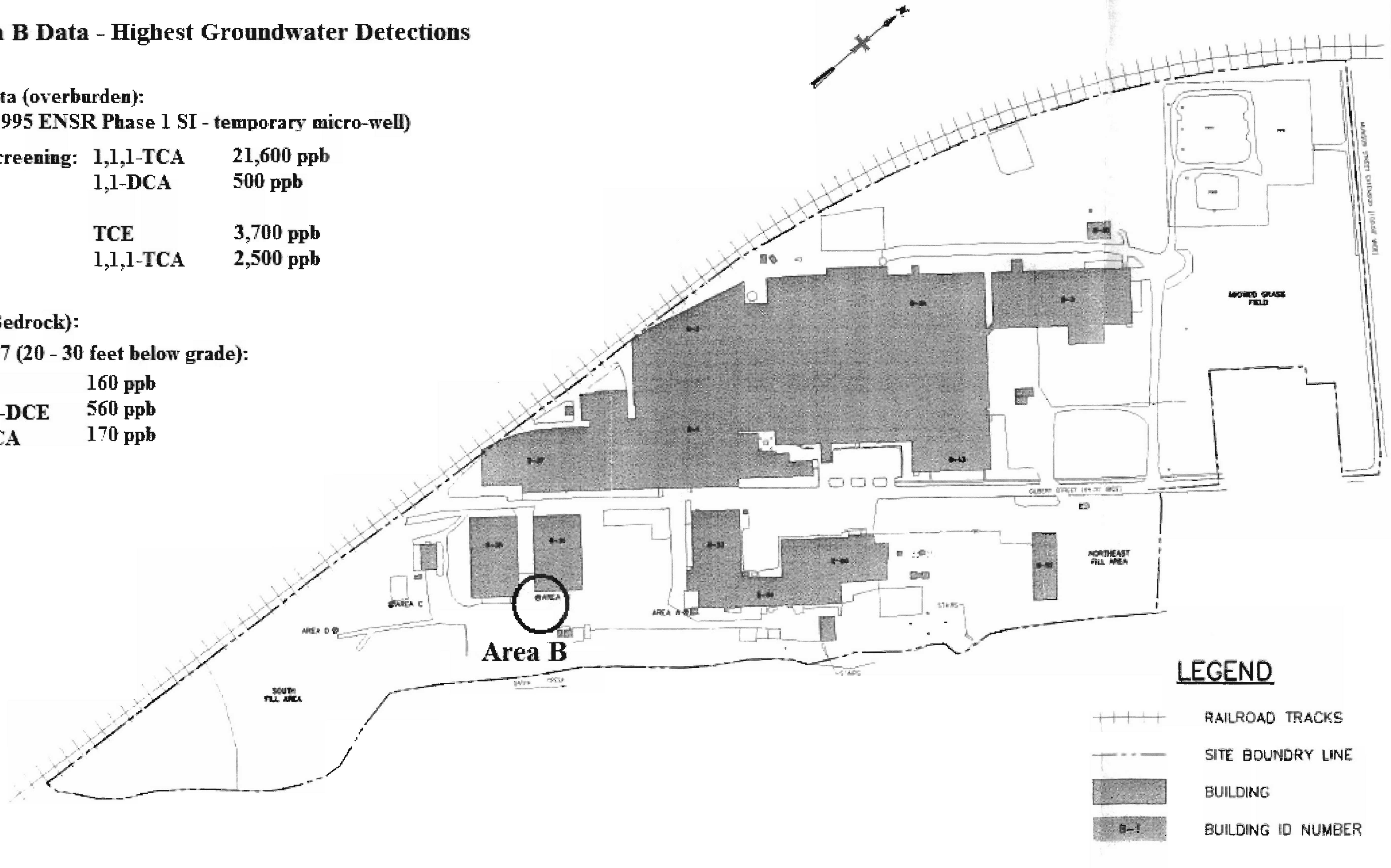
Area B Data - Highest Groundwater Detections

Historic Data (overburden):
PMW-12 (1995 ENSR Phase 1 SI - temporary micro-well)

Field Screening:	**1,1,1-TCA**	**21,600 ppb**
	1,1-DCA	**500 ppb**
Lab:	**TCE**	**3,700 ppb**
	1,1,1-TCA	**2,500 ppb**

RI Data (Bedrock):
MW SR-107 (20 - 30 feet below grade):

TCE	**160 ppb**
cis-1,2-DCE	**560 ppb**
1,1-DCA	**170 ppb**



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SCALE: 1" = 250'

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Figure 7
Area B Groundwater Data

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Areas C & D - Highest Groundwater Detections

- Overburden GW:

PMW-10I	**TCE**	**76,000 ppb**
	1,1,-DCE	**690 ppb**
	1,1,1-TCA	**49,000 ppb**
	1,1-DCA	**310**

- Shallow bedrock:

MW SR-104 (17 - 27 feet below grade):

	TCE	**12,000 ppb**
	cis-1,2-DCE	**57 ppb**
	1,1,1-TCA	**950 ppb**
	1,1-DCA	**410 ppb**

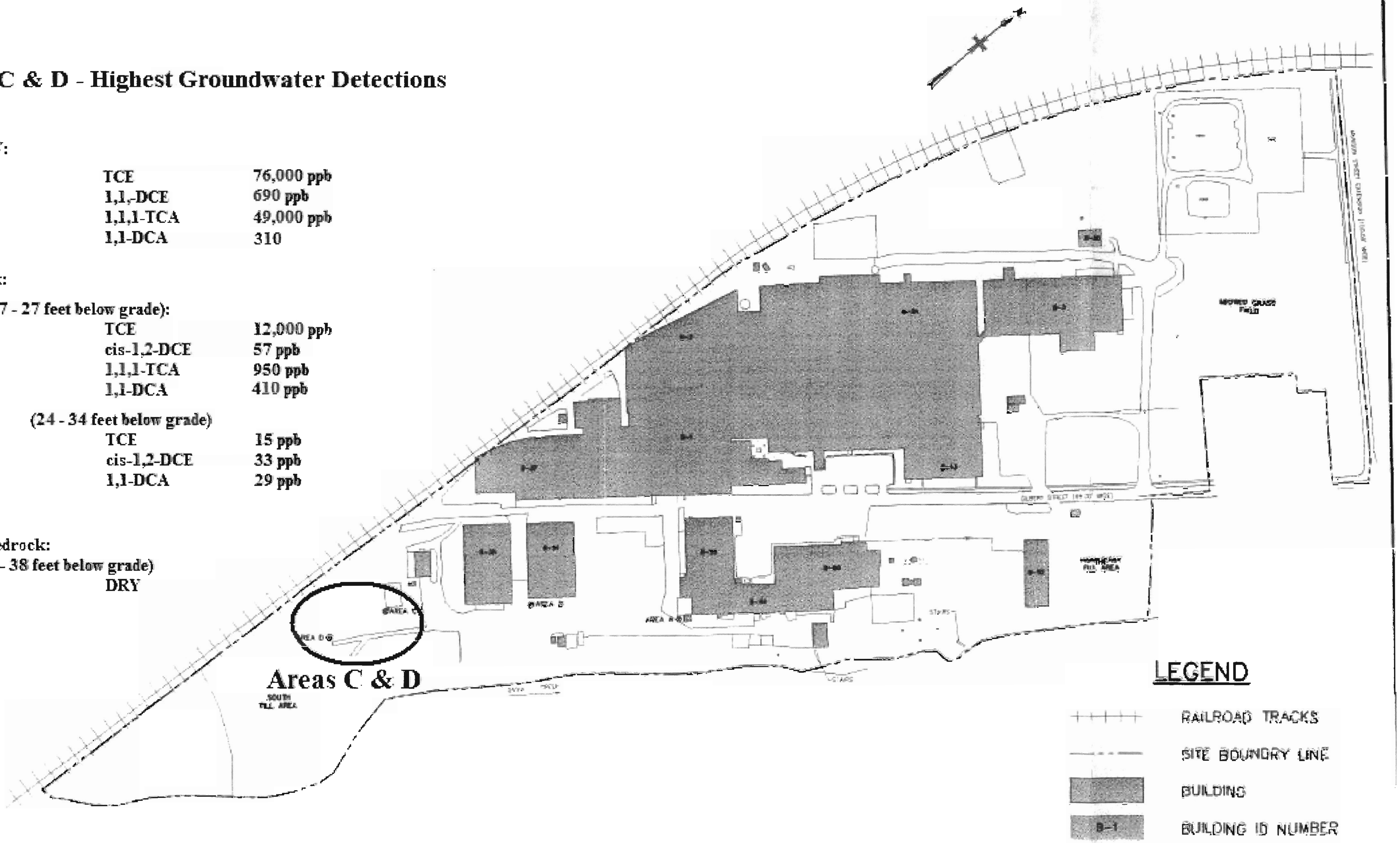
MW SR-108 (24 - 34 feet below grade)

	TCE	**15 ppb**
	cis-1,2-DCE	**33 ppb**
	1,1-DCA	**29 ppb**

- Intermediate bedrock:

MW IR-104 (28 - 38 feet below grade)

DRY



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SCALE: 1" = 250'

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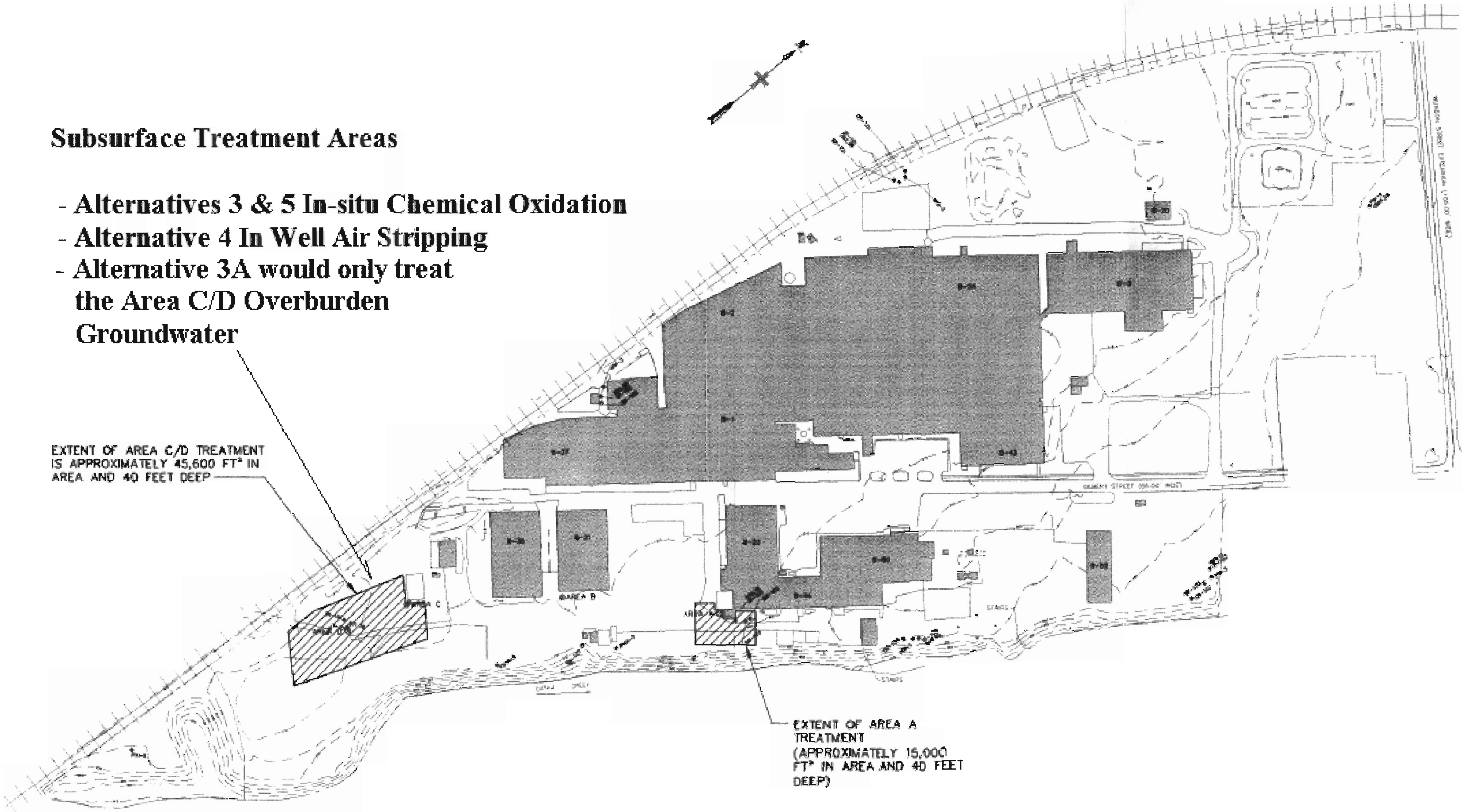
Figure 8
Areas C & D Groundwater Data



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120' 0' 120' 240'

SCALE: 1" = 240'

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Figure 9
Subsurface Treatment Areas